Asia-Pacific Human Development Network

E-Discussion on CLIMATE CHANGE AND HUMAN DEVELOPMENT

Human Development Report Unit
UNDP Asia-Pacific Regional Centre

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Introduction

Under UNDP's Regional Bureau for Asia and the Pacific, the Human Development Report Unit (HDRU) located at the UNDP Asia-Pacific Regional Centre leads the work on the flagship Asia-Pacific Human Development Report (APHDR) series. APHDRs are independent policy advocacy documents supported by UNDP as outcomes of multi -stakeholder participatory processes. The central mandate of HDRU is to produce Regional Human Development Reports for Asia-Pacific to support advocacy and capacity development on critical regional development concerns.

The HDRU is responsible for the Asia-Pacific Human Development Network (AP-HDNet), a knowledge network where knowledge and good practices on human development amongst a wide audience of development practitioners and other stakeholders are shared. The Network is an integral part of the process leading to the preparation of the APHDRs, as a broad cross-section of stakeholders engages in a lively, diverse and rich debate of relevance to the Report.

The Asia-Pacific Human Development Report

The Asia-Pacific Human Development Report (APHDR) deals with long-term development concerns that are important for several countries, have cross-border dimensions, and contain sensitivities that are better addressed at a regional rather than country level. The Report helps UNDP engage with larger external audiences on such issues.

Themes of the previous APHDRs are:

- *HIV/AIDS and Development in South Asia*
- *Promoting ICT for Human Development in Asia: Realizing the Millennium Development Goals*
- *Trade on Human Terms: Transforming Trade for Human Development in Asia and the Pacific*
- *Tackling Corruption, Transforming Lives: Accelerating Human Development in Asia and the Pacific*
- *Power, Voice and Rights: A Turning Point for Gender Equality in Asia and the Pacific*

The theme of the APHDR under preparation is **Climate Change**. Climate change is of long-term relevance, has inherent cross-border dimensions, has some politically sensitive aspects arising from win-loose perceptions in the short-run, and is critical for all countries, making it suitable for a multi-country report.

E-Discussion on Climate Change and Human Development

In 2010 the Asia-Pacific Human Development Network (AP-HDNet) discussion on climate change and human development was launched to explore how climate change would affect human development, with a focus on how to improve the quality of human life in the changing climate. The discussion aimed to:

- Engage its subscribers in focused discussions on issues linked to the contours of the APHDR under preparation
- Strengthen capacity through sharing ideas, examples, experiences and good practices around the theme of the APHDR
- Provide a platform for generating and sharing knowledge, including data, research, priorities, views, ideas as part of the bundle of raw material used for the preparation of the APHDR

The e-discussion started on 4 February 2010 and ended on 30 July 2010. Due to the complexity and diversity of the issues involved, the e-discussion was divided into several sub-themes. In addition to the seven sub-themes initially announced, a sub-theme focusing on folklore and traditional knowledge was also discussed. The discussion was facilitated by Pak Sum Low and Bernarditas Muller, with the exception of the last sub-theme for which the discussion was facilitated by the HDRU Team.

We would like to acknowledge with gratitude all the contributors who shared their knowledge and experience. Without them this exercise would not have been possible. We are indebted to Pak Sum Low and Bernarditas Muller who facilitated the discussion on the first seven sub-themes and prepared the synthesis of the discussion they facilitated. Our thanks are due also to the Members of the KRC at UNDP Asia-Pacific Regional Centre for supporting this publication. Last but not least, Elena Borsatti, Ramesh Gampat, Rohini Kohli, Anuradha Rajivan, Susan Wong, all of the HDRU, must be acknowledged for supporting the discussion.

Synthesis

1. Introduction

Climate change affects every aspect of human development-from poverty reduction; ecosystem management; sustainable livelihoods; water, food, energy and human security; disaster risk reduction; crisis prevention and recovery; human health; to governance, rule of law, social equity and justice (especially relevant for the poor, women and other disadvantaged groups in terms of sharing the benefits of natural resources).

Thus, it was timely for the Asia-Pacific Human Development Network (AP-HDNet) of UNDP to initiate the e-discussion on *Climate Change and Human Development* that aimed to explore how climate change would affect human development, and their complex interactions, with a focus on how to improve the quality of human life in the changing climate.

The e-discussion started on 4 February 2010 when the Opening Message was posted, and ended on 30 July 2010 when the Closing Statement of the final sub-theme was posted. Due to the complexity and diversity of the issues involved, the e-discussion was divided into eight sub-themes, as follows:

1. *Vision of a Climate-Resilient Society* (8 February-7 March 2010) (facilitated by Pak Sum Low)

2. *Mapping and Measuring* (8-22 March 2010) (facilitated by Pak Sum Low)

3. *Adaptation (including technology and financing) and Climate-Related Disaster Risk Reduction* (22 March-18 April 2010) (facilitated by Bernarditas Muller)

4. *Human Security (including food and nutrition, and energy security) and Human Rights* (19 April-3 May 2010) (facilitated by Pak Sum Low)

5. *Mitigation, Technology Transfer and Financing* (3-24 May 2010) (facilitated by Bernarditas Muller)

6. *Research, Education, Training and Public Awareness* (24 May-14 June 2010) (facilitated by Pak Sum Low)

7. *Global Negotiations from Copenhagen to Mexico: Implications for Future Generations* (14 June-6 July 2010) (facilitated by Bernarditas Muller)

8. *Folklore, Traditional Knowledge, Idiomatic Expressions, Proverbs and Quotes* (8-30 July 2010) (facilitated by the HDRU Team)

The above sub-themes were interlinked. The dates and duration of discussion for each sub-theme were indicated above. The duration of discussion for respective sub-themes varied from two to four weeks, but mostly lasted for three weeks.

We have received extensive responses from the Network Members. Indeed, many have joined the Network as new members because of the e-discussion. Nearly 100 contributions have been posted, excluding the Facilitators' opening and closing statements for each sub-theme. Most contributions were submitted from the Asia-Pacific region, though a few contributions were submitted from other regions, including one from Seychelles. We would like to thank all contributors for their perceptive, useful and important contributions that have touched upon a rich and diverse range of important issues relating to all sub-themes.

This synthesis report is largely based on the summaries provided in the closing statements of the above seven sub-themes. It aims to provide a quick review of all discussions undertaken in each sub-theme.

2. Summary of Discussions of Sub-theme 1

The discussion of sub-theme 1 on the Vision of a Climate-Resilient Society has attracted 22 contributions from **Bernarditas Muller; Pradeep Sharma; Peter Neil; Mukul Sanwal; Raj Kumar; Angus Mackay; Chew-Hung Chang; Koos Neefjes; Hasna Cheema; Amelia Supetran; Ramesh Gampat; Ernesto Bautista; Itzá Castañeda; Ramachandran Ramasamy; Andrea De Angelis and Gørild Heggelund (joint contribution); Sarwat Chowdhury; Moisés Herrezuelo López; Amitava Mukherjee; Kishan Khoday and Usha Natarajan (joint contribution); Mai Van Trinh; and Aminul Islam,** respectively.

Much of the discussion was focused on what is meant by a "climate-resilient society", or what makes a society "climate -resilient".

To facilitate the discussion, the Facilitator in the Opening Statement highlighted the following definition of **"resilient"** provided in the Oxford English dictionary:

"**adjective: 1** able to recoil or spring back into shape after bending, stretching, or being compressed. **2** (of a person) able to withstand or recover quickly from difficult conditions."

Thus, part 1 of this definition refers to the **physical system**, while part 2 refers to the **human system**.

Based on part 2 of the definition, a "**climate-resilient**" society could mean a society that is "**able to withstand or recover quickly from difficult conditions**" caused by the adverse effects of climate change, including climate-related hazards and disasters.

However, the Facilitator also pointed out that the ability "**to withstand or recover quickly from difficult conditions**" caused by the adverse effects of climate change over short or longer term depends on many factors, especially on the vulnerability of a society to these adverse effects. The vulnerability of a society to climate-related hazards (natural or human-induced) is a function of duration of exposure, as well as **environmental (including natural ecosystems that provide the environmental services), social, economic, technological and political (including policy) factors.** Thus, the strengthening of coping or adaptive capacity is crucial to ensuring a climate-resilient society or a society with reduced risk to the adverse effects of climate change.

The above definition was further reinforced, strengthened and enriched by the contributors. All stressed the linkage of climate resilience to adaptation, including nature-based responses and the ecosystem-based adaptation to climate change **(Peter Neil)**; while some also highlighted the importance of sustainable development **(Bernarditas Muller; Pradeep Sharma; Raj Kumar; Amelia Supetran; Andrea De Angelis and Gørild Heggelund; Mai Van Trinh)**, including sustainable human development (**Amelia Supetran**); poverty reduction (**Raj Kumar; Amitava Mukherjee**); limit to population growth (**Amitava Mukherjee**); "new opportunities and skills to extend livelihood options" for "the poor and vulnerable" and "specific policies" to help them (**Angus Mackay**); changing consumption patterns to maximize the use of natural resources (**Mukul Sanwal**); "a drastic change in lifestyle" to reduce our carbon footprint (**Sarwat Chowdhury**); "reducing underlying vulnerabilities" and the integration of "risk management and risk reduction strategies" in development planning (**Pradeep Sharma**); adaptation strategies that include disaster preparedness, monitoring, early warning, and information dissemination (**Chew-Hung Chang**); "behavioural change to improve preparation for natural disasters; better information sharing for livelihood diversification, learning and (business) innovation; (agricultural) research and development (R&D); as well as major infrastructure development" (**Koos Neefjes**); "integrated disaster/climate-resilient habitat" that incorporates both "disaster risk reduction" and "livelihood protection" (**Aminul Islam**); capacity development and enhancement at all levels (**Andrea De Angelis and Gørild Heggelund; Koos Neefjes; Mai Van Trinh)**, including skills development in "emerging green businesses", alternative "land-use options", and "improving education standards" for "the next generation" (**Angus Mackay**), and "the self-capacity of the communities" for "adaptation (or preparedness)" as "an integral part of human development" (**Andrea De Angelis and Gørild Heggelund**); social dimension (**Andrea De Angelis and Gørild Heggelund; Amelia Supetran**), including "tools and instruments" that can be provided through (a) economic growth; (b) social protection policies; and (c) balanced (especially from the local and national perspectives) systems of governance (**Andrea De Angelis and Gørild Heggelund**); "policy frameworks tailored to social value creation" (**Mukul Sanwal**); good governance (**Raj Kumar; Ramachandran Ramasamy**); gender empowerment and equality (**Raj Kumar;**

Koos Neefjes); "gender and human-centred approach to development that includes environmental sustainability" (**Itzá Castañeda**); generating knowledge (**Amelia Supetran**), including "traditional knowledge" on adaptation based on good farming practices and experience in various climatic conditions (**Mai Van Trinh**); technology (**Ernesto Bautista**) and new information communication technologies (**Ramachandran Ramasamy**); strong "government regulations and policies"; "active media"; development of "science and technology", including research, especially in rural communities (**Mai Van Trinh**); "political will, appropriate investments and funding" (**Moisés Herrezuelo López**); "a more equitable global system of sharing the burden of climate change adaptation, including transfer of appropriate technology and finance, would create conditions for building resilience" (**Raj Kumar**); opportunities offered by "international capital and technology & knowledge transfer" "for improving resilience and for creating a low-carbon development path with many benefits", including the 'new and additional' international finance for reduced emissions from deforestation and forest degradation (REDD) (**Koos Neefjes**); among others. All the above elements will contribute to a climate-resilient society.

However, a climate-resilient society, including adaptation, cannot be achieved in isolation, and it has to be an integral part of other development challenges that address "poverty eradication, food-fuel-water security, human rights, governance, gender empowerment and equality, and human development" (**Raj Kumar**). Climate change offers opportunity "to build sustainable and equitable society that is also climate-resilient" (**Pradeep Sharma**).

A few contributions cited specific examples or case studies, such as those in China (**Andrea De Angelis and Gørild Heggelund**), Bangladesh (**Aminul Islam**), USA and Myanmar (**Chew-Hung Chang**), and Viet Nam (**Koos Neefjes; Mai Van Trinh**).

However, **Ramesh Gampat** provided "a dissenting voice to the notion of a climate-resilient society (CRS)". He questioned if "a society has the ability to completely recover" or "bounce back" from a temporary or even permanent "climatic perturbation". He also questioned "the technical and economic viability of a CRS" beyond a certain yet-to-be established threshold, and suggested that the cost may be "prohibitive". He believed that "it is more useful to talk about the planet" rather than "a society or some societies, affected by and coping with climate change", though he found "it difficult to conceive of a climate-resilient planet, given that earth is a closed ecosystem".

Sarwat Chowdhury echoed a similar view that it is not possible "for societies facing the manifold impacts of climate change to rebound back to their original state" since the situation cannot be 'elastic'. She highlighted the "sub-subsistence 'resilience'" that simply indicates that the people have "adjusted to a new normal".

Further to **Ramesh Gampat**'s observation, **Ernesto Bautista** provided some equally thought-provoking comments by highlighting the **time-dependent** nature of the factors (e.g., state of knowledge, technology, resources, and institutions, among others) that affect "the ability of society to completely recover from climate change disturbance". These factors will be "**evolving over time**" and they will shape the societies in reaching "different levels of 'equilibrium'".

On a similar point, **Kishan Khoday and Usha Natarajan** highlighted how the "**changing nature of society**" in Asia will be central for understanding the nature of "a climate resilience society" and for design of effective responses. They emphasized the "potentially transformative role of civil society" as "both global consumers and local agents of change", who can "generate a forward-looking vision of multilateralism and galvanize a new generation of global environmental citizens across Asia" to address the emerging "common concern of humanity".

Two contributions discussed the sub-theme within the context of the United Nations Framework Convention on Climate Change (UNFCCC). **Bernarditas Muller** emphasized that the UNFCCC, "when providing for responses to the adverse effects of climate change", focuses on adaptation, as the adverse effects of climate change "are wide -ranging, covering all aspects of human development and not only the physical environment" as suggested by the word "**resilience**" in Article 1.1 of the Convention on "definitions". She pointed out that adaptation "is also the obligation for which financing and technology should be provided to developing countries", and that "policy-making is solely under the competence of States", and "it should not be imposed as a conditionality for enabling means to be provided to developing countries to meet their sustainable development objectives". **Hasna Cheema** highlighted that the major principles of the UNFCCC (1992) and its Kyoto Protocol (1997), such as "common but differentiated responsibilities"; "protection of vulnerable societies"; "prevention and mitigation"; "sustainable development" and "sustainable economic growth", are "critical to foster climate-resilient" or "climate-adaptive" societies. If fully

implemented, including the commitments of Annexes I and II Parties for non-Annex I Parties (e.g., Articles 4.3, 4.4 and 4.5), they "can lay the foundation of climate justice and promote international efforts to reduce global emissions".

To add her voice on the issues raised by **Bernarditas Muller** and **Hasna Cheema, Amelia Supetran** stressed the need to translate "knowledge" into actions with the provision of financial resources "free of conditionalities", as well as development and transfer of technology, as agreed under the UNFCCC.

3. Summary of Discussions of Sub-theme 2

The two-week discussion of sub-theme 2 on Mapping and Measuring continued many of the issues raised in Sub-theme 1: Vision of a climate-resilient society. There were 10 contributions from 12 contributors: **Gerardo Munck; Anthony Patt; Hans-Martin Füssel; Purnamita Dasgupta; Sven Harmeling; Tun Lwin; David Hastings; Ma. Consuelo Garcia; Ramesh Gampat, Niranjan Sarangi and Manoja Wickramarathne (joint contribution); and Anuradha Rajivan**, respectively.

This sub-theme aimed to map and measure climate change and its adverse effects on human development, including the interrelationships between climate change and ecosystems, as well as other environmental, ecological, social and economic changes and their interrelations that affect human development and vice versa. The issues discussed include: data and mapping improvement for better policy and decision-making (**David Hastings**) and for "designing effective adaptive strategy" that "can be integrated into a development framework" (**Purnamita Dasgupta**); physical measures (e.g., Keeling curve for monitoring the atmospheric carbon dioxide concentration) (**Gerardo Munck**); hybrid socio-physical measures (e.g., Environmental Performance Index; Environmental Vulnerability Index) (**Gerardo Munck; Anuradha Rajivan**); GDP and its shortcomings, and Green GDP (**Gerardo Munck; Ramesh Gampat, Niranjan Sarangi and Manoja Wickramarathne; Anuradha Rajivan**); Human Development Index (**Anthony Patt; Ramesh Gampat, Niranjan Sarangi and Manoja Wickramarathne; Anuradha Rajivan**); criteria for social and environmental vulnerability indices (**Hans-Martin Füssel**); Global Climate Risk Index and its limitations (**Sven Harmeling**); uncertainties in climate models (**Anthony Patt; Purnamita Dasgupta; Tun Lwin**); community-based vulnerability assessment (**Tun Lwin**); ASEAN Biodiversity Information Sharing Service (BISS) that may incorporate social, ecological and climate change data (**Ma. Consuelo Garcia**).

The following issues, in particular, were highlighted in the contributions; and indeed, further discussion on these issues are still needed:

- How do we make use of "imperfect" data as useful as possible and to help decision makers to mitigate possible risks? (**David Hastings**);

- The importance of incorporating the social dimension in environmental assessment (**Gerardo Munck**). A similar point was made to explore the possibilities of incorporating social, ecological and environmental parameters, such as the Millennium Development Goals, as well as climate change data, into the web-based ASEAN BISS, particularly the Map-Room, which is a visualization tool to show the links between biodiversity data and other social, ecological and environmental parameters for regional analysis (**Ma. Consuelo Garcia**);

- The "continued dominance of GDP as the overriding goal of public policy" calls for the continuing need "to place sustainable human development at the center of policy discussions" (**Gerardo Munck**). This point was strongly reiterated by **Anuradha Rajivan**;

- The effects of human development, as captured by Human Development Index (HDI), are non-linear- higher levels of HDI actually correlate with higher levels of risk (**Anthony Patt**);

- There are diverse patterns between CO_2 emission per capita and the HDI. For example, more than "one-fifth" of the 113 countries sampled "pumped less CO_2 per capita into the atmosphere even as their GDP and HDI have risen". In general, it seems that "most countries pump out increasing volumes of CO_2 to achieve rising human development". Thus, a global policy on a global carbon tax may be necessary to curb CO_2 emission above "a threshold to the 'capacity' volume of CO_2 per unit of HDI", and the "green" tax raised "could be used to promote the development and deployments of green technology in poor countries".

However, "how to set this threshold" and "how much should the tax be" are issues yet to be fully addressed (**Ramesh Gampat, Niranjan Sarangi and Manoja Wickramarathne**);

- How to transcend or at least transform economic growth as the aim of policies and people's lives; and how to de-couple economic growth and emissions (**Anuradha Rajivan**). These are the pressing issues that are being addressed by many countries. "Green Growth" or environmentally sustainable economic growth, which has been actively promoted by UNESCAP since 2005 (http://www.greengrowth.org/), may provide some of the solutions, even though "Green Growth" also has to be "socially sustainable", and even "politically sustainable" in terms of sustainable government policy for its promotion and implementation (**the Facilitator**);

- The six criteria for the development and application of "good" social or environmental vulnerability indices are: clear purpose; specificity and validity of data selection; methodological soundness of index construction; simplicity and comprehensibility; data availability and reliability; transparency and reproducibility; and results consistent with expert knowledge (**Hans-Martin Füssel**);

- The severe conceptual, empirical, and/or methodological flaws of existing national-level "social" or "environmental" vulnerability indices have precluded "their application to guide major policy decisions, such as the allocation of adaptation resources" (**Hans-Martin Füssel**);

- Policy decisions should be "based on a set of vulnerability indices for different climatic risks or climate-sensitive sectors" combined with experts' judgement and "political priorities", rather than "a single aggregate vulnerability index that falsely suggests scientific objectivity" (**Hans-Martin Füssel**);

- The uncertainties in both future socio-economic and climatic conditions, and the different time scales in their projections require "the options for integrating climate vulnerability into socio-economic data" to be properly identified (**Purnamita Dasgupta**);

- The Global Climate Risk Index (CRI), despite its limitations as acknowledged by the contributor, complements other analyses of extreme weather impacts, and it has brought "more transparency into the debate about extreme event impact" (**Sven Harmeling**);

- "The effects of climate change that we can anticipate for the coming few decades are highly ambiguous", especially when the prediction of "climate models" does not match "the trend of observed events". "To prepare for the future, do we trust our eyes, or our computers? If we try to plan far in advance, there is a 50% chance of getting it wrong, and either protecting people too little, or too much." (**Anthony Patt**);

- Due to discrepancies between the projection of climate models and observation, more attention should be paid to "the underlying driver of the poor's worsening relative and absolute poverty and their high climate sensitivity, which is an inability to innovate". Thus, what "the poor need is the freedom and the capacity to make continual minor adjustments to where and how they live, and how they earn their livelihoods", including education and social security (e.g., insurance) (**Anthony Patt**);

- Rather than relying on climate models that are complex and have inherent uncertainties, a simple and practical community-based approach that integrates "climate science with local concerns and real livelihood choices, and provide improved policy support" within the context of sustainable development has proved effective and useful for vulnerability assessment in pilot villages in the Ayeyarwady Delta regions of Myanmar (**Tun Lwin**).

In many ways, the discussion of sub-theme 2 have clarified many of the issues raised in sub-theme 1, especially on some of the tools that can be used to map and measure the vulnerabilities of our physical and human environment, including ecosystems, social, economic and human development, to climate change, as well as their interrelationships and associated changes. This would only help to further our understanding of one of the most complex issues facing humankind.

4. Summary of Discussions of Sub-theme 3

Fourteen contributions were received to enrich the discussions under this sub-theme Adaptation (including technology and financing) and Climate-Related Disaster Risk Reduction, which in many ways continued the exchange started in the previous sub-themes. The contributors were all experts on the ground: **Lisa Schipper; Nishadi Eriyagama; Alain Lambert and Ioana Creitaru; Ramesh Gampat; Stephanie Hodge, Suchita Sugar and Sonia Sukdeo (joint contribution); Ilan Kelman and J.C. Gaillard (joint contribution); G. Padmanabhan; Amelia Supetran; Patrina Dumaru; Heather Bell and Ray Shirkhodai (joint contribution); Pradeepa Malkanthi; Mai Van Trinh; Bonheur Neou, Kien Tran Mai, Pornsook Chongprasith and Pak Sum Low (joint contribution); Sudip Mitra; and Wong Poh Poh.**

It seems, however, that there remains the need to clarify the understanding of the nature of the linkages among the concepts of climate resilience, climate change adaptation and disaster risk management. Is there a hierarchy of relationships among them, or do they represent various stages of one comprehensive strategy to address the adverse effects of climate change? How could management of both lead to sustainable development? Some answers can be gleaned from the discussions and the concrete examples provided by the contributors.

The contribution of **Ilan Kelman** and **J.C. Gaillard** constituted one end of the spectrum of views, and held that climate change adaptation (CCA) can be encompassed within disaster risk reduction (DRR) strategies. Other contributors, such as **Heather Bell and Ray Shirkhodai** as well as **Pradeepa Malkanthi**, viewed the linkages between CCA and DRR clearly within the context of sustainable development. **Lisa Schipper** called for a "real shift in development paradigms" in order to address both DRR and CCA effectively.

Still others clearly recognized the opportunities offered and challenges faced in redefining development in sustainable terms, including **Amelia Supetran** on the Philippine experience in implementing programmes on DRR that advance CCA. Concrete experiences were provided in the contributions of **Alain Lambert** and **Ioana Creitaru** on the Maldives and South Mexico; **Nishadi Eriyagama** on adaptation options in the water sector in Sri Lanka; **Mai Van Trinh** on adaptation strategies in the two main river deltas in Viet Nam; and **Sudip Mitra** in citing the recognition of this perspective shown for the first time in the 10th five-year plan of India. The Climate Change Adaptation Initiative of the Mekong River Commission, contributed jointly by **Bonheur Neou, Kien Tran Mai, Pornsook Chongprasith, and Pak Sum Low**, gave detailed information on an important initiative on the largest river system in Asia.

Other important aspects that impact on the effective implementation of DRR and CCA activities were demonstrated in **Stephanie Hodge, Suchita Sugar and Sonia Sukdeo's** contribution on the importance of quality education, particularly for children. **Patrina Dumaru's** contribution on a pilot project in Fiji underlined the importance of an integrated approach to CCA, making use of traditional and local knowledge and the involvement of indigenous communities for successful implementation of adaptation strategies. For this reason, the UNFCCC provides for support for the development and enhancement of endogenous capacities and technologies of developing countries. The importance of people-oriented interventions was also highlighted by **G. Padmanabhan** in his contribution on the climate-related disasters in India. **Wong Poh Poh** pointed out that not only climate-related hazards but also disasters resulting from natural phenomena, such as tsunamis, should be taken into account in undertaking CCA in coastal areas. Innovative measures involving local solutions with the use of local resources should be explored to overcome problems of financing as well as difficulties in integrating CCA measures in national development planning. He cited in particular the rehabilitation of mangroves to address sea-level rise as an example of these measures.

Almost all contributions touched on the financing and technology aspects of climate change adaptation. **Amelia Supetran** pointed to innovative means of financing that would be needed for adaptation strategies, one free from conditionalities that inhibit innovation and that would instill a sense of ownership essential for long-term responses to a decidedly long-term challenge of adaptation. The Facilitator added that adequacy and predictability of financing are necessary in order to allow for long-term planning for adaptation.

Lisa Schipper was correct in her observation that "funding structure for development assistance may be seen as a barrier to getting adaptation to work." It is for this reason precisely that developing countries in the UNFCCC have tabled a proposal that would clearly demonstrate that financing climate change is distinct and separate from development assistance. Not only is financing a commitment of developed countries under the UNFCCC because of

their responsibilities for historical emissions that resulted in the concentration of greenhouse gases in the atmosphere, but also because of the failure of current delivery systems of financing to respond effectively to the objective of the UNFCCC.

The same applies to the discussion in **Ramesh Gampat's** contribution of a proposal for a "global carbon-price target" and the establishment of a "Green Fund" to reward compliance with this target. These proposals would be feasible and acceptable within the current climate change process if differentiated responsibilities for historical emissions are factored in the determination of a price target, and if the Green Fund would be under the authority of the Parties to the UNFCCC which would provide policy guidance, determine programme priorities and set eligibility criteria for the use of the Fund.

It is a misperception to state that insufficient funding is portrayed within the context of the UNFCCC as a limit to getting societies to adapt to the adverse effects of climate change. Financing to address climate change and its adverse effects has specific provisions under the Convention, and is clearly not limited to adequacy alone. Moreover, what is "adequate" can only be determined by the countries themselves, and for this, the UNFCCC has programmes for financial and technology needs assessments. Adaptation in particular is considered to be country-specific, even site-specific, and its financing, including for technology, cannot be fully assessed in terms of global estimates.

Adaptation and mitigation are mutually supportive, and the "glue" that holds them together is sustainable development. One must also keep in mind the first of the Rio Principles: "Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature." (United Nations 1992a).

5. Summary of Discussions of Sub-theme 4

The discussion of sub-theme 4 on Human Security (including food and nutrition, and energy security) and Human Rights had attracted 12 contributions from 13 authors: **Ulrik Halsteen; Ranjani K. Murthy; Sribas Chandra Bhattacharya; Susan Wong; Ohnmar Khaing; Usha Natarajan and Kishan Khoday (joint contribution); Manoja Wickramarathne; Kishan Khoday; Khurshid Alam; Keith Openshaw; Shiming Ma; and Abdul Qadir Rafiq,** respectively.

The contributions discussed the implications of the adverse effects of climate change on human security, and the issues covered range from human rights, energy security, food security, livelihoods, gender, population, disaster risk reduction, mitigation, adaptation, to wetland ecosystems. While some contributions focused on a single and unique issue, others touched upon multiple issues. Case studies, examples or experiences from Bangladesh, China, India, Myanmar, Pakistan and the Pacific Islands, have been shared. A number of specific response measures at both policy and operational levels have been proposed.

Ulrik Halsteen set the scene by highlighting that the concept of "human security" "encompasses not only the absence of conflict but also the effective protection and enjoyment of human rights, including access to education and adequate food, housing and health care". In particular, he stressed that "policies and measures" are required to protect the "well-being of the most vulnerable communities", such as "indigenous peoples", "women, older persons and persons with disabilities". Both national and international human rights laws have provided "important safeguards and guidelines for the protection of affected individuals and communities".

Linking climate change to the right to development, **Usha Natarajan and Kishan Khoday** emphasized that a "stable climate is an essential underlying element of the right to development". They regarded melting of glaciers in the Himalayas, which "provide food and water security for hundreds of millions of people in the region" as one of the "most prominent and serious challenges", especially the glaciers in the Tibetan Plateau, where many of Asia's great rivers originate (e.g., Yangtze, Yellow, Mekong and Brahmaputra rivers). They have expanded Amartya Sen's "Development as a Freedom" model to a "Sustainable Development as a Freedom" model, and added "ecological security" as the sixth freedom in addition to the "five freedoms outlined in the original framework".

Three contributions focused on energy security. **Sribas Chandra Bhattacharya** highlighted the need for huge investments and "unprecedented coordinated efforts by the global community" to "develop clean and energy efficient technologies" and "alternative energy sources". He concluded that by mid-2100, "rapid changes and developments

are expected to take place in energy supply as well as end-use technologies in all the sectors of the economy", and coping pace with these changes, "attracting necessary investments, involving the private sector, facilitating technology transfer etc. will present great challenges and opportunities" for the countries in the Asia-Pacific region to ensure their energy security "in the years to come". **Keith Openshaw** emphasized the importance of utilizing "traditional" biomass energy, which is renewable and low cost. He proposed a number of measures to ensure energy security and sustainable development, including the expanded use of biomass energy efficiently and effectively; and family planning that is supported by improved drinking water and medical services and biomass production; among others. He concluded that "Without continual and concerted investment in people and products from renewable resources, especially biomass, the world will not be able to have sustainable development." **Kishan Khoday** discussed the external implications of Asia's quest for energy security as a result of economic growth, particularly in the Arab region. He identified three key areas where opportunities exist for Asia-Arab (South-South) cooperation: (1) promotion of socially and environmentally responsible investments; (2) diversification of oil-dependent economies by shifting to global manufacturing and service sectors; and (3) establishment of enabling policy environments for local development of clean energy technologies, including public-private partnerships for their rapid commercialization in the domestic market.

Three contributions discussed food security. **Ohnmar Khaing** described how the reduced rainfall and the lack of water in the dry zone of Myanmar in recent years has led to the significant decline in crop yields and livestock production, and hence the food insecurity. These have also affected the farmers' incomes, livelihoods and social dynamics (e.g., migration and out-migration), especially the vulnerability of women. She suggested a few possible "climate-proofing" measures, and stressed the important role of non-governmental organizations in sharing experiences and knowledge on adaptation and mitigation measures. **Manoja Wickramarathne** highlighted the challenges that the Pacific Islands are facing as a result of "ocean warming, frequent tropical cyclones, flash floods and droughts", "prolonged variations from the normal rainfall", sea-level rise, ocean acidity and coral bleaching, all of which "are likely to have dramatic impact on the food production system", including agriculture, fisheries, forests (a source of traditional medicines), and water resources, and hence these will have profound implications for "the people's food and economic security". She emphasized the need for "accurate information" relating to "the economic impacts of future climatic conditions"; the strengthening of "enabling environment" for adaptation measures and their implementation, especially within the context of multiple stresses; and capacity development for decision makers and the public. **Shiming Ma** informed on an interesting case study conducted in Ningxia, northwest China, "to investigate and evaluate the cost-benefit effectiveness of northward winter wheat as an adaptation option to climate change both in the field and in farmers' households". The case study, which has implications for food security, used two IPCC scenarios to project yield trends for this particular food crop. The results "show that the multiple cropping of winter wheat and vegetable had the best economic benefits", although it entailed maximum costs. Thus, "winter wheat could not totally substitute for spring wheat". However, further research is needed.

Two contributions specifically focused on women issues in South Asia. **Ranjani K. Murthy** drew our attention in India to "how different groups of women and men are affected differently" by climate change "based on caste, class, pregnancy status, marital status and other aspects of identity and diversity". She cited a few examples of "pre-existing gender inequities" in social relations and development, including the extreme vulnerability of "dalit and tribal women" to "sexual exploitation in times of economic crisis following floods"; high "female illiteracy levels" means that they are unaware of any "early warning on floods and cyclones (especially through newspapers)"; among others. Thus, both government and donor policies have to be "sensitive to sex/gender differentiated human security needs and human rights interests of women and men in the context of climate change", and that the "diversity in needs and interests across marital status, economic status, caste, and pregnancy/lactation status etc. of women" must be recognized in policy and practice. However, **Khurshid Alam** highlighted that in Bangladesh, women are more vulnerable to climate-related impacts due to their limited ability to cope, and they are facing more social, economic, political, informational and migration barriers. He added that food security, including intra-household food distribution, affected by climate change will "exacerbate pre-existing inequalities in the society, in which women's share of household food will most likely go down". In addition, women's key role in disaster risk reduction and adaptation has not been fully recognized and appreciated, and their participation in pre-and post-disaster planning and decision-making process has often been limited or denied. There is a need to learn from, and scale up, "micro-level good practices that promote women leadership in various activities, such as economic empowerment, disaster risk reduction and political empowerment". The contributions from **Ulrik Halsteen, Ohnmar Khaing** and **Abdul Qadir Rafiq** also touched upon women issues, though not as the main focus.

One contribution (**Susan Wong**) stressed the importance of wetland ecosystems for human well-being and future security. These include provision of various important "goods and services", including the opportunities "for improving people's livelihoods, particularly for wetland-dependent, marginalized and vulnerable people"; and as "the planet's natural infrastructure for addressing climate change". Thus, a "healthy natural wetland infrastructure" is not only "a major asset in combating and adapting to climate change", but also essential in ensuring the preservation and enhancement of indigenous communities' livelihoods, cultures and traditional knowledge.

The last contribution came from **Abdul Qadir Rafiq**, who highlighted many challenging issues experienced in Pakistan, especially the vulnerable communities in the coastal, arid and mountainous regions, where the threats of climate change "are increasing the vulnerability of the poorest segments of the Pakistan's society and imperil human security with reduction in food supplies, water stresses, unreliable access to the sources of energy and diminishing livelihoods at the local level". He stressed the need for local "short and medium term coping strategies that address the human security issues", while fully recognizing "the unequal impact on men and women". As "rural women are the principal contributor of basic foods, and the agricultural sector is highly susceptible to risks of drought and uncertain precipitation", any impacts on "food security" would threaten their well-being and capacity to survive.

A number of interesting observations have surfaced from the contributions. For example, **Usha Natarajan and Kishan Khoday** have expanded Amartya Sen's "Development as a Freedom" model to a "Sustainable Development as a Freedom" model, and highlighted the importance of "ecological security". This is very much along the same thinking of the Facilitator's opening message dated 19 April 2010, in which he pointed out that "While every country has its right to development, it is important to emphasize that countries should aim for sustainable development, i.e., the "good" development that integrates environmental, social and economic development as an entity rather than the "bad" development that pursues economic development at all costs (including environmental and social costs) without taking environmental and social parameters into consideration". **Keith Openshaw** raised the issue of "limits to growth", and cited Bhutan's 'Gross National Happiness' (GNH) as a model for sustainable development. Indeed, what makes people happy has been a focus of discussion in recent years by many social scientists. **Susan Wong** noted that the destruction of ecosystems is likely to cause the loss of "both the human repositories for traditional knowledge along with generations of that priceless knowledge" of the indigenous communities through the loss of their livelihoods, "food security and sovereignty".

Other human security issues relating to climate change include climate refugees and conflicts over scarce resources. Although these important issues have not been discussed in the contributions, they have been discussed elsewhere and they are expected to feature more prominently in the near future.

6. Summary of Discussions of Sub-theme 5

All of the ten contributions received for this sub-theme Mitigation, Technology Transfer and Financing covered very important aspects of climate change mitigation in developing countries in Asia, and the role of financing and technology development in these activities. The contributors were: **Massimo Tavoni; K. Madhava Sarma; Lu Qi; Gørild Heggelund, Andrea De Angelis and Inga Fritzen Buan (joint contribution); Kishan Khoday; Pak Sum Low; Keith Openshaw; Yang Youlin; Thanakvaro De Lopez; and Sarwat Chowdhury.**

Many contributions underlined the crucial role of technology in climate change mitigation. **K. Madhava Sarma** shared the valuable experience on technology development and transfer in the Montreal Protocol on the phase-out of ozone-depleting substances, and offered areas that might be explored further for climate change mitigation. **Massimo Tavoni** also focused on the need for increased research and development in technology, both for present and innovative future technologies, for climate change. Citing the case of Cambodia, **Thanakvaro De Lopez** gave an analysis of the difficulties faced by small developing countries in acquiring the necessary technology for the implementation of mitigation actions. The importance of technology for the pursuit of a low-carbon economy, especially in China, was also the focus of the contribution from **Gørild Heggelund, Andrea De Angelis and Inga Fritzen Buan.** All contributions touched on financing as crucial for the whole spectrum of technology, from research and development, to diffusion, deployment and transfer.

The Facilitator noted, however, that the big advantage of the Montreal Protocol is the dedicated fund, the Multilateral Fund (MLF), which is focused on the objective of the Montreal Protocol and through which development and transfer

of technology is financed. Climate change financing, on the other hand, is mainly channelled through what is known as voluntary donor institutions comprised of multilateral financing institutions, regional development banks and bilateral aid agencies, considered to be outside of the framework of the financial mechanism of the UNFCCC. Very little progress has been made both on the ground and in the discussions on the implementation of developed countries' commitments on technology development and transfer in the UNFCCC, including in the current negotiations. Studies have also shown that little or no technology transfer has taken place through the Clean Development Mechanism (CDM).

The contributions by **Yang Youlin** and **Lu Qi** showed that much is being done for mitigation in Asian developing countries, in China in particular, through policies and programmes on sustainable land management. These demonstrated that developing countries are undertaking mitigation actions, even without the financing and technology resources from developed countries, but that they could do much more if these legal obligations would be met under the UNFCCC. These two contributions also underlined the co-benefits that are derived from climate change mitigation activities, in terms of providing better livelihoods for the people, and preserving biological diversity.

Kishan Khoday's analysis of the impacts on global trade of national mitigation policies was a focus of the current negotiations because of the economic and social consequences of response measures to climate change. Article 3.5 of the Convention, taken from the Rio principles, stipulates that "measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade" (United Nations 1992b). The danger exists not only in the projected legislation in the United States, but also in Western Europe, especially France. This illustrates that policy responses to address climate change and its adverse effects should be dictated not by economic interests alone.

Least developed countries (LDCs), as demonstrated by **Sarwat Chowdhury**, face many difficulties in taking mitigation actions. It is for this reason that, in the climate change negotiations, developing countries have taken the position that there must be a balanced consideration of adaptation and mitigation, in particular for financing. It is indeed true that LDCs have little project activities under the CDM. This is also because many LDCs, especially in Africa, are **net** sinks instead of **net** sources of greenhouse gas emissions. The recognition that many developing countries, especially LDCs and small island countries, have little mitigation capabilities is the main reason that the Adaptation Fund was set up under the CDM in the Kyoto Protocol. The Adaptation Fund, mainly financed through shares of certified emission reductions (CERs) under the CDM, is a solidarity fund through which the developing countries that have CDM projects share the benefits derived from these projects with other developing countries. Furthermore, the CERs are added to the assigned amount of developed countries which means that whatever is reduced in developing countries can be emitted by developed countries, and therefore have no direct climate benefits. The CDM is only beneficial for emission reduction if the project activities assist developing countries in their pursuit of sustainable development, or a low-emission pathway to growth.

In this regard, developing countries refer to a low-emission growth, rather than merely to low-carbon development that covers only reductions in carbon dioxide emissions. Many developing countries in Asia have a large amount of emissions coming from agriculture, in particular rice production, and need to address these emissions as well.

Keith Openshaw's contribution on the detrimental effects of unrestricted population growth on development in general and climate change mitigation in particular made valid arguments. A sustainable population policy in developing countries would, however, need to be accompanied by other sustainable development objectives. It has been shown that empowerment of women, education and the availability of basic services are also powerful "contraceptives".

Pak Sum Low's important contribution on the need for equity in the consideration of mitigation actions in terms of changes in consumption lifestyles, given the poverty in developing countries struck the right note, and went to the heart of the need for climate change responses.

The UNFCCC has stipulated that all countries shall "protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities" as its first principle. "Accordingly", it continues, "the developed country Parties should take the lead in combating climate change and the adverse effects thereof".

Both in mitigation and adaptation, therefore, developed countries should lead. This means of course that developing countries will follow that lead, but that the extent to which this is done is determined by the implementation of obligations for the provision of financial resources and transfer of technology to developing countries. Moreover, the Convention provides that the commitments for emissions reductions by developed countries "will demonstrate that developed countries are taking the lead in modifying longer-term trends in anthropogenic emissions…" (Article 4.2), that is in production and consumption lifestyles. On the other hand, the Convention also recognizes that "… economic and social development and poverty eradication are the first and overriding priorities of the developing country Parties…" (Article 4.7).

7. Summary of Discussions of Sub-theme 6

There were 14 contributions to the discussion of sub-theme 6: Research, Education, Training and Public Awareness from 16 authors: **Prathivadi Bhayankaram Anand**; **Trevor Booth**; **Sukthawee Suwannachairop**; **Purba H. Rao**; **Michele Martin**; **Paula Pons and Binoy K. Choudhury (joint contribution)**; **Elena Borsatti**; **Va Dany**; **Chew-Hung Chang; Linda Too**; **Kishan Khoday**, **Stephanie Hodge and Suchitra Sugar (joint contribution)**; **Tim Taylor**; **and Ruwanthi Senarathne,** respectively.

Six contributions discussed various aspects of *research* (**Prathivadi Bhayankaram Anand; Trevor Booth; Sukthawee Suwannachairop; Paula Pons and Binoy K. Choudhury; Va Dany; and Linda Too**); while two contributions were specially focusing on *education and training* (**Chew-Hung Chang; and Stephanie Hodge and Suchitra Sugar**); and another six contributions on *public awareness* (**Purba H. Rao; Michele Martin**; **Elena Borsatti**; **Kishan Khoday**; **Tim Taylor; and Ruwanthi Senarathne**). However, a few contributions also touched upon multiple issues (e.g., research, education and training by **Paula Pons and Binoy K. Choudhury**; research and communication by **Trevor Booth**; awareness and education by **Michele Martin**; research, awareness and education by **Tim Taylor**).

On *research*, **Prathivadi Bhayankaram Anand** emphasized the need for the social science input, especially governance; the need for "maintaining an approach of critical scrutiny"; and the need to prioritize mitigation and adaptation measures due to scarce resources in developing countries and to avoid "incorrect priorities". He also emphasized the importance of engaging the wider public for better policymaking. **Trevor Booth** highlighted the development of a Marine Climate Change Report Card, "the first-ever Australian benchmark of climate change impacts on marine ecosystems", including the development of communication programmes to convey relevant messages to a broad audience (e.g., through websites). This has provided useful experience for other Asia-Pacific countries. **Sukthawee Suwannachairop** stressed the importance of community-led participatory research (or the villagers research) in vulnerability and adaptation assessment, as well as the need to support a constructive and functioning Track III diplomacy, such as to provide the NGOs with "parallel meeting where climate change adaptation issues can be discussed openly and the marginalized groups can make their voice heard". **Paula Pons and Binoy K. Choudhury** discussed the need for research (and also education and training) on appropriate technologies that encourage public participation as an important tool for achieving sustainable development, and national policies must be "supportive of appropriate technologies", such as renewable energy technologies, including "home-grown technologies". They also stressed the importance of tapping the innovativeness of people, particularly "young people and farmer-inventors". **Va Dany** discussed the concepts of adaptation and vulnerability, the role of vulnerability assessment (VA) in the adaptation process, and methodologies. She introduced an ongoing research study (2009-2012) undertaken by the Royal University of Phnom Penh "to evaluate the linkages of VA and adaptation strategy in the water and health sectors in Cambodia" within the context of national poverty reduction strategies, while strengthening the "local and national capacity to conduct VA in order to enhance local and national adaptive capacity". **Linda Too** highlighted the importance of appropriate marketing strategy for green buildings. She observed that "personal benefit is a key determinant" for the "vast majority of the consumers/users" in making "their purchase decision", and thus there is a need to nurture green building occupants for "better acceptance of the green features" from a green marketing perspective. Apart from environmental benefits, the consumers are also concerned about "cost-effectiveness, health and safety, performance, symbolism and status, and convenience", all of which could affect their "satisfaction" in staying in the green buildings. Thus, a strategy, with "actual operational support", "is required to gain user acceptance and support, i.e., to encourage buy-in of green features".

On *education and training*, **Chew-Hung Chang** used four important framework questions to "provide a semblance of a checklist" in crafting an education for climate change (ECC) programme: (1) For whom is ECC intended and

who provides it?; (2) What should be included in the content of ECC?; (3) How should the intended content be delivered?; and (4) How do the providers of ECC know if the intended outcomes have been achieved? He also used these questions to gauge the progress of various environmental education activities that have been undertaken by both the government and the non-governmental organizations in Singapore since 1972, including the first Singapore Green Plan (SGP) in 1992 and its new SGP 2012. His ideas of "green schools" and green workforce are innovative. He believes that "the person on the street has as much a role to play in mitigating climate change impacts as governments and industries", and the consumers' choice of products could make a significant difference in terms of reducing "carbon miles". **Stephanie Hodge and Suchitra Sugar** stressed that "current education must be transformed to be inclusive, protective, democratic and child-centred", and it is important "to uphold a vision of quality and access to education for all" within the context of "Education for Sustainable Development (ESD)", which "is particularly well-suited to addressing climate change in terms of understanding its causes, recognizing its impact, and implementing appropriate responses". They highlighted UNICEF's "model for quality education" and other UNICEF Education initiatives, such as "Education in Emergencies" that provides "disaster risk education" in more than 25 countries; and "Child-Friendly Schools" that include "the promotion of sustainable facilities in schools, including alternative energies, rainwater harvesting and school gardens". **Paula Pons and Binoy K. Choudhury**, apart from stressing the importance of technological research (see above), also emphasized the importance of education and training in assisting the communities to better prepare for the adverse impacts of climate change. **Tim Taylor** also emphasized the importance of education that provides "the next generation" the "insights into the risks of climate change".

On *public awareness*, **Purba H. Rao** found from their survey in Kolkata, India, that both the executives/managers of large corporations and the "hundreds and thousands" of small and medium enterprises (SMEs) and entrepreneurs were aware of climate change and its impacts. However, unlike large corporations, the SMEs found it difficult to get "climate friendly" projects because they lack funding, intensive capital, manpower and technical know-how. She proposed two ways to overcome this dilemma: (1) "inclusive growth to sustainability" (i.e., let the large corporations show the way through forums and expertise advice by enabling the SMEs to follow their examples); and (2) Green supply chain management that holds "regular awareness seminars" to help suppliers and business partners to go green. **Michele Martin** shared the successful experience of the various public awareness activities undertaken by Sustainability for Seychelles (S4S), "a non-governmental organization (NGO) established in 2007 to promote sustainable living in Seychelles". The S4S activities used various means, including workshops, media and art forms, targeting at different groups (e.g., children, post-secondary students, citizens, professionals in various sectors, tourists, members of parliament, various government ministries and private sector), and linked "climate change education to education for sustainability", including traditional cultural practices. **Elena Borsatti** emphasized the critical importance of "changes in individual attitudes and behaviour" in preserving the environment and mitigating climate change, and hence the need for "knowledge and information" in raising the public awareness to initiate such changes "at the local, national, regional and global levels". She cited a number of good environmental practices to reduce waste and save energy, and highlighted various initiatives that "increase awareness on climate change and promote environmentally friendly behaviour", including "individuals who are undertaking exceptional personal feats, high-profile expeditions, and other acts of environmental activism" to publicize environmental causes. Her conclusion was particularly perceptive: "Although only a few individuals" may become "climate heroes or heroines", "every individual has the potential to be an agent for change in his/her daily life." **Kishan Khoday** highlighted the "high levels of citizen awareness within Asian countries on climate change and other environmental issues" and cited China where "there is an increasing spirit of environmental rights, a desire particularly among the youth to address ecological change as a matter of human security and well-being of future generations". The growing environmental awareness in China was best captured in the green 2008 Beijing Olympic Games. He highlighted the significance of four key activities supported by UNDP: (i) Olympic Film and TV Campaign to publicize environmental themes; (ii) Green Torch Relay by "a group of eighteen local environmental champions" who served as Green Olympic Torch Bearers; (iii) Low-Carbon and Resource Conserving Technologies were integrated "into venue design and materials supply"; and (iv) Water Conservation initiative "to improve sustainable use of water in various parts of China towards goals of environmental sustainability and improving human health". **Tim Taylor** highlighted the important linkage between "research" and "awareness of climate change in the eye of the public". In particular, the analysis of future "socio-economic scenario impact on costs and benefits" (within limits of "uncertainty"), and the "cost of adaptation", can "help raise awareness and give support to negotiations", and hence there should be "appropriate training in assessing costs into the future". He cited some of his work in the UK and Africa based on "historical analogues" (i.e., "using past weather events to present a picture of what climate change may do in the future"). There is a "need for a better informed public and efficient policy", though the "difficulty is to ensure that appropriate action is taken", so as to

avoid costly wrong decisions, such as "constructing in flood zones", and jeopardizing the needs of future generations. **Ruwanthi Senarathne** proposed to use "ecological footprint" (i.e., "the amount of biological productive land and water required to meet the needs of an individual, community or a population and absorb the waste they generate") to increase the public awareness on climate change. She discussed how this simple concept can be used to promote "environmental sustainability" in "waste management companies", "schools and universities", with the support of the media. Through these initiatives, "people can be more aware of the interdependence of our lifestyle and its environmental impacts", and hence creating "a social movement" that prevents "over-consumptions" and contributes to "reducing the adverse impacts of climate change".

The above contributions were a small but useful sample of a range of diverse issues that have been discussed in the international forums. Under the UNFCCC, the discussion on Article 5 (RESEARCH AND SYSTEMATIC OBSERVATION) and Article 6 (EDUCATION, TRAINING AND PUBLIC AWARENESS) will continue, especially the aspects relating to financing, technology transfer and capacity-building that are very much needed for the effective implementation of these two Articles.

8. Summary of Discussions of Sub-theme 7

There is a widespread perception among observers of global climate change negotiations that the processes have grown extremely complex from the time that the UNFCCC itself was negotiated in 1991. Indeed, experience in the implementation of legal obligations of all Parties under the Convention resulted in the recognition that there are wide-ranging implications of any action taken to address climate change and its adverse effects. Negotiations have therefore expanded to cover these implications, such as global trade and economic impacts of mitigation and adaptation actions, and their impacts on sustainable development and the well-being of present and future generations.

Scientific findings have evolved as well as concrete manifestations of climate change impacts, providing the incentive for deeper public involvement and concern. Climate change has become the "defining challenge of our time" and expectations from climate change negotiations have been heightened.

The previous sub-themes have covered essential components of these negotiations and this might explain why contributions to the general theme of these negotiations are not as numerous as on the other sub-themes.

The five contributions received from **Marcia V.J. Kran; Maria Melinda Ando; Kishan Khoday and Usha Natarajan (joint contribution); Pak Sum Low; and Mukul Sanwal** nevertheless correctly focused on the fundamental principles that underlie the negotiations and have made important inputs to these discussions.

Kishan Khoday and Usha Natarajan underlined the principle of equity, the primary basic principle of these negotiations. They called for "greater coherence between issues of equity and sustainability in global policy formulation" to address climate change and its adverse effects. Equitable sharing of environmental and developmental space indeed forms the basis of the negotiations on all the main elements of mitigation, adaptation, provision of financial resources, development and transfer of technology, and capacity-building.

The UNFCCC, in its first principle, provides that "the Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities". This principle permeates each Article of the Convention, and forms the key to the balance of common but differentiated responsibilities. From this principle flows the commitment of developed country Parties, responsible for historical emissions that caused climate change, to "taking the lead in modifying longer-term trends in anthropogenic emissions" (Article 4.2a), referring to production and consumption lifestyles. From this principle also flow the obligations to provide financing and technology transfer from developed country Parties to developing country Parties. These form the basic elements under ongoing climate change negotiations.

Equity also underlay the contribution of **Marcia V. J. Kran** calling for a human rights-based approach to the negotiations and to national policy formulation on climate change and its implementation. People are at the centre of our concerns, as is stated in the first of the Rio Principles on sustainable development. This contribution recognized that "both the causes of climate change and options for responding to it" are in the hands of people. Climate change

and its adverse effects exacerbate damaging impacts on vulnerable communities. Current negotiations, in particular on adaptation, but also on the economic and social consequences of response measures on mitigation, focus on these impacts on people and their well-being, indeed for some, on their very survival.

High populations are not synonymous with high-energy consumption, as **Maria Melinda Ando** correctly observed in her contribution. Once again, equity should be observed, as the problem of climate change has its origins in historical emissions of greenhouse gases by countries with much lower populations than developing countries of today. More effective responses to climate change could be achieved by controlling consumption rather than by controlling birth rates, the contribution rightly stated. The conclusion encapsulated the crux of the negotiating positions of developing countries in these negotiations, that "equitable and just climate change strategies should not displace responsibility for carbon emissions upon those least responsible for them".

Pak Sum Low's contribution touched on one of the most sensitive issues under these negotiations, and that is the inconsistencies between the Copenhagen Accord and the UNFCCC, in particular as relates to the provisions on the preparation of national communications of non-Annex I Parties. The exclusive and non-transparent manner in which the Copenhagen Accord was concluded among a small group of countries caused the breakdown at the final plenary of the 15th session of the Conference of the Parties (COP15) of the UNFCCC in Copenhagen in December 2009.

The great majority of developing countries were excluded from representation in the discussions leading to the Copenhagen Accord. This travesty of the multilateral intergovernmental process led to the rejection of the Accord that was then taken note of instead of being adopted by the COP. This means that the Accord has no legal standing in the current negotiations. However, developed country Parties of the Accord are pushing for its integration in the current process. While about half of the developing country Parties of the UNFCCC supported, endorsed or associated with the Accord, many of them did so subject to conditions stated formally in their letters of endorsement or association.

These conditions are mainly related to the provision of the necessary financial resources and development and transfer of technology in order to allow developing countries to take nationally appropriate mitigation actions (NAMAs) that can then be reported through national communications. **Pak Sum Low** pointed out that the conditions put forward by the Copenhagen Accord are inconsistent with the provisions of the UNFCCC, and that these work to the detriment of the interests of developing countries.

Once again, we are faced here with an issue of equity. Developing countries, starting with the big developing ones, but also extending to the second and third levels of developing economies, are being required to undertake NAMAs where they have no such obligations under the Convention. Moreover, any mitigation action to be undertaken voluntarily by developing countries should be accompanied by the necessary financing and transfer of technology in accordance with Convention provisions. In addition, financing obligations of developed countries under the Convention cover not only mitigation actions but also all the necessary conditions that would allow these actions to be formulated, published, and regularly updated, as well as implemented.

Mukul Sanwal proposed a shift in the approach to negotiations that would render operational the element of equity as a concrete outcome for Cancún. Given the reality of the Copenhagen Accord, it must now be taken into account in the negotiations. As it stands, however, the pledges from those countries that have supported the Accord, as reflected in the appendices, remain totally inadequate to meet the objective of reaching a temperature increase "below 2°C" contained in the Accord, not to mention the intention of assessing the implementation of the Accord by 2015, "including in relation to temperature rises of 1.5°C". There is in fact nothing in the Accord that links the expressed goal of "below 2°C" with the listing of either emission targets for Annex I countries or NAMAs of non-Annex I countries.

In his contribution, **Mukul Sanwal** stated that in order to achieve equity in sharing the global carbon space, a global carbon budget must be agreed at international levels with allocation criteria based not only on the responsibility for historical emissions alone, but also with a closer base year of 1970, and take into account present and future emissions as well. It would shift the debate from a stalemate to a proactive approach that would reflect the willingness of all countries to do their fair share for achieving the objective of the Convention, including its ultimate objective, given the necessary financial resources and in particular development, transfer and access to technology.

Equitable sharing of the remaining atmospheric space must take into account the need for developing countries for economic and social development, as recognized in the Convention. The key to the balance of common but differentiated responsibilities of the Convention also recognizes that economic and social development and poverty eradication are the first and overriding priorities of developing countries (Article 4.7). Greenhouse gas (GHG) emissions cannot be seen as damaging the environment alone, **Mukul Sanwal** pointed out, but also as an engine of growth. Developing countries should be allowed to have their rightful share of the remaining global budget in order to achieve sustainable development.

In climate change negotiations, developing countries have referred to their emissions as "survival emissions" as opposed to "luxury emissions" of developed countries that would like to maintain their lifestyles. Movement in the negotiations must come from both sides, and developing countries have the obligation to pursue economic and social development in a sustainable manner, at the same time the developed countries should adopt production and consumption lifestyles that would likewise be environmentally sustainable. Technology development and transfer is crucial to sustainable growth. The balance of obligations carries the key to a successful outcome in Cancún. In this manner, equitable sharing of the atmospheric space could be achieved, one that would fully serve the objective of the Convention.

All five contributions to this sub-theme focused on the fundamental element of equity in negotiations. For this reason, developing countries, including those in the Asia-Pacific region, call for an equitable, comprehensive, concrete, and legally binding outcome of the climate change negotiations in Cancún.

9. Summary of Discussions of Sub-theme 8

The discussion of sub-theme 8 on Folklore, Traditional Knowledge, Idiomatic Expressions, Proverbs and Quotes attracted six contributions from **Jayati Ghosh**; **Sukthawee Suwannachairop**; **Kishan Khoday and Usha Natarajan (joint contribution)**; **Try Thuon**; **Tep Boonny and Kumi Careme (joint contribution)**; **and Sumitra Sundram**, respectively.

Jayati Ghosh shared an old Italian folk tale with a clear "analogy with climate change and the other ecological disasters created by the global pattern of economic growth". But this folk tale was only a departure point to highlight the need "to shift from an obsession on growth (…) to a more rational organization of society, economy and of the relation between humanity and nature". "The interests of people in the centre are not inevitably opposed to those of people in the periphery, since both are now adversely affected by the results of such ecological imbalances".

Tep Boonny and Kumi Careme highlighted that "changes in the environment and ecosystems" negatively affect the "already fragile livelihoods" of the Cambodian fishermen. Their contribution, in which a few proverbs from Cambodia were presented, focused on the natural capture fisheries and indicated that "the range of cultural traditions, together with the different topographic settings in which they have existed, has led to differences in the fishing equipments developed by the various communities/ethnic groups through their interactions".

Kishan Khoday and Usha Natarajan highlighted the importance of traditional knowledge as it is "vital to preservation of a plural and diverse world from both ecological and cultural perspectives". They focused on the Melanesian culture in South-East Asia and the Pacific, and as an example of "the infusion of environmental knowledge and climate change into local traditions", "the Dreamtime tradition of Australian Aborigines" was considered. They also considered the belief in the Rainbow Snake which "symbolizes the regenerative power in nature and serves as a main character in Dreamtime mythology".

People's beliefs and practices were considered also in other contributions. **Sukthawee Suwannachairop** shared some of the beliefs of the Karen community (indigenous peoples living in Thailand and Myanmar) for which "healthy life is a reflection of healthy ecosystems" and therefore "one must protect the environment". The contributor concluded that as ecosystem-based approaches to climate change can "increase the resilience of natural systems and are based on existing practices and local knowledge", they could be mainstreamed "into climate change strategies of national frameworks".

Try Thuon focused on Mondulkiri, "one of the four north-east provinces of Cambodia", and considered people's beliefs and practices to predict the "natural phenomena, borrowing wisdoms of the fellow wildlife which habituate the (…) forest". People have learnt to predict, and prepare for seasonal events such as "floods, droughts and insect infestations". However, since the 1990s the frequency and intensity of these events have changed and people feel that "things are increasingly becoming unpredictable". Thus, this has a negative effect not only on "their traditional farming" but also on their "cultural practices".

Sumitra Sundram shared information on how dragons were perceived in the ancient Chinese society for the protection of "natural elements", "earth, agricultural crops and mountains", "precious metals and gems" and "all sources of water". In those days "the worst floodings (…) were usually attributed to a dragon being upset".

Folk tales, myths and beliefs have given us a peek into different cultures while considering the collective need for living a more harmonious life with nature, to protect and preserve the local environment.

10. Conclusions

Climate change affects every aspect of human development. A total of nearly 100 contributions covering the inter-connected sub-themes -*Vision of a Climate-Resilient Society; Mapping and Measuring; Adaptation (including technology and financing) and Climate-Related Disaster Risk Reduction; Human Security (including food and nutrition, and energy security) and Human Rights; Mitigation, Technology Transfer and Financing; Research, Education, Training and Public Awareness; Global Negotiations from Copenhagen to Mexico: Implications for Future Generations; Folklore, Traditional Knowledge, Idiomatic Expressions, Proverbs and Quotes* - were submitted to the AP-HDNet e-discussion on *Climate Change and Human Development* during the period of 4 February to 30 July 2010. Based on the lively and vigorous discussions, the following conclusions could be drawn:

1. A climate-resilient society will be a society that has the ability, capacity and the necessary resources "**to withstand or recover quickly from difficult conditions**" caused by the adverse effects of climate change over short or longer term and to adapt to these adverse effects. These include the reduction of vulnerability of a society to climate-related hazards (natural or human-induced), which is **a function of duration of exposure, as well as environmental (including natural ecosystems that provide the environmental services), social, economic, technological and political (including policy) factors**. Thus, the strengthening of coping or adaptive capacity, including technological and policy measures, such as nature-based responses, ecosystem-based adaptation, sustainable development (including human development), poverty reduction, research and development, livelihood diversification, reduction of carbon footprint and low-carbon or low-GHG emission development, disaster risk reduction, equitable global system, among others, is crucial to ensuring a climate-resilient society or a society with reduced risk to the adverse effects of climate change".

2. It is important to **map and measure climate change and its adverse effects on human development,** including the interrelationships between climate change and ecosystems, as well as other environmental, ecological, social and economic changes and their interrelations that affect human development and vice versa. Thus, physical, ecological and socio-economic data and hybrid socio-physical measures (e.g., Environmental Performance Index; Environmental Vulnerability Index; Green GDP; Human Development Index; social and environmental vulnerability indices; Global Climate Risk Index). The uncertainties and the limitations of the current global and regional climate models must be recognized.

3. Adaptation to climate change and climate-related disaster risk reduction are essential for building a climate-resilient society. It is important to understand the nature of the linkages among the concepts of climate resilience, climate change adaptation (CCA) and disaster risk reduction (DRR), and how they are related to sustainable development, including a real shift in development paradigms, as well as implementing programmes on DRR that advance CCA, especially making use of traditional and local knowledge and technologies and the involvement of indigenous communities, as demonstrated in many concrete experiences in various countries. It is important to recognize that adaptation measures are very much country and location-specific. It is also important to recognize that adaptation and mitigation are mutually supportive, and the "glue" that holds them together is sustainable development. However, innovative financing and technologies are urgently needed for short-term and longer term adaptation measures in developing countries particularly vulnerable to the adverse effects of climate change.

4. The adverse effects of climate change have significant implications on human security, which encompasses not only the absence of conflict but also the effective protection and enjoyment of human rights, including access to education and adequate food, energy, water, housing and health care. In particular, appropriate policies and measures are required to protect the well-being of the most disadvantaged and vulnerable communities, such as indigenous peoples, women, children, older and disable people, who must be protected by both national and international human rights laws. Specific response measures are required at both policy and operational levels on the above issues discussed.

5. Climate change mitigation, development and transfer of technology for both mitigation and adaptation, and financing are key issues that are being negotiated under the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA) and the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP). It is interesting to note that many developing and least developed countries are facing difficulties in acquiring the necessary technology for the implementation of mitigation actions because of lack of markets, as demonstrated in the case of the difficulty in acquiring biogas technology in Cambodia. This is an example of market failure.

6. Research (in both physical and social sciences), education (from primary to tertiary), training (in all aspects relating to climate change, including climate change negotiations) and public awareness (including outreach activities that may be undertaken in conjunction with other environmental activities) are important elements for the effective implementation of the UNFCCC, as provided by Articles 5 (RESEARCH AND SYSTEMATIC OBSERVATION) and 6 (EDUCATION, TRAINING AND PUBLIC AWARENESS) of the Convention.

7. Climate change has become the "defining challenge of our time", and the global climate change negotiation processes under the UNFCCC have grown extremely complex, with wide-ranging implications of any action taken to address climate change and its adverse effects. There are inconsistencies between the non-legally binding Copenhagen Accord and the provisions of the UNFCCC. The provision of the necessary financial resources and development and transfer of technology in order to enable developing countries to take nationally appropriate mitigation actions are the key issues under negotiation. Developing countries, including those in the Asia-Pacific region, call for an equitable, comprehensive, concrete, and legally binding outcome of the climate change negotiations at COP 16 in Cancún. The balance of obligations carries the key to a successful outcome in Cancún. Any failure to achieve a successful outcome will have profound implications for the well-being of present and future generations.

11. References

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Sub-theme 1

Vision of a Climate-Resilient Society

1. Opening Message

Dear Network Members,

Climate change is strongly affecting both natural ecosystems and our society, which are interlinked. Given the profound impact of climate change on every facet of our society, especially the poor and the disadvantaged groups who are most vulnerable because they have the least resources to cope with, or adapt to, the adverse effects of climate change, I think it is appropriate to start our discussion with the **vision of a climate-resilient society**, the topic chosen for sub-theme 1.

"Climate resilient" is a term widely used in the literature and by the media, but not everyone seems to have the same understanding of its meaning and implications.

The Oxford English dictionary defines **"resilient"** as follows: "**adjective:** (1) able to recoil or spring back into shape after bending, stretching, or being compressed. (2) (of a person) able to withstand or recover quickly from difficult conditions." Thus, part 1 of this definition refers to the physical system, while part 2 refers to the human system.

Based on part 2 of the definition, a "**climate-resilient**" society could mean a society that is "**able to withstand or recover quickly from difficult conditions**" caused by the adverse effects of climate change, including climate-related hazards and disasters.

However, the ability "**to withstand or recover quickly from difficult conditions**" caused by the adverse effects of climate change over short or longer term depends on many factors, especially on the vulnerability of a society to the various impacts of climate change. The vulnerability of a society to climate-related hazards (natural or human-induced) is a function of duration of exposure, as well as environmental (including natural ecosystems that provide the environmental services), social, economic, technological and political (including policy) factors. For example, a country with an intact natural ecosystem is likely to be more resilient to climate risks. Similarly, a country with effective policies for both mitigation and adaptation and with more financial and technological resources (e.g., an effective early warning system) for mitigation and adaptation (including climate-related disaster preparedness), is **more able**, and hence **less vulnerable**, to the adverse effects of climate change. Strengthening of coping or adaptive capacity is crucial in ensuring a climate-resilient society or a society with reduced risk to the adverse effects of climate change.

I am sure that many other different definitions of "**resilience**" are available in the literature.

For example, United Nations International Strategy for Disaster Reduction defines "**resilience**" as "*The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.*", with the following comment: "*Resilience means the ability to 'resile from' or 'spring back from' a shock. The resilience of a community in respect to potential hazard events is determined by the degree to which the community has the necessary resources and is capable of organizing itself both prior to and during times of need.*" (UNISDR 2009). The word "*accommodate*" in the definition implies "*adaptation*".

Network members may wish to challenge or further elaborate, refine, enrich and strengthen the definition of "**climate-resilient**" society so that all of us can have a common understanding of its full meaning.

The following questions are provided to facilitate the discussion of this sub-theme. These questions are by no means exhaustive. Network members may wish to introduce any additional questions that are relevant to the discussion.

- What makes a society "climate-resilient"? What other concepts have to be built in for a human development oriented notion of climate resilience?
- What is your vision of a climate-resilient society, including barriers and their removal?
- What are the policies, strategies and the enabling environment required for building a climate-resilient society?
- Is a "climate-resilient society" feasible? To what extent does vested interest and the divide between rich and poor countries or between rich and poor within a country a factor in making this concept workable?

- How will climate change affect human development, including the achievement of Millennium Development Goals (MDGs), which, in turn, contribute to a climate-resilient society?
- How can human development, including poverty reduction, facilitate a climate-resilient society?
- How can the effective implementation of the UNFCCC facilitate a climate-resilient society?
- How can the effective implementation of Bali Action Plan contribute to a climate-resilient society?
- How can we strengthen or build human and institutional capacity for a climate-resilient society?
- How can science and technology play an important role in building a climate-resilient society?
- How may public-private partnerships strengthen human development for a more climate-resilient society?
- How may traditional knowledge be used to build a more climate-resilient society?

All Network members may wish to address any one or more of the above questions, which are interlinked and not necessarily provided in the order of importance.

We look forward to a lively discussion of this first sub-theme!

With best wishes,

Pak Sum Low
AP-HDNet Facilitator

Reference

UNISDR (United Nations International Strategy for Disaster Reduction). 2009. UNISDR terminology on disaster risk reduction (2009). Geneva: UNISDR. [http://www.unisdr.org/eng/terminology/terminology-2009-eng.html]. Last accessed on 8 February 2010.

2. Contributions

The following authors, with their respective contributions, helped to enrich the discussion on the sub-theme *Vision of a Climate-Resilient Society:*

Bernarditas Muller, *"Climate resilience" in the light of the UN Framework Convention on Climate Change (UNFCCC)*
Pradeep Sharma, *Climate change: An opportunity to build a resilient society*
Peter Neil, *Vision of a climate-resilient society*
Mukul Sanwal, *A vision for the planet in 2020*
Raj Kumar, *Vision of climate-resilient society: Can it ever be achieved in isolation?*
Angus Mackay, *A future vision of climate-resilient societies*
Chew-Hung Chang, *Climate resilience paradoxes: A case of storm preparedness*
Koos Neefjes, *Viet Nam and climate change: Policies for sustainable human development-Some highlights*
Hasna Cheema, *International legal instruments: Tackling climate change and fostering climate-adaptive societies*
Amelia D. Supetran, *Vision of a climate-resilient society*
Ramesh Gampat, *Questioning the idea of a climate-resilient society*
Ernesto Bautista, *Many paths to developing resilient societies*
Itzá Castañeda, *Gender-differentiated impacts*
Koos Neefjes, *Responding to climate change in Viet Nam: Opportunities for improving gender equality*
Ramachandran Ramasamy, *Emerging net-citizenry governance groups*
Andrea De Angelis and Gørild Heggelund, *The importance of social dimension in building a climate-resilient society*
Sarwat Chowdhury, *Vision of a climate-resilient/climate-conscious society*
Moisés Herrezuelo López, *From a vulnerable society to a climate-resilient society*
Amitava Mukherjee, *Poverty alleviation: Best elixir for mitigating climate change*
Kishan Khoday and Usha Natarajan, *Climate change in a multi-polar world*
Mai Van Trinh, *Vision to climate-resilient and some experiences from Viet Nam*
Aminul Islam, *Climate-resilient community under emerging climate change scenario: Bangladesh context*

3. Online Discussion

Bernarditas Muller wrote:

Facilitator's note (Pak Sum Low): Bernarditas Muller has been a negotiator for the United Nations Framework Convention on Climate Change (UNFCCC) since the very beginning. She puts "climate-resilient" within the context of the Convention, and emphasizes the importance of adaptation for responses to the adverse effects of climate change. She points out that adaptation "is also the obligation for which financing and technology should be provided to developing countries", and that "policy-making is solely under the competence of States", and "it should not be imposed as a conditionality for enabling means to be provided to developing countries to meet their sustainable development objectives".

Dear Network Members,

"Climate resilience" in the light of the
UN Framework Convention on Climate Change (UNFCCC)

The only reference in the UNFCCC, the only science-based, universally-agreed, legally-binding agreement dealing with climate change, to resilience is in Article 1.1, on "definitions". It refers to the understanding of "adverse effects of climate change" to mean "changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosytems…".

A focus of human development on climate resilience alone would limit this development to responses to adverse effects that affect the physical environment.

The adverse effects of climate change however are wide-ranging, covering all aspects of human development and not only the physical environment.

For this reason, the UNFCCC, when providing for responses to the adverse effects of climate change, focuses instead on adaptation. Any mention of policies and measures dealing with these adverse effects are on adaptation.

It is important to clarify this understanding because all Asian countries are Parties to the Convention, and the activities of UN funds and programmes operating in the region must be consistent with the international commitments of these countries when addressing climate change.

Adaptation is also the obligation for which financing and technology transfer should be provided to developing countries. The advantage of this approach is that there are already existing mechanisms which allow developing countries under the Convention to identify their needs and determine their vulnerabilities, essential to any development of programmes or national plans dealing with climate change. Among these are the preparations of national communications, the first obligation of all Parties to the Convention, which would provide the bases for developing programmes containing measures to address climate change. A thorough identification of sources and sinks of emissions as well as vulnerabilities is essential for any action to be taken on climate change.

Much work has already been accomplished under the Convention, including the development of national adaptation programmes of action (NAPAs) for least developed countries. Building upon this work wold greatly facilitate any capacity-building activities to be financed by UNDP, including strengthening of human and institutional capacities, to promote the capacity of a country to respond to the challenge of climate change.

The Convention of course recognizes that poverty eradication and sustainable development are the first and overriding priorities of developing countries, and the balance of differentiated responsibilities under the Convention, particularly in reference to financing and transfer of technology commitments of developed countries, and it is therefore clear that any action to be undertaken would take these into account.

Finally, it is important to recognize that policy-making is solely under the competence of States, and cannot be taken over by other external entities. In particular, it should not be imposed as a conditionality for enabling means to be provided to developing countries to meet their sustainable development objectives.

With best regards,

Bernarditas Muller
Special Advisor, Climate Change
South Centre, Geneva

About the contributor

Mrs. Bernarditas C. Muller is a retired diplomat, and is currently serving as the Environmental Affairs Adviser of the Department of Foreign Affairs of the Philippines. She is also the Special Advisor on climate change for South Centre, Geneva. In the course of her professional diplomatic career, she has followed climate change negotiations from its inception in 1990, within the context of the negotiations for the UN Conference on Environment and Development. Mrs. Muller is serving as lead negotiator and coordinator of the Group of 77 and China in the Ad Hoc Working Group on Long-term Cooperative Action (AWG-LCA) process under the Bali Action Plan, since its first meeting in Bangkok in March 2008.

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United Nations. 1992. *United Nations Framework Convention on Climate Change.* [http://unfccc.int/resource/docs/convkp/conveng.pdf]. Last accessed on 5 February 2010.

Pradeep Sharma wrote:
Facilitator's note (Pak Sum Low): Pradeep Sharma has identified the essential elements for building climate-resilient societies. In particular, he raises the following important points that deserve special attention and consideration: (i) "Building climate-resilient societies involves reducing underlying vulnerabilities as distinct from responding to impacts of climate change" and thus it requires "anticipatory" rather than "reactive" action; (ii) Sustainable and equitable development contributes to climate-resilience societies; (iii) "Risk management and risk reduction strategies need to be integrated in development planning", and "imprecision of climate change science should not be used as an excuse for inaction"; and (iv) "Climate change offers an opportunity to build sustainable and equitable society" that is also climate-resilient. He provides a few good examples to illustrate his points.

Dear Network Members,

Climate change: An opportunity to build a resilient society

The impact of climate change in Asia-Pacific region-which is already home to bulk of the world's poor, facing severe demographic pressure, environmental degradation, and social vulnerabilities-is likely to be severe and threatens to neutralize whatever attainments the region has made in MDGs. Conversely, failure to make progress on MDGs can further aggravate the consequences of climate change. Within this region, less developed countries, small island states and the poor are more vulnerable due to their dependence on climate-sensitive resources for sustenance and lack of capacities, technologies and resources to neutralize adverse impacts of climate change. Women and girls face disproportionate burden. Social tensions over sharing of depleting and degrading natural resources can trigger more destabilizing conflicts. Climate change has thus brought to the fore, and added a sense of urgency to, the question of building more resilient, sustainable and equitable societies. In that sense, it is an opportunity.

A climate-resilient society is essentially one in which the communities are able to reduce their vulnerabilities to protect their lives and livelihoods against climate variations and extreme weather events. This is not a society different from the one that follows sustainable environmental resource management practices. Communities have for ever adapted themselves to climatic variations and environmental degradation using local knowledge and resources. Farmers in the dry and rain-fed areas in India have learnt to diversify their livelihoods and not rely on a single crop. Flood-affected communities in Bangladesh grow vegetables on top of their houses so that they have something to feed on in case their crops are lost. Societies that have not adapted themselves over time are also the ones that face higher risks of being adversely impacted by climate change.

Building climate-resilient societies involves reducing underlying vulnerabilities as distinct from responding to impacts of climate change. Thus, what is required is anticipatory action and not reactive one. This is also at the core of promoting sustainable and equitable development. Even though current level of research and information on adaptation does not adequately guide development policy makers on how to adapt and how to mainstream adaptation in development agenda, the societies and communities must not wait for better knowledge and start adapting. In climate change, there may not be certainties but enough is known about the *risks and vulnerabilities* which are at the heart of building resilience to climate change.

Based on scientific evidence and traditional knowledge on how communities have adapted historically, different scenarios should be worked out and likely impact assessments prepared with associated capacity and financial needs analyses. Risk management and risk reduction strategies need to be integrated in development planning. Imprecision of climate change science should not be used as an excuse for inaction.

Climate change offers an opportunity to build sustainable and equitable society which is also a climate-resilient society. Poverty reduction efforts must be reinforced through rights to land, water, energy and forests for the poor. The village of Ralegaon Siddhi in Maharashtra (India) was transformed from a drought-prone village and a degraded ecosystem to a prosperous one in partnership with people who carried out programmes of environmental conservation. As a result, they now have access to water year round, reliable energy from renewable sources and have come out of extreme poverty. Sukhomajiri (in northern state of Haryana in India) is another example of people's participation in natural resource management through community-based micro-watershed development to build climate resilience. These examples show how community action can have salutary effect on underlying vulnerabilities of the poor and their resilience to climate change. In fact, ability to adapt is directly linked to the levels of development. Climate change severely limits people's choices but simultaneous poverty reduction efforts can expand these choices. Local governance must be strengthened to find local solutions to make people more resilient to climate change. In sum, we should continue to promote environmentally sustainable and egalitarian development to build climate-resilient societies using climate change as an opportunity and an entry point.

With best regards,

Pradeep Sharma
Acting Deputy Country Director (Programme) and Head of Poverty Reduction and Environment Unit
UNDP Timor-Leste

About the contributor

Pradeep Sharma is the Acting Deputy Country Director (Programme) and Head of Poverty Reduction and Environment Unit, UNDP, Timor-Leste. Previously, he was the Assistant Resident Representative in Public Policy and Local Governance Unit, UNDP, India, New Delhi. He did his Masters in Development Economics from the University of East Anglia, Norwich, UK and Doctorate in Economics from Jawaharlal Nehru University, New Delhi. He has worked on many development issues, including decentralization and local governance, access to justice, ICT for development, right to information, food policy, poverty reduction and environment.

Peter Neil wrote:
Facilitator's note (Pak Sum Low): Peter Neil highlights the importance of nature-based responses to climate change as an integral part for building a climate-resilient society. In particular, he discusses the benefits and co-benefits of ecosystem-based adaptation that uses ecosystem services as part of an overall adaptation strategy. Ecosystem-based adaptation, which can be integrated into community-based adaptation, is a cost-effective way to protect vulnerable communities from the adverse effects of climate change. Healthy and well-managed ecosystems also have great potential for climate change mitigation. So it is a win-win solution for both adaptation and mitigation.

Dear Network Members,

Vision of a climate-resilient society

While many of us in the conservation arena are interested in biodiversity, it is useful to remind ourselves that for most people the biggest climate change adaptation issues are not about biodiversity conservation directly but are food security, coping with extreme weather and natural disasters, and dealing with the potentially massive re-locations of people and land-uses in the face of sea level changes and shifting ecosystems and species ranges. However, IUCN believes that nature-based responses to climate change are an integral part in tackling this increasingly problematic issue and can help to build a climate-resilient society, and thus warrant investment. For several years, the world has been investing in technology and engineering to fight climate change. Technology is vitally important, but we must be careful not to put all of our eggs in a 'techno-fix' basket. Some technologies will work; others will not; and others will be economically unviable. Some may even be unsafe or risky.

What is Ecosystem-based Adaptation (*)?

Ecosystem-based adaptation (EbA) is the use of biodiversity and ecosystem services (**) as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change. As one of the possible elements of an overall adaptation strategy, ecosystem-based adaptation uses the sustainable management, conservation, and restoration of ecosystems to provide services that enable people to adapt to the impacts of climate change. It aims to maintain and increase the resilience and reduce the vulnerability of ecosystems and people in the face of the adverse effects of climate change. EbA can generate significant social, economic, cultural and human well-being co-benefits; contribute to the conservation of biodiversity; and build on the traditional knowledge and practices of indigenous peoples and local communities; including the important role of women as custodians of local knowledge. In addition, healthy, well managed ecosystems have climate change mitigation potential, for example, through the sequestration and storage of carbon in healthy forests, wetlands, and coastal ecosystems.

Ecosystem-based Adaptation activities should be part of a broader portfolio of adaptation measures

Ecosystem-based adaptation can be applied at different geographical scales (local, regional, national) and within various time frames (short to long term). It can be implemented as projects and as part of overall adaptation programmes. It is most effective when implemented as part of a broad portfolio of adaptation and development interventions, such as early warning systems, education, and physical infrastructure.

EbA promotes policy coherence

In promoting the sustainable use of nature and biodiversity, ecosystem-based adaptation strategies provide policy coherence with other national and international commitments. For maximum effectiveness, these strategies should be aligned with ongoing action under the UN Framework Convention on Climate Change, Convention on Biological Diversity, the UN Convention to Combat Desertification, the Ramsar Convention on Wetlands, the UN Declaration on the Rights of Indigenous Peoples, and other relevant international commitments.

Ecosystem-based Adaptation is a cost-effective way to protect communities from climate change and extreme weather events

Healthy ecosystems, such as intact forests and wetlands, are beneficial to local populations for the many livelihood benefits that they provide: firewood, clean water, fibres, medicines, shelter and food. They can also form physical barriers against some extreme weather events, such as storm surges. As natural buffers, ecosystems are often less expensive to maintain, and often more effective than physical engineering structures, such as dykes, levees, or concrete walls. This is a means of adaptation that is readily available to the rural poor; it is readily integrated into community-based adaptation, and addresses many of the concerns and priorities identified by the most vulnerable countries and communities.

With best regards,

Peter Neil
Coordinator Regional Forest Programme & Climate Change Focal Point, Asia, IUCN

Notes

(*) This text draws from and is consistent with the Report *Connecting biodiversity and climate change mitigation and adaptation: Report of the second ad hoc technical expert group on biodiversity and climate change* (Secretariat of the Convention on Biological Diversity 2009).
(**) Ecosystem services are the benefits people obtain from nature, such as food regulation, storm protection, food, clean water, fuel, shelter etc.

About the contributor

Peter Neil is the Coordinator, Regional Forest Programme (RFP), Asia, IUCN. He has more than twenty-five years of experience with multi-disciplinary programmes in developing countries, including inclusive people-oriented natural resource management and research. Before joining IUCN he has been working as a Livelihoods Adviser with the UK Department for International Development (DFID) in Nepal. He has also worked as a Conflict Sensitive Development Adviser and a Programme Coordinator, Livelihoods and Forestry Programme with the same organization.

Reference

Secretariat of the Convention on Biological Diversity. 2009. *Connecting biodiversity and climate change mitigation and adaptation: Report of the second ad hoc technical expert group on biodiversity and climate change.* Montreal, Quebec: Secretariat of the Convention on Biological Diversity. [http://www.cbd.int/doc/publications/cbd - ts - 41-en.pdf]. Last accessed on 2 February 2010.

Mukul Sanwal wrote:
Facilitator's note (Pak Sum Low): Mukul Sanwal has mapped out a vision for the planet in 2020. He questions the "current paradigm that encourages people to define their well-being through their consumption patterns", and highlights the key 'new' drivers for change in order to achieve global sustainability. Strategic policy "for decoupling energy use from economic growth", and a "modal shift" in transportation and urbanization "to maximize" the use of natural resources; "new ways of thinking" regarding the energy services and the ecological services; "innovative market-based trading mechanisms" "to augment ecosystem services" and "to support both cost-effectiveness and patterns of resource use"; appropriate "policy frameworks tailored to social value creation"; and "new instruments to impact on modifying consumption patterns", among others, are needed to be developed "for achieving the transition to global sustainability".

Dear Network Members,

A vision for the planet in 2020

In drawing up a vision for the planet in 2020, the question that should be asked is how our complex social and economic systems should interact with a complex planetary system undergoing rapid change to create a sustainable future for all citizens? As a result of globalization, the economic crisis and its global response the centre of political gravity has shifted towards a wider and balanced structure and this trend will continue as larger numbers of developing countries breakout of poverty and their citizens will demand an increasing share of the scarce atmospheric resource. The defining characteristic of the world in 2020 will be patterns of resource use that are common for all countries.

The global goal should, therefore, be identified as improvement in human well-being in line with sustainable development, with a new model of growth whereby consumers consider their needs rather than their wants, so controlling material consumption. We need to question the current paradigm that encourages people to define their well-being through their consumption patterns. For Asia, the trade offs in the kinds of deep structural changes that will be necessary will be very different to a focus only on carbon management. While the global consensus around climate change will be the driver for these changes, the response should be shaped by a strategic perspective of the future, and not just by the Copenhagen Accord, for transformation of the economy and human activity to achieve sustainable development.

Global sustainability, and how we are to achieve it, in the context of the services sector replacing industrialization as the engine of growth, requires a focus on the "new" drivers of change. The key drivers for sustainable development in the 21st century will be patterns of resource use in providing services for human well-being, augmentation of services provided by the ecosystem, and new opportunities for the rural poor that conserve the natural resource base of economic growth supported by technological and financial services.

High emissions/GDP are a symptom of energy consumption growing rapidly in the transport, household and service sectors, driven by rising passenger travel and freight transport, appliance energy use by households and a rapid expansion in the service economy. According to the International Energy Agency (2007) two-thirds of energy use in developed countries is in the end-use sectors, and developing countries can be expected to follow a similar path. For example, in India, with 10 per cent of emissions from the transport and residential sectors, energy use per capita is one-fifth of developed country levels and 300 million people waiting to move into towns (Climate Modelling Forum, India 2009), the problem must be framed in terms of urban development and transportation.

The strategic policy issue for decoupling energy use from economic growth will not just be developing energy efficiency standards and de-carbonizing energy-as developed countries are doing-but rather a modal shift in transport patterns to railways and modifying the nature of the urbanization process itself, in particular new land-use patterns that minimize personal transportation and maximize natural resource use. Moving beyond energy efficiency to conservation of energy is a necessity, because actions taken now will largely determine options for many decades to come.

New ways of thinking must impact not only energy services but also ecological services affected by the growing scale of human activity. For example, payments for allocation of the limited capacity to absorb waste (carbon dioxide, chemicals); as an integral part of the incomes of the poor (forests); recognition of the economic and social gains from new products (biodiversity); and, augmentation of water supply and agricultural productivity (watershed management). Innovative market based trading mechanisms need to be developed to augment these ecosystem services on the lines of the proposed carbon, energy efficiency and renewable energy units, to support both cost-effectiveness and patterns of resource use.

The societal response to resource scarcity is already very different in Asia compared with the West, as innovation here is driven by need and not by greed. The interaction between poverty, societal forces and technology has already led to new products and services. For example, Indian firms have established themselves as cutting-edge innovators targeting the poor-some 500 million consumers (*). That trend surfaced with the Nano (the small car costing approximately US$2,000, introduced by Tata Motors in July 2008, whose design and innovation is considered a trendsetter by the global auto industry), and has resulted in a number of products for people with little money who aspire for a better life. The products are not just cheaper versions of well established models available in developed countries, but have taken design and manufacturing to a whole new level in the way they use resources.

Modifying longer term trends in patterns of resource use for achieving the transition to global sustainability requires a policy frameworks tailored to social value creation to chart new pathways in transportation and urbanization; new instruments to impact on modifying consumption patterns; and, innovative policies for augmenting services provided by critical natural resources-energy, water, forests. The required shifts will come from infrastructure decisions, new institutions, changing values, behaviour and innovative technology.

With best regards,

Mukul Sanwal
South Centre, Geneva

Note

(*) This figure is the estimated number of citizens expected to reach middle class income levels by 2020.

About the contributor

Mukul Sanwal has served in policy positions in the Government of India (1971 - 1993) when he represented India at the Rio Conference. As Policy Adviser in the United Nations Environment Programme and in the United Nations Climate Change Secretariat (1993-2007) he was involved with the World Summit on Sustainable Development. He is currently associated with the South Centre, Geneva. These are his personal views.

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Raj Kumar wrote:
Facilitator's note (Pak Sum Low): Raj Kumar points out that a climate-resilient society, including adaptation, cannot be achieved in isolation, and it has to be an integral part of other development challenges that address "poverty eradication, food-fuel-water security, human rights, governance, gender empowerment and equality, and human development". A more "open society" with good governance is important for building resilient societies. Internationally, "a more equitable global system of sharing the burden of climate change adaptation, including transfer of appropriate technology and finance, would create conditions for building resilience". He emphasizes that the "impact of climate change and variability affect mostly the people who are at the edge of coping with poverty and hence most vulnerable and least able to adapt", and that "a person cannot have the capacity to respond or prioritize climate adaptation initiatives until basic needs are met".

Dear Network Members,

Vision of climate-resilient society: Can it ever be achieved in isolation?

If we were to start the discussion by removing the word "climate" from the title, and just label the subject, "Vision of a Resilient Society", what would that mean in the broader context of the human condition and response? According to the Oxford English definition, "resilience" implies the ability of any society "to withstand or recover quickly from difficult conditions." The "difficult conditions" at the level of a society or community do not entirely relate to the impact of climate change, but could encompass both catastrophic or sudden events (e.g., a natural disaster, or an armed uprising, or outbreaks of infectious disease such as SARS and H1N1 flu) as well as events that will gradually affect the livelihoods of society, which could be as wide-ranging as globalization, urbanization, revolutions in technology, population ageing, terrorism and climate change itself. This implies that the climate-change driven impacts on society (both catastrophic and gradual) cannot be easily disentangled from other elements of change and pressures, occurring simultaneously in varying degrees, whether discernable or not. Any response in policy and its implementation and prioritization, in terms of use of scarce resource, is hence complex when we talk of a climate-resilient society. For instance direct adaptation to climate change is difficult to separate from other livelihood adaptations.

Given the intricate linkages of climate change to other development challenges, policies for building resilience to climate change have therefore to be better formulated. After all, climate change is a relative slow and subtle event (*) whose impact varies across communities in different parts of the world, under multiple time horizons and levels of human development. We therefore need to understand better the whole concept of building resilience or what allows families, communities and countries to manage risk and crises, and the critical role of institutional linkages, including effective governance. One may even say that such a formulation can only be partial as there is no clear exit strategy for the problem of climate-driven impacts. Hence we are not talking about an issue or a development challenge that has a beginning and an end with well-defined sets of solutions that fit all or at least most conditions. Building climate resilience in isolation of other development challenges is like to be futile.

Moving to the societal level, what kind of environment will allow individuals and households to build their resilience and adaptive capacity? Society or human society is the manner or condition in which the members of a community

live together for their mutual benefit in a region or country or the world at large. Another way is to consider a society as an economic and social infrastructure, made up of a varied collection of individuals. Societies will remain fragile if there are disparities across individuals in terms of access to assets and technology, the level of human development and opportunities to participate. It is clear that an open society, with transparent and accountable government and the corporate sector, where citizens trust their government and leaders of business community, are some of the constituent elements of resilient societies. Likewise a more equitable global system of sharing the burden of climate change adaptation including transfer of appropriate technology and finance would create conditions for building resilience.

Taken at one extreme, a climate-resilient society, whichever way one looks at it, has to ensure that each individual is empowered with the capacity, resources and knowhow as well through responsible institutions to respond, at least at the livelihood level, to climate change for mutual societal benefit and stability. But in reality the additional impact of climate change and variability affect mostly the people who are at the edge of coping with poverty and hence most vulnerable and least able to adapt. The recent food, fuel and economic crises have further eroded the resilience of the poor, especially women. Without food and water security or basic access to service delivery in health and education, water and sanitation, a person cannot have the capacity to respond or prioritize climate adaptation initiatives until basic needs are met. Climate change adaptation is an integral part of development issues involving poverty eradication, food-fuel-water security, human rights, governance, gender empowerment and equality and human development. The Millennium Development Goals and other internationally agreed goals, albeit not fully comprehensive, represent at least an international consensus on the way forward. A climate-resilient society cannot be created without the addressing of these development challenges.

With best regards,

Raj Kumar
Independent Economic Consultant
(Former Senior Adviser, United Nations and Commonwealth Secretariat)

Note

(*) Climate changes are slow and subtle because climate can only be measured over decades as it is often not possible to give an instant answer to the question of whether and when a climate has changed. Similarly catastrophic events like Hurricane Katrina and Cyclone Nargis cannot be directly attributed to climate change.

About the contributor

Raj Kumar has over 35 years of practical working experience in a range of economic development issues gained through working for the United Nations, the Commonwealth Secretariat and Singapore civil service. He is an author of four books and has published extensively on economic development issues.

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Angus Mackay wrote:

Facilitator's note (Pak Sum Low): Angus Mackay highlights the need to provide "the poor and vulnerable" "with new opportunities and skills to extend livelihood options". Using mountain herders as example, he discusses the need to strengthen their capacity to "increase resilience to climate change" in immediate term (say 5-10 years) (e.g., "better access to weather forecast information"; "provision of outreach programs"; and improved planning and implementation), medium term (10-15 years) (e.g., "more information and understanding of possible climate impacts" on water supply, grazing and fodder), and longer term (15-20 years) (e.g., "more fundamental changes to existing livelihood strategies"). Skills development in "emerging green businesses", alternative "land use options", and "improving education standards" for "the next generation" would also increase "resilience immeasurably". He identifies the "barriers to building resilience to climate change" (e.g., uncertainties in future climate and the issue of "scaling up" based on limited examples of good practices), and points out that with assistance from "specific policies", "the poor and most vulnerable" can benefit from "some of the opportunities that are emerging".

Dear Network Members,

A future vision of climate-resilient societies

One way of building our understanding of resilience to climate change is to consider how distinct communities (such as mountain herders, lowland farmers, urban dwellers or coastal fisher folk) are already coping with the climate, and work with them in identifying and reducing future risks.

One thing is for certain-the poor and vulnerable cannot be left to subsist in the margins of development. They will need to be much more effectively linked in with the formal economy and the support mechanisms provided by the state. Equally they will need to be better informed about climate risks and better able to access and process new information and ideas. With time they will need to be provided with new opportunities and skills to extend livelihood options, based on the principle of 'augmenting' existing capacity and local knowledge.

A few attributes of climate resilience

Taking the example of mountain herders, in the immediate term (say 5-10 years hence), better access to weather forecast information to help with decisions on livestock movements would certainly increase resilience to climate change. This might require a combination of organizational, technological and training related measures, such as the installation of a denser network of weather stations, provision of improved forecasts through various media, and the provision of outreach programs for herders to help them to interpret new information.

Furthermore the planning and implementation of these initiatives would require improvements in the knowledge, coordination and management skills of service providers, such local departments of agriculture, planning and disaster management.

In the medium term (10-15 years) as the effects of climate change become more visible, our herders would need more information and understanding of possible climate impacts on the supply of water, grazing and fodder. This would help them to make definitive decisions to help sustain their livelihoods such as reducing herd size, varying herd compositions or investing in improved veterinary services.

As the effects of climate change harden (15-20 years hence) and become more widespread, more fundamental changes to existing livelihood strategies may be necessary. They may need a much more comprehensive package of support that would enable significant change or diversification of livelihoods through access to additional technologies, vocational training and financial capital.

Skills development could be closely aligned with the demands of emerging green businesses, combining knowledge of livestock management with new methane reduction technologies and practices. Alternative land use options could be promoted, for example by shifting from livestock production to the production of simple forms of clean energy.

By improving education standards, the next generation would be better placed to take up less natural resource dependent jobs, thereby increasing resilience immeasurably.

Clearly the sequencing above would not (in practice) be as linear as the 'suggested' timeline implies. In some situations vulnerable communities may need to move towards livelihood diversification sooner than later and, in most cases, a combination of adaptation measures would be required at one time.

A few key challenges

Inevitably there are barriers to building resilience to climate change. For one we lack sufficient evidence of what the future climate will look like to be able to make informed planning decisions today. So the challenge is to learn to shift towards planning in the context of uncertainty and a range of possible futures. This means working out what you can do now and leaving other questions (where there is greater uncertainty) to future planning cycles.

The issue of 'scaling up' from a few scattered examples of good practice to broad-scale uptake of measures to improve resilience presents a further challenge. Governments and the international community are beginning to respond at scale but there is much more to be done in translating new global financing and political support into the sorts of coordinated approaches described above.

Then there is the whole issue of ensuring that the poor and most vulnerable are not simply viewed as victims but can become genuine beneficiaries in some of the opportunities that are emerging. It is relatively easy to see how the urban middle classes and elites could benefit from the innovation and rapid transfer of ideas and technology that is helping to build green economies throughout the world.

But if the poor are to benefit in equal measure, we need to put in place quite specific policies now to help them achieve this. The coming Asia-Pacific Human Development Report on Climate Change seeks to build awareness and advocate for change by placing poor people and their livelihoods at the centre of the issue.

More importantly than anything we (development practitioners) must ensure that we 'stick at it'. Once the big international decisions have been made there is always a tendency for the less glamorous but equally important follow up activities to be buried as new issues emerge and grab attention.

With best regards,

Angus Mackay
Regional Adaptation Adviser
UNDP Regional Centre, Bangkok

About the contributor

Angus Mackay is a UNDP Regional Technical Adviser on Climate Change for Asia. This involves helping countries across the region to design, implement and learn from measures to promote climate resilience. He is also part of a team helping to prepare this Regional Human Development Report on Climate Change.

Chew-Hung Chang wrote:
Facilitator's note: Chew-Hung Chang discusses the concept of "preparedness" and highlights its importance as a response to extreme storm events such as Hurricane Katrina in the USA (one of the most developed countries) and Cyclone Nargis in Myanmar (a least-developed country). It seems that in both cases, for various reasons, the communities were ill-prepared for the extreme events, although early warning information was given (of course the level of early warning system in the USA is much more advanced than that in Myanmar). In the case of Hurricane Katrina, certain government policies at the federal and local levels (i.e., the "storm preparedness paradoxes") have made the local communities more vulnerable to the extreme event. In the case of Cyclone Nargis, questions have been raised on what information had "really reached individuals in the country". Based on the lessons learnt from Hurricane Katrina and Cyclone Nargis, he concludes that the governments at the national and local levels "must consider adaptation strategies that include preparedness, monitoring, warning, and information dissemination so as to build resilience against impacts of climate change and to avoid the tragedies of the two cases mentioned".

Dear Pak Sum and Network Members,

Climate resilience paradoxes: A case of storm preparedness

In addition to the insights by Bernarditas Muller on adaptation as an important concept of resilience, I would like to comment on the concept of preparedness. While a major part of adaptation will be on monitoring and management to attain preparedness, there are problems with preparedness as a concept itself. While policy makers are urged to consider adaptation as an important response to climate change, it is important to consider the concept of adaptation paradoxes as exemplified in the case below.

As one potential impact of climate change is the increased frequency and intensity in precipitation events in some regions in Asia (IPCC 2007), there is a need to consider the idea of storm preparedness in adapting to such imminent impacts. There are many examples of communities adversely affected by extreme precipitation events, even when these storms occur on a regular basis. Much can be learned from such lessons. Hurricane Katrina is one such example. Despite the high accuracy of monitoring and forecast and the existence of evacuation and relief efforts protocols, Katrina was ranked one of the deadliest hurricanes as it killed thousands of people, and displaced many more (Travis 2005). The sad reality is that while impacts of storms like Katrina have been simulated prior to the event, almost 1 in 4 persons ignored evacuation orders and were unable to flee the path of destruction. Despite the apparent preparedness for the storm, the storm topped the charts with over US$200 billion worth of damage.

The reason for this tragedy can be traced to two storm preparedness paradoxes, at the federal and local government levels in the USA, respectively. The federal level paradox is the safe development paradox, in that by making hazardous areas safer, it has increased the potential for property damages and economic loss (Burby 2006). The concept of safe development is that the federal government considers that if steps are taken to make it safe for human occupancy then land exposed to natural hazards can be used profitably. These steps usually include measures to mitigate the likelihood of damage by offering federal financial support for flood and hurricane protection works, beach nourishment, and federal requirements through the "National Flood Insurance Program for safe building practices such as elevation of construction in flood hazard areas" (Burby 2006: 173). "Supposedly safe development in New Orleans (and elsewhere) has proven to be unsafe for several reasons including limitations of flood and hurricane protection works and limitations of the National Flood Insurance Program's efforts to control losses through floodplain mapping and regulation of construction practices" (Burby 2006: 176). However, it is the illusion of such "safety" that contributed to the unprecedented life and economic losses.

On the other hand, the local government paradox is that while their citizens bear the burden of deaths, displacement and economic loss in disasters, policies to limit vulnerability are given inadequate attention (Burby 2006). Of the US$500 billion in losses from natural disasters in the United States between 1975 and 1994 (Burby 2006: 178), only a relatively small proportion of this was covered by federal disaster relief. In fact, most losses were not insured and were borne by victims. "Given that the incidence of disaster losses is primarily borne by local residents and businesses, one would expect that avoidance of losses would be a high priority for local officials. The paradox is that this is typically not the case" (Burby 2006: 178). Apparently the political apathy stems in part from the lack of citizen concern about hazards, resulting in a "policies without publics" dilemma that smothers local policy initiatives. The federal level safe development concept results in a kind of "moral hazard" in which "the availability of insurance protection lowers an insured party's incentive to avoid risk" (Burby 2006: 179). This discourages both the local governments and individuals from taking actions to decrease the risk of loss.

In addition to preparing ahead of storms through insurances, there is a need to consider monitoring, warning and information dissemination as adaptation strategies. While international institutions are able to provide a network of information for monitoring and warning, information dissemination is usually poor. This is evidently the case in Cyclone Nargis. According to WMO Director for Weather and Disaster Risk Reduction Activities Department Dieter Schiessl, a cyclone hits Myanmar once every 40 years, and being an infrequent disaster, "governments have no incentives to prepare themselves thoroughly". Although the information about the cyclone was "amply available and timely provided, and distributed in the ways and means for reaching the general public", the WMO was unsure "what really reached individuals in the country" (Channel NewsAsia 2008). Information dissemination is a crucial step to consider in crafting storm preparedness programs.

Mitchell and Tanner (2006) defined adaptation as an understanding of how individuals, groups and natural systems can prepare for and respond to changes in climate or their environment. In adapting to climate change, policies formulated for storm preparedness programs should take into consideration the concept of preparedness over and above the paradoxes discussed above. In considering the lessons learnt from Katrina and Nargis, governments, both at the local and national level must consider adaptation strategies that include preparedness, monitoring, warning, and information dissemination so as to build resilience against impacts of climate change and to avoid the tragedies of the two cases mentioned.

Regards,

Dr. Chew-Hung CHANG
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About the contributor

Dr. Chang is an Assistant Professor at the Nanyang Technological University, Singapore and the secretary and acting president of the Southeast Asian Geography Association (SEAGA). As part of SEAGA's outreach to society, he has been an organizer and facilitator for a climate change workshop for the Southeast Asian region. He is also active in climate change education through seminars in schools, public talks, radio and TV appearances. In this contribution, he argues for the concept of "preparedness" as a necessary condition for climate change adaptation, which, in turn, is required for a climate resilient society.

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Koos Neefjes wrote:
Facilitator's note (Pak Sum Low): Koos Neefjes provides some highlights on policies for sustainable human development, especially the aspects of adaptation and resilience, in Viet Nam, which is '*particularly vulnerable to the adverse effects of climate change*'. He stresses the need for strengthening "resilience" of "women, men, children, communities, regions and sectors", "businesses and governments", and points out that enhancing "resilience" would require "behavioural change to improve preparation for natural disasters; better information sharing for livelihood diversification, learning and (business) innovation; (agricultural) research and development (R&D); as well as major

infrastructure development". In particular, there is a need to address barriers to women's participation in "planning and decision-making related to climate change responses, including disaster risk mitigation". "International and national policies and actions", including "international capital and technology & knowledge transfer", "offer opportunities for improving resilience and for creating a low-carbon development path with many benefits". Mitigation actions would improve "the resilience of livelihoods and of communities", and thus, "multiple aims can be achieved with '*new and additional*' international finance for reduced emissions from deforestation and forest degradation (REDD)."

Dear Network Members,

Viet Nam and climate change: Policies for sustainable human development - Some highlights

In December 2009, the UN in Viet Nam published a policy discussion paper that sets out to identify and analyse the main policy challenges that Viet Nam faces in responding to the causes and effects of climate change to ensure continued human development.

The main thesis of the paper is that although climate change is a major threat to sustainable human development, international and national policies and actions also offer opportunities for improving resilience and for creating a low-carbon development path with many benefits. Climate change is a wake-up call and an imperative for doing more, better and faster, and Viet Nam's human development ambitions should remain high, despite climate change.

The paper is about international and national climate policies, adaptation and resilience, greenhouse gas mitigation and co-benefits, financing and technology transfer, and capacity development. Here I want to highlight aspects of adaptation and resilience.

Viet Nam is '*particularly vulnerable to the adverse effects of climate change*', as per the UNFCCC. Among the most vulnerable to climate change are women, children and the elderly, ethnic minorities, and migrants. Their human development is likely to be affected strongly without major climate change action. But Viet Nam has major capacities when compared to several other developing countries.

The Mekong Delta, which is shared with Cambodia, is characterised by IPCC as one of three global hotspots regarding potential population displacement. And without climate change action there will be risks to global food prices, as most of Viet Nam's rice export comes from the Mekong Delta.

Strengthening resilience is the overall objective of climate change adaptation. This includes the resilience of women, men, children, communities, regions and sectors, and the ability of businesses and governments to deliver goods and services in the face of climate change effects. For example, access to services such as hospitals during and after disasters is critical, as was demonstrated during the river floods in the Mekong Delta in 2000 and 2001.

Enhancing resilience will require e.g., behavioural change to improve preparation for natural disasters; better information sharing for livelihood diversification, learning and (business) innovation; (agricultural) R&D; as well as major infrastructure development.

Women are not well represented in planning and decision-making related to climate change responses, including disaster risk mitigation. Barriers to women's participation need to be addressed as climate change creates new stresses on resources and livelihoods.

"Resilience" is primarily about just one side of the climate coin. However, many actions to mitigate greenhouse gas emissions can help improve the resilience of livelihoods and of communities. One example is the production and use of biogas from animal waste, with financial benefits, improved indoor air quality and labour saving that is especially felt by women-there are tens of thousands of micro-biogas installations around the country already.

Trees and soils capture and store carbon, but mangroves also protect from storm surges and provide ecological services, upland forests protect water supplies, and forest plantations provide income. Therefore, multiple aims can be achieved with '*new and additional*' international finance for reduced emissions from deforestation and forest degradation (REDD). Viet Nam is becoming "REDD-ready" with a UN-REDD project and other international support.

Viet Nam should consider the risk that sea level rise and the effects of climate change on typhoons, rainfall, drought and temperature could be worse than even the worst case (IPCC) predictions. It should therefore use the precautionary principle in long-term visioning and in planning of e.g., urbanisation and industrialisation. Long-term visioning and investment plans also need to recognise that although climate change effects cannot be predicted with absolute certainty, up-front investments in adaptation will pay off in all IPCC climate change scenarios. And despite climate change effects, it is important that Viet Nam provides even better protection from e.g. flooding in the future. To raise safety standards befits the ambition of Viet Nam to become a developed nation by say 2050.

This then means that international capital and technology & knowledge transfer is critical for achieving resilience for the adverse effects of climate change and for turning actions into opportunities for social-economic development. Viet Nam should also prepare for raising very large amounts of domestic capital, especially for adaptation actions combined with raised safety standards for climatic stresses and shocks.

Finally, the paper suggests that the UN must help Viet Nam to implement treaty obligations; 'convene' stakeholders in policy dialogues; support national capacity development; provide policy and technical advice; and help international resource mobilization, for and with Vietnamese and international partners.

With best regards,

Koos Neefjes
Policy Advisor Climate Change
UNDP Viet Nam

About the contributor

Koos Neefjes has worked on sustainable development questions in nearly 30 countries over the past 25 years, in both advisory and management positions. He has lived in Viet Nam for the past 10 years and is currently Policy Advisor Climate Change with UNDP in Viet Nam where he advises the Government on climate change policy; facilitates policy dialogues; performs and manages policy-relevant research; and supports donor coordination. He leads the UNDP in Viet Nam on climate change, and supports the wider UN in climate change policy work as well as program development.

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Hasna Cheema wrote:
Facilitator's note: Hasna Cheema highlights the major principles of the UNFCCC (1992) and its Kyoto Protocol (1997), which include "Common but differentiated responsibilities"; "Protection of vulnerable societies"; "Prevention and mitigation"; "Sustainable development" and "Sustainable economic growth". These two legally-binding international agreements are "critical to foster climate-resilient" or "climate-adaptive" societies, "in Asia-Pacific and across the world". If fully implemented, including the commitments of Annexes I and II Parties for non-Annex I Parties (e.g., Articles 4.3, 4.4 and 4.5), they "can lay the foundation of climate justice and promote international efforts to reduce global emissions". Further negotiations on the UNFCCC (i.e., on "Long-term Cooperative Action under the Convention" since the Bali Action Plan) and the Kyoto Protocol (i.e., on "Further Commitments for Annex I Parties under the Kyoto Protocol" since May 2006) have been ongoing, with a view to achieving the ultimate objective of the Convention. These issues will be discussed in sub-theme 7.

Dear Network Members,

International legal instruments: Tackling climate change and fostering climate-adaptive societies

Climate change is a threat that may have lasting consequences for mankind. Article 1(2) of the United Nations Framework Convention on Climate Change (UNFCCC) defines it as "A change of climate that alters the composition of the global atmosphere" (UN 1992). UNFCCC holds 'human-induced' activities responsible for the global problem (UN 1992: Article 3(4)). There is a growing recognition that climate change is no longer an environmental or technical issue but is a social and human development problem. It is mainly triggered by release of greenhouse gases (GHGs) (*) into the atmosphere. These emissions cause global warming. The impacts of a steadily warming world, with rising global average temperatures, may affect many sectors of society: agricultural production; water availability; livelihood opportunities; health and the mere subsistence of low-lying islands and coastal zones.

How to tackle this issue and to promote climate-adaptive societies? International legal instruments are critical to foster climate-resilient or to put it differently climate-adaptive societies. UNFCCC (1992) and the Kyoto Protocol (1997) are two major international agreements on climate change. The foundation of these legally-binding agreements is based on five core principles of:

- *Common but differentiated responsibilities:* The developed Parties (Annexes I and II) (**) should take the lead in combating climate change.
- *Protection of vulnerable societies:* The special needs of developing country Parties, particularly vulnerable, should be given "full consideration".
- *Prevention and mitigation:* Parties to take precautionary measures to "anticipate, prevent or minimize the causes of climate change".
- *Sustainable development:* Parties to promote "sustainable development".
- *Sustainable economic growth:* Parties' cooperation to promote open international economic system that would lead to sustainable economic growth and development (UN 1992: Article 3 (1-5)).

If followed in practice, these principles can lay the foundation of climate justice and promote international efforts to reduce global emissions.

What is the importance of UNFCCC in reducing global emissions?

The Convention (UN 1992) recognizes that climate change is a global challenge and must be tackled. As per Article 2, its ultimate objective is to "Stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system". The Convention sets up a process through which governments meet regularly-Conference of the Parties (COP). It commits Annexes I and II Parties to provide 'new and additional financial resources' to support mitigation and adaptation in non-Annex I Parties, particularly those vulnerable to 'the adverse effects of climate change'. It also obligates them to facilitate and finance 'transfer and access to environmentally sound technologies and know-how' to Parties to the Convention (Articles 4.3, 4.4 and 4.5).

Parties to the Convention are also required to develop a greenhouse gas "national inventory" of 'sources' (such as industries and transport) and 'sinks' (such as forests and ecosystems that absorb GHG from the atmosphere) (Article 12 (1a)).

The Convention encourages Parties to share technology and to cooperate in ways to reduce greenhouse gas emissions, especially from energy, transport, industry, agriculture, forestry, and waste management, which together produce nearly all greenhouse gas emissions attributable to human activity.

The major limitation of the Convention had been absence of legally binding targets for Annex I and II parties to return to 1990 emissions levels by 2000 (UNFCCC 2005). In order to impose legally-binding commitments on developed Parties, the Kyoto Protocol was adopted in 1997 and enforced in 2005.

Significance of the Kyoto Protocol

The Protocol (UN 1998) is founded on the same principles as the Convention and shares its ultimate objective. It sets legally binding targets for developed countries to reducing their collective emissions by at least 5 per cent. The emissions levels are to be calculated as an average of the years 2008-2012 (see Article 3(1)). There are no 'voluntary commitments' on developing countries to cut emissions under the Protocol as their per capita emissions are still low compared to those of developed countries. However it does contain a set of general commitments that apply to all Parties: improve quality of emissions data; initiate national mitigation and adaptation programmes; support education, public awareness and capacity building (UN 1998).

Apart from the legally binding commitments, the Protocol proposes a climate insurance scheme through its three innovative implementation mechanisms. The mechanisms are designed to boost the cost-effectiveness of climate change mitigation by opening ways for Parties to cut emissions, or enhance 'sinks', more cheaply abroad than at home (***).The Compliance Committee established under 2001 Marrakash Accords and the Marrakash Declaration, monitors compliance levels with Protocol's legally binding commitment (UNFCCC 2001).

The countries of Asia-Pacific are committed to abide by international legal standards on climate change. As a testimony of their compliance, the two economic giants of Asia have set voluntary emissions targets. India and China have pledged to reduce emissions (20-25 per cent and 40-45 per cent respectively) by 2020 (Alingod 2009). The developed countries in the region are also making concerted efforts to adhere to their legally binding commitments.

Fostering climate-adaptive societies through international legal agreements

The effective implementation of UNFCCC and Protocol can go a long way in fostering climate adaptive societies in Asia-Pacific and across the world. The international solution to the global threat of climate change lies in strict adherence to UNFCCC's sublime goals of: Effective implementation of adaptation and mitigation strategies by all Parties; developed countries' compliance with legally binding emissions targets (as set by Protocol) and pursuing sustainable development model by all Parties to the Convention.

With best regards,

Hasna Cheema
Consultant
Human Development Report Unit
UNDP Regional Centre for Asia-Pacific, Colombo Office

Notes

(*) Greenhouse gases are natural and industrial gases that trap heat from Earth and warm the surface.
(**) Annex I Parties are industrialized countries and countries in transition to a market economy which took on obligations to reduce their GHGs emissions under the Kyoto Protocol. Annex II Parties are those countries that have a special obligation under the Kyoto Protocol to provide financial resources and transfer technology to developing countries.
(***) Joint implementation allows Annex I Parties to implement projects that reduce emissions, or increase removals using sinks, in other Annex I countries. A Clean Development Mechanism provides credit for financing emissions-reducing or emissions-avoiding projects in developing countries. An emissions trading regime will allow industrialized countries to buy and sell emissions credits amongst themselves (see Articles 4; 12 (2); 17 of the Kyoto Protocol).

About the contributor

Hasna Cheema is a lawyer and also holds a Masters degree in Political Science. She has over eight years of work experience with different UN organizations on development and human development issues of gender, governance and poverty. Currently she is a member of the Human Development Report Unit Team located at the UNDP Regional Centre for Asia-Pacific, Colombo Office. Her previous work includes assignments with UNDP HQ at New York, Fiji and United Nations Mission in Kosovo.

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Amelia Supetran wrote:

Facilitator's note (Pak Sum Low): Amelia Supetran has enriched the definition of a "climate-resilient" society (i.e., "one which will not only be able to adapt itself to the environmental changes and uncertainties brought on by a changing climate", but also "able to continue pursuing sustainable development despite seemingly insurmountable difficulties"). She stresses that "people take center stage" in both "climate resilience" and "human development" paradigms, "both as an end and a means of generating the most responsive solution". Human development indicators and targets (e.g., income, lifespan and education), and even barriers, will reflect a country's "potential or existing capacity for climate resilience". She believes that the "obvious response" "is to invest in generating knowledge", including that from communities, such as indigenous peoples, "on climate risks and coping mechanisms" based on "solid empirical climate related information", and the "strategies to improve the socio-economic status of the poor and vulnerable and systems that are critical for sustainable human development." However, "knowledge" must be translated into actions with the provision of financial resources "free of conditionalities", as well as development and transfer of technology, as agreed under the UNFCCC.

Dear Colleagues,

Vision of a climate-resilient society

Resilience connotes the capacity to absorb pressure from whatever source, using the opportunity to transform an adverse situation to a positive, more productive one for stakeholders. It also implies the ability to bounce back in a relatively short time frame after a devastating experience. A "climate resilient" society, therefore, is one which will not only be able to adapt itself to the environmental changes and uncertainties brought on by a changing climate but one which is able to continue pursuing sustainable development despite seemingly insurmountable difficulties.

This resilience is characterized by many dimensions which can be dissected at the operational, indicator level. At the heart of this notion is peoples' inherent desire to use knowledge and other tools at their disposal, not only to survive in the face of adversity, but also to strive towards a better quality of life. It points to the fact that people have the capacities to learn, innovate and evolve into higher societal forms that continually develop over time.

A society's level of resilience is, in itself, an indication of the degree to which it has achieved human development. A more "evolved" and developed society has enlarged choices, including the most appropriate development responses to a changing climate. Climate resilience and human development are, therefore, two sides of the same coin. In both paradigms, people take center stage, both as an end and a means of generating the most responsive solution.

Given this framework, the status of a country's human development indicators and targets, namely income, lifespan and education, can be starting points for analyzing its potential or existing capacity for climate resilience. Barriers to human development can then also potentially become barriers to climate resiliency. However, a deeper, more nuanced

analysis of the derivatives of these indicators should be undertaken, informed by experience on the ground, to generate practical, feasible response interventions.

For example, economic status and educational levels cannot be absolute indicators for climate resilience as many rich, educated people caught in climate disasters are just as devastated, vulnerable and have difficulty recovering as their poor counterparts. In fact, in many cases, the poor seem to develop coping mechanisms faster, especially when they have nowhere else to go. This seems to indicate that a factor which is more influential than money and social status is at work, influencing the way affected communities think, plan and act when faced with the same danger or risk the next time around. And this factor seems to be knowledge, which is really processed information. Knowledge doesn't only come from formal education; more importantly, it comes from experience.

History is rife with stories of communities who have coped over significant periods of time to climate variability and extremes such as indigenous peoples in fragile ecosystems or traditionally vulnerable communities in typhoon prone areas. In recent times, however, their capacity to cope is being outpaced by meteorological events, the timing and frequency of which are confounding us all. This seems to indicate that "experiential" information is not being processed fast enough into adaptation or coping measures. The obvious response, therefore, is to invest in generating knowledge on climate risks and coping mechanisms which is grounded on solid empirical climate related information, alongside strategies to improve the socio-economic status of the poor and vulnerable and systems that are critical for sustainable human development.

Knowledge must be coupled with wherewithal in order to translate intent into action. As the climate change imperative demands that countries pursue adaptation and mitigation in a balanced manner, other requirements like environmentally sound and climate friendly technologies should be made available in countries which do not have them, especially the developing ones. Technology transfer and technology development which also address the sustainable human development needs of the poor in developing countries should be facilitated. All of these imply that financial resources which are free of conditionalities, in order to respond flexibly to the specific needs of developing countries, should be made available as already agreed under the UN Framework Convention on Climate Change.

Cheers,

Amelia D. Supetran
Team Leader, Environment & Energy
UNDP Philippines

About the contributor

Amelia Supetran is currently the Team Leader of the Energy & Environment Team of UNDP Philippines. She has a background in Chemistry and served the Philippine Government's environment sector for more than 20 years.

Ramesh Gampat wrote:
Facilitator's note (Pak Sum Low): Ramesh Gampat provides "a dissenting voice to the notion of a climate-resilient society (CRS)". Based on the definition of "resilience" that "means recovery after a perturbation", he questions if "a society has the ability to completely recover" or "bounce back" from a temporary or even permanent "climatic perturbation". He also questions "the technical and economic viability of a CRS" beyond a certain yet-to-be established threshold, and suggests that the cost may be "prohibitive". He believes that "it is more useful to talk about the planet" rather than "a society or some societies, affected by and coping with climate change", though he finds "it difficult to conceive of a climate-resilient planet, given that earth is a closed ecosystem". I hope that this interesting and thought-provoking contribution will generate further debates and discussions.

Dear Network Members,

Questioning the idea of a climate-resilient society

I would like to add a dissenting voice to the notion of a climate-resilient society (CRS) for two reasons: a substantive one and a provocative one. On the substantive point (more below), the discussion to date seems to imply that there is no limit to a CRS, and, therefore, climate change is not a threat at all. Beyond this, I would like to provoke my fellow networkers to think out-of-the box and to ask deep questions about the technical and economic viability of a CRS beyond a certain threshold (which is yet to be established, as far as I know).

In the opening message, our Facilitator, Pak Sum Low, offered broad and insightful parameters for interpreting and discussing a CRS, but I think that the discussion is yet to address the issues he raised. For example, from a strictly semantic standpoint, "resilience" by definition means recovery after a perturbation. Two elements are central to this definition: factors that endow a society with its "recovery ability," and the temporary nature of the disturbance. The former is an internal feature of the society, while the latter is external in that it derives from the "environment" that cradles the society in an ecological sense. Therefore, the meaning of resilience is akin to that of unique: it cannot be more or less, since it suggests a return to the pre-perturbation status quo. That is, the response to the perturbation in all its rich dynamics, non-linearity and syntheses-restores the pre-perturbation equilibrium. If resilience and recovery are taken to mean the establishment of a new and more secure equilibrium after the perturbation, that's an even more sticker definition.

If the above interpretation correct, a CRS would imply that such a society has the ability to completely recover from a climatic perturbation that is *temporary* in nature-to bounce back to its equilibrium situation prior to the one-off external shock. This is perhaps true or perhaps it is debatable. But what if the climatic perturbation is *not* temporary but is instead permanent as the scientific literature suggests?

As I understand it, climate change does not happen abruptly, but builds up over a long period of time. Its effects accumulates, albeit gradually initially, but the changes it brings is irreversible at least within the next several thousand years or so. If this perspective is correct, the question arises: if the perturbation is permanent in nature and will probably become more pronounced over time, can we really speak of a CRS? If the answer if in the affirmative, one has to conclude that, if humans can engineer a CRS, then CC is not an issue. In other words, humans have the ability to cope with climate change whether that change is temporary or permanent. Climate change, then, is not the issue; the real issue is the willing to address climate change.

While I am not entirely against the notion of a CRS, I am against the implicit assumptions that the "bounce back" ability is limitless and that the perturbation is temporary. There must a threshold beyond which a society-indeed, planet earth-will be unable to cope, let alone bounce back from climate change. Our sun, for example, has only enough fuel (hydrogen) to last for another 5 billion years. But scientists believe that long before that life on earth will come to an end, which brings me to another issue. Since climate change is a global phenomenon, it affects all societies, rich and poor. Hence, it is more useful to talk about the planet, not a society or some societies, affected by and coping with climate change. And I find it difficult to conceive of a climate-resilient planet, given that earth is a closed ecosystem.

The technical, scientific issue aside, there is a simple mundane economic issue: cost and choice have not been factored into the climate-resilient society equation: will the cost necessary to endow a society be prohibitive? Resiliency is not a free good, like manna from heaven. It has a cost and beyond a certain threshold other things necessary for comfort and survival will be threatened. Either way, then, survival will be threatened.

Looking forward to your thoughts.

Ramesh
Deputy Programme Coordinator
Human Development Report Unit
UNDP Regional Centre for Asia-Pacific, Colombo Office

About the contributor

Ramesh Gampat, an economist, is the Deputy Coordinator of the Human Development Report Unit. He believes that too much has been written already on climate change; it is time to act. But there will be more hot air, as climate change illustrates a classic human dilemma: a greedy struggle to hog the benefits and dodge the costs. Privileged positions, entrenched interests and habitual modes of thinking are leading us into a dangerous cul-de-sac.

Ernesto Bautista wrote:
Facilitator's note (Pak Sum Low): Ernesto Bautista provides some equally thought-provoking comments on Ramesh Gampat's contribution posted yesterday. He points out that "the ability of society to completely recover from climate change disturbance" "will depend on a number of factors-state of knowledge, technology, resources, and institutions, among others". These factors will be "evolving over time" and they will shape the societies in reaching "different levels of 'equilibrium'". Indeed, the "state of knowledge, technology, resources, and institutions" are all part of the factors that affect the "vulnerability", and hence the ability of a society "to withstand or recover quickly from difficult conditions" caused by the adverse effects of climate change over short or longer term, as discussed in my Opening Statement for this sub-theme.

Dear Colleagues,

Many paths to developing resilient societies

Ramesh and the previous contribution provide us with a thought provoking discussion in raising some important issues. In his dissenting view Ramesh questions the ability of society to completely recover from climate change disturbance which he views to be more long lasting if not altogether permanent. He also suggests that perhaps we should think in terms of the planet rather than society or societies when discussing about climate change resilience since the effects of climate change affect not just some societies but the planet more generally.

I think that given the profound potential impact of climate change the ability of societies to be able to recover will vary substantially and may take a much longer time. Societies' ability will depend on a number of factors-state of knowledge, technology, resources, and institutions, among others. Indeed because knowledge and institutions usually take time to evolve so does the ability of society to bounce back. For those with more advance state of knowledge, technology and more developed institutions their adjustment maybe faster. In fact it is likely that a society will not achieve the 'equilibrium'. Or if that equilibrium is achieved it is not likely to be the equilibrium in a comparative static sense. This is because if climate change affects the initial conditions and given that the planet and societies evolve continually what we will have are societies reaching different equilibrium-in other words-multiple equilibrium points. In other words, societies will be located in different equilibrium points; some better than others. And the path to these equilibrium points will be shaped by each society's state of knowledge, institutions, etc. all of which will also be evolving over time. All these suggest that societies' ability to bounce is not limitless but is constrained by many factors; that societies' adjustment or ability to bounce will follow different paths, and in the process may end up in the long run at different levels of 'equilibrium'.

I look forward to your comments.

Regards,

Ernesto Bautista
Governance Team Leader
UNDP Pacific Centre, Fiji

About the contributor

Ernesto Bautista is an economist by academic training. He has worked with UNDP on economic and governance reform issues in Asia-Pacific and Eastern Africa both at the regional and national levels. He is currently the Governance Team Leader of the UNDP Pacific Centre in Suva, Fiji.

Itzá Castañeda wrote:

Facilitator's note (Pak Sum Low): Itzá Castañeda highlights that poor people "will be disproportionately affected by climate change", and in particular, she identifies a number of key "gender-differentiated impacts". These include: increased time "required for women" to manage livelihood (e.g., collecting water and firewood), which affects negatively their health; food insecurity and hunger due to "decreased production and productivity in agriculture (a highly 'feminized' sector), fisheries and forestry"; "increased conflicts driven by climate change and disasters can increase women's vulnerability to violence"; and impaired physical and mental health due to diseases (e.g., malaria and cholera) will increase women's burdens on "care responsibility". She stresses the need for a "gender and human-centred approach to development that includes environmental sustainability" "if the global community is to confront the costs and coordinate the response to the urgency of climate change", and a "gendered and rights - based analysis is likely to provide a richer understanding of the potential policy options in different countries and cultural contexts".

Dear Colleagues,

Gender-differentiated impacts

I would like to share some ideas regarding gender and climate change (*).

In order to explore the gender dimensions of climate change and environmental degradation, we must first identify a few of the key sectors and locations where climate change is likely to radically alter existing patterns of production and consumption. It is clear that people living in conditions of poverty worldwide and the majority of the populations of developing countries, will be disproportionately affected by climate change for three reasons: their location in parts of the globe that will register the greatest rise in surface temperatures and sea-level; their dependence on agriculture and environmental resources; and because they have fewer institutional and productive resources with which to mitigate the costs of climate change.

Some of the key gender-differentiated impacts of climate change are:

- The loss of between 15 and 40 percent of species due to extinction associated with global temperature increases of only 1-2°C (Stern 2007). Strong drying effects from changes in the hydrological cycle and wind patterns could result in the die-back of extensive areas of the ecosystems with the highest biodiversity on the planet. Increased time required for women's work on managing environmental resources (e.g. collecting water and firewood), makes it difficult for poor women to engage in other tasks and negatively impacts on their health due to the increased work burden.
- Rising temperatures, falling water tables, interrupted water cycles and drought will drastically reduce crop yields, especially in Africa, and are likely to deprive hundreds of millions of people of the ability to produce or purchase sufficient food. Decreased production and productivity in agriculture (a highly 'feminized' sector), fisheries and forestry, is likely to result in food insecurity and hunger.
- Melting glaciers will increase the risk of flooding during the wet season and significantly reduce dry-season water supplies to one-sixth of the world's population-most of those affected will be in the Indian sub-continent, parts of China, the Andes and South America (Stern 2007). Rising sea levels will contribute to land loss, coastal erosion and population displacement. The Stern Review (2007) projects that by the middle of the century close to 200 million people may become permanently displaced as a result of flooding, drought and rising sea levels.
- Loss of shelters, assets, family members, community networks, social capital and jobs may result in relocation and transition to new livelihoods, and increased conflicts driven by climate change and disasters can increase women's vulnerability to violence.
- Impaired health because of diseases such as malaria and cholera, and psychosocial problems not only impact women's health but also increase burdens on their care responsibility.

A gender and human-centred approach to development that includes environmental sustainability will be essential if the global community is to confront the costs and coordinate the response to the urgency of climate change. Moving beyond narrow measures of economic progress to include multidimensional measures and maximize human well-being and environmental quality is going to be critical in the next phase of human development in the twenty-first century. Such an approach must consider women's rights and the gender dimensions of human

progress both in the analysis of the distribution of costs and benefits and in the exploration of how vulnerable populations respond and adapt to climate change.

A gendered and rights-based analysis is likely to provide a richer understanding of the potential policy options in different countries and cultural contexts. What is more, without a gendered lens we are unlikely to harness the unique contributions that men and women can make to mitigating environmental degradation, adapting to or compensating for climate change, and ultimately conserving ecosystems and ensuring human and animal survival and well-being.

With best regards,

Itzá Castañeda
Senior Gender Advisor
UNDP Mexico

Note

(*) This contribution highlights some of the arguments presented in Castañeda Camey, Itzá, and Sarah Gammage. (Forthcoming). "Gender, global crises and climate change".

About the contributor

Itzá Castañeda is the Senior Gender Advisor at the UNDP Mexico Country Office. She is an expert on gender and the environment. She was the Director of Gender Equity in the Secretariat of Environment and Natural Resources of Mexico and has a long experience in environmental research and local capacity building in communities in Mexico and Central America. Her publications include: *Resource guide on gender and climate change (coordinator); In search of the lost gender: Equity in protected areas; About fishermen, fisherwomen, oceans and tides: A gender perspective in marine coastal zones; and The unavoidable current: Gender equity policies within the Mesoamerican environmental sector.* She is member of the Global Gender and Climate Alliance (GGCA) and the Gender and the Environment Network of Mexico.

Reference

Stern, Nicholas. 2007. *The economics of climate change: The Stern review.* Cambridge: Cambridge University Press.

Koos Neefjes wrote:
Facilitator's note: Based on the outcomes of "a policy dialogue on gender-climate change links", Koos Neefjes highlights the opportunities for improving gender equality in Viet Nam, where "women's participation in local political and management structures remains low" and "women have less influence in decision-making, less secure resource rights and are more likely to experience poverty". He describes how climate change "affects men and women differently" (e.g., women suffer from more mental and physical health problems; "limited access to livelihood assets"; and high female illiteracy rate, "especially in ethnic minority communities"). In order to make "development and climate change responses" equitable, "women's empowerment" must be placed at the "centre-stage". A number of recommendations were made to improve gender equality and increase climate resilience, including awareness raising; research; mainstreaming "gender-climate change links" "in policy and programs"; and creating "livelihood opportunities for women and female headed households" "as a key response to climatic stresses", among others.

Dear Network Members,

Responding to climate change in Viet Nam: Opportunities for improving gender equality

Through 2009 the UN and Oxfam in Viet Nam facilitated a policy dialogue on gender-climate change links. We did desk and field research on this topic, and concluded the work with a discussion paper presented in a high profile event.

We analyzed rural gender dimensions of climate change impacts and of greenhouse gas emissions mitigation. National

and international experts participated in the policy dialogues. The paper recommends policy actions to address both climate change and promote gender equality.

Following are some highlights.

We used a vulnerability and sustainable livelihoods framework in which vulnerability is defined as inability to cope with, resist or recover from shocks and stresses including climate change effects. Power relations between the sexes and gender roles in livelihoods are stressed, as they influence vulnerability and adaptive capacity of individuals, households and communities, and women have less influence in decision-making, less secure resource rights and are more likely to experience poverty.

We agreed that climate change adaptation and mitigation must achieve climate change objectives such as reducing vulnerability and increasing resilience to climate change shocks and stresses, as well as contribute to achieving gender equality. However, development and climate change responses can only be equitable if they place women's empowerment centre-stage. Actions to mitigate greenhouse gas emissions must also be gender sensitive.

Trends that influence how climate change affects women and men include the rising social inequality between rural and urban areas in Viet Nam, and between ethnic minorities and the majority. Resilience is improving with better living standards, but it is distributed unequally. Awareness of gender equality has increased, but this does not always translate into increased gender equality in practice, especially for ethnic minority women. Women's participation in household and community decision-making has increased, but men continue to make the final decisions in relation to large expenses, and women's participation in local political and management structures remains low.

Climate change affects men and women differently. For example, there are disproportionate effects on women's mental health related to natural disasters and women often eat less in times of food shortage and suffer more health problems for example due to lack of clean water. Both men and women experience increased workloads during disasters, but women are primarily responsible for household food supply and water collection, which is arduous during natural disasters such as floods and droughts.

Many women in rural areas are taking on more agricultural tasks as a result of male out-migration and local non-farm employment. At the same time, women have limited access to livelihood assets which would enable them to cope with major shocks and stresses. Men and women identify different measures in response to climate change, yet women's voices are not being heard in decision-making on natural resources management and disaster management, despite their central roles and responsibilities.

Women have generally good access to micro-credit but their access to larger scale credit, an important coping mechanism in the face of shocks and crises, is more limited, as women are less likely to have their names on land use certificates which are required as collateral.

While education is seen as an escape route from poverty, girls leave school earlier than boys, and female illiteracy rates remain high, especially in ethnic minority communities. Young people who do gain an education tend not to return to their remote homes.

Teenage boys and girls identified many ways to increase climate resilience, such as learning and investment in new technologies, investment in education, and awareness raising. Girls focused on small-scale technologies and social investment in our dialogues on responses to climate change, while boys focused more on technological and industrial shifts.

Recommendations include the following:

- Raise awareness on both climate change and gender equality and promote women and girls' education.
- Improve the research base on gender and climate change links.
- Ensure that gender-climate change links are mainstreamed in policy and programs.
- Improve women's participation in decision-making on climate change.
- Protect women's rights in particular during and after disasters.

- Create livelihood opportunities for women and female headed households, including rural livelihood diversification and migration, as a key response to climatic stresses.

Please see for more details our joint paper, referenced below.

With best wishes,

Koos Neefjes
Policy Advisor Climate Change
UNDP Viet Nam

About the contributor

Koos Neefjes has worked on sustainable development questions in nearly 30 countries over the past 25 years, in both advisory and management positions. He has lived in Viet Nam for the past 10 years and is currently Policy Advisor Climate Change with UNDP in Viet Nam, where he advises the Government on climate change policy; facilitates policy dialogues; performs and manages policy-relevant research; and supports donor coordination. He leads the UNDP in Viet Nam on climate change, and supports the wider UN in climate change policy work as well as program development.

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United Nations, and Oxfam in Viet Nam. 2009. *Responding to climate change in Viet Nam: opportunities for improving gender equality. A policy discussion paper.* Hanoi: UN & Oxfam in Viet Nam. [http://www.un.org.vn/index.php?option=com_docman&task=doc_details&gid=110&Itemid=266&lang=en]. Last accessed on 17 February 2010.

Ramachandran Ramasamy wrote:
Facilitator's note (Pak Sum Low): Ramachandran Ramasamy highlights the importance of good governance (e.g., transparency, openness, responsibility, accountability, adherence to the rule of law, and community participation in decision-making processes) "at all levels", including "international levels" for "the development of a climate-resilient society". He observes that "the governance elements and processes at national and international levels are taking new shapes and forms" because of the new information communication technologies, such as "Internet and borderless mobile communications and networking". The "net-citizenry or e-governance groups" are "emerging as powerful forces in the world addressing various issues, problems and challenges that are concerning the welfare of global population", and these groups could help to bring "good practices" in "national governance" and to develop a "corruption-free" and a "a climate-resilient society".

Dear Network Members,

Emerging net-citizenry governance groups

Like building any other types of society in development domains, the development of a climate-resilient society also requires good governance at all levels, including at international levels. Elements of good governance such as transparency, openness, responsibility, accountability, adherence to the rule of law and community participation in decision making processes are imperative for creating a climate-resilient society. Today the challenge is that the global countries are at different levels of progress socially, economically and politically. Community participation at all levels and in all spheres of development can become restricted when traditional forms of governance are very restrictive in nature. Therefore, under such circumstances it will be a formidable challenge to realize a climate-resilient society, as the definition of the nomenclature "resilient" connotes, not only ability to withstand and recover but also to "respond quickly and effectively" to difficult conditions or difficult times, when encountered.

It must be also reckoned that, the detrimental effects of environment and elements of climate change are fast becoming pervasive and ubiquitous as well as borderless and affect both, rich and poor, educated and not educated. It is not merely a national issue, rather global in nature. Thus, the pertinent questions that need to be addressed how many

countries or societies in the world, particularly in the Asia-Pacific, can rise up to such an envisaged resilient level? If not, how well global nations could leverage with one another in combating the ill practices that affect environment and climate as well as people's livelihoods? How long will it take to develop climate-resilient societies? At least at this juncture only very little was achieved when global nations gather at the climate change summit in December 2009 at Copenhagen. The achievement was that the summit organizers were able to bring together policy makers, development practitioners, academia, media and industry players from all over the world; however the real global emission reduction targets could not be achieved for various known and unknown reasons. But, one reason is clear that some countries drive their own development agenda, that is monetary driven, rather than promulgating agendas that can ensure sustainable development and survival of human race.

Nevertheless, with the advent of new age technologies like Internet and borderless mobile communications and networking the governance elements and processes at national and international levels are taking new shapes and forms. In particular, net citizen groups are formed on various topics and such groups constitute of global members irrespective race, colour, religion, creed, culture, language and traditions. Such groups are already exist in the world and whenever need arises they make the requisite policy and advocacy interventions. Indeed, such groups are emerging as powerful forces in the world addressing various issues, problems and challenges that are concerning welfare of global population. Thus, towards creating a climate-resilient society formation of such net-citizenry or e-governance groups warrant due attention. It is envisaged that in the near future size of any net-citizenry group can be even grow bigger than the most populated nations in the world. When they are truly united for a common cause they can withstand any detrimental or negative agendas that affect quality and dignity of living of global population, including the poor and marginalized.

When such global forces continue to emerge in big number in various forms, I believe, automatically national governance will be compelled to evolve to adopt good practices in order to avert their own destruction socially, economically and politically. Realizing the growing new age socio-economic and political imperatives, governments are also compelled to take proactive actions of educating the masses about corruption-free society and integrity. In fact we are witnessing that the contemporary ICT is helping to develop a climate-resilient society.

With best regards,

Ramachandran Ramasamy
Head of Policy, Capability and Research
The National ICT Association of Malaysia

About the contributor

Ramachandran Ramasamy, a statistician, has a work experience of 30 years. In the last 10 years he has worked in the area of ICT policy research. He is currently the Head of Policy, Capability and Research at the National ICT Association of Malaysia, also known as PIKOM.

Andrea De Angelis and Gørild Heggelund wrote:
Facilitator's note (Pak Sum Low): Andrea De Angelis and Gørild Heggelund highlight the importance of the social dimension in building a climate-resilient society. They stress the need to enhance "the self-capacity of the communities", including the "capacity of adaptation (or preparedness)" as "an integral part of human development", with "tools and instruments" that can be provided through (a) economic growth; (b) social protection policies; and (c) balanced (especially from the local and national perspectives) systems of governance. All three elements are essential and mutually supportive. Citing China as an example, they point out the need "to focus on the link between poverty and climate change in order to make robust the capacity development at community-level", and conclude that "enhancing human development" (e.g., education, including health education, and "training for trainers" for "vulnerable populations") will strengthen "the response capacity and will improve the resilience of the communities at risk".

Dear Network Members,

The importance of social dimension in building a climate-resilient society

The resilient society

The challenges of the 21st century call for a paradigm shift in development practice, by recognizing the nexus among climate change adaptation, reducing inequality and poverty reduction. This new paradigm requires that development assistance supports resilience and adaptive capacities of human, natural and economic systems. Countries are increasingly required to develop national policies and framework that integrate climate change and development across multiple sectors, especially for the most vulnerable communities. Furthermore, several international papers and strategic plans are calling for the design of integrated adaptation and mitigation policies and strategies.

Since the development of the ecological science (Holling 1973), resilience has been generally associated with "the capacity of an ecosystem to deal with hazards or to withstand from difficult conditions". Though, the concept has been gradually linked to the ability of a community (or societies) to be reactive-or proactive. This capacity on behalf of a community to respond was intended in respect to the occurrence of specific threats and/or specific impacts. In other words a resilient society will be able to transform single actions performed by its individuals in innovative (or produced) social action (Touraine 1977).

Dimensions of a climate-resilient society

Under these premises, descending from the needed progression of human development to accomplish the objective of an increase of the human choices, the measure of a resilient community would seem to be the capacity of self-endowment with tailored instruments and tools to respond to climate change.

According to new sustainable development paradigms, tools and instruments are provided through three major channels: a) the economic growth and the possibility to find ways to be endowed with tools and instruments; b) social protection policies provisions; c) balanced (especially from the local and national point of view) systems of governance. An analysis of the resilience to the impact of climate change in the Asia-Pacific region must always take into account the enormous (local and national) heterogeneity in the delivery of growth, social protection and governance. These drivers must then cope with the self-capacity of the communities in being prepared to respond to the threats they are exposed to.

In principle, the capacity of a community to become self-sufficient in the availability tools and instruments of response to climate change - and therefore being more resilient-is encouraged, increased and enhanced by the three dimensions. But sometimes, as it is the case of the villages affected by the Yangtze river floods (*), resilience is also an issue of dealing with old, existing and well-known threats (**) to society, which must find long-term and stable solutions.

Paradoxically, if we strictly focus on the theme of preparedness, there are some poor rural communities, (self-provided) with capacities of response, more resilient than some affluent urban communities to face an unexpected emergency situation. This point was stressed in this forum by Dr. Chew-Hung Chang on the case of the Katrina Hurricane floods, as well.

Resilience and adaptation

Regarding much part of adaptation issues, such as floods, droughts and desertification or health issues, it seems an easier task to control the risks descending from the threats than manage the threat in order to eliminate it. Therefore, resilience becomes synonym of capacity of adaptation (or preparedness) on behalf of social communities rather than meaning the full recovery of the environmental and socio-economic conditions preceding the impacts.

Resilience, climate change and poverty

For many communities increasing their own capacity of adaptation is an integral part of human development. Climate change has been identified as an increasing threat to and major challenge of achieving development goals and poverty

eradication. In China for instance, poverty alleviation achieved in some areas in the last decades may be reverted as is portrayed in a report by Greenpeace and Oxfam (Xu Yinling and Ju Hui 2009). Thus, there is a need to focus on the link between poverty and climate change in order to make robust the capacity development at community-level (***).

On the relationship between climate change, disaster and vulnerability, integrating mitigation and adaptation under the need to address poverty alleviation will be a necessary step to increase the performances of governance and social response. According to the Chinese Government's White Paper on Climate Change (2008), adaptation has become a real priority. In China, the National Assessment Report on Climate Change illustrated the country's vulnerability to climate change. The impacts of climate change may make it harder for China to continue with its poverty reduction efforts in the ecologically most vulnerable areas. A 2nd National Assessment Report is being prepared to be published in 2010.

The social dimension of resilience and UNDP Human Development Reports

Based on the pre-conditions above we conclude that the reduction of risk in China can be realized and managed taking into due account the delivery of social protection tools, as the National Chinese Human Development 2007-2008 (UNDP China 2008) has already shown, focusing on the public services.

The mere economic growth and good governance measures and policies cannot be automatically translated into punctual tools and instruments of defense or protection from the impact of climate change, if they are not followed by the growth of social self-awareness, social action and supported by solid social protection measures. Resilience, in the sense of social response, seems to be a concept that is more substantial than any other when we are dealing with the adaptation of people to changing climatic conditions (****).

Education schemes, training for trainers, health education responses in many situations are the sole key provided to vulnerable populations that appear exposed to new threats represented by Climate Change. As is demonstrated by the forthcoming National Human Development Report 2009/10, *China and a Sustainable Future: Towards a Low Carbon Economy and Sustainable Society*, enhancing human development will increase and enhance the response capacity and will improve the resilience of the communities at risk (*****).

With best regards,

Andrea De Angelis, Senior Advisor on Climate Change
Gørild Heggelund (PhD), Senior Climate Change Advisor
Policy Support Team, UNDP China

Notes

(*) There were 178 extreme floods event recorded in the Yangtze River catchment between 2nd and 20th century (Becker *et al.* 2004: 343). Six regional or basin wide heavy floods occurred in the 90s with the greatest losses in the history. According to WWF (2009), the main threats are declines in crop production, and rising sea levels, which will make coastal cities such as Shanghai vulnerable. Some of the problems could be averted by strengthening river reinforcements, and switching to hardier crops.
(**) With regard to the threats posed, it may be noted that Yangtze River Basin is a region struggling to contend with the environmental problems arising from population pressure and rapid economic development. The growth of China's population is heavily concentrated along the major river valleys. With an unprecedented economic boom, the pressure on natural resources is also increasing. There are also threats to biodiversity. Yangtze and particularly the Minshan have been threatened for many years by state-owned timber production and agricultural encroachment. In only 15 years (between 1974 and 1989), half of all the forest once occupied by giant pandas in Sichuan Province was wiped out by commercial logging. Almost all the natural habitats, including nature reserves, face pressure from people in surrounding communities. Ill-planned hydrological engineering projects and infrastructure projects in the flood plain have destroyed ecosystems and driven species out of their natural homes.
(***) The strengthening of resilience must be related with the hard-core poor that are located in fragile eco-systems and face pressure from changes in the climate.

(****) Furthermore, the capacity to create social models of cohesion and response becomes for the poorest and the most vulnerable (where economic growth and good governance are out of sight) the sole tool of survival, and the only possible response to the incumbent threats.
(*****) This capacity of response will be not only limited to the adaptation but will be carried out also in response of the need of mitigate the climate from un-necessary emissions. The linear relationship existing in China between human developed and carbon productive provinces is a surprising and convincing argument that must be taken solidly into account, when we are dealing with the vision of societies that we should assist to become more resilient to climate change. Human development enhances the capacity of response to both mitigation and adaptation.

About the contributors

Andrea De Angelis has more than 12 years of experience in bilateral and multilateral institutional relationships with governments and international organizations (in China and Eastern Europe), and as advisor on climate change projects and policies, particularly on CDM. Before joining UNDP, between 2001 and 2006, as envoy from Italian Ministry of the Environment to China, he started up and directed a bilateral cooperation program, the Sino-Italian Cooperation Program for Environmental Protection in Beijing, leading the initiatives related to address, bilaterally, Climate Change. De Angelis completed a Master degree in Political Science on International Law, University of Rome.

Before joining UNDP China in May 2009, Gørild Heggelund has worked as Senior Research Fellow and acted as Director of Global Programme at the Fridtjof Nansen Institute, Norway for a number of years. She completed a PhD in 2002 at the University of Oslo on the environmental and resettlement policies for the Three Gorges Dam, published as a book in 2004 (Environment and Resettlement Politics in China: The Three Gorges Project). Heggelund has studied and worked in China for a number of years, including in the UNDP China office with responsibility for energy and environmental projects.

Together, they have contributed to the Air Management chapter (Energy and Transport) as well as the International Cooperation chapter (Climate Change) of the "Environmental Performance Review" of China, published by OECD in 2007.

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Sarwat Chowdhury wrote:

Facilitator's note (Pak Sum Low): Sarwat Chowdhury prefers the term 'climate-conscious society' rather than 'climate-resilient society', as it is not possible "for societies facing the manifold impacts of climate change to rebound back to their original state" since the situation cannot be 'elastic'. She points out that "even seemingly natural renewable resources" (e.g., soil, groundwater, and biomass, among others) "can be degraded or degenerated to such an extent that their renewable usefulness for future generations is lost." Citing Bangladesh as an example, she highlights that "the improved disaster management practices" (e.g., significantly reduced death tolls in cyclone Sidr in 2007 compared to the 1991 cyclone of comparable magnitude; "floating gardens to grow vegetables" "for the villagers in times of prolonged floods") do not really make the societies "resilient", as they are "merely coping below a threshold". This "sub-subsistence 'resilience'" simply indicates that the people have "adjusted to a new normal". She believes that a 'climate-resilient' or 'climate-conscious' society is "one that lives within its means and houses a population that does not exhaust its natural resources with continued impacts of overarching carbon footprints on other societies as well". She calls for "a drastic change in lifestyle" to reduce our carbon footprint.

Dear colleagues,

Vision of a climate-resilient/climate-conscious society

I would like to add to the discussion, especially in terms of the issues raised on the connotations of a 'climate-resilient society'. Since the term came into vogue, I have found its usage problematic since it seems to rise from the assumption that it is possible for societies facing the manifold impacts of climate change to rebound back to their original state. Can the situation be as elastic as the term seems to suggest?

Over-usage of nonrenewable resources including fossil fuels has long-term adverse impacts on the ecology as evidenced from the negative impacts of climate change. However, some sustainable development-related literature suggests that even seemingly natural renewable resources can be degraded or degenerated to such an extent that their renewable usefulness for future generations is lost. This can include resources such as soil, groundwater, and biomass among others. With mono-cultural production practices, we have already lost valuable species of flora and fauna and this loss in biodiversity cannot be compensated (a point we should take special note of as this is the International Year of Biodiversity). With continued increases in the emission of greenhouse gases, climate change impacts on biodiversity will not be welcome. I think these realities call for a drastic change in lifestyle especially for those of us who live and/work in urban areas of the world. In that context, I think there is merit in livelihoods that are dependent on local resources (e.g., consuming locally grown/made food, biking/walking to work and using public transportation, etc.) instead of continuing with the business-as-usual approach of expanding our carbon footprint by importing consumer goods from overseas or even different parts of the same country (and using cars for commuting/traveling etc.). This type of lifestyle choice implies conscious changes prior to adverse impacts of climate change become too aggressive. I believe the environmental movement has not been as successful as it could have been in convincing more people to make such adjustments, especially in relatively richer countries or richer sections of developing countries. New techniques that promote positive behavior should be explored (such as those being popularized through behavioral economics, which seek to promote socially valuable behavior through a person's self perceptions vis-à-vis their peers).

The example highlighted here, I think, is an example of anticipatory adaptation in a so called 'climate-resilient society' though I would prefer to use a term like 'climate-conscious society' because I think in practical sense, policy makers would be aiming for the latter. I think it is very important that in such a society (whatever term we choose to address it as) a main policy concern would be to reduce the rich-poor divide within that society.

To go back to the idea of 'resilience', we can cite examples of success stories, e.g., in terms of less damage and loss of life due to improved disaster management practices in countries like Bangladesh. A popular example is comparing the death tolls in the cyclone of 1991 with cyclone Sidr in 2007 of comparable magnitude in Bangladesh. In the former, the loss of lives was about 140,000 (World Bank 2000); and in the latter it was about 3,400 (Government of Bangladesh 2008). There is also the practice of floating gardens to grow vegetables as food for the villagers in times of prolonged floods; which is sometimes cited. However, as I understand it, these societies are not really resilient. They are merely coping below a threshold that would be unacceptable for people in say, a western European country. This sub-subsistence 'resilience' is exposed if one goes back to the villages a few years after the natural disasters have taken place. People may seem to be thriving again but when one becomes familiar with their personal stories, things are not necessarily back to where they were prior to the disaster. They have adjusted to a new normal, and because there has been neither a social nor political revolution in the meantime, we draw the wrong conclusions. In this sense, the society might be adjusting to new levels of sub-subsistence; and people might be forced into becoming more compliant and conservative because of their vulnerability, but it can hardly be described as a society that has built back better. This is why I think it is important to unpack this concept further and consider how people cope, and how they respond the way they do, before we ascribe unanalyzed labels to them.

My view of a 'climate-resilient' or 'climate-conscious' society is therefore one that lives within its means and houses a population that does not exhaust its natural resources with continued impacts of overarching carbon footprints on other societies as well.

More generally, the concept of resilience seems to have taken hold in other conversations as well. UNDP's major capacity development event in March is occurring under the banner "Capacity is Development: Smart Strategies and Capable Institutions for Resilient Societies". I expect questions about the meaning of resilience will be discussed there also.

Best regards,

Sarwat Chowdhury
Consultant
EEG/BDP
UNDP, New York

About the contributor

Sarwat Chowdhury is a consultant at the Environment & Energy Group, Bureau for Development Policy, UNDP. Previously, she worked as a Programme Specialist at Regional Bureau for Asia and the Pacific at UNDP, NY. For the last ten years, she has been working on climate change, energy and disaster management issues for international organizations including DfID, UNDP-GEF, World Bank and NGOs such as Grameen Bank, Greenpeace and SciDev.net. She was the task manager of a World Bank report on Climate Change Adaptation in Bangladesh during 1999-2000. Her PhD thesis from University of Maryland (2003) focused on renewable energy development in rural Bangladesh.

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Moisés Herrezuelo López wrote:

Facilitator's note (Pak Sum Low): Moisés Herrezuelo López highlights the need for effective adaptive strategies "to build climate-resilient societies and to secure livelihood options", especially in poor countries in view of the significant impact of climate change on "physical and biological systems globally". The low elevation coastal zones with high population density are particularly vulnerable. He foresees the "catastrophic impact on people's lives across the globe", such as "water availability and agricultural productivity, extreme temperatures/droughts, the risk of forest fire, etc.", if the global air temperature increases to 4°C. He illustrates this potential impact with the melting of Himalayan glaciers, which supply freshwater to the Ganges, Indus, Brahmaputra, Salween, Mekong, Yangtze and Yellow rivers, on which two billion people or "one third of the world's population" depend for livelihoods. Thus, "political will, appropriate investments and funding", and green technology are needed to turn a "vulnerable society" into a "climate-resilient society". I would like to add that the current international debate on the "dangerous" level of global temperature increase is focusing on 1.5°C or 2°C. The 2°C limit is provided in the Copenhagen Accord, while the 1.5°C limit has been strongly advocated by many developing countries, especially the small island developing states and the least developed countries.

Dear Network Members,

From a vulnerable society to a climate-resilient society

Climate change is a very important issue, especially considering its effect on people-the heart of this e-discussion. Adaptation to climate change is already taking place, but on a limited scale. Adaptive strategies are needed to build climate-resilient societies and to secure livelihood options. The effectiveness of these strategies could be increased if adaptive capacity is strengthened across and within societies.

Different and significant changes in physical and biological systems are occurring on all continents and in most oceans (see Rosenzwei *et al.* 2008). Most of these changes are in the expected direction, with an increase in the global surface temperatures and in sea level. Anthropogenic climate change, and climate change in general, is having a very significant impact on physical and biological systems globally.

Clearly, the issue of global warming needs to be addressed seriously without any delay. As highlighted in the Stern Review (2006), developing regions are "at a geographic disadvantage: they are already warmer, on average, than developed regions, and they also suffer from high rainfall variability. As a result, further warming will bring poor countries high costs and few benefits. Second, developing countries-in particular the poorest-are heavily dependent on agriculture, the most climate-sensitive of all economic sectors, and suffer from inadequate health provision and low-quality public services. Third, their low incomes and vulnerabilities make adaptation to climate change particularly difficult".

This issue is particularly important for costal environments. According to a review of the population and urban settlement patterns in the Low Elevation Coastal Zone (LECZ) (*), many countries with a large share of their population in this zone are small island countries (**). But most of the countries with large populations in the zone are large countries with heavily populated delta regions. On average, the Least Developed Countries have a higher share of their population living in the zone (14 per cent). In some countries (most notably China), urbanization is driving a movement in population towards the coast (McGranahan and Anderson 2007).

Continued greenhouse gas emissions at or above current rates would cause further warming. This will induce changes in the global climate system during the 21st century, which would very likely be larger than those observed during the 20th century. In Asia, warming greater than the global mean is projected for South Asia (3.3°C) and East Asia (3.3°C), and much more than the global mean in the continental interior of Asia (e.g., 3.7°C in central Asia, and 4.3°C in northern Asia) (Christensen *et al.* 2007).

Studies have considered an increase of 4 degrees Celsius: the impact on people's lives across the globe would be catastrophic (see UK Government 2010). The effects across the planet would include a reduction in water availability and agricultural productivity, extreme temperatures/droughts, the risk of forest fire, etc. As the snow and the glaciers represent an essential source of water on the planet, this will impact people's life. To understand the magnitude of this

impact (***), it may be useful to highlight that the Himalayan region provides freshwater to one third of the world's population. By supplying water to the Ganges, Indus, Brahmaputra, Salween, Mekong, Yangtze and Huang rivers, glaciers in this area ensure a year-round water supply to 2 billion people (UNESCO 2009: 20). In densely populated regions in China and South-East Asia, the increase in temperature could affect the agricultural productivity with a reduction in rice crops of 30 per cent and wheat and maize crops of 40 per cent in Bangladesh, China, India and Indonesia. (Arup 2009).

This will also translate into migration. But how would this exodus be politically acceptable? Therefore, political will, appropriate investments and funding are needed. Green technology should become profitable. Demand seems to exist already, also thanks to the incentives introduced to encourage business and consumers to adopt technologies that are eco-friendly (see, for example, Foo 2009).

With best regards,

Moisés Herrezuelo López
Spain & Portugal Director
Head of IT Management
Security and Strategy Research Manager
Track & Catch

Notes

(*) This is defined as "the contiguous area along the coast that is less than 10 metres above sea level. Overall, this zone covers 2 per cent of the world's land area but contains 10 per cent of the world's population and 13 per cent of the world's urban population" (McGranahan and Anderson 2007: 17).
(**) For specific information on small islands' vulnerabilities to climate change, sea-level rise and extreme events, please see Minura *et al.* 2007.
(***) Studies have already shown that there has already been a change in the river flows. From 1948 to 2004 the stream flow of about one-third of the world's largest rivers has recorded significant changes. Of those, the rivers with decreased flow outnumbered those with increased flow by a ratio of about 2.5 to 1 (NCAR 2009).

About the contributor

Moisés Herrezuelo López is a computer engineer, with a master in neuroscience & biological behaviour. He is an analyst in strategies for secure supply, and he conducts research on emergency future risk.

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Amitava Mukherjee wrote:

Facilitator's note: Amitava Mukherjee points out that "poverty reduction" is "the best medicine for combating climate change". "One of the measures for alleviating poverty" is to limit "population growth", which has significant implications for demand on natural resources; urbanization (e.g., provision of basic services, such as waste management, water, energy and sanitation); food security; environmental quality; and "access to primary health care and education".

Dear Colleagues,

Poverty alleviation: Best elixir for mitigating climate change

I have been reading a lot of very interesting things about climate change and resilient societies through this e-discussion. Thanks to everyone.

I was wondering how developing countries can contribute to building a resilient society in the face of climate change. An important point that needs serious consideration and immediate action is "poverty reduction as the best medicine for combating climate change". Unless poverty is tackled, pollution will grow, green house gas emissions will continue unabated and measure to deal with climate change (both mitigation and adaptation) will yield sub-optimal results.

Take the case of poverty and population growth. One of the measures for alleviating poverty is reduction in fertility rates in the developing world; if fertility rates decline rapidly in the developing countries, the impact on climate change will be singularly spectacular through lower demand on natural resources. It is true that "a large collection of people, especially in densely populated (but low emission) slums is more visible than the embodied emissions in a kilo of meat or a designer handbag" but there are sound reasons for causing fertility decline, particularly local environmental ones (Doll 2010).

It is important to listen to various projections on urbanisation. Population in ESCAP Region (which is roughly the Asia-Pacific Region) is projected to grow from 4.7 billion in 2005 to 5.1 billion by 2050. The entire population growth will take place in developing countries and it will occur wholly in urban areas, which will swell to 3.41 billion people (up from 1.68 billion in 2007) as rural population contract (from 2.39 billion in 2007) to 1.75 billion by 2050 in the ESCAP Region (*). By 2050 if most of the poor move to cities in the developing countries in our region, the impact

on waste management, water supply, sanitation and other key basic services, including a much higher elevated demand for energy and water, in urban areas will be devastating. The urban areas are already bursting at their seams with the present population load; fresh influx of people without fresh injections of massive doses of capital (which is very unlikely) will only worsen the situation.

The new urban people from the rural areas will also face a very new kind of serious food insecurity as a vital source of food supply for them from the commons will no longer be available. Though they may have economic access to food (in terms of wages etc.), food availability will be a critical problem, not only because they will rely increasingly only on food produced by the use of technology but because the nature of food demand itself will change, making greater demand on environmental resources. Furthermore, food security will be compromised, through poorer food utilization and food absorption, due to poorer quality of water, lower sanitation and lack of access to primary health care and education.

Thanks and regards,

Dr. Amitava Mukherjee
Senior Project Expert
Macroeconomic Policy and Development Division
United Nations Economic and Social Commission for Asia and the Pacific, Bangkok

Note

(*) Author's calculations on the basis of UNDESA Data.

About the contributor

Dr. Mukherjee has nearly 35 years experience in development especially in areas of poverty alleviation and hunger; planning for livelihood development and capacity building. He was Advisor and Project Head of the Planning Commission of India Project on decentralised planning Government of India; and a consultant to various international agencies. He has worked in many countries in Asia-Pacific, and in a few African countries. He is currently working on development issues confronting Democratic Republic of Korea.

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Kishan Khoday and Usha Natarajan wrote:

Facilitator's note: Kishan Khoday and Usha Natarajan highlight how the "changing nature of society" will also be central for understanding the nature of "a climate resilience society" and for design of effective responses. Amid "the rapid shift of geopolitical power from West to East and the emergence of a more multi-polar world", they have identified "three main challenges and opportunities" that will shape the "vision of climate resilience in Asia": (i) "Asia's own perspectives on climate resilience and social equity", including adaptive governance measures; (ii) the "rapid changes taking place within Asian society", and "the need to address sub-national disparities in human development and climate vulnerability, and the need for regional governance measures to prevent the risk of conflicts"; and (iii) Asia's "own pathways" to engage local communities **"beyond science and engage new social narratives"** on the risks from climate change. They emphasize the "potentially transformative role of civil society" as "both global consumers and local agents of change", who can "generate a forward-looking vision of multilateralism and galvanize a new generation of global environmental citizens across Asia" to address the emerging "common concern of humanity".

Dear Network Members,

Climate change in a multi-polar world

When thinking about the vision of a climate resilience society, two key concepts are critical-**complexity and adaptive governance.** Our ability to develop systems of resilience, towards the goal of achieving and sustaining human development, will be shaped by our ability to analyze and act on a complex array of social, economic, and ecological drivers of change. Beyond the technical and scientific aspects of climate resilience, a key concern will be the ways in which we adapt socio-political processes to address new levels of complexity arising from climate change. The concept of a climate resilience society will be defined not only by the nature of risk and resilience, but also by the **changing nature of society.**

As we look to the future, climate governance will no longer be driven solely by the historical fault lines between developed and developing societies. It will also need to address the complexity of changes taking place as a result of the rapid shift of geopolitical power from West to East and the **emergence of a more multi-polar world society.** While attention has been given to the economic implications of this transformation, the social and ecological implication of this transition will be equally profound. Three main challenges and opportunities can be identified.

First, **Asia's own perspectives on climate resilience and social equity** will increasingly shape the global discourse on climate change and our ability to craft meaningful adaptive governance measures. The UN Climate Change Conference in Copenhagen in 2009 (COP15) served as an example of how the shifting balance of power to Asia will determine the ways we define and act on climate risks. Countries like China, India and Indonesia share a common concern that their inclusion in hard emission targets would slow growth-a situation perceived to be unfair given the history of carbon-intensive growth in the West, and contrary to their right to development. In the past, issues of equity and fairness were often deemed secondary concerns taking a back seat to the scientific basis of climate change and the technical design of technology transfer and finance mechanisms. The assumption had been that global frameworks and norms had already reached maturity, and the remaining issues were ones of compliance, market incentives, and technology. There had been little recognition that the normative base for climate policy required reforming. Copenhagen showed not only the continued resonance of issues of fairness and equity, but also the increasing influence of Asia in placing such concerns at the center of the debate.

Second, apart from the reorientation of global discourse between developed and developing societies, our vision of climate resilience in Asia will also be shaped by the **rapid changes taking place within Asian society** and the consequences for crafting effective adaptive governance measures. As globalization and middle-class consumerism continues to expand, Asia will itself become an important source of emissions and proximate cause for climate impacts in the region, from the shifting of the monsoon and the melting of the Himalayan glaciers, to the devastating toll from increasingly-frequent Pacific storms. While past and current debates rightly focus on the historic climate debt of the West for climate impacts, our ability to craft adaptive governance measures in the 21st century will also need to address sub-national disparities in human development and climate vulnerability, and the need for regional governance measures to prevent the risk of conflicts.

Last, but not least, Asia will need to find its own pathways to addressing these issues, potentially leapfrogging the policies and cultural mindsets that have prevailed in the West. While the IPCC Fourth Assessment Report and the science of climate change continue to drive the global process, there is a **need to go beyond science and engage new social narratives** on the risks that ecological change bring for sustaining Asia's hard won development gains. The vision of a more climate-resilient and low-carbon society needs to include the potentially transformative role of civil society in Asia as both global consumers and local agents of change. This can generate a forward-looking vision of multilateralism and galvanize a new generation of environmental citizens across Asia to address what is quickly emerging as a common concern of humanity.

With best regards,

Kishan Khoday, Deputy Resident Representative, UNDP Saudi Arabia
Usha Natarajan, Legal Research Fellow, Centre for International Sustainable Development Law, Canada

About the contributors

Kishan Khoday served as Sustainable Development Advisor and Deputy Coordinator for Environment UNDP Indonesia (1997-2005), Assistant Resident Representative and Team Leader for Energy & Environment UNDP China (2005-2009), and currently as Deputy Resident Representative UNDP Saudi Arabia. He may be contacted at kishan.khoday@undp.org.

Usha Natarajan holds a PhD in Third World approaches to international law and served as Assistant to the UN Special Ambassador for the MDGs in Asia and the Pacific (2003-2004). She is currently based in Riyadh from where she serves as Legal Research Fellow with the Centre for International Sustainable Development Law, Canada.

Mai Van Trinh wrote:
Facilitator's note: Mai Van Trinh sees the linkage between climate resilience and sustainable development. He believes that "climate resilience should not be confined to climate preparedness but to embrace sustainable use of natural resources, energy, and greenhouse gases emission reduction". "Strengthening or building human and institution capacity" for all stakeholders at all levels in "different sectors", including "policy makers, professional and administrators"; strong "government regulations and policies"; "active media"; development of "science and technology" (e.g., data and information dissemination; climate prediction; mitigation and adaptation); and "traditional knowledge" on adaptation based on good farming practices and experience in various climatic conditions; are essential elements for "building a more climate-resilient society". He highlights the research gaps on vulnerability assessment and response preparedness in Viet Nam, not only in cities, but especially in rural communities where nearly 72 per cent of the population live.

Dear Network Members,

Vision to climate-resilient and some experiences from Viet Nam

I understand that *climate-resilience is linked to sustainable development.* In the context of global warming and climate change where extreme weather events and natural disasters have become increasingly common, climate preparedness determines the resilience of sustainable livelihood.

Climate resilience should not be confined to climate preparedness but to embrace sustainable use of natural resources and energy, and greenhouse gases emission reduction. Therefore, "climate resilience" needs to include these elements or to be guided by international regulations. Otherwise, it would not be feasible to address the evolving challenges of climate change, as well as the interactions with critical development issues, such as food security, especially in poor countries.

Climate change will affect human development by changing livelihood patterns, production activities and people's vision of the future. Planning for climate change adaptation and mitigation would make significant positive contributions to building a climate-resilient society.

Role in building a climate-resilient society

For the poor countries, poverty reduction in parallel with industrialization, urbanization and effective use of natural resources may not be adequate to facilitate climate resilience. This has to involve *all sectors and communities* who have a role in changing people's attitude to climate change mitigation.

Strengthening or building human and institution capacity for a climate-resilient society requires stepping up involvement of people from different sectors, policy makers, professional and administrators alike, as well as knowledge of different demonstration and site specific sustainable management practices. Strong government regulations and policies, and active media are some of the most effective elements for improving society. Science and technology play also an important role in building a climate-resilient society by disseminating data information based on modelling and climate predictions to provide optimal options for climate change adaptation and mitigation.

Traditional knowledge has a very important role in building a more climate-resilient society. For example, in Viet Nam,

many adaptation measures have been applied and practiced at the community-level. Since a long time ago, farmers know how to read the signs of the sun and the moon, and other early warning indicators of potential catastrophies to avoid damages by making advance adjustments to production/management. They also have the experience of adapting to climate change impact by: i) choosing high resistant crop varieties that thrive in saline/acid sulphate soils; ii) adjusting crop calendar to coincide with periods of favourable weather conditions; iii) diverting water flow from the main river to prevent sea (or saline) water intrusion into fresh water or irrigation system; and iv) switching from three rice crop rotation to double rice crop and fish as an adaptation measure to threats of sea-level rise and flash floods from upstream.

Research gap

I have studied the World Bank website and learned a lot about the vulnerability assessment, preparedness and response evaluation to the climate-related events/disasters. Unfortunately, the focus is only on cities. How much do we know about the vulnerability and preparedness of rural communities? This is important as the rural population in Viet Nam is about 71.89 per cent (preliminary for 2008, GSO 2010).

I hope to discuss and learn more from you.

My best regards,

Mai Van Trinh, PhD
Chair, Environmental Modelling and Information Group
Institute for Agricultural Environment (IAE)
Phu Do, Me Tri, Tu Liem, Hanoi, Viet Nam

About the contributor

Mai Van Trinh is the Chair of the Environmental Modelling and Information Group, Institute for Agricultural Environment (IAE). He is working on several projects on climate change, including *Study on the Economics of Adaptation to Climate Change in Viet Nam Agriculture; Vulnerability to Climate Change: Adaptation Strategies;* agricultural mitigation options in Viet Nam; and analyzing the impact of climate change on Vietnam agriculture, and developing adaptation and mitigation measures.

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Aminul Islam wrote:
Facilitator's note: Aminul Islam describes the efforts made by Bangladesh, "one of the most vulnerable countries", to build a climate-resilient society, including the development of "Climate Change Strategy and Action Plan" and the creation of "Climate Trust Fund". He also highlights UNDP's "strategic environment, climate and disaster risk reduction programme" that helps the "response towards climate-resilient society". These include "innovative community-based adaptation"; "integration of adaptation and disaster risk reduction"; "innovative approach" for "improving the quality of life of urban poor"; "sustainable land management"; and mainstreaming "poverty-environment-climate" "into the planning and budgeting process", among others. He stresses that "traditional settlement patterns in the coastal areas are no more climate-resilient", and that "the number of cyclone shelters is not adequate for the large population". Thus it is important "to develop an integrated disaster/climate-resilient habitat" that incorporates both "disaster risk reduction" and "livelihood protection". He cites a UNDP a pilot demonstration project to illustrate this important concept. All the above initiatives are aimed at improving "the security of human beings" based on "sustainable solutions in different fields".

Dear Network Members,

Climate-resilient community under emerging climate change scenario: Bangladesh context

Bangladesh, which is home to about 162 million people (United Nations 2009: 31), is one of the most populous countries in the world. The population density (of about 1,099 persons per square kilometre) is also high (Wikipedia 2010). Bangladesh is also one of the most vulnerable countries to climate change. Therefore the issue of building a climate-resilient society needs special attention.

The country's geographical location, its low and flat topography and dense population, means that natural hazard events often result in disasters with a high loss of life and economic damage. Two-thirds of the country is only five metres above sea level and it is identified to be the most vulnerable country in the world to tropical cyclones and the sixth most vulnerable country to floods (Ministry of Environment and Forests 2008: 5-6). It has been estimated that six to eight million people could be displaced by 2050 and would have to be resettled if the sea level is higher than currently expected and costal polders are not strengthened and/or new ones are built (Ministry of Environment and Forests 2008: 13). Displacement may be also the result of extreme weather events, as in the summer of 2007 when the monsoon floods displaced more than 20 million people in Bangladesh, India, and Nepal (World Bank 2009: 31). People displaced internally or across borders are vulnerable to disease (St. Louis and Hess 2008, cited in World Bank 2009) and suffer poverty impacts which can be irreversible.

Efforts to build a climate-resilient society

In September 2009, the Government of Bangladesh, approved Bangladesh Climate Change Strategy and Action Plan (BCCSAP) and created Climate Trust Fund to meet the challenges due to the causes and effects of climate change to ensure continued human development. BCCSAP is built on six pillars. These are: (i) *Food Security, Social Protection and Health* to ensure that the poorest and most vulnerable in society are protected from CC; (ii) *Comprehensive Disaster Management* to strengthen the existing system to deal with increasingly frequent and severe natural calamities; (iii) *Building Adaptive Infrastructure* to improve the existing assets so that fit for the purpose to face the emerging climate change scenario; (iv) *Research and Knowledge Management* to predict the likely scale and timing of CC impacts on different sectors of economy and socio-economic groups, to underpin future investment strategies; (v) *Mitigation and low Carbon Development;* and (vi) *Capacity Building & Institutional Strengthening* to enhance the capacity of the Government, civil society, and other stakeholders.

A further response towards climate-resilient society, in line with UNDAF, is UNDP's strategic environment, climate and disaster risk reduction programme. UNDP is supporting the Government through a number of projects and policy advisory services as well in the implementation of the priority areas such as: (i) Building green shield along the coast line through an innovative community based adaptation (including coastal biodiversity management and demonstration of climate-resilient livelihoods); (ii) Integration of adaptation and disaster risk reduction. Climate change affects disaster risks in two ways, firstly through the likely increase in weather and climate hazards, and secondly through higher vulnerability of communities to natural hazards, particularly through ecosystem degradation, reductions in water and food availability, and changes to livelihoods; (iii) Innovative approach for pro-poor growth improving the quality of life of urban poor; (iv) Practicing sustainable land management; and (v) Sustainable development with proper attention on (a) poverty environment and climate mainstreaming into the planning and budgeting process, (b) access to disaster and climatic information/early warning, and (c) localization of MDGs and adaptation to climate change at the local level and all of these are closely linked toward achievement of MDGs.

Way forward: Beyond cyclone shelter - climate-resilient habitat

Traditional settlement patterns in the coastal areas are no more climate-resilient. People's life and livelihood are not secured and fully at the mercy of nature. The number of cyclone shelters is not adequate for the large population.

It is therefore important to develop an integrated disaster/climate-resilient habitat, which incorporates a disaster risk reduction approach and livelihood protection issues. UNDP initiated a pilot demonstration on integrated disaster/climate-resilient habitat with provision of structural safety (owner's driven cyclone resilient home building and landscape planning and designing, tidal surge safety measures, saline proof structure, etc.), adaptation interventions

(i.e., renewable energy, rain water harvesting, bio-gas digester, etc.), social/human development interventions (i.e., women and children's program, health and nutrition care, etc.), community based livelihood supportive interventions (common horticulture, floating agriculture, grazing land and mini-dairy farm, pond for aquaculture, common production centre etc.), user-friendly early warning systems (not only hydro-meteorological but sectoral preparedness such adaptive crops, fisheries and health related preparations, soil condition trend, early warning for sustainable land and water management as well). The communities in habitat may explore the possibilities of tapping local tourism opportunities.

These initiatives show how Bangladesh is responding to the consequences of climate change and is pushing for sustainable solutions in different fields, all aiming to improve the security of human beings.

With best regards,

Aminul Islam
Assistant Country Director and Cluster Leader for Environment and Disaster Management Programme
UNDP Bangladesh

About the contributor

Aminul Islam is Assistant Country Director and Cluster Leader for Environment and Disaster Management Programme, UNDP, Bangladesh. Prior to this Dr. Islam was serving as the Team Leader of the Water Disaster Risk Reduction Project in Central Vietnam. Earlier he was Associate Professor and Head of Environment Management Department, Independent University, Bangladesh.

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4. Closing Message

Dear Network Members,

The discussion of sub-theme 1 on the Vision of a *Climate-Resilient* Society has attracted 22 contributions. We would like to thank the following contributors for their useful and informative contributions: Bernarditas Muller, Pradeep Sharma, Peter Neil, Mukul Sanwal, Raj Kumar, Angus Mackay, Chew-Hung Chang, Koos Neefjes, Hasna Cheema, Amelia Supetran, Ramesh Gampat, Ernesto Bautista, Itzá Castañeda, Ramachandran Ramasamy, Andrea De Angelis and Gørild Heggelund (joint contribution), Sarwat Chowdhury, Moisés Herrezuelo López, Amitava Mukherjee, Kishan Khoday and Usha Natarajan (joint contribution), Mai Van Trinh and Aminul Islam, respectively.

Much of the discussion has focused on what is meant by a "climate-resilient society", or what makes a society "climate-resilient".

To facilitate the discussion, I have highlighted in my Opening Message the following definition of **"resilient"** provided in the Oxford English dictionary: "**adjective: 1** able to recoil or spring back into shape after bending, stretching, or being compressed. **2** (of a person) able to withstand or recover quickly from difficult conditions."

Thus, part 1 of this definition refers to the **physical system**, while part 2 refers to the **human system.**

Based on part 2 of the definition, a **"climate-resilient"** society could mean a society that is **"able to withstand or recover quickly from difficult conditions"** caused by the adverse effects of climate change, including climate-related hazards and disasters.

However, I also pointed out that the ability **"to withstand or recover quickly from difficult conditions"** caused by the adverse effects of climate change over short or longer term depends on many factors, especially on the vulnerability of a society to the various impacts of climate change. The vulnerability of a society to climate-related hazards (natural or human-induced) is a function of duration of exposure, as well as **environmental (including natural ecosystems that provide the environmental services), social, economic, technological and political (including policy) factors**". "Strengthening of coping or adaptive capacity is crucial in ensuring a climate-resilient society or a society with reduced risk to the adverse effects of climate change".

The above definition was further reinforced, strengthened and enriched by the contributors. All stressed the linkage of climate resilience to adaptation, including nature-based responses and the ecosystem-based adaptation to climate change (**Peter Neil**); while some also highlighted the importance of sustainable development (**Bernarditas Muller, Pradeep Sharma; Raj Kumar; Amelia Supetran; Andrea De Angelis and Gørild Heggelund; Mai Van Trinh**), including sustainable human development (**Amelia Supetran**); poverty reduction (**Raj Kumar; Amitava Mukherjee**); limit to population growth (**Amitava Mukherjee**); "new opportunities and skills to extend livelihood options" for "the poor and vulnerable" and "specific policies" to help them (**Angus Mackay**); changing consumption patterns to maximize the use of natural resources (**Mukul Sanwal**); "a drastic change in lifestyle" to reduce our carbon footprint (**Sarwat Chowdhury**); "reducing underlying vulnerabilities" and the integration of "risk management and risk reduction strategies" in development planning (**Pradeep Sharma**); adaptation strategies that include disaster preparedness, monitoring, early warning, and information dissemination (**Chew-Hung Chang**); "behavioural change to improve preparation for natural disasters; better information sharing for livelihood diversification, learning and (business) innovation; (agricultural) research and development (R&D); as well as major infrastructure development" (**Koos Neefjes**); "integrated disaster/climate-resilient habitat" that incorporates both "disaster risk reduction" and "livelihood protection" (**Aminul Islam**); capacity development and enhancement at all levels (**Andrea De Angelis and Gørild Heggelund; Koos Neefjes; Mai Van Trinh**), including skills development in "emerging green businesses", alternative "land use options", and "improving education standards" for "the next generation" (**Angus Mackay**), and "the self-capacity of the communities" for "adaptation (or preparedness)" as "an integral part of human development" (**Andrea De Angelis and Gørild Heggelund**); social dimension (**Andrea De Angelis and Gørild Heggelund; Amelia Supetran**), including "tools and instruments" that can be provided through (a) economic growth; (b) social protection policies; and (c) balanced (especially from the local and national perspectives) systems of governance (**Andrea De Angelis and Gørild Heggelund**); "policy frameworks tailored to social value creation" (**Mukul Sanwal**); good governance (**Raj Kumar; Ramachandran Ramasamy**); gender empowerment and equality (**Raj Kumar; Koos Neefjes**); "gender and human-centred approach to development that includes environmental sustainability" (**Itzá Castañeda**); generating knowledge (**Amelia Supetran**), including "traditional knowledge" on adaptation based on good farming practices and experience in various climatic conditions (**Mai Van Trinh**); technology (**Ernesto Bautista**) and new information communication technologies (**Ramachandran Ramasamy**); strong "government regulations and policies"; "active media"; development of "science and technology", including research, especially in rural communities (**Mai Van Trinh**); "political will, appropriate investments and funding" (**Moisés Herrezuelo López**); "a more equitable global system of sharing the burden of climate change adaptation, including transfer of appropriate technology and finance, would create conditions for building resilience" (**Raj Kumar**); opportunities offered by "international capital and technology & knowledge transfer" "for improving resilience and for creating a low-carbon development path with many benefits", including the *'new and additional'* international finance for reduced emissions from deforestation and forest degradation (REDD) (**Koos Neefjes**), among others. All the above elements will contribute to a climate-resilient society.

Raj Kumar rightly pointed out that a climate-resilient society, including adaptation, cannot be achieved in isolation, and it has to be an integral part of other development challenges that address "poverty eradication, food-fuel-water security, human rights, governance, gender empowerment and equality, and human development". **Pradeep Sharma** also pointed out that climate change offers opportunity "to build sustainable and equitable society that is also climate-resilient".

A few contributions cited specific examples or case studies, such as those in China (**Andrea De Angelis and Gørild Heggelund**), Bangladesh (**Aminul Islam**); USA and Myanmar (**Chew-Hung Chang**), and Viet Nam (**Koos Neefjes; Mai Van Trinh**).

However, **Ramesh Gampat** provided "a dissenting voice to the notion of a climate-resilient society (CRS)". He questioned if "a society has the ability to completely recover" or "bounce back" from a temporary or even permanent "climatic perturbation". He also questioned "the technical and economic viability of a CRS" beyond a certain yet-to-be established threshold, and suggested that the cost may be "prohibitive". He believed that "it is more useful to talk about the planet" rather than "a society or some societies, affected by and coping with climate change", though he found "it difficult to conceive of a climate-resilient planet, given that earth is a closed ecosystem".

Sarwat Chowdhury echoed a similar view that it is not possible "for societies facing the manifold impacts of climate change to rebound back to their original state" since the situation cannot be 'elastic'. She highlighted the "sub-subsistence 'resilience'" that simply indicates that the people have "adjusted to a new normal".

Further to **Ramesh Gampat**'s observation, Ernesto Bautista provided some equally thought-provoking comments by highlighting the **time-dependent** nature of the factors (e.g., state of knowledge, technology, resources, and institutions, among others) that affect "the ability of society to completely recover from climate change disturbance". These factors will be **"evolving over time"** and they will shape the societies in reaching "different levels of 'equilibrium'".

On a similar point, **Kishan Khoday** and **Usha Natarajan** highlighted how the **"changing nature of society"** in Asia will be central for understanding the nature of "a climate resilience society" and for design of effective responses. They emphasized the "potentially transformative role of civil society" as "both global consumers and local agents of change", who can "generate a forward-looking vision of multilateralism and galvanize a new generation of global environmental citizens across Asia" to address the emerging "common concern of humanity".

Two contributions discussed the sub-theme within the context of the UNFCCC. **Bernarditas Muller** emphasized that the UNFCCC, "when providing for responses to the adverse effects of climate change", focuses on adaptation, as the adverse effects of climate change "are wide-ranging, covering all aspects of human development and not only the physical environment" as suggested by the word "resilience" in Article 1.1 of the UNFCCC on *"definitions"*. She pointed out that adaptation "is also the obligation for which financing and technology should be provided to developing countries", and that "policy-making is solely under the competence of States", and "it should not be imposed as a conditionality for enabling means to be provided to developing countries to meet their sustainable development objectives". **Hasna Cheema** highlighted that the major principles of the UNFCCC (1992) and its Kyoto Protocol (1997), such as "common but differentiated responsibilities"; "protection of vulnerable societies"; "prevention and mitigation"; "sustainable development" and "sustainable economic growth", are "critical to foster climate-resilient" or "climate-adaptive" societies. If fully implemented, including the commitments of Annexes I and II Parties for non-Annex I Parties (e.g., Articles 4.3, 4.4 and 4.5), they "can lay the foundation of climate justice and promote international efforts to reduce global emissions".

To add her voice on the issues raised by **Bernarditas Muller and Hasna Cheema, Amelia Supetran** stressed the need to translate "knowledge" into actions with the provision of financial resources "free of conditionalities", as well as development and transfer of technology, as agreed under the UNFCCC.

In conclusion, the discussion on sub-theme 1 was lively and vigorous. We hope that this trend will continue to the discussion of sub-theme 2 Mapping and Measuring and the rest of the sub-themes.

With best wishes,

Pak Sum Low
AP-HDNet Facilitator

Sub-theme 2

Mapping and Measuring

1. Opening Message

Dear Network Members,

Following the successful conclusion of the discussion of sub-theme 1 on the *Vision of a Climate-Resilient Society*, we now move to sub-theme 2: *Mapping and Measuring,* which will be discussed in the next two weeks.

Climate change is not only an environmental issue, but also a sustainable development issue. Thus, this sub-theme will cover the quantitative aspects of the environmental, social, economic and even political issues that are related to climate change and that are also crucial for achieving sustainable development.

Any national policy, strategy and action plan in response to climate change in key socio-economic sectors should be an integral part of the national sustainable development policy, strategy and action plan. The development of both of these policies, strategies and action plans must be based on science. Otherwise, unscientific policies, strategies and action plans will certainly lead to failure.

We hope that by offering this sub-theme on *Mapping and Measuring* in climate change, we are providing a forum for national scientists in the Asia-Pacific region, who may inform us of their latest scientific research activities relating to climate change, whether it is on physical science, or on impact, vulnerability and adaptation; or on mitigation of climate change, as well as relevant tools and technologies (e.g., space technologies and remote sensing), that they are using for mapping and measuring in their scientific research. In particular, we would like to link the above scientific research to human development.

Thus, the following topics will be relevant to the discussion of this sub-theme:

a) Scientific assessments in climate change, especially those at national and regional (Asia-Pacific) levels, including changes in atmospheric concentrations of greenhouse gases and aerosols; observed changes in air, land and ocean temperatures, precipitation, glaciers and ice sheets, oceans and sea level; historical and paleoclimatic perspective on climate change; biogeochemistry, carbon cycle, gases and aerosols; satellite data and other data; national and/or regional climate models and projections-these are also the areas largely covered by IPCC Working Group I;

b) Climate change impacts, vulnerability and adaptation assessment, including the vulnerability of socio-economic and natural systems to climate change; impacts of climate change in various sectors (water resources; ecosystems; food and forests; coastal systems; industry; and human health), and options for adaptation; inter-relationship between vulnerability, adaptation and sustainable development; relevant tools and technologies (e.g., space technologies and remote sensing) and indicators (e.g., vulnerability maps and indices); linkage to human development (e.g., Human Development Index (HDI), green index)-some of these areas are covered by IPCC Working Group II;

c) Mitigation of climate change, including greenhouse gases inventory; cost-effective mitigation options and measures through limiting or preventing greenhouse gas emissions in key socio-economic sectors (e.g., energy, transport, buildings, industry, agriculture, forestry, waste management), and enhancing activities that remove them from the atmosphere (e.g., reduced emissions from deforestation and forest degradation or REDD); green growth (environmentally sustainable economic growth); Environmental Performance Index (EPI); sustainability index; policy instruments for reducing emissions (e.g., green tax)-some of these areas are also covered by IPCC Working Group III;

d) The economic cost of addressing climate change and reducing disaster risk, including social and environmental cost, with the development of relevant indicators (e.g., green Gross Domestic Product (GDP); Index of Sustainable Economic Welfare (ISEW); and Genuine Progress Indicator (GPI));

e) Research (both systematic observation and human development), including data coverage, acquisition, analysis and dissemination, especially at national and regional levels.

In addition, as raised by my UNDP colleague, Ramesh Gampat, does it make sense to develop a 'green' index of development? If so, should the HDI be modified or should a new index be developed? Since the APHDR is a report on climate change and human development, mapping and measuring the two, including feedback and synergistic

effects, are crucial issues.
We look forward to the active participation of the Network members in the discussion of this sub-theme.

With best wishes,

Pak Sum Low
AP-HDNet Facilitator

2. Contributions

The following authors, with their respective contributions, helped to enrich the discussion on the sub-theme *Mapping and Measuring:*

Gerardo Munck, *Some comments on the "Mapping and measuring" of environmental questions*
Anthony Patt, *Human development and climate change: Let's think small and incremental*
Hans-Martin Füssel, *How (not) to measure countries' vulnerability to climate change*
Purnamita Dasgupta, *Data concerns: Evolving socio-economic markers for climate change*
Sven Harmeling, *The Germanwatch Global Climate Risk Index: Extreme events in Asia in the last 20 years*
Tun Lwin, *A livelihood vulnerability-based alternative*
David Hastings, *"Mapping and measuring"climate change for Asia and the Pacific*
Ma. Consuelo Garcia, *Sharing data and information: Challenges on re-developing the web-based ASEAN biodiversity information sharing service*
Ramesh Gampat, Niranjan Sarangi, and Manoja Wickramarathne, *The price of progress*
Anuradha Rajivan, *Transforming and transcending growth in measuring climate change*

3. Online Discussion

Gerardo Munck wrote:
Facilitator's note (Pak Sum Low): Gerardo Munck highlights that the development of "physical measures", such as the Keeling curve for monitoring the atmospheric carbon dioxide concentration, "has been key to drawing attention" to the widespread environmental degradation. He stresses the importance of the social dimension in environmental assessment. He discusses the "shortcomings of GDP as a measure from an environmental perspective", and to overcome the weaknesses of the GDP, alternatives approaches have been proposed. These include *green GDPs* that incorporates environmental and social factors; *physical measures (e.g., ecological footprint); and hybrid socio-physical measures* (e.g., Environmental Performance Index that includes physical and social (health-related) indicators; and Environmental Vulnerability Index that includes physical, social (health-related), demographic and other indicators). However, the "continued dominance of GDP as the overriding goal of public policy" calls for the continuing need "to place sustainable human development at the center of policy discussions".

Dear Network Members,

Some comments on the "mapping and measuring" of environmental questions

The state of the environment

A focus on the environment - the natural environment - draws attention, most distinctively, to our physical environment and debates about the environment hinge, first of all, on physical measures of the environment. Indeed, a discussion of environmental issues necessarily involves references to things such as trends in global temperature, the level of emissions of carbon dioxide and other greenhouse gases, the amount of non-renewable natural resources (especially fossil fuels such as coal, petroleum and natural gas) that are extracted from the earth, and the reduction of the stock of renewable natural resources to dangerous levels (such as in overfishing, deforestation and the overuse of fresh water aquifers). In turn, physical measures of the environment have played a key role in the debate about the environment. For example, the Keeling curve, the first continuous measure of carbon dioxide in the atmosphere, helped to establish that global atmospheric concentrations of carbon dioxide were rising. And, more generally, the development of such physical measures, the result of much scientific work, has been key to drawing attention to the widespread degradation of the environment.

The social dimension of environmental questions

Assessments of the state of the environment, particularly when they point to problematic patterns and trends, immediately raise social questions. Specifically, an awareness of environmental degradation has focused attention on three complex and much debated questions: 1) Is environmental degradation anthropogenic, that is, the result of human activities? 2) What are the social consequences of environmental degradation? and 3) What policy responses should be given to the problem of environmental degradation? The debate, fortunately, has moved forward. The view that environmental degradation is not a social problem and that no change of course is needed has been discredited by scientific research and the work of groups such as the Intergovernmental Panel on Climate Change (IPCC). That is, the lack of environmental sustainability of current policies has been widely recognized. Nonetheless, among those who share the view that current practices are not sustainable and hence call for policy responses, there are some important differences concerning a basic issue, namely, how should environmental issues shape our thinking about what constitutes social progress?

The conventional economic growth-centered perspective

The currently conventional perspective is well represented by *The Stern Review* (Stern 2007) and the debate it has generated. This report essentially provides a cost-benefit analysis, which estimates the future costs of current policies regarding the environment and compares these costs to those associated with policies that aim at redressing environmental problems. Thus, understandably, much of the debate surrounding this report's conclusions revolve around the adequacy of the report's use of a low discount rate, meaning that the value of consumption in the future is not seen as differing much from consumption in the present, an assumption that increases the assessed benefit of current actions designed to reduce greenhouse gas emissions (Yale Center for the Study of Globalization 2007). But, it is noteworthy that this debate takes as a given that costs and benefits are adequately assessed in terms of GDP growth, that is, an income and market-based measure.

The shortcomings of GDP as a measure from an environmental perspective are well known. Not only does GDP not directly take into account the implications of environmental degradation and the depletion of natural resources. In addition the GDP ignores any non-monetary losses associated with environmental degradation and, furthermore, perversely considers "defensive expenditures" aimed at rectifying or preventing environmental degradation - e.g., the annually US$10 billion worth of trading on global carbon markets reported by Stern (2007: 304) - as gains in GDP. Thus, it is important to stress that the merits of discussions such as those provoked by the Stern Report notwithstanding, such discussions still never quite bring the question, growth "for what?" into clear focus, and are framed in terms of the challenge of attaining sustainable economic growth as opposed some broader notion of sustainable development or sustainable human development.

Alternative perspectives

Efforts to fashion an alternative to the conventional, economic growth-centered, perspective have focused, among other things, on the development of measures of social progress that overcome the limitations of the GDP. And, in this regard, three different approaches to the development of measures can be distinguished.

1. *Green GDPs*. A first set of measures are monetary measure that focuses on income, as the GDP, but that deduct defensive expenditures and incorporate environmental (and social) factors that fall outside the realm of monetized exchange (these non-monetary factors are converted to cash values based on unit costs estimates through various means). Examples of such measures are the Index of Sustainable Economic Welfare (ISEW) and the similar Genuine Progress Indicator (GPI) (strictly speaking, these measures are not green GDP measures since they take private consumption expenditures as their starting point). But these measures lack official backing and data on these indices are available only for a handful of countries. Indeed, discussions concerning the development of a Green GDP have largely stumbled due to a lack of consensus regarding the valuation method, that is, how to assign a monetary value to things that are not exchanged on a market.

2. *Physical measures.* A second set of measures focus on non-monetary indicators and get around the hurdle concerning the valuation method by relying solely on physical measures. A well-known example is the Ecological Footprint (EF) measure, available for 240 countries, territories, and regions, and calculated by comparing human demands of nature to how much nature can supply by way of regenerative biological capacity.

3. *Hybrid socio-physical measures.* Finally, a third set of measures also focuses on non-monetary indicators, though not solely on physical measures, and get around the hurdle concerning the valuation method by using methods similar to those used in the human development index (HDI). Examples of such an approach are the Environmental Performance Index (EPI), which includes physical as well as social (health-related) indicators and is available for 163 countries; and the Environmental Vulnerability Index (EVI), which includes physical, social (health-related), demographic and other indicators and is available for 235 countries and territories.

These and other attempts to develop measures that overcome the weaknesses of the GDP have been the subject of much discussion (Lawn 2006, 2007: Part III; Gadrey and Jany-Catrice 2006; Bartelmus 2008; Fleurbaey 2009). And this discussion has certainly done much to clarify how we might go about bringing the environment into discussions of public policy. Nonetheless, it is also clear that the development of a suitable aggregate measure that incorporates GDP along with measures of the environment - much as the HDI aggregates a measure of income along with other key social indicators - is a project that still awaits official backing. This situation is an obvious indication of the continued dominance of GDP as the overriding goal of public policy and the treatment of environmental problems as matters of secondary importance, to be tackled only within the parameters of decisions aimed at attaining economic growth. Hence efforts to place sustainable human development at the centre of policy discussions continue to be needed.

With best regards,

Gerardo L. Munck
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About the contributor

Gerardo Munck is Professor in the School of International Relations at the University of Southern California (USC). His research focuses on democracy, corruption, methodology, and Latin America.

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Anthony Patt wrote:

Facilitator's note (Pak Sum Low): Anthony Patt highlights the challenges for human development and climate change. He makes two very interesting observations: (i) "the effects of human development, as captured by HDI, are non-linear"- "higher levels of HDI actually correlate with higher levels of risk, while the least developed countries are safer", "even after controlling for other important effects, like countries' exposure to extreme events"; (ii) "the effects of climate change that we can anticipate for the coming few decades are highly ambiguous", as in the case of Mozambique, the

prediction of "climate models" does not match "the trend of observed events". "To prepare for the future, do we trust our eyes, or our computers? If we try to plan far in advance, there is a 50 per cent chance of getting it wrong, and either protecting people too little, or too much." Thus, he suggests to pay "more attention to the underlying driver of the poor's worsening relative and absolute poverty and their high climate sensitivity, which is an inability to innovate". "What the poor need is the freedom and the capacity to make continual minor adjustments to where and how they live, and how they earn their livelihoods". He advocates education and social security (e.g., insurance), as well as the "power to make small and incremental changes" that is "needed most urgently".

Dear Network Members,

Human development and climate change: Let's think small and incremental

Human development and climate change are the two big challenges facing our generation, and they both seem to be going in the wrong direction. The worsening state of human development is the first force of nature. Left to their own, liberal markets create a lot of wealth, but they usually create it for those who innovate, and those people tend to be the ones who are well off to begin with. Left behind, the poor have less and less to offer, aside from a few handicrafts and artisanal crops, and have become worse off not just in relative, but often in absolute, terms. The second force of nature seems to be climate change. One of the major enablers of the wealthy's wealth is cheap and convenient energy, and the cheapest and most convenient of this is in the form of fossil fuels, just waiting to be dug up and burned. This raises temperatures and messes up rainfall, and the poor - least able to innovate and adapt - suffer most.

The temptation has been to think big and bold. To counteract the worsening condition of human development, we need to undertake projects that make life better for the poor, somehow satisfying their wants and needs by providing the things measured by the Human Development Index (HDI): to keep them alive, to educate them, and to give them the power to buy things. To counteract climate change, we need of course to reduce our burning of fossil fuels, but we also need to "climate proof" the development of the poor: building dikes and seawalls and irrigation systems, and helping them to grow drought resistant crops.

The problems with this approach only begin to become apparent when we try to support it with mapping and measuring. In a recent study, we looked at how the poor are affected-killed or displaced-by climate-related extreme events (Patt *et al.* 2010). We found two interesting things. First, the effects of human development, as captured by HDI, are non-linear. Below an HDI of about 0.6 - roughly that of India or the Solomon Islands - higher levels of HDI actually correlate with higher levels of risk, while the least developed countries are safer. This is so even after controlling for other important effects, like countries' exposure to extreme events. This means that for many countries in the Asia-Pacific region with the lowest HDI levels - Cambodia, Nepal, Bangladesh, Timor-Leste, and Papua New Guinea-improvements in measurable development could actually be making people's sensitivity to climate change worse. Nobody knows why. Second, the effects of climate change that we can anticipate for the coming few decades are highly ambiguous. In the country that we studied in great depth, Mozambique, climate models did not project much of an increase in exposure to extreme events, even while the trend of observed events over the last four decades suggests a rapid rise. To prepare for the future, do we trust our eyes, or our computers? If we try to plan far in advance, there is a 50 per cent chance of getting it wrong, and either protecting people too little, or too much.

In the face of this uncertainty, I want to suggest more attention to the underlying driver of the poor's worsening relative and absolute poverty and their high climate sensitivity, which is an inability to innovate. What the poor need is the freedom and the capacity to make continual minor adjustments to where and how they live, and how they earn their livelihoods. There is evidence that education may be the biggest driver of this (Lutz *et al.* 2008), as literate, critical thinkers with access to information are able to copy the innovations of others. Institutions that provide security - not just social safety nets but also effective property rights and access to safe bank accounts, as well as risk spreading arrangements like insurance - are also important, as they leave people with greater freedom to take chances. The power to make small and incremental changes is the third force of nature, needed most urgently.

With best regards,

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About the contributor

Dr. Anthony Patt leads the Decisions and Governance research group at IIASA. He has conducted extensive research, and published widely, on the links between climate change and development, with a regional focus on Africa. He is a co-editor of the journals *Climate and Development* and *Regional Environmental Change.*

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Hans-Martin Füssel wrote:

Facilitator's note (Pak Sum Low): Hans-Martin Füssel highlights "key challenges faced by quantitative assessments of vulnerability to climate change", such as "the uncertainty about future climate change and socio-economic development", and "the complexity of the interactions between climate, non-climatic factors, and society". He suggests seven criteria for the development and application of "good" vulnerability indices (i.e., *clear purpose; specificity and validity of data selection; methodological soundness of index construction; simplicity and comprehensibility; data availability and reliability; transparency and reproducibility; and results consistent with expert knowledge*). He then briefly reviews some existing national-level vulnerability indices with a focus on "social vulnerability" or "environmental vulnerability", but these indices "have severe conceptual, empirical, and/or methodological flaws that preclude their application to guide major policy decisions, such as the allocation of adaptation resources". He concludes that policy decisions should be "based on a set of vulnerability indices for different climatic risks or climate-sensitive sectors" combined with experts' judgement and "political priorities", rather than "a single aggregate vulnerability index that falsely suggests scientific objectivity".

Dear Network Members,

How (not) to measure countries' vulnerability to climate change

There is substantial interest in measuring, and mapping, the vulnerability of nations, regions, population groups, and/or economic sectors to climate change. For instance, several member countries to the UNFCCC have suggested that the IPCC develop a national-level index of vulnerability to climate change to guide the allocation of resources from the Kyoto Protocol Adaptation Fund. Quantitative vulnerability indices are being applied at many scales (from local to global) and with different policy objectives (e.g., raising awareness of climate change risks, guiding the allocation of resources for adaptation, identifying suitable entry points for interventions, and monitoring the progress in reducing vulnerability over time). However, quantitative vulnerability assessments face a number of challenges, and many past assessments do not withstand scientific scrutiny. This contribution highlights key challenges faced by quantitative assessments of vulnerability to climate change, suggests criteria for the development and application of "good" vulnerability indices, and briefly reviews some existing vulnerability indices.

What is vulnerability to climate change?

It is important to recognize that vulnerability means different things to different people because the term is used differently in a variety of scholarly communities that are contributing to climate change and global change research. Some conceptualizations of vulnerability only consider the internal side of vulnerability (e.g., socio-economic and environmental conditions in a region) whereas others also include external aspects (e.g., the frequency of hazardous weather events). Some conceptualizations (e.g., in the literature on secure livelihoods and famine, following a political economy approach) focus on the social and economic dimensions of vulnerability, others (e.g., in the natural hazards literature, following a risk-hazard approach) focus on the physical and environmental dimensions, and still others (e.g., in the climate change and global environmental change literature) include both dimensions.

Given the multitude of possible conceptualizations of vulnerability, the crucial starting point for the development of any vulnerability index is clarity over its primary purpose. Relevant questions include: Shall the index measure the vulnerability of poor people, economic sectors, or ecosystems to climate change? Shall the index measure the vulnerability to a particular hazard (e.g., sea-level rise) or to a broad range of climatic, environmental, and economic threats? Shall the index support the management of current risks linked to climate variability and change or adaptation to the long-term incremental risks caused by climate change?

Further challenges for measuring vulnerability to climate change

The development of quantitative indices of vulnerability to climate change is challenged by the uncertainty about future climate change and socio-economic development, and by the complexity of the interactions between climate, non-climatic factors, and society. Furthermore, the development of aggregated vulnerability indices unavoidably involves subjective choices regarding the aggregation of monetary, human health and other non-market impacts of climate change; of future and current risks; of high-certainty and low-certainty impacts; and of beneficial and adverse impacts occurring in different sectors and/or regions. Finally, index developers need to carefully consider seemingly technical choices regarding reference level and normalization that will often dominate the results. The following questions serve to illustrate some of these challenges. If a currently water-scarce region will experience a substantial decrease in future water availability with a probability of one third but a substantial increase with a probability of two thirds, should it be regarded as vulnerable to climate change or not? Is it possible to assess and compare flood risks in different communities by combining quantitative information about changes in extreme precipitation events at the river basin level with qualitative information on the quality of national governance? Is China more vulnerable to sea-level rise because of the large number of people at risk or Kiribati because of the large fraction of its population at risk? Should a vulnerability (or risk) index reflect the total level of flood risks including climate change or only the *change* in flood risks due to climate change?

Criteria for "good" vulnerability indices

Vulnerability indices should be developed with a view the following criteria of scientific quality and policy relevance. Note that there is a trade-off between some of these goals, and the balance should reflect the purpose of the vulnerability index.

1. *Clear purpose:* The purpose of the index should be clearly stated because its policy relevance can only be assessed with reference to a specific decision context.

2. *Specificity and validity of data selection:* The underlying data should reflect the purpose of the index. As far as possible, the data selection should be based on a theoretical model of vulnerability (theory-driven index) or on its statistical relationship with a suitable vulnerability outcome (data-driven index).

3. *Methodological soundness of index construction:* The index construction should follow established mathematical and scientific standards. Common flaws include inappropriate combination of variables at different measurement scales, of normalized and non-normalized variables, and the (unintended) scaling of vulnerability with population size or area. Vulnerability indices should be normalized by population or area so that a region is not considered more vulnerable than another just because it is more populous or larger.

4. *Simplicity and comprehensibility:* An index is more easily accepted by policymakers if it is simple and comprehensible than if it is very complex.

5. *Data availability and reliability:* An index is more easily accepted by policy makers if the underlying data are freely accessible and reliable than if it contains proprietary data and/or highly controversial data.

6. *Transparency and reproducibility:* The documentation of the index construction should be detailed enough so that the index can be reproduced by anyone with access to the underlying data.

7. *Results consistent with expert knowledge:* An index is more easily accepted by policy makers if the results are largely consistent with expert assessments of the relative ranking of regions or population groups.

Existing indices of vulnerability to climate change

Some national-level indices of vulnerability to climate change have been developed with a focus on social vulnerability (e.g., National Adaptive Capacity Index and the Predictive Indicators of Vulnerability). These indices largely resemble established development indices (e.g., the human development index, human poverty index, or the human assets index). Other indices focus on environmental vulnerability (e.g., the climate change subindex of the SOPAC Environmental Vulnerability Index) and on integrated vulnerability (e.g., vulnerability-resilience indicators and the indicator of 21st century socioclimatic exposure). Some of these indices attempt to quantify the generic vulnerability of countries or regions whereas others are targeted at specific risks (e.g., mortality from meteorological hazards). Scientific reviews conclude that all of the existing national-level indices of generic vulnerability to climate change have severe conceptual, empirical, and/or methodological flaws that preclude their application to guide major policy decisions, such as the allocation of adaptation resources. Policy decisions should instead be informed by combining disaggregated indices for different climate risks or climate-sensitive sectors with expert judgement. A particular convincing example has been the selection of countries and regional groups for participation in the Pilot Program for Climate Resilience (PPCR) of the World Bank. Based on reasonably detailed guidance by the World Bank, a multidisciplinary group of experts combined quantitative indicators of socio-economic vulnerability, biophysical vulnerability to different climatic hazards, and aid effectiveness with their subjective judgements in a transparent manner to recommend a limited number of countries and regional groups for inclusion in the PPCR.

Conclusions

Good vulnerability indices are characterized by a clear purpose to guide the index development; by *reliable data* that is available at the appropriate spatial resolution; by sound methods for combining the heterogeneous information into an aggregated index, or a set of indices; and by their *transparency* and *understandability*. Aggregate indices of vulnerability to climate change tend to hide controversial subjective judgements that should be discussed and resolved explicitly through a political process rather than implicitly by scientific experts. Policy decisions, such as the allocation of resources for adaptation at the national or international level, should thus be based on a set of vulnerability indices for different climatic risks or climate-sensitive sectors combined with qualitative information from relevant experts and detailed guidance about political priorities rather than by a single aggregate vulnerability index that falsely suggests scientific objectivity.

With best regards,

Hans-Martin Füssel
Senior Research Fellow
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About the contributor

Hans-Martin Füssel is a senior researcher in the Department Sustainable Solutions at the Potsdam Institute for Climate Impact Research. Formerly he has worked at the Center for Environmental Science and Policy of Stanford University (USA) and at the Ritsumeikan Research Center for Sustainability Science of Ritsumeikan University in Kyoto (Japan). Dr. Füssel holds degrees in computer science, applied systems science, and physics. He has contributed to many interdisciplinary research projects concerned with the integrated assessment of climate change and the development of response strategies. His current research interests include climate change and global justice, vulnerability and adaptation assessment, and probabilistic integrated assessment of climate change. Dr. Füssel served as author, review editor, and expert reviewer for the IPCC Fourth Assessment Report. He has consulted for UNDP, UNFCCC, WHO, IPCC, the World Bank, and the European Commission on climate change.

Purnamita Dasgupta wrote:
Facilitator's note (Pak Sum Low): Purnamita Dasgupta discusses the importance of data for "the analysis of social and economic implications of the consequences of climate change" and for "designing effective adaptive strategy" that "can be integrated into a development framework". The concerns with "sustainability" (e.g., "ecosystem stresses"

and their relationships with adaptation); and "vulnerability of socio-economic development to climate change" (e.g., food security) require interdisciplinary data (including reliable baseline data) to "measure and map climate change impacts and adaptation" at global, regional, national and local scales. There are "statistical challenges" in working with existing data or the absence of data. She illustrates with examples from India, such as environmental (e.g., biophysical indicators), power consumption and health (e.g., mortality and morbidity due to vector-borne and waterborne diseases, and heat stress) statistics, all of which would require social, economic and demographic data for strategic adaptation planning. Due to the uncertainties in both future socio-economic and climatic conditions, and the different time scales "in a typical projection and planning exercise", she concludes that the "key challenge lies in identifying the options for integrating climate vulnerability into socio-economic data".

Dear Network Members,

Data concerns: Evolving socio-economic markers for climate change

Sustainability and vulnerability

Climate change has raised many concerns for South Asian economies which are striving to attain balanced and inclusive development. Given the likely adverse impacts and the unpredictability of these impacts to a certain extent, adds several dimensions to the analysis of social and economic implications of the consequences of climate change. Climatic change has major implications for livelihoods, particularly for the vulnerable sections of society. Data for impact analysis and data for designing effective adaptive strategy can be integrated into a development framework.

It is the concern with sustainability which makes it politically and economically acceptable to measure and map climate change impacts and adaptation, across scales - global, regional, national and local. The sustainable development framework also allows for a wide range of experiences and perceptions to be accommodated, admitting interdisciplinarity in sample design, data collection and interpretation. Of paramount importance is the bringing together of various stakeholders at the local or community level to inform understanding of both ecosystem stresses and the close relationship between stress and adaptation. However, data and information flows regarding ecosystem/ climatic stress get influenced by the efficiency and inclusiveness of the operational institutional structure and governance framework.

Vulnerability of socio-economic development to climate change in developing countries is associated with criteria such as income differentials, land-holding patterns and inter-state variations in productivity. Sustaining food security, employment and livelihood opportunities become major concerns for which both demand and supply side data are required.

In the case of food security, for instance, while changes in current cropping patterns, yield and area cultivated can impact sustainable food security in terms of food production, these very same factors can result in demand side vulnerability by affecting entitlements and incomes in subsequent years or seasons. It is as much a concern for food production as of calorific consumption norms, expenditure elasticities and access to food. The effectiveness of using economic instruments for providing incentives for changes in cropping patterns, crop diversification, promotion of water use efficiency and energy use efficiency also depend on the reliability of baseline data on the basis of which these are designed.

Challenges in working with existing data

An important input into the development of adaptive strategies is the study of past behaviour by economic agents such as producers and consumers in response to changes in ecosystem services. Typically, these take time to manifest themselves and longitudinal datasets are a valuable input in understanding how human society adapts to such changes. Unfortunately, this aspect has not been adequately covered in most existing datasets in South Asia. Differences in sampling units, large gaps in time periods for repeat surveys make comparisons across time difficult.

In the absence of data sets that mesh into each other, researchers draw on data from multiple sources, with varying sampling frames. The data and statistical challenges that emerge are a serious concern.

A primary requirement seems to be to make available data by coordinates, which map datasets easily from one on to another. Alternatively given the data collection systems already in place in several South Asian economies, attempts should be made to identify common variables across datasets, particularly in terms of socio-economic categorization.

Apart from this, in the case of climate change there is a pressing need to generate specific datasets such as those for areas threatened by sea-level rise. There is also a need to bridge fragmentation that arises across datasets. Ideally, one should have specific data collection where the sourcing or selection criteria are derived from both climate science and socio-economic considerations. I illustrate this point with some specific examples for India, where existing datasets could be strengthened to become very useful in climate change analysis.

Some illustrations

The Compendium on Environment Statistics in India as of now reports data on a number of ecosystems. For instance it provides data on the coverage, area and density of mangroves in the country. However, to utilize it in an effective manner for adaptation strategy one needs to know more about demographic variables and livelihood patterns in the ecosystem, given that mangroves have important ecological functions, such as restricting damage to lives and livestock through their storm protection function. A dataset which combines the biophysical indicators with the social, economic and demographic parameters will enhance both an understanding of the pressures on the ecosystem, and the likely relocation costs due to climatic impacts such as increased cyclonic activity or sea-level rise.

Similarly, in the Power sector there are dual imperatives of providing a minimum threshold level of clean energy for the poor in South Asian economies along with energy conservation. In high growth situations, this calls for as much importance being attached to data based on detailed sampling (classes) on consumption of the upper income groups as for the poor. This would help to address cross-cutting influences in the strategy on increasing power consumption and enhancing energy efficiency/conservation.

Another area which has increasingly gained importance is that of health statistics. In the context of climate change, data on mortality and morbidity on specific diseases becomes very important. These include vector borne disease (malaria), waterborne diseases, and those related to heat stress. This calls for universal birth and death registration in the country, which provides reliable data and markers on the type and extent of illness. There is here an urgent need for better reporting to forecast with greater confidence the additionality of disease burden imposed by climate change. Preliminary findings on malaria transmission in India show that by the 2050s, changes in climatic conditions could lead to newer states becoming prone to malaria, such as Himachal Pradesh in the north and coastal states such as Maharashtra, Karnataka and Kerala (Bhattacharya *et al.* 2006). Here again, however, the extent of vulnerability, in terms of increased morbidity, mortality and health costs would depend on the socio-economic and demographic situation in the affected regions.

There is probably a greater deal of uncertainty regarding future socio-economic conditions than climatic conditions, and the time scales for these tend to be different in a typical projection and planning exercise. Therefore to begin with one seeks to build a few plausible reference points for the future, which integrate climate science inputs about the future with current developmental data. The key challenge lies in identifying the options for integrating climate vulnerability into socio-economic data.

With best regards,

Purnamita Dasgupta
Ford Foundation Chair in Environmental Economics
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About the contributor

Purnamita Dasgupta holds the Ford Foundation Chair and heads the environmental economics unit at the Institute of Economic Growth. She has been researching and teaching on environmental economics, health economics

and research methods for two decades and has led projects funded by various national and international agencies, particularly on forests, common property resources and water. She has served on committees of the Government of India. Currently, she is engaged in research on developing future socio-economic scenarios for India in the context of climate change.

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Sven Harmeling wrote:
Facilitator's note (Pak Sum Low): There has always been a debate on which countries are "most vulnerable" to climate change. The UNFCCC only refers to countries "particularly vulnerable" to climate change. The Global Climate Risk Index (CRI), as presented here by Sven Harmeling, builds on the direct economic losses (in terms of percentage GDP) and the number of deaths. However, the CRI, while "bringing more transparency into the debate about extreme event impact", has its limitations. For example, of the six Asian countries that are in the top 10 countries "most affected in 1990 to 2008", Myanmar ranks second after Bangladesh, due to only "one remarkable event-Cyclone Nargis in 2008", even though "other Asian countries were hit much more frequently by extreme events". In addition, data availability "is a certain disadvantage for very small countries such as some small island states". Furthermore, the CRI does not include "indirect impacts" and "the total number of affected people (in contrast to the deaths)", which could be most significant in extreme events such as droughts, which are slow onset with non-structural impacts, as "is often the case in African countries". This partly explains "the relatively low visibility of African countries amongst those countries ranked highest." Gerardo Munck on 9 March 2010 has pointed out the "shortcomings of GDP as a measure from an environmental perspective". Thus, before we use or cite the CRI to assess which countries are "most affected" by, or "most vulnerable" to climate change, we must recognize its limitations. However, the CRI complements other analyses of extreme weather impacts.

Dear Network Members,

The Germanwatch Global Climate Risk Index: Extreme events in Asia in the last 20 years

What is the Global Climate Risk Index?

The Germanwatch publication *Global Climate Risk Index 2010 - Who is most vulnerable? Weather-related loss events since 1990 and how Copenhagen needs to respond* was published during the UN climate change conference in Copenhagen. The Climate Risk Index, which has been published annually since 2006, provides a quantitative analysis of the impacts of extreme weather events such as storms, floodings or heat waves. It is based on one of the most reliable databases analysing the impacts of such events, provided by the MunichRe NatCatService, and further takes into account socio-economic data, such as the population and Gross Domestic Product. This index builds on two key criteria: the direct economic losses occurring from such extreme events, and the number of deaths. Both the absolute figures and the relative impacts-deaths per 100,000 inhabitants and losses per unit of GDP in percentage-are taken into account to balance the very different underlying implications of taking absolute or relative figures. For example, if only the absolute number of deaths would be taken into account countries with a bigger population would be "favoured", while in the relative case one victim in a small country may lead to a much higher ranking than thousands of deaths in a bigger country. Each edition contains an annual and long-term ranking as well as additional analyses. There would be additional options for analyses with the figures available.

What does the analysis tell about extreme events in Asia?

The recently published version of the Global Climate Risk Index has been the most comprehensive analysis so far, since it looked at the impacts of the last 20 years in most countries of the world. It is obvious from the data that Asia is relatively strongly affected, with 6 countries ranking among the ten most affected ones (see Table 1). The Climate Risk Index score (3rd column) is calculated from the average ranking in the four indicators, with a slightly higher weighting for the relative figures.

Out of these six countries, Myanmar, is very exceptional, since the records only show one remarkable event - Cyclone Nargis in 2008 with about 85,000 deaths and damages of US$4 billion (in PPP) (*) - while the other Asian countries were hit much more frequently by extreme events. This points to the limitation of the average figures. A similar case is Honduras, where more than 80 per cent in both categories were caused by Hurricane Mitch in 1998. So some countries are continuously at risk while others have seen exceptional catastrophes. Bangladesh is an interesting example, which is somehow in between these two extremes. While 1991 was an exceptional year with more than 100,000 deaths and thus it heavily impacts the long-term calculations, it also appeared frequently among the most affected countries in single years, e.g., Rank 1 in 2007, Rank 3 in 2004, Rank 19 in 2005 (see previous versions of the Climate Risk Index), however with significantly smaller impacts. While the quantitative analyses are not sufficient to draw country-specific conclusions, this development can serve as an indication that Bangladesh's serious attempts to better prepare for disasters have a positive impact.

Table 1. Global Climate Risk Index: Results (annual averages) in specific indicators in the 10 countries most affected in 1990 to 2008

CRI 1990-2008	Country	CRI score	Death toll (annual Ø)	Deaths per 100,000 inhabitants (annual Ø)	Total losses in million US$ PPP (annual Ø)	Losses per GDP in % (annual Ø)
1	**Bangladesh**	**8.00**	8,241	6.27	2,189	1.81
2	**Myanmar**	**8.25**	4,522	9.60	707	2.55
3	**Honduras**	**12.00**	340	5.56	660	3.37
4	**Viet Nam**	**18.83**	466	0.64	1,525	1.31
5	**Nicaragua**	**21.00**	164	3.37	211	2.03
6	**Haiti**	**22.83**	335	4.58	95	1.08
7	**India**	**25.83**	3,255	0.33	6,132	0.38
8	**Dominican Republic**	**27.58**	222	2.93	191	0.45
8	**Philippines**	**27.67**	799	1.11	544	0.30
10	**China**	**28.58**	2,023	0.17	25,961	0.78

Notes: a) The CRI score is calculated as the average ranking of a country in the four different indicators. For example, if a country would rank number 1 - worst affected - in all indicators, the average score would be 1: the lower the score, the more affected a country was in relative terms, compared to other countries. The absolute indicators (death toll and total losses) are weighted 1/3, while the relative indicators are given a slightly higher importance (2/3). b) *The full document contains the figures for all countries. A world map can be found at http://www.germanwatch.org/klima/cri2010map - highres.jpg*
Source: Harmeling 2009.

Out of these six countries, Myanmar, is very exceptional, since the records only show one remarkable event - Cyclone Nargis in 2008 with about 85,000 deaths and damages of US$ 4 billion (in PPP) (*) - while the other Asian countries were hit much more frequently by extreme events. This points to the limitation of the average figures. A similar case is Honduras, where more than 80 per cent in both categories were caused by Hurricane Mitch in 1998. So some countries are continuously at risk while others have seen exceptional catastrophes. Bangladesh is an interesting example, which is somehow in between these two extremes. While 1991 was an exceptional year with more than 100,000 deaths and thus it heavily impacts the long-term calculations, it also appeared frequently among the most affected countries in single years, e.g., rank 1 in 2007, rank 3 in 2004, rank 19 in 2005 (see previous versions of the Climate Risk Index), however with significantly smaller impacts. While the quantitative analyses are not sufficient to draw country-specific conclusions, this development can serve as an indication that Bangladesh's serious attempts to better prepare for disasters have a positive impact.

How to read the index and its limitations

The CRI does not intend to give a comprehensive answer on the question "Which countries are most vulnerable to climate change?" It only looks at one important piece in the overall, more comprehensive puzzle of climate-related impacts on socio-economic systems and, for example, does not take into account aspects such as sea-level rise or glacier melting. It is based on past data and is thus not a linear projection of future climate impacts, also because a

single extreme event cannot be traced back solely to anthropogenic climate change. Nevertheless, climate change is an increasingly important factor for the occurrence and intensity of these events. The Climate Risk Index thus indicates a level of exposure and vulnerability to extreme events that countries should see as a warning signal to prepare for more severe events in the future.

The limitations to the data availability, including the socio-economic data, is a certain disadvantage for very small countries such as some small island states, since particularly in a longer-term comparison, sufficiently sound data are not always available. Furthermore, the data only show direct impacts of extreme weather events, while, for example, heat waves often lead to much stronger indirect impacts (e.g., through droughts and food scarcity), which is often the case in African countries. Also, it does not include the total number of affected people (in contrast to the deaths), since the comparability of such data is very limited. This is another reason for the relatively low visibility of African countries amongst those countries ranked highest. However, the experience that Germanwatch has gathered with this tool shows that it is effective with regard to bringing more transparency into the debate about extreme event impact. Furthermore, since generally media is quite perceptive of indexing and ranking, it has received a lot of media coverage, in particular in those countries and regions particularly affected. This can help to promote national debates about the urgency and adequacy of responding.

With best regards,

Sven Harmeling
Senior Advisor Climate and Development
Germanwatch
Bonn, Germany

Note

(*) Germanwatch calculations based on Munich Re NatCatService database.

About the contributor

Sven Harmeling is working as Senior Advisor Climate and Development with the German development and environment NGO Germanwatch. His main areas of work are adaptation-related policy processes, in particular under the UNFCCC and the Kyoto Protocol Adaptation Fund, and general climate change policies. He has carried out consultancy work for the Wuppertal Institute for Climate, Energy, Environment, the German government and the World Bank. Sven Harmeling is co-chairing the adaptation working group of Climate Action Network International (CAN), serves as spokesperson of the climate change working group of the German umbrella organisation of development NGOs (VENRO) and is member of the steering committee of the German Climate Alliance. He finished his diploma in geography, environmental economics and political sciences in 2004.

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Further work on climate and development issues: http://www.germanwatch.org/klima/en.htm#Development

Tun Lwin wrote:
Facilitator's note (Pak Sum Low): Tun Lwin compares the conventional top-down approach for generating scenarios and projected temperature rise and impacts based on climate models and the community-based livelihood vulnerability approach for analyzing climate change impacts. The conventional approach is complex and inherent with uncertainties, while the alternative approach integrates "climate science with local concerns and real livelihood choices, and provide improved policy support" "in the context of sustainable development". Using the community-based approach, he led a study team in 2009 to undertake survey on six pilot villages in the Ayeyarwady Delta regions of Myanmar, which has resulted in "very useful information on climate change impacts in the study areas". He highlights the changing nature of risks that are caused by climatic and non-climatic factors. In particular, he cites the eight benchmarks (i.e., early warning; emergency response and evacuation; disaster recovery; governance; socio-economy and livelihoods; natural resources; land use and structural design; and risk knowledge and public education) that were successfully used in a community-based assessment soon after Cyclone Nargis hit Myanmar in May 2008.

Dear Colleagues,

A livelihood vulnerability-based alternative

I would like to share some ideas regarding approaches for climate change impact assessments.

Climate change is manifested in the form of increased frequency and intensity of weather-related disasters such as floods and cyclones; climatic variability in terms of changes in temperature, predictability of rainfall and the onset of seasons. It is already established that climate change is having a huge impact on the agricultural sector in developing and least developed countries across Africa, Asia and Latin America, and the relationship between climate change and food insecurity is becoming apparent. The crop loss to disasters and crop failure due to erratic weather pose a great threat to the food security of poor and marginalized communities.

Conventional scenario generation

A conventional top-down approach to analyzing climate change impacts can be summarized as follows: first greenhouse gas emission scenarios are generated and from them, through radiative physics, climate change scenarios are generated and modelled and projections made of rates of change of temperature.

Climate models (UNEP recommended models) are then used to map changed climates (including temperature, pressure patterns, rainfall patterns soil moisture, sea-ice extents and other parameters of the climate system), comparing today's climates generally using a 1990 baseline with conditions of some undefined time in the future when CO_2 levels are approximately twice the pre-industrial levels (possibly by 2050 or soon after). There is uncertainty inherent in this process, the outcomes of which are various "generic scenarios" or "climate futures" (Huttner *et al.* 2003).

The next steps are to consider what effects these changes to climate around the world might have on physical and biological systems. Then it adds further levels of uncertainty and dramatically increasing the complexity of the systems and interactions that certainly need to be thoroughly studied. Then consideration is made of the impacts of preferred scenarios on human activities. Apart from the complexity of branching pathways, this approach is problematic for another reason-the original global warming estimates are given in ranges. For example, currently a range of 1.4 to 5.8°C increase is projected by 2100 (IPCC 2007). Therefore all derived scenarios are similarly broad. Thus the road map to assessment in the conventional approach is complex and problematic.

As climate conditions change, it is neither clear how to draw thresholds of effect on either biophysical systems or on any human activities, nor indeed properly consider responses. For example, it may never be possible to state that a sea temperature increase of say 2°C will allow a certain coral reef system to be sustained whilst one of 2.5°C will cause it decline. And it is likely we will never be confident in a given situation that a rise of 2°C in 50 years will be sustainable but in 40 years will not. It is practically almost impossible to draw lines around the sustainability in the conventional approach (Huttner *et al.* 2003).

A livelihood vulnerability-based alternative

Seeking a way to minimize the complexity of the conventional decision-risk tree approach, an alternative approach is possible which can better integrate climate science into local concerns and real livelihood choices, and provide improved policy support. In this approach one can start at a local level by considering today's livelihoods and how they can be sustained in the light of today's risks and vulnerabilities. The fact that the increased number of climate and weather-related hazards in today's risks makes the conventional approach to become more complex and problematic. The new approach consider, however, how improved knowledge of possible changes in the climate risk mix because of projected global warming might affect communities and impact on their options and livelihood choices in the context of sustainable development.

This approach would enable responses to climate change to be fully integrated into development. Then, improving our understanding of the likelihood of change and knowledge of impacts can help to overcome ignorance and can provide development opportunities in all societies (Huttner *et al.* 2003).

To provide the linkage from vulnerable livelihoods to biophysical drivers and climate scenarios, a methodology can be envisaged which would cluster typical or archetypal communities, livelihoods, stakeholder groups, and multi-sector interactions according to the opportunities and threats they face in today's world, in the face of variable climate.

Analysing the vulnerabilities of these livelihoods provides a powerful knowledge base from which to consider climate change impacts, avoiding the extreme complexities of the decision-tree generated by starting at the top with global temperature projections.

Many communities in developing countries may be ignorant about climate change science and the likely direction of change and yet they are especially well-adapted to sustaining livelihoods, having traditional adaptive capacity in an uncertain present, and have relevant knowledge of extremes that can inform their decision-making now and as future climate change occurs.

The innovative approach known as "A Livelihood Vulnerability-Based Alternative Approach" will allow assessing indigenous approaches which have been used by communities for years and therefore they were time and space tested tools for adaptation.

Another important issue in disaster risk reduction (DRR) and coastal community resilience (CCR) is that not only the risks of the community are important themselves, but also the risks themselves are changing by the following causes, namely (i) climatic causes; (ii) non-climatic causes; and (iii) environmental governance.

In 2009, I led a team to survey on six pilot villages in the Ayeyarwady Delta regions of Myanmar for obtaining information on the following Frequently Asked Questions (FAQs):

1) What kind of climatic changes (temperature, rainfall patterns, seasonal predictability …) the community has witnessed in the last few decades?
2) What are the impacts of climate change on people's life, what are the reasons for these impacts and how are they coping with these changes?
3) What has been the direct impact of climate change on crop production?
4) How farmers have been adapting on their own to improve their agricultural production?
5) What changes do communities want to support their adaptation initiatives?

These community-based analyses have given me very useful information on climate change impacts in the study areas.

Right after Cyclone Nargis in May 2008, a Joint Rapid Assessment was undertaken by Department of Meteorology and Hydrology (DMH) and Asian Disaster Preparedness Centre (ADPC) in Yangon and Ayeyarwady Divisions. The main assessment made was focused on the assessment on CCR (Coastal Community Resilience) on CC and DRR. There are eight benchmarks used in the assessment: (1) Early warnings; (2) Emergency response and evacuation; (3) Disaster recovery; (4) Governance; (5) Socio-economy and livelihoods; (6) Natural resources; (7) Land use

and structural design; and (8) Risk knowledge and public education. By interviewing and surveying at the community levels to both public and officials, each benchmark was scored and the performance assessment was made at the community level.

Best regards,

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Private Consultant, Myanmar Climate Change Watch, Yangon, Myanmar

About the contributor

Dr. Tun Lwin is the former Director-General of Department of Meteorology and Hydrology (DMH). He joined the DMH in 1965 and during his tenure of nearly 45 years, he has worked as an instructor, researcher, weather forecaster, TV weather telecaster. He was also a Principal of a Joint Degree Programme on Meteorology and Hydrology, with the Physics and Mathematics Department, University of Yangon. Dr. Tun Lwin authored 3 books, 81 research papers and 250 articles on weather forecasting, natural disasters, storm surge prediction, impacts of El Niño and La Niña, Climatic Classification, Storms, Teleconnections, and more. He conducted over 75 international seminars and more than 350 local seminars.

Dr. Tun Lwin is currently serving as the Chairman/Technical Adviser for the Regional Integrated Multi-hazard Early Warning System-RIMES, which is led by the Vice President of Maldives and the Secretary of Science and Technology Ministry, India. This is a collaborative work of 28 countries in Asia and Africa under Memorandum of Understanding (MOUs). He has started an NGO named "Myanmar Climate Change Watch" in Yangon. Dr. Tun Lwin is also a parttime consultant for CARE Myanmar, ActionAid Myanmar, Myanmar Red Cross Society (MRCS), as well as a resource person for ICHARM/PWRI Japan, EGRESS Myanmar, EcoDev Myanmar..

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David Hastings wrote:

Facilitator's note (Pak Sum Low): David Hastings highlights the importance of having "good data, visualizations, and assessments" for "policy/programmes/forecasts/responses" to adverse effects of climate change on various environmental and socio-economic sectors, including human development and security. Even though the data are "imperfect", and with various levels of "uncertainty", the challenge "is to make them as useful as possible and to help decision makers to mitigate possible risks". He identifies the following sample issues that are relevant to data/mapping: (i) compilation of "new graphics indicating El Niño and La Niña some associations in global and regional context, including precipitation, temperature, floods and drought" to "help prioritize developmental policies and activities"; (ii) the feasibility of crafting "an environmental indicator" for countries in Asia and the Pacific that "can be as useful as possible for decision makers to pursue progress in the countries"; and (iii) compilation of summaries of sources of information for stakeholders to use - particularly those active in the region". He suggests that additional thoughts on adaptation of "data/mapping materials from the IPCC reports" and "other resources (materials and people)" would improve "understanding of climate change with respect to human development in Asia and the Pacific".

Dear Network Members,

"Mapping and measuring" climate change for Asia and the Pacific

It is timely to assess the potential effects of climate change on human development in Asia and the Pacific. These are pressing issues, which have implications for national, community, and individual policy and responses. Governments are still trying to understand what to do internally and cooperatively with each other on the world stage with respect to climate change. A better-measured mapping of the situation would be valuable.

Policies/programmes/forecasts/responses regarding flooding, drought/desertification, heat waves, sea-level change, and implications for biodiversity, surface and groundwater, agriculture, food security, fisheries and other climate-dependent resources, industry, health, as well as other impacts on human development and security, are more effective when grounded by credible data and illustrations, and the knowledge derived therefrom. Each of these sub-issues may be helped by good data, visualizations, and assessments of ways forward.

IPCC reports are an excellent starting point for digested data and mapping. But there is some new information which (1) did not reach the IPCC reports; (2) have been compiled since the reports were edited; or (3) could be compiled now if priorities could be adjusted to make such compilations-and specialists attracted to adjust priorities to release such knowledge.

Other sources result from international cooperative mechanisms under WMO, UNEP and the International Council on Science (ICSU). All regional economies' meteorological services (even if several are not WMO members) may individually or jointly be good sources of such information.

Some sample issues on mapping and monitoring for which data/mapping may be valuable are highlighted below:

- It appears possible to compile new graphics indicating El Niño and La Niña some associations in global and regional context, including precipitation, temperature, floods and drought. Such information could help prioritize developmental policies and activities.

- Studies note that coasts far from the Last Glacial Maximum have characteristically experienced sea-level drop during the past 6,000 years (see Figure 11.5 in IPCC 2001). Detailed studies for southeastern Australia indicate that sea-level rise after the Last Glacial Maximum caused sea level to reach its current level ~7700 years ago, plateau at about 1 - 1.5 metres above current sea level during ~7400 - ~2000 years ago, after which it gradually dropped again to present mean sea level (Sloss and Murray-Wallace 2008). Local sea-level change between 1950 and 2000 could be viewed at (see Figure 5). The Asia-Pacific region generally ranges between -2 to +2 mm/year. The general global pattern of sea-level change is not observed universally. Some areas may experience uplift or subsidence, which affects local sea-level change. Data/model results for many parts of the region may be available to help illustrate regional patterns in more detail.

- What other data/graphics could be produced on a regional basis to improve climate-change related understanding and decision making? Who might be able to provide such materials-using what sources? Can the sourcing and provision of such materials-in themselves help to strengthen regional institutions?

- Is it feasible to craft an environmental indicator for countries in Asia and the Pacific - (1) that includes as many states as possible, even small island states; (2) that is based on data that can pass a regional or global test of relevance; and (3) that is not merely an exercise in ranking countries-but can be as useful as possible for decision makers to pursue progress in countries? I have some thoughts on this, as I have been working to draft a prototype index-which is hardly perfect at this point, but may be useful particularly after vetting and likely improvements in formulation or presentation by the Network.

- Although not necessarily in the context of mapping and monitoring-it may be worthwhile to compile summaries of sources of information for stakeholders to use-particularly those active in the region.

Of course, there is only one guarantee regarding such data-that they are imperfect. A challenge is to make them as useful as possible, and to help decision makers to mitigate possible risks in using such information.

Thus, it is probably useful for all discussions of data and mappings to discuss levels of uncertainty, with advice for decision makers on (1) what they may be sure of; (2) what is fairly certain to happen; and (3) what they should be prepared for even if the science is uncertain as of now.

It is hoped that upcoming discussions can offer additional thoughts on such topics as (1) What data/mapping materials from the IPCC reports should be adapted; (2) What other resources (materials and people) might be good; toward improved understanding of climate change with respect to HD in Asia and the Pacific.

With best regards,

David Hastings
United Nations Economic and Social Commission for Asia and the Pacific (retired)
National Oceanic and Atmospheric Administration, National Climatic Data Center (and World Data Center for Meteorology)

About the contributor

David Hastings spent the initial leg of his career as a geophysicist in academia and the public services of Ghana, his mid career likewise in the USA, and the latter leg of his career with the United Nations Economic and Social Commission for Asia and the Pacific. The first leg was dominated by in-situ Earth observations and characterization of resources and environment, the middle leg by using satellite observations and geographic information systems for similar purposes (plus pursuing use of the Web for sharing information and ideas), and the third leg by promoting partnerships and the creation of the Human Security Index. He is now back in the USA, attempting to put the previous pieces together into a coherent whole.

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Ma. Consuelo Garcia wrote:
Facilitator's note (Pak Sum Low): Ma. Consuelo Garcia stresses the importance of biodiversity "information sharing" "from national to regional and global levels". She discusses the rationale for the web-based ASEAN Biodiversity Information Sharing Service (BISS) established by the ASEAN Centre for Biodiversity (ACB). The ASEAN BISS has been re-designed and re-developed in recent years covering various activities on "people, data and process, and information technology components". She highlights the major challenges and lessons learned during the re-development process, and explores the possibilities of incorporating social, ecological and environmental parameters, such as the Millennium Development Goals, as well as climate change data, into the ASEAN BISS, particularly the Map-Room, which "was envisioned to serve as a visualization tool" to show the links between biodiversity data and other social, ecological and environmental parameters for regional analysis.

Dear Network Members,

Sharing data and information: Challenges on re-developing the web-based ASEAN biodiversity information sharing service (*)

The ASEAN BISS (**) - Rationale

The increasing availability of distributed mapping and the need for more robust analysis of biodiversity information from diverse sources of data have continuously challenged bioinformatics research and development. And as biodiversity issues straddle countries and ecosystems, information sharing has to scale up from national to regional and global levels.

In 2004, the Vientiane Action Programme proposed the establishment of a functional regional database or network of national databases containing inventory of the biological resource of the ASEAN Region. Following the 2008 CBD COP9 (see UNEP 2008), Parties encouraged regional partners holding biodiversity information to establish regional, sub-regional or thematic clearing-house mechanisms to provide support to national clearing-house mechanisms, to share knowledge, and to facilitate scientific and technical cooperation relating to biodiversity.

These scenarios and regional and global decisions provided the rationale for the re-development of the Biodiversity Information Sharing Service (BISS) under the Biodiversity Information Management of the ASEAN Centre for Biodiversity (ACB).

The original BISS version 1.0 contained species and protected areas information. Serving as a platform for sharing and linking biodiversity information, the original BISS maintained minimum data fields and established links with other global databases for technical details. Maps then were static and updating and creating records in the original BISS was tedious. With the rapid changes in the information technology, establishment of new global datasets, and the increasing need for web-and map-based platforms to support biodiversity management efforts, BISS version 1.0 was re-developed and enhanced into ASEAN BISS Version 2.0 by ACB from early 2007 to mid-2009. The ASEAN BISS Version 2.0 is a web-based data management system envisioned to serve as a common data sharing platform for ASEAN Member States on biodiversity information (ASEAN Centre for Biodiversity Conservation 2009b).

The challenges of re-developing the ASEAN BISS

As part of the re-development and enhancement plans for the BISS (now renamed ASEAN BISS) related activities covering people, data and process, and information technology components were undertaken.

The *people component* covered the ACB, ASEAN Member States (AMS), donors, partners and stakeholders, and their overall sharing culture or openness to sharing information and knowledge. The data and process component included the biodiversity data generation, analysis, exchange and reporting processes, as well as the multilateral environmental agreements' guidelines and data standards and sharing protocols. The *information technology component* involved the use of Internet, databases, tools for collaboration, websites and portals and applications to enable the AMS to access, share, and exchange biodiversity information within and outside the region. For information sharing to work in the AMS, ACB through its Biodiversity Information Management program addressed the needs, gaps and opportunities in all three areas.

The broad re-design process for the ASEAN BISS version 2.0 involved rapid assessment for ICT assessment and information needs; enhancing the data sharing capacities of member states (people component); moving the species and protected area database to an open source platform, re-establishing links with relevant national, regional and global data holders, and preparing a framework for data sharing (data and processes); designing a Map-Room and lodging the ASEAN BISS within the ACB and ASEAN Clearinghouse Mechanism Website or CHM (information technology). The major challenges and lessons learned are discussed below.

i) *To enhance capacities for data sharing and information harmonization,* a rapid assessment on ICT and biodiversity information needs was conducted (ASEAN Centre for Biodiversity Conservation 2009c), and a series of Biodiversity Data Sharing and Information Harmonization were designed and implemented for the AMS from 2007 to 2009

(***). The rapid assessment initially involved using a questionnaire but there was hardly any response; hence more focused face to face interviews using the survey questionnaire were undertaken. For the capacity building activities, the challenge lie on the ensuring that the almost the same set of trainees attended the training to ensure continuity of understanding the training concepts, support the set of data validation exercises as well as provide updates on post-training in-country activities. At least two representatives were always invited for each training workshop.

ii) Prior to the actual re-development of the original BISS, *the data holdings and links to external databases were reviewed.* As there was no formal handover nor technical documentation then, the old species and protected area contents had to be manually reviewed and moved to MySQL platform. Old partnerships with relevant data holders including GBIF, WorldFish and UNEP WCMC had to be re-established since the redesign of the ASEAN BISS involved linking the basic species and protected areas data fields to details in updated global data sets held by these data holders. To support information harmonization, the core data fields used in the ASEAN BISS were matched with the data fields of relevant data partners. However, until partnerships were officially established through an MOU or MOA, caution had to be practised in downloading new datasets from global data sources to update the ASEAN BISS. Research on existing data sharing guidelines of data holders as well as those of ASEAN member states pointed to differing guidelines and procedures. As part of the data harmonization activities and to facilitate information sharing, a framework for sharing biodiversity information was drafted (ASEAN Centre for Biodiversity Conservation 2009a) and presented to ACB's National Contact Points in 2008.

iii) The centerpiece of the ASEAN BISS re-development was the designing of the Map-Room. In the past, using commercial mapping software was the norm for publishing content and maps on the web. However, the cost of maintaining up-to-date versions of commercial softwares is huge. For the re-development of the ASEAN BISS, an open source mapping platform-Google Map API was used. After the initial re-development activities were completed, the ASEAN BISS including the Map - Room can already be directly posted on the web. Highlighting its web presence and promoting its use, however, were seen to be another set of challenges. To ensure greater exposure, the ASEAN BISS was linked to two websites: the ACB website and the ASEAN CHM website. User acceptance testing, presentations in workshops, and soft - launching also helped in re - introducing the ASEAN BISS.

The possibilities - Incorporating the MDG and climate change data in ASEAN BISS

While planning for the ASEAN BISS re-development, incorporating other data layers including those on the Millennium Development Goals (MDG) and climate change information were considered.

The idea was to expand the use of the ASEAN BISS, particularly the Map-Room, for regional analysis using biodiversity data and other biological, ecological, and social parameters. The Map-Room was envisioned to serve as a visualization tool to show links between biodiversity and social parameters including poverty, and between biodiversity and climate change.

While the impacts of climate change on species and protected areas have been continuously studied, results may be either locked in publications or project documents. Developing and promoting the use of map-based information sharing platforms like the ASEAN BISS can support the communication of scientific studies on the links of biodiversity and climate change.

As part of the Map-Room development, a tab on the MDG was created and a poverty map was uploaded. This will serve as the start of Map-Room's expanded visualization function not only for biodiversity but also for other observable parameters on the MDG and possibly climate change.

Conclusion

Summing up, the re-development of the ASEAN BISS took a long iterative and consultative process with ASEAN Member States and data partners via workshops and face to face focused discussions. The process also took into consideration existing national, regional and global data holders and their sharing requirements and guidelines. Early engagement with the stakeholders ensured that needs and gaps were considered during the re-development phase.

The next phase of the ASEAN BISS will have to focus more on updating its data holdings, consider the incorporation of MDG and climate change parameters in the Map-Room, expand its regional analysis and mapping capability, and develop more automated uploading and downloading tools.

With best regards,

Ma. Consuelo Garcia
Knowledge Manager

Notes

(*) The views expressed in this contribution are those of the contributor in her personal capacity.
(**) The original Biodiversity Information Sharing Service (BISS) was developed under an EU-funded project called the ASEAN Regional Centre for Biodiversity Conservation (ARCBC). After the ARCBC project completion, the BISS was redesigned by the EU-sponsored ASEAN Centre for Biodiversity (ACB). See Garcia and Pangga 2007 for more information.
(***) Workshops were also organised. For further information, please see ASEAN Centre for Biodiversity 2009a, and 2009b; and ASEAN Centre for Biodiversity Conservation 2009d.

About the contributor

Ms. Ma. Consuelo Garcia was previously the Director for Biodiversity Information Management, ASEAN Centre for Biodiversity. For the past 23 years, she has been involved in information services, information management and knowledge management mostly relating to environment and natural resources. She has also previously worked on knowledge management and applications development at the UNESCAP and the Asian Development Bank. Her academic background includes marine science, fishery biology, remote sensing and GIS.

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19-30 May 2008. UNEP/CBD/COP/DEC/IX/30. [http://www.cbd.int/doc/decisions/cop-09/cop-09-dec-30-en.pdf]. Last accessed on 18 March 2010.

Ramesh Gampat, Niranjan Sarangi, and Manoja Wickramarathne wrote:

Facilitator's note (Pak Sum Low): Ramesh Gampat, Niranjan Sarangi and Manoja Wickramarathne discuss per capita GDP and the Human Development Index (HDI), two widely acceptable measures of progress, and their relationships with ecosystem. They then analyse the "price of progress": the cost of HD in terms of CO_2 emission, based on data for 113 countries, and observe the "diverse patterns between CO_2 and the HDI". For example, more than "one-fifth of the countries in the sample of 113 countries pumped less CO_2 per capita into the atmosphere even as their GDP and HDI have risen". Some of "the least CO_2-intensive countries are in Africa", while "some of the high CO_2-intensive countries are both developed and developing economies". It seems that "most countries pump out increasing volumes of the greenhouse gas (CO_2) to achieve rising human development". Global policy on a global carbon tax may be necessary to curb CO_2 emission above "a threshold to the 'capacity' volume of CO_2 per unit of HDI". The "hundred of millions of dollars" possibly raised by this "green" tax "could be used to promote the development and deployments of green technology" in poor countries. However, "how to set this threshold" and "how much should the tax be" are issues to be fully addressed.

Dear Network Members,

The price of progress

Mapping and measuring

It is difficult to conceive of sustained economic progress and human development without the use of natural resources-what the classical economists called land, what was called until the 1990s natural resources, but what is today properly called the ecosystem. In fact, the ecosystem is both the supplier of natural resources and the sink for the absorption of waste that is an inevitable byproduct of human progress. This inevitable byproduct of progress degrades the ecosystem, which could be serious enough to pose a threat to our very existence, as well as that of other species, in the long run.

Two crucial factors are thus the engine of the equation: human progress and our closed ecosystem. The purpose of the mapping and measuring exercise, as we see it, is to gauge the link and feedback loops between the two: do they move in opposite directions, bi-directionally or not? Two widely acceptable measures of economic progress are per capita GDP and the Human Development Index (HDI) (*). How does one gauge the status of the ecosystem? The preferred approach is an indirect one: ascertaining factors that cause the ecosystem to degrade. Some of these factors include CO_2 emission, share of urban population, the structure of an economy, electric power consumption, energy use per capita, fossil fuel consumption and forest area. So, in essence, the mapping and measuring exercise is one that attempts to chart factors that connect economic progress and HD to ecosystem and vice versa.

Our purpose here is not to propose a rigorous framework for a new index to measure the impact of progress on the ecosystem or to suggest ways of greening the HDI - we believe that the HDI is good as it presently is and should be left alone. Instead, we propose to explore superficially the relationship between the HDI (per capita GDP explains more than 75 per cent of the HDI) as the measure of progress and CO_2 emissions (total metric tons and per capita). Beyond this, we shall look at the "price of progress": the cost of human development in terms of CO_2 emission. We have data on these variables for 113 countries, 20 of which are from the Asia-Pacific.

The data

The initial year for all indicators is 1995, while the end year varies between 2005 and 2008, depending upon data availability. Almost all countries grew their HDI between 1995 and 2007, while the volume of CO_2 they pumped into the atmosphere (total and per capita) either increased or declined. More than one-fifth of the countries in the sample pumped less CO_2 per capita into the atmosphere even as their GDP and HDI have risen.

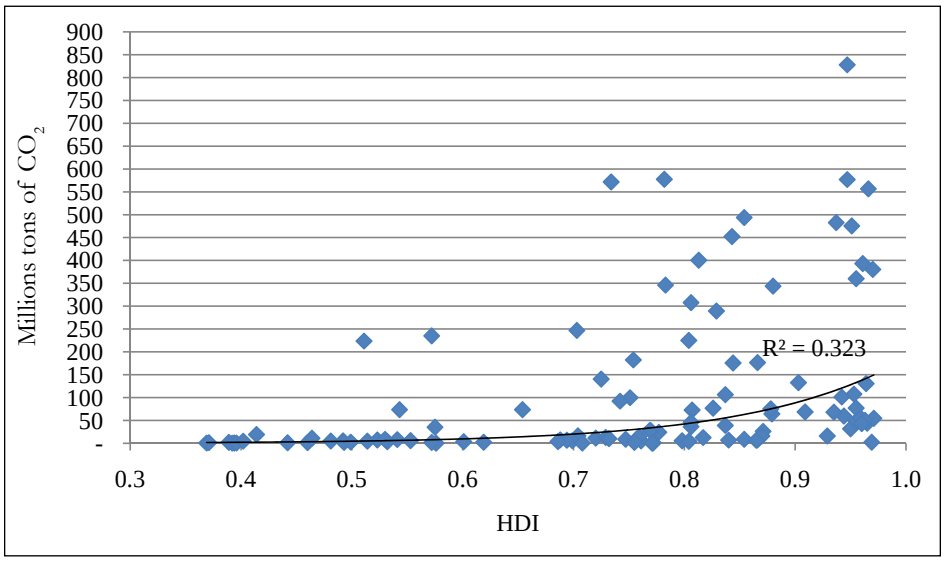
The countries that experienced changes in the HDI of more than 20 per cent during 1995-2007 are developing countries. In all cases, their emission of CO_2 per capita has either increased more than 30 per cent or actually declined (seen in case of African countries). Another group comprises countries, including some of the so-called emerging economies, registered HDI growth of less than 20 per cent but recorded CO_2 growth of more than 30 per cent. A third group of countries grew their HDI while pumping less CO_2 into the atmosphere. Such diverse patterns between CO_2 and the HDI certainly require further research, which is beyond the scope of this short piece.

CO_2 and the HDI

It is by now an indisputable fact that human progress spews an increasing amount of CO_2 into the environment. At the risk of oversimplifying the issue, we propose to take CO_2 as a proxy for the price of progress and the HDI as the gauge of progress itself. Then the price of progress could be written as CO_2/HDI (**), which simply shows the amount of CO_2 associated with a unit of the HDI. This is, of course, at the national level, but it might be possible to calculate sub-national CO_2 and HDI, if necessary. The results show that some of the least CO_2-intensive countries are in Africa, as might be expected. Interestingly, some of the high CO_2-intensive countries are both developed and developing economies. *Ceteris paribus,* at the global level, it requires 360.12 million metric tons of CO_2 for an HDI = 0.100.

At a more analytical level, Figure 1 shows a scatter plot of CO_2 and the HDI for all 113 countries in the sample. The pattern seems to suggest that most countries pump out increasing volumes of the greenhouse gas (CO_2) to achieve rising human development. This finding is consistent with that of Anthony Patt in a recent post: "… higher levels of HDI actually correlate with higher levels of risk …". Apparently, it is somewhat premature to talk about the greening of the HDI. Rather, it seems more appropriate to talk of the "browning" of the HDI, at least in the medium term.

Figure 1. Most countries pump out more CO_2 to grow their HDI



Sources: UNDP 2009; World Bank 2010.

One immediate global policy implication of this formulation is that of a global carbon tax: the idea that there is a threshold to the "capacity" volume of CO_2 per unit of HDI. We do not profess to know how to set this threshold (which would probably require a paper in itself), but one simple approach is to take a weighted average: sum of country per capita average CO_2 and divide it by the sum country-weighted per capita GDP. CO_2 emission above this threshold becomes taxable. How much should the tax be? The tax could be levied on each increment of CO_2 above the threshold. This increment is yet to be defined, as is the tax itself. Incidentally, it might be noted that there are proposals for a global financial transaction tax set at 0.05 per cent per transaction (Rodrik 2010). The "green" tax could potentially raise hundred of millions of dollars, which could be used to promote the development and deployments of green technology, particularly in poor countries.

With best regards to all,

Ramesh Gampat, Deputy Regional Programme Coordinator, HDRU
Niranjan Sarangi, Economist, HDRU
Manoja Wickramarathne, Statistics Officer, HDRU
UNDP Regional Centre for Asia-Pacific, Colombo Office

Notes

(*) Per capita GDP is one of the three components of the HDI. As GDP has a positive time trend (excepting a few countries), it can positively influence HDI values, even if countries do not show progress on the education and health indicators.
(**) There have been debates in recent years about measuring carbon intensity, such as total carbon emission, per capita carbon emission or per unit of GDP carbon emission. These proposed measures have influenced the climate change negations at the international forums in one way or the other. As far as we know, we are the first to propose the CO_2/HDI method to look at the carbon-intensity of progress. One important limitation of this method is that it does not discount for the population or GDP of a country. The results are preliminary observations and we appreciate your feedback.

About the contributors

Ramesh Gampat, together with Anuradha Rajivan, are the editors of the two-volume *Perspectives on Corruption and Human Development,* just published by Macmillan.

Niranjan Sarangi is an Economist with the HDRU. His publications and work deal with issues on inclusive finance, evaluation and measurement, poverty, employment and human development with a focus on Asia-Pacific countries.

Manoja Wickramarathne is a Statistics Officer with the HDRU. Her areas of work focus on poverty and human development.

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Anuradha Rajivan wrote:
Facilitator's note (Pak Sum Low): Anuradha Rajivan reiterates the issue of measurement dilemma based on GDP that continues to dominate public policy, and the need for green GDP, as raised by Gerardo Munck on his posting on 9 March 2010. She confirms the usefulness of "other indicators of well-being like the HDI family of indices". She further raises the following important questions that have been facing the economists, as well as policy and decision makers: (1) "Can we transcend or at least transform economic growth as the aim of policies and people's lives?"; and (2) "Can growth and emissions be de-coupled?". With the creativity and innovativeness of humankind, I certainly believe that the answers are "yes" for both questions. Indeed, Anuradha has presented some recent data from

India and China to answer the second question. This brings to the concept of "Green Growth" or environmentally sustainable economic growth, which has been actively promoted by UNESCAP since 2005 (http://www.greengrowth.org/). "Green Growth" will address many of the issues raised here. However, for "Green Growth" to be sustainable, not only it needs to be "environmentally sustainable", but also "socially sustainable", and even "politically sustainable" in terms of sustainable government policy for its promotion and implementation.

Dear Network Members,

Transforming and transcending growth in measuring climate change

The measurement dilemma: GDP dominance

The big question before the word is: can we transcend or at least transform economic growth as the aim of policies and people's lives? And if we are to do so, how do we map and measure change? At a macro level while GDP continues to be the overall explicit goal of public policy, governments have realized that they can become vulnerable on other grounds, like food shortages, health disasters or natural calamities, and more recently climate change. While the media does raise issues other than money, it has been easier to prioritise economic growth in public discourse, largely because it is easier understood and better backed by regularly available and officially accepted data. Increasingly, other indicators of well-being like the HDI family of indices, and disaggregated data on school performance, health, demography, emissions, etc., along the line of the MDGs, have gained growing legitimacy as yardsticks by which societies are assessed. And even as income-based assessments continue to concern people as aspirational goals, people themselves are coming to expect public policy to deliver a better quality of life for the current and future generations. Official statistics are attempting to respond to this pressure. Climate variability and change is one such area.

However the dilemma is that while most non-income indicators, like better schooling or health outcomes, correlate positively with income, cleaner air or lower greenhouse gases do not correlate except in limited cases (*). There is little need to resist growth if the aim is a better quality of life for all, except when it comes to human-behaviour-induced climate change. While people do benefit from clean air, water and less variability in the climate, tradeoffs can be uncomfortable. The short-run implications for behaviour change in production and consumption are not easy to operationalise, even if accepted. Concomitantly, consensus in mapping and measuring climate change from a people's perspective is still to be established.

No official backing yet

As succinctly argued by contributors like Gerardo Munck and other contributors, a suitable aggregate measure that incorporates GDP along with the environment - much as the HDI aggregates a measure of income along with other key social indicators - is a task still to receive official backing. Environmental issues are no longer denied, but are still seen as needing to be addressed within the framework of decisions aimed at economic growth. Efforts to bring sustainability considerations at the heart of policy debates continue.

Greening money or going physical?

'Greening money' and 'going physical' are two directions that are seen. Greening money includes attempts at adjusting GDP for environmental damage to develop a Green GDP in dollars-transforming how growth is assessed. Examples are the Index of Sustainable Economic Welfare (ISEW) and the Genuine Progress Indicator (GPI). But these continue to use private consumption expenditures as a starting point and are dogged by a lack of consensus in how to assign a money value to things that are not exchanged on the market. And, not being backed by official statistics, data are only available for a few countries. Going physical includes attempts to bypass growth to capture the ecological footprint by assessing human demands of nature against how much nature can supply through regenerative biological capacity. But this latter is itself influenced by human behaviour.

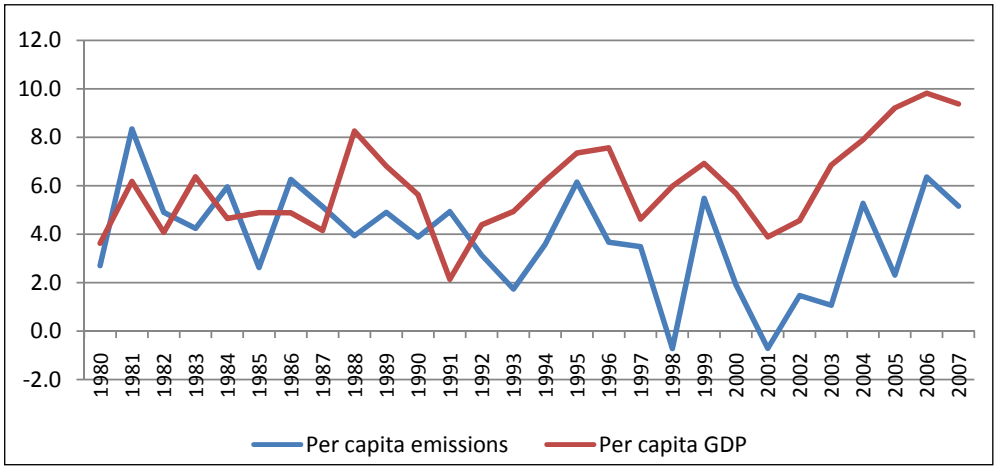
Aggregating physical and social indicators in HDI-type indices have resulted in combinations like the Environmental Performance Index (EPI), Global Climate Risk Index (CRI) (**) and the Environmental Vulnerability Index (EVI). Questions of conceptual clarity and weights aside, is there a simpler way?

Can growth and emissions be de-coupled?

The tragedy of the commons is very much in our face-while many in the developed world grapple with transforming and even possibly transcending growth, powerful interest groups continue to benefit from the conventional green-house-gas-intensive growth paths. These issues are also extremely relevant for large and highly growth-oriented societies of Asia like China and India. Can countries of Asia demonstrate that there could be other ways to organize production consumption and exchange without necessarily compromising living standards-essential if poverty and inequality are to be tackled?

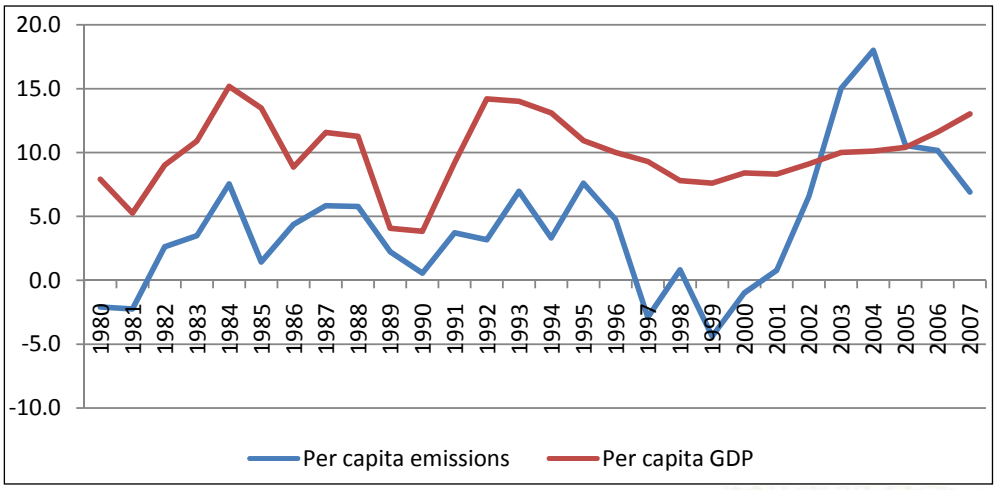
A quick look at the trends in per capita emissions and GDP growth data for India (Figure 1) and China (Figure 2) between 1980-2007 shows that while emissions and growth have been closely correlated for decades, China may have started to decouple GDP growth rate from per capita emissions from 2004 (***). While a search for consensus on other indicators and indices continues, the extent of decoupling is one way for countries to map and measure.

Figure 1. India: Correlation between per capita emissions and GDP growth rates (1980-2007)



Sources: International Energy Agency 2010; World Bank 2010.

Figure 2. Possible decoupling of per capita emissions from GDP growth rates (1980-2007)



Sources: International Energy Agency 2010; World Bank 2010.

With best regards,

Anuradha Rajivan
Regional Programme Coordinator
HDRU
UNDP Regional Centre for Asia-Pacific, Colombo Office

Notes

(*) Environmental Kuznets curve does indicate positive correlation after a certain income level is reached in a limited number of cases (e.g., sulphur dioxide emission).
(**) See Sven Harmeling's contribution to the AP-HDNet (Harmeling 2010) for more information on this index.
(***) I would like to acknowledge the discussions with Dr. Biswajit Dhar, RIS, Delhi, March 2010. The data considered for per capita emissions are from International Energy Agency (2010). For the per capita GDP, the WDI (World Bank 2010) has been considered.

About the contributor

Anuradha Rajivan is the Regional Programme Coordinator, HDRU, UNDP Regional Centre for Asia-Pacific, Colombo Office. She is an expert on poverty, microfinance, food and nutrition security issues. Her prior work includes assignments for the World Bank, IFAD, UNDP and UN-Habitat in Asia and Africa.

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4. Closing Message

Dear Network Members,

The discussion of sub-theme 2 on *Mapping and Measuring* continues many of the issues raised in Sub-theme 1: *Vision of a climate-resilient society.* It has attracted 10 contributions from 12 contributors over a two-week period. We would like to thank the following contributors for their important contributions: Gerardo Munck, Anthony Patt, Hans-Martin Füssel, Purnamita Dasgupta, Sven Harmeling, Tun Lwin, David Hastings, Ma. Consuelo Garcia, Ramesh Gampat, Niranjan Sarangi and Manoja Wickramarathne (joint contribution) and Anuradha Rajivan.

This sub-theme aimed to map and measure climate change and its adverse effects on human development, including the inter-relationships between climate change and ecosystems, as well as other environmental, ecological, social and economic changes and their inter-relations that affect human development and vice versa. The discussion was lively and informative, and the topics that have been covered were diverse and wide-ranging. These include: data and mapping improvement for better policy and decision-making (**David Hastings**) and for "designing effective adaptive strategy" that "can be integrated into a development framework" (**Purnamita Dasgupta**); physical measures (e.g., Keeling curve for monitoring the atmospheric carbon dioxide concentration) (**Gerardo Munck**); hybrid socio-physical measures (e.g., Environmental Performance Index; Environmental Vulnerability Index) (**Gerardo Munck; Anuradha Rajivan**); GDP and its shortcomings, and Green GDP (**Gerardo Munck; Ramesh Gampat, Niranjan Sarangi and Manoja Wickramarathne; Anuradha Rajivan**); Human Development Index (**Anthony Patt; Ramesh Gampat, Niranjan Sarangi and Manoja Wickramarathne; Anuradha Rajivan**); criteria for social and environmental vulnerability

indices (**Hans-Martin Füssel**); Global Climate Risk Index and its limitations (**Sven Harmeling**); uncertainties in climate models (**Anthony Patt; Purnamita Dasgupta; Tun Lwin**); community-based vulnerability assessment (**Tun Lwin**); ASEAN Biodiversity Information Sharing Service (BISS) that may incorporate social, ecological and climate change data (**Ma. Consuelo Garcia**).

The following issues, in particular, stand out from the discussions, and indeed, further discussions on these issues are still needed:

- How do we make use of "imperfect" data as useful as possible and to help decision makers to mitigate possible risks? (**David Hastings**);

- The importance of incorporating the social dimension in environmental assessment (**Gerardo Munck**). A similar point was made to explore the possibilities of incorporating social, ecological and environmental parameters, such as the Millennium Development Goals, as well as climate change data, into the web-based ASEAN (BISS), particularly the Map-Room, which is a visualization tool to show the links between biodiversity data and other social, ecological and environmental parameters for regional analysis (**Ma. Consuelo Garcia**);

- The "continued dominance of GDP as the overriding goal of public policy" calls for the continuing need "to place sustainable human development at the center of policy discussions" (**Gerardo Munck**). This point was strongly reiterated by **Anuradha Rajivan**;

- The effects of human development, as captured by HDI, are non-linear-higher levels of HDI actually correlate with higher levels of risk (**Anthony Patt**);

- There are diverse patterns between CO_2 emission per capita and the HDI. For example, more than "one-fifth" of the 113 countries sampled "pumped less CO_2 per capita into the atmosphere even as their GDP and HDI have risen". In general, it seems that "most countries pump out increasing volumes of CO_2 to achieve rising human development". Thus, a global policy on a global carbon tax may be necessary to curb CO_2 emission above "a threshold to the 'capacity' volume of CO_2 per unit of HDI", and the "green" tax raised "could be used to promote the development and deployments of green technology in poor countries". However, "how to set this threshold" and "how much should the tax be" are issues yet to be fully addressed (**Ramesh Gampat, Niranjan Sarangi and Manoja Wickramarathne**);

- How to transcend or at least transform economic growth as the aim of policies and people's lives; and how to de-couple economic growth and emissions (**Anuradha Rajivan**). These are the pressing issues that are being addressed by many countries. "Green Growth" or environmentally sustainable economic growth, which has been actively promoted by UNESCAP since 2005 (http://www.greengrowth.org/), may provide some of the solutions, even though "Green Growth" also has to be "socially sustainable", and even "politically sustainable" in terms of sustainable government policy for its promotion and implementation (**the Facilitator**);

- The six criteria for the development and application of "good" social or environmental vulnerability indices are: *clear purpose; specificity and validity of data selection; methodological soundness of index construction; simplicity and comprehensibility; data availability and reliability; transparency and reproducibility; and results consistent with expert knowledge* (**Hans-Martin Füssel**);

- The severe conceptual, empirical, and/or methodological flaws of existing national-level "social" or "environmental" vulnerability indices have precluded "their application to guide major policy decisions, such as the allocation of adaptation resources" (**Hans-Martin Füssel**);

- Policy decisions should be "based on a set of vulnerability indices for different climatic risks or climate-sensitive sectors" combined with experts' judgement and "political priorities", rather than "a single aggregate vulnerability index that falsely suggests scientific objectivity" **Hans-Martin Füssel**);

- The uncertainties in both future socio-economic and climatic conditions, and the different time scales in their projections require "the options for integrating climate vulnerability into socio-economic data" to be properly identified (**Purnamita Dasgupta**);

- The Global Climate Risk Index (CRI), despite its limitations as acknowledged by the contributor, complements other analyses of extreme weather impacts, and it has brought "more transparency into the debate about extreme event impact" (**Sven Harmeling**);

- "The effects of climate change that we can anticipate for the coming few decades are highly ambiguous", especially when the prediction of "climate models" does not match "the trend of observed events". "To prepare for the future, do we trust our eyes, or our computers? If we try to plan far in advance, there is a 50 per cent chance of getting it wrong, and either protecting people too little, or too much." (**Anthony Patt**);

- Due to discrepancies between the projection of climate models and observation, more attention should be paid to "the underlying driver of the poor's worsening relative and absolute poverty and their high climate sensitivity, which is an inability to innovate". Thus, what "the poor need is the freedom and the capacity to make continual minor adjustments to where and how they live, and how they earn their livelihoods", including education and social security (e.g., insurance) (**Anthony Patt**);

- Rather than relying on climate models that are complex and have inherent uncertainties, a simple and practical community-based approach that integrates "climate science with local concerns and real livelihood choices, and provide improved policy support" within the context of sustainable development has proved effective and useful for vulnerability assessment in pilot villages in the Ayeyarwady Delta regions of Myanmar (**Tun Lwin**).

In many ways, the discussion of sub-theme 2 has clarified many of the issues raised in sub-theme 1, especially on some of the tools that can be used to map and measure the vulnerabilities of our physical and human environment, including ecosystems, social, economic and human development, to climate change, as well as their inter-relationships and associated changes. This would only help to further our understanding of one of the most complex issues facing humankind.

It is likely that many of the issues raised above will be further discussed in sub-theme 3: Adaptation (*including technology and financing*) and Climate-Related Disaster Risk Reduction, which starts on 22 March. For example, the issue of using scenarios and results projected by climate models for future adaptation planning is central to the discussion of sub-theme 3. How do we prepare or plan for longer-term adaptation while we can only predict short-term climate variability? What are the linkages between climate variability, disaster risk reduction and adaptation to climate change, as well as their synergies for climate risk reduction? All these issues will be explored, among many others, in the discussion of the next three weeks.

With best wishes,

Pak Sum Low
AP-HDNet Facilitator

Sub-theme 3

Adaptation (including technology and financing) and Climate-Related Disaster Risk Reduction

1. Opening Message

Dear Network Members,

In this opening message, I would like to share with you information on adaptation technology and financing within the UN Framework Convention on Climate Change and the current process. This includes a summary of the positions taken by developing countries on adaptation in general, and in particular on the role of technology and financing in adaptation. The developing country Parties' positions are those that they apply at national level, and could therefore be useful in evaluating and understanding programmes taken at that level.

Disaster risk reduction (DRR) is covered in these positions, as it is one of the sub-elements on enhancing action on adaptation under the Bali Action Plan. Again here, DRR in terms of adaptation is considered in terms of "risk sharing and transfer mechanisms such as insurance." (UNFCCC 2008) (*). It is also considered in relation to "means to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate change." (UNFCCC 2008) (**). In both cases, DRR is seen in the context of financing loss and damage due to climate change.

Adaptation is one of the four main building blocks of the Bali Action Plan, which looks at enhanced action on these elements for "the full, effective and sustained implementation of the Convention…" (UNFCCC 2008) (***). Under the Convention, adaptation is seen in the light of the commitments of developed country Parties related to financing and technology development and transfer to support action on adaptation.

Of four articles of the Convention that deal with adaptation, one deals with the precautionary principle, and the three others stipulate commitments of Parties to the Convention. The first provides for obligations of all Parties to prepare mitigation and adaptation programmes. The two others deal with financing and technology commitments of developed country Parties to developing country Parties on adaptation.

Ecosystem adaptation is one of the three important parameters in the achievement of the "ultimate objective" of the Convention, together with ensuring that food production is not threatened, and enabling development to proceed in a sustainable manner. The UNFCCC, it may be recalled is one of the three Rio Conventions on sustainable development, the other two being the UN Convention on Biological Diversity and the UN Convention to Combat Drought and Desertification.

However, in implementation, financing for adaptation under the Convention has been relegated to a far second priority. For almost the entire fifteen years since its entry into force, the bulk of climate change financing has instead been focused on mitigation. Almost 90 per cent of the financing that has gone through the Global Environment Facility (GEF), the only operating entity of the financial mechanism of the Convention so far, has been for mitigation activities. It was only in 2004 that the GEF put up a Strategic Programme for Adaptation (SPA), which undertook pilot projects, currently on hold since 2009, awaiting a further decision of the GEF Council for its continuation.

A Special Climate Change Fund (SCCF), to which was added a Least-developed Countries Fund (LDCF) was established in 2001. The SCCF decision to render the fund operational was adopted only in 2007. Both are woefully underfunded, and their operations are entrusted, again, to the GEF. Both were likewise subjected to conditionalities such as co-financing, which punishes the poorest of the poor developing countries that cannot raise counterpart financing in order to access GEF funds.

The LDCF mainly funds the preparations of National Adaptation Plans of Action (NAPAs) by least developed countries, which, as stipulated in Article 4.3 of the Convention are to be financed at "agreed full incremental costs" basis. Very few of these NAPAs have so far been approved for financing by the GEF.

Financing for adaptation is mainly undertaken by those financing institutions that are outside the framework of the financial mechanism of the Convention. These are the multilateral financing institutions, regional development banks and bilateral aid agencies. These institutions are considered external to the Convention as they are voluntary and not subject to the governance and authority of the Conference of the Parties to the Convention. Studies have also shown that little, if any, technology transfer has taken place for adaptation.

The Group of 77 developing country Parties (made up of 132 developing countries) and China have taken positions that would remedy this implementation gap in the Convention. Its objective is to establish a framework/mechanism under the Convention to enable, support, facilitate and implement adaptation actions, including through vulnerability assessments, establishment of institutions at all levels, and capacity-building.

On technology, enhanced action is also focused on endogenous technologies, joint development of technology through research, deployment, and diffusion. These technologies should be adapted to local conditions, as it is recognized that adaptation technologies are sector-and ecosystem-specific. Technology access and transfer must also cover the full cycle of technology and should be accessible for stand-alone projects as well as for long-term adaptation activities.

Financing should be adequate and predictable in order to enable long - term planning. It should likewise be non-debt-creating, and therefore mainly grants-based, as well as new and additional to financing efforts on poverty eradication. It should not therefore divert funds from sustainable development activities to enable adaptation.

Financing and identification of technology needs should be fully country-driven, determined by the countries themselves, including through the design and implementation of projects, and should facilitate a shift from vulnerability and assessments alone to concrete adaptation actions.

The adaptation proposal by the Group of 77 and China is based on the past experience of developing countries with adaptation financing under the Convention, through activities funded by the GEF, as well as financing received through external institutions. It seeks to remedy the serious concerns raised by developing countries on financing and technology activities related to adaptation, in order to pursue enhanced long-term cooperative action on adaptation.

While, as expressed above, adaptation financing under the Convention falls under the legal obligations of developed countries to developing countries, this is not the case for disaster risk reduction.

There are however clear linkages that would render this financing co-beneficial both for urgent, short-term, medium-term, and long-term adaptation actions. More perhaps than DRR alone, the whole continuum of disaster management is related to adaptation. For long-term adaptation, the most relevant phase would be rehabilitation from disasters caused by natural phenomena.

The previous discussions, in particular on sub-theme 1 have been very rich in terms of identifying the linkages, and perhaps this opening statement would develop these further in terms of how development can best be served through effective and efficient financing and technology development, access and transfer.

I hope to have offered some considerations for reflection on adaptation financing and climate-related disaster risk reduction by this statement and look forward to a rich exchange of ideas on these subjects.

In addition, other topics that may be discussed in this sub-theme may include any new ideas and concepts, as well as any good practices in adaptation to climate variability/change and disaster risk reduction.

With best regards,

Bernarditas Muller
AP-HDNet Facilitator

Notes

(*) Decision 1/CP.13 (the Bali Action Plan), paragraph 1, sub-paragraph (c) (ii).
(**) Paragraph 1, sub-para. (c) (iii).
(***) Paragraph 1.

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2. Contributions

The following authors, with their respective contributions, helped to enrich the discussion on the sub-theme *Adaptation (including technology and financing) and Climate-Related Disaster Risk Reduction:*

Lisa Schipper, *Are adaptation and disaster risk reduction planning approaches misaligned with development trajectories?*
Nishadi Eriyagama, *Climate change impacts on water resources and agriculture in Sri Lanka: A review and preliminary vulnerability mapping*
Alain Lambert, and Ioana Creitaru, *Climate risk management*
Ramesh Gampat, *Adaptation and mitigation: Need for a more coherent link to climate change*
Stephanie Hodge, Suchita Sugar, and Sonia Sukdeo, *Quality education: One of the most sustainable and cost-effective solutions for climate change adaptation*
Ilan Kelman, and J.C. Gaillard, *Climate change adaptation as part of disaster risk reduction*
G. Padmanabhan, *Climate-related disaster risk reduction through people-centred interventions*
Amelia Supetran, *The role of technology and financing in effecting integrated climate change adaptation and disaster risk reduction for sustainable development*
Patrina Dumaru, *Enhancing the capacity of local communities to adapt to climate change*
Heather Bell and Ray Shirkhodai, *Thoughts on the links between disaster risk reduction and climate change adaptation*
Pradeepa Malkanthi, *Enhancing the adaptive capacity of developing countries to climate change*
Mai Van Trinh, *Climate change adaptation: A great challenge for developing countries*
Bonheur Neou, Kien Tran Mai, Pornsook Chongprasith, and Pak Sum Low, *Climate change adaptation initiative of the Mekong River Commission*
Sudip Mitra, *Reducing disaster risks under changing climate: A major challenge*
Wong Poh Poh, *Climate change adaptation and disaster risk reduction: Innovations required*

3. Online Discussion

Lisa Schipper wrote:
Facilitator's note (Pak Sum Low): Lisa Schipper raises a number of thought provoking issues that link adaptation (including social adaptation), disaster risk reduction, development paradigms, poverty reduction, vulnerability, and even culture and politics, all of which are inter-related and each is an important part of the risk management equation. She argues that adaptation and disaster risk reduction planning approaches are misaligned with development trajectories, and points out that "development projects focused only on poverty reduction would not necessarily make people less vulnerable to climate change". Thus, there is a need to focus on "enabling a process of rethinking development pathways", so that adaptation planning "actually aligned with other approaches to poverty reduction". She suggests that "insufficient financing for adaptation is not a limit to getting societies to adapt", but "the funding structures for development assistance may be seen as a barrier to getting adaptation to work". While donors "have urged 'mainstreaming' of adaptation into development", "other priorities for developing countries also need to be mainstreamed into adaptation". She stresses that "our risk reduction activities" should not be only focused "on the impacts and causes of the hazards", and ignoring "the deep roots of vulnerability that are embedded in culture and politics", otherwise they will lead to failure. I hope that this contribution will generate further discussion on the issues raised.

Dear Network Members,

Are adaptation and disaster risk reduction planning approaches misaligned with development trajectories?

Why are we unable to make more impressive progress toward addressing risk in developing countries? Brilliant thinkers such as Amartya Sen, Terry Cannon, Ben Wisner and Susan Cutter have contributed vital insights to build our knowledge on what is driving vulnerability to natural hazards, but our efforts to implement this knowledge have mostly fallen flat. I argue that it is because the international assistance community, including the UN and national governments, has approached risk management in a way that does not sufficiently provoke a real shift in development paradigms.

Both adaptation and disaster risk reduction are in theory about reducing vulnerability - in other words addressing unequal wealth distribution, discrimination of women and minority groups, livelihood insecurity, among many other factors. In reality, however, the changes necessary to actually reduce vulnerability would require an overhauling of most countries' development priorities, prejudices and perceptions of well-being. In other words, the frameworks for adaptation and disaster risk reduction that are currently in existence and development are woefully inadequate and skirt the real challenge of sustainable development in a major way. At the practice level, therefore, the activities carried out in the name of either adaptation or disaster risk reduction do not actually reduce vulnerability systemically (Schipper 2009).

Soussan and Burton argued in 2002 that adaptation could be a 'new opening to revisit some long-standing problems of environment and development in an innovative way', but somehow this important message has become sidelined. For the last decade, the number of people who are voicing opinions on how to respond to climate change is growing. Everyone seems to have some idea, tool, method, framework and guidelines to help societies adapt to experienced and anticipated changes, whether they are creeping and barely detectable or sudden and extreme. Organisations, including my own, are developing approaches to provide support for adaptation planning on all levels of governance. But much of this work continues to be focused on addressing the impacts of climate change only, without enabling a process of rethinking development pathways. With so many other changes taking place in society, this therefore begs the question: To what extent are our ideas about how to plan adaptation to climate change actually aligned with other approaches to poverty reduction?

I am not suggesting that vulnerability reduction should be equated with poverty reduction-they are not the same, as Chambers and Swift clearly pointed out in 1989. 'Vulnerable' is not just a synonym of 'poor'-it is far more nuanced, and it is always relative. People are not just 'vulnerable', but they are 'vulnerable to' something. This means that they are not vulnerable to everything-not floods and droughts, for example. So development projects focused only on poverty reduction would not necessarily make people less vulnerable to climate change. Therefore we should not simply drop our risk-related activities and focus only on poverty reduction projects. But there must be stronger synergy between the development agendas-those of countries and those of the donor community (let us be honest that they are not always the same)-and the activities necessary to sustainably reduce disaster and climate change risk.

Insufficient financing for adaptation is not a limit to getting societies to adapt, although it is sometimes portrayed this way in the context of the UNFCCC. Limits to social adaptation are primarily socio-cultural, political and ecological, as Adger *et al.* (2009) and others have eloquently argued. Rather, the funding structures for development assistance may be seen as a barrier to getting adaptation to work. Much of that can be blamed on the major actors providing assistance in the form of funds, loans and projects for adaptation, who have urged 'mainstreaming' of adaptation into development, but forgotten that other priorities for developing countries also need to be mainstreamed into adaptation.

If we focus our risk reduction activities only on the impacts and causes of the hazards, without acknowledging the deep roots of vulnerability that are embedded in culture and politics, we will surely fail in our efforts. For this reason we should no longer speak of the importance of creating synergies between adaptation and disaster risk reduction without remembering the third part of the triangle-namely sustainable development (Schipper and Pelling 2006).

With best regards,

Lisa Schipper
Senior Research Fellow
Stockholm Environment Institute
Bangkok, Thailand

About the contributor

Lisa Schipper is a Senior Research Fellow at the Stockholm Environment Institute, based in Bangkok. Her research focuses on socio-cultural aspects of vulnerability, understanding adaptation in the context of development, and disaster risk reduction. Lisa works across Southeast and South Asia, East Africa and Central America. She is currently involved as a Lead Author in the IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation and the IPCC Fifth Assessment Report (WG2). She can be reached on lisa.schipper@sei.se.

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Nishadi Eriyagama wrote:

Facilitator's note (Pak Sum Low): Nishadi Eriyagama highlights a number of important results on climate change in Sri Lanka based on a recent study by the International Water Management Institute (IWMI), including the identification of the country's agricultural vulnerability hotspots and existing knowledge gaps. A pilot level Climate Change Vulnerability Index consisting of three sub-indices (Exposure; Sensitivity; and Adaptive Capacity) was developed and mapped at district scale. Various "smart investments" and "no regrets" adaptation options in the water sector that "simultaneously deliver climate resilience and address current development needs" are being considered. These include rainwater harvesting in drought prone areas; restoration of the ancient tank system; development of sustainable groundwater; promotion and adoption of micro-irrigation technologies; wastewater reuse; increasing water use efficiency; and change of allocation practices, as well as research on crop adaptation (e.g., rice; field crops; horticultural crops; tea; rubber and coconut). Sea-level rise is also being considered. However, "a comprehensive national study on river basin or district scale on vulnerability of Sri Lanka's water resources and agriculture sectors to climate change", using reliable methodologies and tools, is "urgently needed" for better "strategic" adaptation planning. She stresses the importance

of "creating awareness among different stakeholders on vulnerabilities, impacts and adaptation options", as well as encouraging "farmers to take individual or communal action to prepare for climate change".

Dear Network Members,

Climate change impacts on water resources and agriculture in Sri Lanka: A review and preliminary vulnerability mapping (*)

There is ample evidence to suggest that Sri Lanka's climate has already changed. During 1961-1990, its mean air temperature has increased by 0.016^0C per year (Chandrapala 1996a), and mean annual precipitation decreased by 144 mm (7 per cent) compared to the period 1931-1960 (Chandrapala 1996b; Jayatillake *et al.* 2005). However, the bigger question of national importance is what Sri Lanka's climate will look like in 50 or 100 years and how prepared is the country to face it. Few studies attempted to project future climate scenarios for Sri Lanka and to identify climate change impacts on agriculture, water resources, the sea level, the plantation sector, the economy and health. Even the ones that exist appear to have contradictory projections, especially with respect to future rainfall.

A recent review by the International Water Management Institute (IWMI) on the status of climate change research/ activities in Sri Lanka suggests that Sri Lanka's mean temperature may increase by about $0.9\text{-}4^0$C, over the baseline (1961-1990), by the year 2100 with accompanying changes in the quantity and spatial distribution of rainfall. These changes may lead to an increase in the wet (Maha) season irrigation water requirement for paddy by 13-23 per cent by 2050 compared to that of 1961-1990 (De Silva *et al.* 2007). Future projections on coconut yield suggest that production after 2040 may not be sufficient to cater to local consumption (Peiris *et al.* 2004), and reduction of monthly rainfall by 100 mm could reduce productivity by 30-80 kg of 'made' tea/ha (Wijeratne *et al.* 2007), thus impacting the country's exports.

Agricultural vulnerability hotspots

This study also attempts to identify the country's agricultural vulnerability hotspots, as well as ascertain existing knowledge gaps. It developed a pilot level Climate Change Vulnerability Index consisting of three sub indices (Exposure; Sensitivity; and Adaptive Capacity) which was subsequently mapped at district scale. Typically, a complete measure of exposure to future climate change would require consideration of projected changes in climate in each analysis unit. However, given the existing ambiguity in climate change projections for Sri Lanka, this assessment relies on data on exposure to historical climate extremes, since it is likely that this vulnerability will only increase under future climate. The maps indicate that typical farming districts such as Nuwara Eliya, Badulla, Moneragala, Ratnapura and Anuradhapura are more sensitive to climate change than the rest of the country due to their heavy reliance on primary agriculture. Coupled with their low infrastructural and socioeconomic assets (or low adaptive capacity), and high level of exposure to historical hazards, they are the most vulnerable to adverse impacts of climate change.

Adaptation strategy and options

This study also points out that in the face of an uncertain climate, Sri Lanka needs to concentrate on "smart investments" and "no regrets" adaptation interventions that simultaneously deliver climate resilience and address current development needs. Both, rainwater harvesting, and restoration of the ancient tank system of the country, are two such adaptation options against future challenges in the water resources and agriculture sectors. De Silva *et al.* (2007) suggest provision of a rainwater harvesting system to all households in drought prone areas, making it a prerequisite to receive drought relief. Development of sustainable groundwater, promotion and adoption of micro-irrigation technologies, wastewater reuse, increasing water use efficiency and change of allocation practices are other adaptation options under consideration in the water resources sector. Studies on crop adaptation are performed mainly by six research institutes in the country conducting research on rice, field crops, horticultural crops, tea, rubber and coconut. The Coast Conservation Department (CCD) is in the process of formulating a Climate Change Action Plan for adapting to sea-level rise. However, equally important is creating awareness among different stakeholders on vulnerabilities, impacts and adaptation options, as well as the encouragement of farmers to take individual or communal action to prepare for climate change. Apart from the above, reliable and detailed quality controlled climate scenarios and a comprehensive national study on river basin or district scale on vulnerability of Sri Lanka's water resources and agriculture sectors to climate change are also urgently needed, in order to obtain a better idea of the

risks and benefits of climate change and for strategic planning towards adaptation. It is equally important that such a study takes stock of Sri Lanka's present water resources in the form of a national water resources audit.

With best regards,

Nishadi Eriyagama
Water Resources Engineer
International Water Management Institute (IWMI)
Colombo, Sri Lanka

Note

(*) This note is the extended abstract of a forthcoming publication (IWMI Research Report 135) *Climate change impacts on water resources and agriculture in Sri Lanka: A review and preliminary vulnerability mapping* by the International Water Management Institute (IWMI), Colombo, Sri Lanka.

About the contributor

Nishadi Eriyagama is a Water Resources Engineer attached to IWMI. She has over twelve years work experience in water resources and environmental engineering as well as hydrological estimation and analysis. She is actively involved in IWMI's research on environmental flows, drought assessment and climate change, and also focuses on the development of drought and climate vulnerability indices, and hydrology-based environmental flow assessment methods and tools.

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Alain Lambert and Ioana Creitaru wrote:

Facilitator's note (Pak Sum Low): Alain Lambert and Ioana Creitaru rightly point out that "disaster risk reduction (DRR) and climate change adaptation (CCA)" "share the common goal of managing uncertainty, reducing vulnerability and building resilience for communities at risk". Thus, climate risk management (CRM), which "looks at the whole spectrum of disaster-related activities, from preparedness and disaster mitigation to broader adaptive activities related

to livelihoods, natural resources management, food security, etc.", "can be understood as integrating concept for DRR and CCA approaches and activities". They highlight five analytical steps that UNDP-BCPR has used to "support the formulation of a set of institutional, policy and programmatic responses": climate analysis; identification of climate-related risks and impacts; decision analysis and support; institutions and policy research; and capacity development-which are sequential but inter-related. They provide two unique success stories, in Maldives and South Mexico, respectively, to show case the good practices of integrating disaster risk reduction and climate change adaptation.

Dear Network Members,

Climate risk management

Across a large part of the developing world, exposure and vulnerability to climate-related hazards lead to frequent disasters. During the period of 2000-2007 there has been an average of 400 disasters in 120 countries affecting 230 million people annually. These have caused an average economic loss of US$80 billion per year (CRED 2009). It is widely acknowledged that the threat of disaster resulting from climate variability and change is twofold. First, extreme events have a direct and devastating impact on vulnerable communities. Second, climate change compounds existing problems of poor countries and endangers development gains. Identifying and reducing risks associated with climate -related hazards help to protect people and livelihoods, and contribute towards the achievement of the Millennium Development Goals.

Disaster risk reduction and climate change adaptation, a common goal

Although disaster risk reduction (DRR) and climate change adaptation (CCA) have developed as independent practice areas and within separate institutional frameworks, they share the common goal of managing uncertainty, reducing vulnerability and building resilience for communities at risk. The link between disaster risk reduction and climate change adaptation is increasingly acknowledged by practitioners at local, national and international levels. In the context of the changing environment, there is an emerging need for greater coordination between DRR and CCA policy and strategy frameworks practices and epistemic communities. DRR has been conceptualized as the first line of defense against climate change, as it deals with methods to anticipate, resist, cope, response and recover from hazard impacts. At the same time, CCA policies can benefit from the proved risk reduction frameworks and methodologies. In the face of climate change and variability, DRR programmes need to take a long term perspective to prepare communities not just against current, but also projected climate related risk.

Climate risk management as an integrating concept

The assessment and understanding of potential losses is the basis for risk management. It allows for the determination of the acceptable level of risk-defined as the level of losses that is acceptable without destroying lives, national economy or personal finances. Once the acceptable level of risk is determined, the capacity (legal, financial, institutional, and political) to reduce the risk above the acceptable level can be assessed.

Climate risk management (CRM) can be understood as integrating concept for DRR and CCA approaches and activities. The CRM approach looks at the whole spectrum of disaster-related activities, from preparedness and disaster mitigation to broader adaptive activities related to livelihoods, natural resources management, food security, etc. UNDP-BCPR believes that preventing disasters and protecting development through CRM requires a programmatic approach that includes institutional capacity development and appropriate policies. Putting these in place can be broken down into a series of analytical steps that support the formulation of a set of institutional, policy and programmatic responses:

1. **Climate analysis** brings together what is known about current climate in a particular location, including climate variability and trends, the degree of climate predictability over various time scales, how the climate might change, and the level of certainty associated with specific changes that could affect development.

2. **Identification of climate-related risks and impacts** establishes the actual and potential impacts of climate variability and change currently (based on historical information), in the medium term (based on the current situation and observed trends) and over the longer term (based on projections and predictions). It provides a basis for reducing and transferring the specific risks that most threaten priority aspects of development.

3. **Decision analysis and support** provides decision makers with relevant scientific information about climate variability and change for informed decision-making. This tailored information allows specific risks to be managed and specific goals to be achieved. Projects and programs to manage risks in pursuit of the achievement of these goals can then be strengthened or put in place.

4. **Institutions and policy research.** With growing awareness of disaster risks and climate change, many countries have to consider what policies and institutional responsibilities are adequate to confront risks of multiple hazards across multiple sectors. Many countries are only recently beginning to reconfigure government institutions and policies to pursue preventive, as opposed to reactive, disaster reduction strategies. Responsibilities for managing disaster or climate-related risks may be distributed across multiple agencies and departments with inadequate clarity on mandates and unclear division of labour.

5. **Capacity development.** Climate change and disasters pose difficult and new challenges that no country is fully capable of handling. Assessment of the required capacities-in light of assessed risks, development priorities, and desired institutional and policy changes-provides a basis for capacity development to meet identified challenges. UNDP's Capacity Development Group has developed a capacity assessment tool that can be used for this purpose.

Investing in disaster/climate risk management

Cost-effective risk management builds on the idea that investments in resilience constitute good value. It is important that risk management activities build on solid hazard analysis, take into account exposure, and reduce vulnerability and increase resilience. Funding mechanisms should particularly prioritize strengthening, up-scaling and replication of effective 'no regrets' risk reduction measures such as climate risk information and early warning systems.

In addition to channeling and leveraging the existing development funds to make them more disaster/climate change sensitive, the existing Multi Donor Trust Funds and GEF grant mechanisms may provide good financing options for DRR and CCA. In UNDP's experience, the enabling factors that have helped the integration of DRR concerns into development financing include DRM-focused agencies working at different levels, capacity for weather and climate modelling at national level, cross-sectoral collaboration between coordination bodies for DRR and CCA and the incorporation of poverty reduction and environmental sustainability issues into DRR policies and strategies.

Integrating disaster risk reduction and climate change adaptation: Examples of success

In the **Maldives**, the government and the UN Country Team jointly developed the Maldives Strategic National Action Plan for Disaster Risk Reduction and Climate Change Adaptation (SNAP) in 2009 with a view to promoting good governance, foster democracy and capacitate decentralization. It is also the first time DRR, CCA and development are integrated clearly in a national strategy. The SNAP is aimed to provide short and long-term strategic direction and action to reduce the risk of disasters and adaptation to climate change in the country. Building on existing capacities in the Maldives, the SNAP is intended to identify and present priority programmes and projects which the Government, together with partner stakeholders, may undertake to attain the country's objectives in disaster risk reduction and climate change adaptation (*). Also in the Maldives, an LDCF-funded climate change adaptation project is building on disaster risk assessments that were conducted in the aftermath of the 2004 tsunami. The information generated by these assessments was integrated into the design of coastal protection initiatives on 4 different islands in 4 distinctive atoll settings. The project makes an active effort to bridge institutional coordination gaps and ensure access by government planners in different departments to relevant climate risk information.

The **South Mexico** community-based climate risk management programme implemented by UNDP through the GEF Small Grant Programme has worked in about 300 municipalities in the South of Mexico and has convinced authorities that ecosystems are instrumental in reducing damages from hurricanes. A quantitative analysis of the damage has shown that damage to crops was 15 per cent in areas protected by forest ecosystems and 29 per cent in areas where local ecosystems had been destroyed. Serious damage to houses was 6 per cent in areas protected by mangroves while it was 16.5 per cent in areas where mangroves had been destroyed. Furthermore, mangroves were used to protect fishing boats. Special shelters were built to warehouse small boat engines while the small boats

themselves are sank in tunnel dig into the mangroves. By doing so, boat destructions were reduced by 98 per cent from one year to the other, securing incomes for hundreds of families after the disaster. After the project demonstration, the authorities of two provinces (Yucatan and Quintana Roo) are considering major shifts in the local economic model based on cattle breeding (requiring large destruction of ecosystems) to a more sustainable model based on ecosystem protection. About 40 per cent of the cattle died during the last hurricane. Apart from a serious economic loss, it also created a serious health hazard. The authorities are now very well aware that not only do ecosystems help save lives and infrastructure but also speed up recovery after a disaster. Fisherman all recognize that fishing, after a hurricane, is much better in areas where mangroves are well conserved. The project has been able to demonstrate that disaster is not a fatality and that sound development and planning practices can reduce the risks dramatically (Disaster Risk Reduction and Recovery Team 2010).

With best regards,

Alain Lambert, Senior Policy Officer
Ioana Creitaru, Programme Analyst
Disaster Risk Reduction and Recovery Team
Bureau for Crisis Prevention and Recovery
United Nations Development Programme, Geneva

Note

(*) For more details, visit the Maldives National Disaster Management Centre (http://www.ndmc.gov.mv). Last accessed on 17 March 2010.

About the contributors

Alain Lambert is Senior Policy Officer in UNDP's Bureau for Crisis Prevention and Recovery and is leading the global Climate Risk Management programme. He holds a Master degree in political sciences and in environmental economics and a PhD in International Law. As a former environmental expert with IUCN, the Ramsar Convention and UNEP, Alain has a keen interest in using ecosystems for disaster risk reduction, and as a former senior natural resources economist with DFID, he is also very interested in building the economic case for DRR and climate risk management. Alain has worked in Brazil, Kenya, Argentina, Nicaragua and Indonesia and has visited over 100 countries on mission.

Ioana Creitaru is Programme Analyst in UNDP's Bureau for Crisis Prevention and Recovery. Ioana's areas of work are climate risk management, governance for disaster risk reduction and mainstreaming of disaster risk reduction into development programming. She is also a PhD Candidate of the Graduate Institute of International and Development Studies in Geneva; her research interests include climate change governance, human security and development.

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Ramesh Gampat wrote:
Facilitator's note (Pak Sum Low): Ramesh Gampat highlights that "a coherent framework" is needed to address both mitigation and adaptation, but "adaptation is more costly and more politically unpalatable than mitigation". He cites various analyses from the literature on the pathways to stabilize different levels of greenhouse gas concentrations and hence the projected limiting global temperatures. He discusses the merits of a proposal by Crampton and Stoft (2010) on an internationally binding "global carbon-price target" that will enable a country to collect "revenues equal to the price target times its total emission or pay other countries to make up any carbon-revenue shortfall"; and

the establishment of a "Green Fund" that "will reward low-emission countries once they have complied with the global pricing target". These "will contribute to reducing the risks and damages of climate change". He stresses that technology for both mitigation and adaptation must be "appropriate" for reducing climate risks, and for protecting the environment and "the health of humans (and other animals)".

Dear Network Members,

Adaptation and mitigation: Need for a more coherent link to climate change (*)

From Bernarditas Muller's opening message, it seems that financing for adaptation and mitigation is inadequate. One gets that impression that the appropriate provisions in the UN Framework Convention on Climate Change lack teeth even though they are legally binding. This gap is apparently evident from the fact that "the bulk of climate change financing has instead been focused on mitigation" (Muller 2010). Why is this so? Of the two, adaptation and mitigation, the latter is easier to justify politically to national constituents; it calls for a smaller amount of financing that does not have to be sustained over a relatively long period; and mitigation does not carry any implication for reciprocal action in developed countries. In short, adaptation is more costly and more politically unpalatable than mitigation and thus not acceptable to shortsighted politicians and vested interest groups.

Framework

But neither adaptation nor mitigation will work, let alone be effective, if these two strategies to combat climate change are not grounded within a realistic framework. At the moment, they are unanchored, free-floating, loose and ad hoc. What is needed is a coherent framework to prevent the earth from warming up by about 2^0C by the end of the present century (Weitzman 2007). The next block of the framework calls for a global price per ton of carbon and the establishment of a Green Fund. Both will contribute to reducing the risks and damages of climate change: the former through the price mechanism and the latter by providing funding for adaptation and mitigation. With the right mix of polices and effective monitoring for compliance-these could reduce the risk and consequences of climate change, promote "green growth" and human development.

Warming up

Adaptation and mitigation, two sides of the same coin, must take as their starting point that, based on the IPCC 2007 report, global temperature could rise by about 1.1°C to 6.4°C by the end of the 21st century (lowest to highest range). A former Chair of the IPCC, Bob Watson, think that $E[\Delta T] = 4°C$ is not a far-fetched possibility (Vince 2009). On the other hand, the Stern Review recommended stabilizing greenhouse gas atmospheric concentrations at ≈ 550 parts per million (ppm) of CO_2-equivalent (CO_2e). With this scenario, the expected rise in temperatures will be about $E[\Delta T] = 2°C$ by the end of the present century, and it would probably permanently stabilize temperature at $\Delta T = 3°C$ (Stern 2007). Current concentration of greenhouse gases is ≈ 455 ppm CO_2e, which is significantly higher than the pre-Industrial Revolution level (IPCC 2007; Weitzman 2007).

But the Stern Review calls for immediate, strong and decisive action to reduce CO_2 and other greenhouse gases. Immediate steps must be taken to cut greenhouses gas emission by about 3 per cent per year. Other analysts of climate change do not see the need for immediate, decisive action (Weitzman 2007) and have advocated a more gradualist approach, which would shift CO_2e concentration by the end of the century to > 600 ppm and $E[\Delta T] = 2.5°C$ (Weitzman 2007). With this approach, however, temperatures are expected to rise above $E[\Delta T] = 3°C$ after 2105 (*ibid:* 704). The Stern Review proposal to curb CO_2 is at the lower end of the IPCC predicted range and it is better to adopt this as the starting point for action on climate change than none at all.

Besides strategies to pursue adaptation and mitigation, one other critical issue needs to be addressed: financing. The requirement here, unlike that climate change science, is that of predictability, regularity, adequacy and transparency. These requirements rule out funding on a voluntary, *ad hoc* and crisis basis.

Most of the discussion about financing has adopted an MDG-like framework: setting an international target to cap emission, which has not been productive thus far and is likely to remain so. The problem with emission caps is that they "may appear transparent, their consequences are opaque, and they impose financial risk rather than provide

financing" (Cramton and Stoft 2010). Moreover, because caps are likely to squeeze developing countries harder, these countries have rejected them. By itself, this makes the idea of a carbon cap unworkable and is a recipe for inaction.

Global price target and the Green Fund

So what to do? A recent article (Crampton and Stoft 2010) makes an interesting proposal: a binding global carbon-price target and a green fund financed by a form of carbon pricing. This proposal thus moves away from a cap to a price. A global price target for carbon removes the objections developing countries have with caps and improves the chances of a binding international agreement. Each county collects revenues equal to the price target times its total emission or pay other countries to make up any carbon-revenue shortfall. But whatever carbon revenue a country collects it keep. The manner in which this revenue is collected is left entirely to the county-it could be a fossil tax or auctioning of allowances, for example.

The Green Fund provides "equity transfers, improved pricing compliance, and motivation for non-price climate policies" (Crampton and Stoft 2010: 3). It is reasonable to expect that developing countries with low per-capita emission to commit to a global price target for carbon. This is why the Green Fund will reward low-emission countries once they have complied with the global pricing target. "Fully-compliant countries with emissions per-capita that are below the global average by D tons per person receive a per-capita payment of G x D" (*ibid:* 3), where G is the incentive strength. Countries that exceed the global emission average will pay to the Green Fund according to the same formula. The result is a balanced Green Fund budget.

One final point: Technology, whether it is about adaptation or mitigation or both, should not only be "green" in the sense of protecting, land, air, water, marine life and forestry. It must at the same time "red" to protect human health and that of other animals. This side of technology-its health aspect-is often neglected in the enthusiasm to come up with a technical fix to a specific problem. Financing by the Green Fund will have to ensure that the technology is "appropriate" in the sense that it protects the environment, reduces risk associated with climate change and does not damage the health of humans (and other animals).

With best regards,

Ramesh Gampat
Deputy Regional Programme Coordinator, HDRU
UNDP Regional Centre for Asia-Pacific, Colombo Office

Note

(*) I owe Pak Sum Low a debt of gratitude for reviewing an earlier version of this contribution and providing useful feedback. Any remaining error (of omission or commission) in this contribution is mine.

About the contributor

Ramesh Gampat, together with Anuradha Rajivan, is the editor of the two-volume *Perspectives on Corruption and Human Development.*

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Stephanie Hodge, Suchita Sugar, and Sonia Sukdeo wrote:

Facilitator's note (Bernarditas Muller): Stephanie Hodge, Suchita Sugar, and Sonia Sukdeo underline the crucial role that quality education, in particular for children, can play in climate change adaptation in the light of its close linkages with disaster risk reduction. They define "quality education" as one "that is relevant and empowers children with the skills, knowledge and values necessary for innovative solutions to climate change adaptation." Citing various studies that demonstrate the positive correlation between education and improved capacity to cope with natural disasters, the contributors then link this to the development of long-term capabilities to address the adverse effects of climate change through adaptation. Women and children, two of the most vulnerable groups to natural disasters, are particularly concerned. The contributors also refer to a UNICEF presentation to the 15th Session of the Conference of the Parties of the UNFCCC that recognized the close linkages between climate change adaptation and disaster risk reduction. UNICEF then incorporates this concept in its strategic programmes such as the "Child-Friendly School Initiative".

Dear Network Members,

Quality education: One of the most sustainable and cost-effective solutions for climate change adaptation

More investment in girls and quality education can provide a systemic, sustainable and cost-effective solution for climate change adaptation while concurrently yielding a multitude of development benefits. Quality education calls for education that is relevant and empowers children with the skills, knowledge and values necessary for innovative solutions to climate change adaptation. Education for sustainable development and disaster risk education are inherent in quality education.

Toya and Skidmore (2007) found a significant correlation between higher educational attainment and fewer human and economic losses from natural disasters. They concluded that education can have an important role in reducing vulnerability, through better choices in areas ranging from safe construction practices to assessment of potential risks.

Investing in quality education also includes investment in disaster-resilient school construction, consistent with advocating the government to take responsibility for the safety of public infrastructure, including hospitals and schools. It also powerfully and effectively integrates development outcomes for health, nutrition, water supply, sanitation, and governance.

UNICEF focuses on results for children and also women. These groups are particularly vulnerable to the impacts of climate change and also have a key role to play in adaptation. There are several reasons for this elaborated in *Climate change and children: A human security challenge* (UNICEF 2008) and in the presentation prepared for COP15, "The social consequences of climate change: Child rights and participation" (Hodge 2009). For women, vulnerabilities include a lack of opportunities and resources combined with or resulting in a disproportionate reliance on natural resources for livelihoods. Children, in addition to economic and social vulnerability, are faced with greater physical and developmental harm than adults from climate change impacts as a result of their immature, developing minds and bodies.

Children make up half the world's population and are the decision makers of now and the future, that is, if their right to participate is to be fulfilled. They are also our greatest asset in sustainable development.

Investments in multi-sectoral quality education such as through the child friendly school principled framework are a good solid investment for long-term adaptation and disaster risk reduction.

Blankespoor *et al.* (2010) build upon empirical work and case studies that have documented the role of socioeconomic development including girl's education in reducing vulnerability to climate shocks. In it, the authors set out to answer the question: 'As climate change increases potential vulnerability to extreme weather events, can expanding female education neutralize this increased vulnerability?'

Through modelling they find that empowering girls through primary and secondary education, in conjunction with continuing trends in GDP, can actually reduce losses from increasing extreme weather events to such an extent that losses in the future will be less than they are currently. They calculate the cost of the investment in education that will be needed by various countries and regions to neutralize increased vulnerability to extreme weather events from climate change.

Through a literature review the authors find that most of the work in this field has focused on the effect of rising income per capita. As communities get richer, they have greater willingness and ability to pay for preventive measures. Toya and Skidmore (2007) however find a significant role for education in reducing vulnerability, as mentioned above. They also point to the work of Oxfam International (2008) which drew on extensive evidence from South Asia to highlight the particular vulnerability of women, who often suffer far greater losses than men in natural disasters.

The UNICEF paper entitled *Education in emergencies in South Asia-Reducing the risks facing vulnerable children* (UNICEF 2009) highlights, documents and analyses vulnerability and education in emergencies in several South-East Asian countries.

In essence this paper puts forth, that impinging on a child's/person's right to quality education increases vulnerability. It postulates that "the phrase 'building back better' does not just refer to physical infrastructure. The 'tyranny of the urgent' should become replaced with medium and long-term strategies which protect children as children and in future as adults. In terms of conflict or extremism, it could be argued that this might be protective of society generally. This study has emphasized capabilities as well as protection, and these capabilities are not just personal in terms of survival, but are capabilities in participating in civil society and building secure societies (UNICEF 2009)."

The Education Section in UNICEF does not view disaster risk reduction and climate change adaptation as independent but intertwined. Risk reduction measures are necessary to have climate change adaptation and as a result have been incorporated in strategic frameworks such as the Child Friendly School initiative (*). Disaster Risk Reduction is the developmental aspect and long-term solution for governments, communities, and schools to adapt to their changing climate. The importance of this approach is evident in the ongoing work of many agencies and organizations which have been reflected in the compilation of best practices titled *Disaster risk reduction begins at school* (UN/ISDR 2007).

With best regards,

Stephanie Hodge, Cross Sector Coordination Specialist
Suchitra Sugar, Consultant on Climate Change and Environmental Education
Sonia Sukdeo, Education Officer (Emergencies)
Education Section, Programme Division, UNICEF, New York

Note

(*) For more information on the Child Friendly School Initiative please refer to the Child Friendly Schools Manual at http://www.unicef.org/publications/files/Child_Friendly_Schools_Manual_EN_040809.pdf

About the contributors

Stephanie Hodge, Sonia Sukdeo and Suchitra Sugar work in the Education Section for UNICEF in New York. Stephanie focuses on cross-sectoral work (from the perspective of education), including work on climate change and environmental education. On a more historical note, she worked at the Environment and Energy group at UNDP for many years and helped set up the global network on Environment and Energy. Sonia works for the Emergencies, Post Crisis and Transition unit in the Education Section. Her focus is Education and Disaster Risk Reduction, and issues relating to Gender in Emergencies. Suchitra is working in the Section as a consultant on climate change and environmental education and is helping in various ways to mainstream environment into education and education into environment.

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Ilan Kelman and J.C. Gaillard wrote:

Facilitator's note (Bernarditas Muller): Ilan Kelman and J.C. Gaillard dispute the widely-held view that climate change is "the greatest global crisis which humanity has ever faced" in the light of other long-term global crises "such as poverty, inequality, injustice, and oppression." They maintain, in this contribution, that these other global challenges are caused by activities other than the increasing adverse effects of climate change, and express the concern that the current focus on climate change distracts attention from, and deflects responsibility for other root causes of global disasters. The contribution makes the case for encompassing climate change adaptation within disaster risk reduction instead, in order to ensure a "long-term perspective" on sustainability and development. Three reasons are put forward to support this contention: first, that "climate change is one driver of disasters amongst many"; second, that "climate change is one 'creeping environmental change' amongst many"; and third, that the heightened political importance of climate change which has raised public consciousness worldwide could provide an opportunity to advance the conclusion made in the article for "embedding climate change within disaster risk reduction."

Dear Network Members,

Climate change adaptation as part of disaster risk reduction

Climate change in context

Climate change has been receiving plenty of publicity as not only a global crisis, but also as perhaps the greatest global crisis which humanity has ever faced. Viewing climate change as the greatest crisis is incorrect due to the many other long-term global crises facing humanity, such as poverty, inequality, injustice, and oppression. Nonetheless, little scientific doubt exists that climate change resulting from human activity is an immense, long-term, global disaster. Even if human greenhouse gas emissions were to stop entirely today, we would still be facing climate change's legacy for many generations into the future, which would include detrimental impacts on the other long-term global crises.

Yet we would still be facing these other immense, long-term, global disasters. Irrespective of climate change, coastal floods continue to kill thousands of people due to social pressures, such as age and gender inequities; manipulation of living conditions and livelihoods by more powerful people; governments, and corporations; and failure to address poverty and sustainable access to available resources. Current rates of overfishing are more damaging to marine resources than climate change is predicted to be. Many deltas are threatened by sea-level rise, but groundwater extraction, gas mining, and upstream dams have all damaged deltas as much as climate change might (Overeem and Syvitski 2009).

Those with interests in overfishing and other resource extraction, such as large-scale logging, have even argued that climate change will ruin these resources, so humanity might as well exploit them now while they exist (Elliott 2009). These interests would continue to be involved in such destructive activities and would still be ignoring the consequences, but climate change provides a welcome distraction for them to attempt to shift the focus of their actions and the consequences.

Climate change as a scapegoat and distracter

Putting climate change in the spotlight means that it becomes a scapegoat for many global ills that existed long before climate change. The most prominent examples being blamed on climate change are high-profile disasters, including non-climate disasters such as tsunamis. Making climate change the scapegoat for even climate-related disasters means that the responsibility for comprehensive disaster risk reduction is absolved. The prior decades of inappropriate development in disaster-prone locations-the societal processes that create and perpetuate the vulnerability that causes the disaster-are diminished in importance in favour of climate change as the villain.

To continue focusing on root causes and long-term vulnerability generation, research, policy, and practice should accept contemporary climate change adaptation as a subset of disaster risk reduction activities. That is, dealing with climate change should be encompassed within dealing with disasters, since climate change is one disaster amongst many. Consequently, adaptation becomes one process amongst many of dealing with disasters-including the long-term disaster of climate change.

A legitimate question is: why not the other way around? Should disaster risk reduction be encompassed by climate change adaptation? Naturally, climate change adaptation should factor in theory and practice from disaster risk reduction in order to learn from past experience (e.g., Gaillard 2010; Mercer 2010). But the definitions of the two processes mean that climate change adaptation is a subset of disaster risk reduction.

Disaster risk reduction, by definition, includes dealing with climate, weather, earthquakes, volcanoes, tsunamis, and many more. Conversely, climate change adaptation by definition excludes earthquakes, volcanoes, tsunamis, and many more. Presumably no one involved in development and sustainability would wish to ignore non-climate-related disasters. If that were the case, then the hundreds of thousands killed in each of the 2004 Indian Ocean tsunami and the 2010 Haiti earthquake would reveal the consequences. Thus, disaster risk reduction by definition must embrace climate change adaptation, not the other way around.

Climate change adaptation as part of disaster risk reduction

Three points support climate change adaptation being embedded within disaster risk reduction.

First, climate change is one driver of disasters amongst many. It should not be ignored, but nor does it dominate other drivers. Those drivers include inequities, injustices, social oppression, discrimination, poor wealth distribution, bad governance, and a value system permitting exploitation of environmental resources irrespective of the consequences.

Second, climate change is one "creeping environmental change" amongst many. Creeping environmental changes are incremental changes in conditions which cumulate to create a major catastrophe or crisis, apparent only after a threshold has been crossed (Glantz 1999). Climate change fulfils that definition and is not unique. Some argue that the catastrophic threshold for climate change is nearing (e.g., Hansen *et al.* 2007), but other creeping environmental changes have already surpassed the threshold (e.g., Glantz 1999).

Other creeping environmental changes not linked to climate change include soil erosion due to intensive farming or due to regular climate variability and extremes; salinization of freshwater supplies due to excessive drawdown; and slow subsidence of land due to water or gas pumping. In all these cases, as with climate change, human action exacerbates natural trends. As such, climate change is one long-term human-exacerbated disaster amongst many.

Third, the reality is that climate change has become politically important and has reached the public consciousness around the world. That should provide an opportunity, not to focus on climate change, but to raise the points made in this article to engage interest in more comprehensive disaster risk reduction, environmental management, development, and sustainability processes. All these are linked to climate change, but by definition include climate change and go beyond it (e.g., Gaillard 2010; Gaillard *et al.* 2010).

Conclusions

By embedding climate change within disaster risk reduction while using the prominence of climate change to promote and achieve wider sustainability, a long-term perspective is ensured. That avoids being distracted by climate change and also directs attention to root causes and fundamental ideas, ensuring that a single issue is not highlighted and permitted to become a target or a scapegoat.

Instead, the threats from climate change to disaster risk reduction, development, and sustainability are recognised along with how to use well-known disaster risk reduction, development, and sustainability actions for tackling climate change and much more (e.g., Gaillard 2010; Mercer 2010). We can move forward with disaster risk reduction, development, and sustainability by incorporating, but not making exclusive, the narrow focus on climate change.

With best regards,

Ilan Kelman, Senior Research Fellow, Center for International Climate and Environmental Research, Oslo
J.C. Gaillard, Maître de Conférences, University of Grenoble

Note

(*) This contribution presents some of the arguments of Kelman and Gaillard (2008).

About the contributors

Ilan Kelman (http://www.ilankelman.org) is a Senior Research Fellow at the Center for International Climate and Environmental Research, Oslo. His main research interests are: (i) Island sustainability, creating and maintaining safer and healthier communities on islands and in other isolated areas. See http://www.islandvulnerability.org; (ii) Disaster diplomacy, how and why disaster-related activities do and do not reduce conflict and create peace (see http://www.disasterdiplomacy.org).

J.C. Gaillard (http://jc.gaillard.monsite.orange.fr) is a full-time member of the faculty of the University of Grenoble in France and a Visiting Professor at the University of the Philippines Diliman. His research focuses on participatory tools and methodologies to assess and reduce the risk of disasters, the ethnic and cultural dimension of disasters, post-disaster reconstruction, and the interplay between armed conflict and disasters.

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G. Padmanabhan wrote:

Facilitator's note (Pak Sum Low): India is one of the major countries prone to climate-related hazards, which could turn into disasters because of a number of underlying environmental, social, economic and even cultural factors. G. Padmanabhan describes the climate-related disasters situation in India and the related costs and losses, and highlights the importance of people-centred interventions in reducing the risk, including community and institutional capacity development in disaster awareness, early warning systems and networks, as well as disaster preparedness, response, management and mitigation. He cites the successful experience of the GOI-UNDP Disaster Risk Management (DRM) Programme (2002-2009) that "worked with communities to translate their familiarity and coping mechanisms into Community Based Disaster Preparedness (CBDP) plans", which "were prepared by 17 state governments in 150,000 villages". The DRM programme was "able to reduce losses of lives and properties", as evident "in some cases in Assam and villages in Tamil Nadu, where disasters successfully tested the level of preparedness of the local communities". However, it may be noted that DRM and climate change adaptation are different in nature, hence the financing and technology required, though there are common elements between the two.

Dear Network Members,

Climate-related disaster risk reduction through people-centred interventions

Climate-related disasters affect negatively the lives of many people around the world, particularly the poor. Poverty and low awareness contribute to the number of casualties due to such disasters in Asia. Events such as droughts, floods and storms cause loss of lives. Further, they destroy livelihoods. For example, with the destruction of paddy fields and vegetable crops due to heavy floods, the farming community becomes not only homeless but without the means to survive. Most of the countries in South Asia are regularly affected by severe and often multi-year droughts. Between 1990 and 2008, more than 750 million people-50 per cent of the population in South Asia-were affected by at least one natural disaster, leaving almost 230,000 deaths and about US$45 billion in damages (World Bank 2009).

The situation in India

In India 33.516 million hectares of land have been identified as flood-prone (Government of India 2005; Ministry of Water Resources n.d.). India is one of six major cyclone-prone countries in the world. According to the Vulnerability Atlas of India (Building Materials and Technology Promotion Council 2006) approximately 5,700 km of the 7,500 km long coastline are prone to cyclones arising from the Bay of Bengal and Arabian Sea. Cyclonic storms and storm surges have been responsible for some severe fatalities along the coasts, the worst of which was caused during the Orissa Super (*) cyclone (1999) killing at least 10,000 people (Government of India 2004). The hilly regions of India are susceptible to landslide and avalanche hazards. The most vulnerable are the Himalayan Mountains followed by the North-Eastern hill ranges.

Between 1990 and 2008 natural disasters affected more than 885 million people in India (World Bank 2009:111). The World Bank (2009) has provided the following figures relating to natural disasters in India (**):
Population: 1,071,608,000
Population affected: 885,244,000
Number of deaths: 53,400
Damage (US$): 25.74 billion (see Figure 8.3)

In the period 1990-2008 floods accounted for the majority of damages in terms of costs in South Asia (***). India's reported cost of damage by floods has been the highest in the region (World Bank 2009: 114). While the country is familiar with annual floods in Assam, Bihar ad Uttar Pradesh, new areas have been witnessing major floods (for example, Mumbai floods in 2005, Kosi (Bihar) floods in 2008, Andhra Pradesh and Karnataka floods in 2009).

All this entails huge economic losses and causes developmental setbacks. In India, for instance, the direct losses from natural disasters have been estimated to amount to up to 2 per cent of India's GDP and up to 12 per cent of central government revenues (World Bank 2003, as cited in World Bank 2009: 115). At times state governments have spent more on relief and damages than on their rural development programmes. In the state of Maharashtra, for example, a single drought in 2003 and a flood in 2005 consumed more of the budget (Rs 175 billion) than the entire planned expenditure (Rs 152 billion) on irrigation, agriculture, and rural development for the 2002-2007 period (World Bank 2007, as cited in World Bank 2009: 115).

Putting people at the centre: Enhancing communities' preparedness

Considering the impact that climate-related disasters have on people's lives, it is important to enhance communities' preparedness. In order to do so, it is required to identify, assess and monitor disaster risk. It is also important to take into account that in any community, the level of vulnerability to climate change and climate-related disasters would differ among people (e.g., the elderly and the children would be more vulnerable).

It is accepted that that climate change will alter the number, severity, frequency and complexity of climate-related hazards. However, there is great uncertainty about the local level manifestations, even natural variability impacts are varied from event to event. The traditionally understood hazard, risk and vulnerability profiles in the region are changing and newer hazards are getting introduced while the existing ones are getting accentuated. In August 2006, the usually drought-prone Barmer district was hit by flash floods. Even as late as 27 August 2006, some of the villages in this district were under the effect of flood (Rawat *et al.* 2007).

Given the new challenges it is important to enhance the ability of communities and empower them to deal with disaster risk management so that they are able to "help themselves" before external support reaches them. This can be achieved only if awareness among people at risk is enhanced. In most Asian countries, the official early warning network, especially at the last mile, is extremely inadequate. Therefore, in order to alert the communities at risk about impending events that are likely to inflict loss and damages, early warning systems will have to be strengthened. This would entail focused investment in physical infrastructure as well as on soft areas such as human skills on dissemination of warning information, evacuating people, etc. The next step will have to develop capacities at the communities with plans and skills to undertake evacuation, first aid, shelter management, search and rescue tasks, through establishment of task forces and skills enhanced to undertake specific tasks. In order to make sure that the people remember their roles and responsibilities and act as per an agreed plan, mock drills will have to be conducted. This would also help in testing the efficacy of the preparedness plans.

Examples of interventions to enhance communities' disaster preparedness in India

The GOI-UNDP Disaster Risk Management Programme (2002-2009) was launched in 2002 with the goal of sustainable reduction in disaster risk in some of the most hazard-prone states in India. Over the past seven years, the DRM Programme supported under a multi-donor framework of US$41 million focused on strengthening disaster preparedness, response, management and mitigation capacities of institutions as well as local communities in 176 districts in 17 states across India. Through the programme, efforts were taken to build the capacities of the community. Keeping in mind that communities are the first responders to any natural disaster, and have developed coping mechanisms and systems over centuries, the DRM Programme worked with communities to translate their familiarity and coping mechanisms into Community Based Disaster Preparedness (CBDP) plans. The CBDP process involved the formation of disaster management committees (DMC) and task force teams of volunteers, the formulation of a plan mapping vulnerabilities, available resources and routes for evacuation, and the formulation and implementation of mock drills so as to strengthen the disaster response in case of extreme events due to climate change. Under the project CBDPs were prepared by 17 state governments in 150,000 villages (****).

The DRM programme was successfully able to reduce losses of lives and properties in certain cases of natural disasters. This was evident in some cases in Assam and villages in Tamil Nadu, where disasters successfully tested the level of preparedness of the local communities (*****).

With best regards,

G. Padmanabhan
Emergency Analyst
UNDP India

Notes

(*) When the maximum sustained 3 minutes surface winds are more than 119 knots, the low pressure system is called as "Super Cyclone" over north Indian Ocean (India Meteorological Department n.d.).
(**) These figures (quoted from the World Bank report 2009) are not available by type of disaster in the study, except in the case of the economic impact (see Figure 8.3 of the Report). In the case of the economic impact the value is expressed in billions as per Figure 8.3. The value expressed in Table 8.1 (as trillion) seems not in line with the figure provided for the region in the text of the report (billion). The types of disasters mentioned with regard to the reported costs of damage by country in Figure 8.3 for the same period (1990-2008) are: wind storm, wild fires, wave/surge, flood, extreme temperature, and drought. For more details please see World Bank 2009.
(***) This is based on Figure 8.3, titled "Reported cost of damage in South Asia by country and disaster type (1990-2008)". The countries considered in this figure are: Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka.
(****) For more details please see http://www.undp.org.in/disaster_risk_management
(*****) This is an observation by the Asian Disaster Preparedness Centre, Bangkok, which undertook an evaluation of the programme in 2008.

About the contributor

G. Padmanabhan has been handling Disaster Management portfolio of UNDP-India since 1995. He has led the Team involved in implementing the GOI-UNDP Disaster Risk Management Programme in the 17 states. Padmanabhan is also the Moderator of the Disaster Management Community of Practice (electronic network established under the under the Solution Exchange project of the UN system in India with about 2,500 disaster management practitioners as members). He worked for a year in Northern Iraq as a senior manager of a large Electricity Network Rehabilitation Project, executed by UNDP. He has been supporting various UNDP country offices in the Asia region in developing guidelines, conceptualizing and formulating projects. He was also associated with the design and implementation of the state Human Development project of UNDP-India.

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Amelia Supetran wrote:
Facilitator's note (Bernarditas Muller): In this excellent contribution which directly addresses the current sub-theme, Amelia Supetran describes the approach taken by the Philippines, as a developing country, in implementing an integrated approach which factors "disaster and climate change risks into all national and local development planning, programming and relevant regulatory processes."

Elements shared by climate change adaptation and disaster risk management link these concepts that were previously held to be distinct and separate. An approach reducing information on these elements into common units of measure would be necessary to forge a feasible, cost-effective risk management regulation in terms of a quantitative risk assessment (QRA) and probabilistic risk assessment (PRA) as tools for assessing disaster or climate change risks. The contributor sees the opportunity offered for redefining development in sustainable and meaningful terms for the

people. Rather than waiting for international financing, poor developing countries could adopt innovative means for increasing their capacities to deal with climate and disaster impacts. However, there remains the need for both financial and technological resources for full implementation of this approach.

The Facilitator believes that these could identify the incremental needs that should be met by the obligations to provide financing and technological resources under the UN Framework Convention on Climate Change, as an integral part of the global effort to address climate change and its adverse effects.

Dear Network Members,

The role of technology and financing in effecting integrated climate change adaptation and disaster risk reduction for sustainable development

Climate change adaptation and disaster risk reduction were often thought to be two distinct, disparate concepts which have nothing in common. However, this notion is changing because these two issues actually involve common elements (hazards and management measures) which intersect and are, therefore, interlinked.

In as much as both deal with risks from meteorological hazards, which also often interact with geological ones, an analytical approach which can transform this diverse information into common, intelligible units of measure would be crucial for a feasible, cost effective risk management regime. Quantitative Risk Assessment (QRA) employs standard quantification processes which generate objective and consistent basis for a systematic choice of the most appropriate cost effective risk management measures. Owing to the probabilistic nature of risks for both climate change and natural hazards and the level of uncertainties involved, Probabilistic Risk Assessment (PRA) would be more appropriate as opposed to the conventional deterministic approach in assessing either disaster or climate change risks.

As can be gleaned from the definition of the proposed approach, empirical data and the concomitant technology to generate and transform them into usable form would be necessary. It goes without saying, therefore, that process changes, especially those involving technological means, will necessarily require new and additional financing, especially if such action will be incremental on the part of the implementer.

Developing countries like the Philippines, which are still grappling with their sustainable human development concerns, also have to increasingly deal with the looming realities of climate change and disaster impacts. They must institute measures which, in the absence of additional outside financing, need to be least cost but effective. In the wake of these urgent challenges, they cannot afford to take separate, sequential strategies, nor small incremental steps, to forestall disasters from whatever source. The Philippines, therefore, is implementing an integrated approach to systematically factor disaster and climate change risks into all national and local development planning, programming and relevant regulatory processes. The level of ambition in paradigm shifting must equate the high stakes in terms of lives saved and economic costs forestalled.

As in any threat, climate change offers an opportunity for redefining development such that it becomes sustainable and meaningful for a country's citizenry. This opportunity has to be seized now, otherwise, delayed actions will not only be more costly but meaningless. With new and additional financing, not immediately forthcoming because of the slow global climate change negotiations, many poor developing countries are resorting to imaginative means to increase their capacities to survive climate change and disaster impacts. But there are limits to the imagination, no matter how prolific. Although it fuels innovation which is key to making meaningful changes in the development paradigm, imagination must actually be supported by actual resources, including technology, to translate dream into reality.

With best regards,

Amelia D. Supetran
Team Leader, Environment & Energy
UNDP Philippines

About the contributor

Amelia Supetran is currently the Team Leader of the Energy & Environment Team of UNDP Philippines. She has a background in Chemistry and served the Philippine Government's environment sector for more than 20 years.

Patrina Dumaru wrote:

Facilitator's note (Pak Sum Low): Patrina Dumaru discusses the outcomes of a pilot project in Fiji that implemented "an integrated approach to climate change adaptation in six rural communities", "focusing on coastal ecosystems and water supply issues". In particular, she highlights the usefulness of traditional and local knowledge in enhancing the capacity of local communities to adapt to climate change, including "historical community water or coastal management practices, rainfall and land-use patterns, demographic changes and community views on how the water/coastal problem was to be addressed" through "culturally appropriate community consultations". It was also important to involve "indigenous people as project implementers" because of their local language ability, as well as their understanding of local history and "familiarity with the dynamics of village governance structure and the social rules and protocols that operate within this system". However, "modern science" is still needed to complement the "limitations" of this valued traditional "knowledge base in the process of adapting to climate change". It is interesting to note Patrina's experience that the process of "carrying out capacity development in adaptation in local communities does not necessarily require a lot of money, at least initially". However, capacity development is a continuous and long-term process.

Dear Network Members,

Enhancing the capacity of local communities to adapt to climate change

Adaptive capacity is a system's ability to take action to reduce vulnerability to climate change (Barnett 2008; Adger *et al.* 2007; Burton 2002; Smit *et al.* 2000) and is dependent on: economic resources (to pay for adaptation); awareness and information (identification of problems and knowledge of solutions); technology (the tools needed to adapt); skilled labour (the ability to use available technologies); infrastructure (the means by which the services, information, and resources needed to adapt reach communities) (Adger *et al.* 2007; Barnett 2008). The renaissance of traditional methods of marine resource management (e.g., taboos, sacred sites, and fisheries closures due for example to the death of a prominent community member) in many Pacific Island countries since the 1980s has been seen to have enhanced the adaptive capacity of local or indigenous communities (Govan *et al.* 2009). In fact, the effect of these traditional practices helped to reduce/limit the pressure on resources. However, a key factor distinguishing such initiatives from projects designed specifically for climate change adaptation would be that the later would have climate change factored into the community awareness component as well as in development decision-making processes (Huq and Reid 2007).

Traditional knowledge and community-based adaptation: A climate change adaptation process in Fiji

The recognition of traditional and local knowledge is a fundamental component of community-based adaptation (CBA) projects that are beginning to mushroom globally. One such initiative is the Fiji Climate Change Adaptation (Barnett and Campbell 2010) Project designed to pilot an integrated approach to climate change adaptation in six rural communities in Fiji, focusing on coastal ecosystems and water supply issues (two of the four most vulnerable sectors identified in Fiji's Climate Change Policy Framework (Government of Fiji 2009). The project objectives were to enhance community awareness to climate change, incorporate climate change and adaptation in community governance processes, and to identify and implement appropriate adaptation measures. Funded by AusAID, via the Fiji Department of Environment, the project was implemented from August 2006 to December 2009 by the Pacific Centre for Sustainable Development (PACE-SD) and the Institute of Applied Science (IAS) of the University of the South Pacific. Other stakeholders involved in the project as members of the advisory committee included various government departments, academics, conservation agencies, NGOs, regional development agencies, other donors and private water and coastal engineering consultants.

The overall outcome of the Fiji CCA Project was the general improvement in water and coastal management in the six pilot villages. For example, the three sites where water was the issue of focus, communities worked with the project

partners in examining historical factors that contributed to the water shortage, developed a community adaptation plan that focused on water, established or enhanced the functions of the village water committee and actively participated in the upgrading of the old water system that significantly improved access to water by households. Traditional knowledge relating to land use and water management patterns, environmental changes as well as population trends were gathered via culturally appropriate community consultations upon which the village project activity outcomes were based. Another key outcome of the project was the level of knowledge achieved by community members on the causes and possible future impacts of climate change to their local environment and the importance of mainstreaming adaptation at the community level. While community members had already observed changes in the local environment, scientific interpretations on climate change was disseminated by the project implementers to compliment this already existing knowledge. This additional climate change awareness was particularly appreciated by traditional leaders and decision-makers who encouraged and supported the community members' involvement in the project and accepted and recognized the new water management plan and committee as part of the community governance regime. While these outcomes are a direct improvement in community-based water management, they are also indicative to the enhanced local capacity to respond to climate change.

Another positive outcome of the project was the involvement of indigenous people as project implementers. Their ability to speak the local language and familiarity with the dynamics of village governance structure and the social rules and protocols that operate within this system saved much time and effort in learning about the local history and processes, and enabled more sensitive understanding of, and responses to, local concerns. For example, it is important for researchers to know how and where to sit, and the manner of addressing people, particularly when conversing publicly with the chief, and failure to do this correctly can jeopardize communication, while the ability do it correctly can greatly enhance the success of the project. Traditional ties based on kinship, totems and significant historical events (e.g., warring alliances, migration, marriage) connect clans, villages and provinces from various parts of Fiji and an understanding of, and interest in, these relationships can help with the bonding process between the 'outsider' and the village. So, hiring local project staff enables a trusting relationship between the village and the project which greatly helps improve the project's outcome for all parties.

The Fiji CCA project implementation process also showed that carrying out capacity development in adaptation in local communities does not necessarily require a lot of money, at least initially (*). Following the awareness raising of communities on climate change including discussions on observations and knowledge of local climate trends and impacts the next key procedural step was to gather local knowledge of water sources or coastal changes, historical community water or coastal management practices, rainfall and land-use patterns, demographic changes and community views on how the water/coastal problem was to be addressed. Alongside this process water and coastal engineers from government departments and technical agencies visited each site to assess the water or coastal problems and recommend possible adaptation measures from a scientific perspective. The technical assessment outcomes, summarized and translated in the local vernacular, were an important information source to the community as they developed their adaptation plan which focused on water. Adaptation options that involved less environmental and financial risks, and which were deemed manageable and sustainable by the community were favoured, while more expensive, engineering-based options were held-off until the softer options were trialed. The outcomes of this process illustrated both the value and limitations of traditional knowledge and the of role modern science in complementing this knowledge base in the process of adapting to climate change.

The combined adaptive management process of implementing, ongoing review and adjustment of the community adaptation plan was the final step of the project. A third workshop on community-based monitoring was conducted in each site and frequent field visits were made throughout the project with the aim of checking on the implementation of adaptation activities and to review and update the adaptation plan so as to keep it relevant to the existing needs and concerns of the community. This stage was essentially the beginning of the adaptive management process to be continued by the community.

With best regards,

Patrina Dumaru
PhD student
University of Melbourne, Australia

Notes

(*) The allocation for the capacity development in adaptation was US$20,000 for each of the six sites, with a total of US$120,000.

About the contributor

Patrina Dumaru is a Fijian PhD student at the University of Melbourne studying the strengths and weaknesses of a community-based adaptation project to enhancing the adaptive capacity in Fijian villages. She has worked for over ten years in the area of community-based natural resource management, waste management, climate change and community development in Fiji and the Pacific region. In 2009 she was awarded the UNDP Asia-Pacific Human Development Academic Fellowship.

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Smit, Barry, Ian Burton, Richard J.T. Klein, and J. Wandel. 2000. "An anatomy of adaptation to climate change and variability". *Climate Change* 45: 223-251.

Heather Bell and Ray Shirkhodai wrote:

Facilitator's note (Bernarditas Muller): Referring to previous contributions under the current sub-theme, Heather Bell and Ray Shirkhodai examine the linkages between climate change adaptation and disaster risk reduction within the context of sustainable development. The contributors appear to subscribe to the view that "climate hazards and climate change are not the only components of near-term and long-term disaster risk", and that "focusing on climate change specific measures will not be sufficient to reduce suffering." Risk reduction must take into account many other

factors encompassing wide-ranging "historical and emergent social, economic, cultural, and political systems." These drivers of risk constitute the link among actions on development, disaster risk reduction (DRR) and climate change adaptation (CCA).

The contributors also describe how they apply the analysis of these linkages as practical decision-making tools. They conclude by stating that "situating CCA within DRR and development could improve integration and increase the effectiveness of measurement, representation and decision-making related to policy and planning."

Dear Network Members,

Thoughts on the links between disaster risk reduction and climate change adaptation

Both Schipper (2010) and Lambert and Creitaru (2010) note that climate change adaptation (CCA) and disaster risk reduction (DRR) share common goals, though the practice areas and funding structures have developed somewhat independently. Schipper (2010) also notes that, "without acknowledging the deep roots of vulnerability that are embedded in culture and politics, we will surely fail in our efforts" to reduce risk and adapt to a changing climate. Sustainable development and the institutional structures which frame and organize its execution must be considered as well.

Sustainable development depends on reducing and managing disaster risk in both the near term and the long term. But DRR is not the only component of sustainable development. Similarly, as Kelman and Gaillard (2010) intimate, climate hazards and climate change are not the only components of near-term and long-term disaster risk. Disaster risk is a function of the characteristics of likely hazards, the vulnerability of exposed elements to those hazards, and the capacity of human-environment systems to handle impacts. Future risk is a function of both the existing relationship between hazard, vulnerability and capacity, as well as the relationship between any changes in these components over a given period of time. Climate change will contribute to shifts in environmental conditions and hazard patterns, affecting all components of risk and altering the relationships between them. However, as Kelman and Gaillard (2010) point out, climate change is not the only mechanism of change, and thus CCA is not the only avenue for reducing future risk. Focusing on climate specific measures will not be sufficient to reduce future suffering.

In order to reduce overall risk, hazards cannot be looked at in isolation, though DRR activities may be prioritized based on losses associated with specific hazard types. Exposure, and some vulnerabilities and capacities, are certainly hazard specific (if not hazard determined). However, as has been argued elsewhere in this forum and in the literature, many of the factors that increase vulnerability and decrease capacity (access to resources and services, institutional mechanisms, social and environmental protections, etc.) are independent of specific hazards and rooted in historical and emergent social, economic, cultural, and political systems. Cross hazard and hazard independent drivers of risk provide a practical link between development, DRR and CCA.

Without the alignment of political and development priorities with DRR and CCA approaches, effectiveness of all activities decreases. We can advance the alignment of priorities by overtly framing DRR and CCA activities and decision-making within the context of sustainable development goals. Identifying hazard independent components of disaster risk (both long term and short term) that align with sustainable development could help increase the effectiveness of resources coming from multiple funding communities. As an applied science and technology center, we are interested in how discussions and research surrounding DRR, CCA and sustainable development mesh in practice and can be used by practitioners. Lambert and Creitaru (2010) identify 'no regrets' measures as funding priorities. We, like them, see scalable risk information and early warning systems as solutions that span DRR, CCA and development concerns and reduce future risk regardless of the time frame. We are actively working in this area.

As part of our DRR activities, we have also created assessments at various scales that identify, map and index various hazard independent contributors to vulnerability and capacity. While this approach has limitations, it is one way to make hazard independent drivers visible to decision makers. We have combined these with hazard specific information to produce multi-hazard indices of risk. The framework for these indices is rooted in sustainable development concepts. While the results of these studies are (naturally) influenced by data availability and quality, we have received positive feedback from practitioners who see their value as DRR and disaster management decision-making tools. We are

working to increase the utility of this information and better adapt indices to priorities by including practitioners in their further development and application. We have also included an idea introduced by UNOCHA (a "focus factor"), which can help to overcome some data limitations and better incorporate political priorities into results, a concern cited by Füssel (2010) in a previous posting.

As timeframes become longer, uncertainties regarding how exactly human systems and environmental systems will interact and change, and how the relationships between the various components of risk will shift, increase. We can work to minimize potential changes in climate related hazards as well as potential exposure. However, we will also need to encourage flexibility in our systems in order to maximize our ability to access, synthesize, and enact creative solutions. This will help support development and reduce disaster risk regardless of the hazard or timeframe. Approaches focused on building long-term adaptive capacity will contribute to near term reductions in vulnerability and increases in coping capacity. Near-term actions will set the stage for future conditions and options. Situating CCA within DRR and development could improve integration and increase the effectiveness of measurement, representation and decision-making related to policy and planning.

With best regards,

Heather Bell, Science Advisor
Ray Shirkhodai, Executive Director
Pacific Disaster Center, Hawaii

About the contributors

Heather Bell is the Science Advisor at PDC in Hawaii. Her areas of focus are risk and vulnerability assessment, risk perception, and risk communication. At PDC, she works to connect risk related research and practice.

Ray Shirkhodai is the Executive Director of the Pacific Disaster Center (PDC) in Hawaii. A Computer Scientist by training, since 2002, he has been involved in the development of the center's strategies regarding practical applications of sciences and technologies to the disaster and climate change risk reduction agendas.

PDC's mission is to help *foster disaster-resiliency through application of science, information, technology, and exchange.*

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Pradeepa Malkanthi wrote:

Facilitator's note (Bernarditas Muller): The contribution focuses on adaptation to the adverse effects of climate change, and differentiates between "autonomous" and "planned" adaptation. Autonomous adaptation is adaptation that occurs in "unmanaged natural systems" while planned interventions would require policy planning and decision-making. The contribution gives as examples of the latter "integrating adaptation into development projects through systematic application of climate risk assessment", and reinforcing existing risk reduction strategies such as coastal zone management and infrastructure development. For adaptation strategies to be effective, barriers such as availability of information on the nature and extent of the adverse effects, as well as costs of response measures should be addressed. Adaptive capacity, institutional frameworks, access to financial resources and technology are also required. Development would most likely mean rising emissions. The contributor therefore concludes that focusing on "green growth" is essential rather than following conventional development approaches.

The Facilitator believes that adaptation and mitigation are mutually supportive, and that these are two sides of sustainable development, or following a low-emission growth, that is part of the objective of the UN Framework Convention on Climate Change.

Dear Network Members,

Enhancing the adaptive capacity of developing countries to climate change

Though the global temperature level has not yet risen by two degrees Celsius above the 1990 levels - a rise in temperature of this magnitude is predicted to cause irreversible changes to the climate (IPCC 2007) - nations across the world are experiencing the adverse impacts of climate change to varying degrees. This has underscored the importance of devising adaptation strategies along with mitigation measures. This contribution will focus on adaptation, which implies "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (Levina and Tirpak 2006).

Adaptation could be autonomous or planned. *Autonomous adaptation* involves changes that systems will undergo in response to changing climate irrespective of any policy plan or decision (TERI 2007). These are the changes that occur in unmanaged natural systems; they are self-generated changes.

As it is difficult to predict the extent to which autonomous adaptation can offset the impacts associated with severe climate change (Smit *et al.* 2001), planned interventions are needed. This especially holds true for some developing countries as they are highly vulnerable to climate change (Gagnon-Lebrun and Agrawala 2006), owing to their heavy dependency on climate-sensitive sectors and their location at lower latitudes (Burton *et al.* 2006).

Some planned adaptation strategies that could be beneficial to developing countries include:

- Integrating adaptation into development projects through systematic application of climate risk assessment. For example, the World Bank has begun to develop a "screening tool" to help project developers assess whether proposed investments pose significant climate risk (Burton *et al.* 2006).

- Strengthening and widening existing disaster risk reduction strategies, such as use of micro irrigation techniques, rain-water harvesting system, constructing dams and coastal defences, etc.

There are numerous barriers that affect the design and implementation of adaptation strategies: lack of knowledge about the nature and the size of future climate change impacts, questions as to who will bear the cost of adaptation and how to allocate resources to adaptation and mitigation-equally or not equally (Muller 2010). In order to overcome these barriers, it is essential to design and implement adaptation strategies and options effectively. This will also help societies to gain maximum benefits from these strategies.

Prerequisites to the success

Success of adaptation strategies requires:

- Availability of information on the nature, severity of the problems and the cost and efficiency of proposed adaptation options;
- Adaptive capacity: capability in technical and planning disciplines to undertake adaptation options;
- Financial resources: Financial resources has to be mobilized to developing countries to develop adaptive capacity, undertake adaptive measures and to cope with the adverse climate impacts;
- Institutions: necessary intuitional framework to develop and coordinate comprehensive strategies; and
- Access to technology and the ability to develop technologies that are best suited to the country under concern (Burton *et al.* 2006).

Of these essential prerequisites, I will dwell briefly on the adaptive capacity.

Adaptive capacity

The potential or ability of the system, region, or community to adapt to the effects or impacts of climate change is known as adaptive capacity (Smit *et al.* 2001). It is determined by the availability of economic resources, information and skills, infrastructure, institutional strength, access to technology and equity of the society (Burton *et al.* 2006; Smit *et al.* 2001). Thus, it is clear that the level of development is a key factor that determines the adaptive capacity of a country. One way to enhance the adaptive capacity of developing countries is to invest in human development.

Human development and climate change

Though rising level of human development is favourable for successful adaptation, this itself has the capacity to aggravate the adverse impacts associated with climate change (*). Indeed, the data show that progress in human development and change in per capita CO_2 emission move together in the same direction-that is, it seems likely that rising human development will be associated with rising emission of CO_2, at least in the medium-term. In other words, rising levels of human development is good for adaptation, while it is bad for mitigation. It is obvious that the positive correlation between the Human Development Index and per capita CO_2 emission originates from unsustainable economic growth that has targeted the efficient use of natural resources at the cost of the environment. But, with the onset of climate change, it has become essential to go for 'green growth' rather than adhering to these conventional development approaches in achieving the development targets while successfully mitigating and adapting to the future climate change impacts.

That is the dilemma we must confront, though I would like to think that we do not have to choose either. Timely and appropriate global action could bring rising human development and a decline in the emission of CO_2 and other green house gasses.

With best regards,

Pradeepa Malkanthi
Consultant
HDRU
UNDP Regional Centre for Asia-Pacific, Colombo Office

Note

(*) The correlation coefficient between rate of change in per capita Carbon Dioxide emission and rate of change in the Human Development Index between 1995 and 2005 is 0.16. The analysis covers 115 countries in the world. Data on Per capita CO_2 emission was extracted from WDI Dataset while the HDI values were taken from the UNDP Human Development Report on *Overcoming barriers: Human mobility and development* (2009).

About the contributor

Pradeepa Malkanthi is a consultant and currently working with the Human Development Report Unit Team located at the UNDP Regional Centre for Asia-Pacific, Colombo Office.

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Mai Van Trinh wrote:

Facilitator's note (Bernarditas Muller): Mai Van Trinh examines the economic implications of addressing climate change adaptation in Viet Nam, given the increasing severity of the adverse effects of climate change globally and in Asia, in particular. Water-related damage affects the whole region, especially in coastal areas, ranging from decrease in freshwater availability due to drought, to loss of lives and settlements due to floods. In Viet Nam, adverse impacts of sea-level rise, seawater intrusion and resulting salinity, flooding and regional variations in crop productivity have brought about an estimated economic loss of 1.5 per cent of annual GDP. Rice-producing areas, which are sources of food and also contribute to Viet Nam's exports, are located in the two largest deltas, the Red River Delta and

the Mekong River Delta. Policy responses include infrastructure development for adaptation, including changes in irrigation systems. These, however, would require a huge amount of resources for implementation. The contributor concludes by observing that while climate change is a global problem, individuals could contribute their share in undertaking activities to address climate change adaptation.

Dear Network Members,

Climate change adaptation: A great challenge for developing countries

Climate change is a global issue with social and economic impacts for many countries. According to IPCC (2007), in Asia, freshwater availability is projected to decrease in Central, South, East and South-East Asia, particularly in large river basins. Coastal areas in South, East and South-East Asia will be at greatest risk of increased flooding from the sea, and from some large deltas. Endemic morbidity and mortality associated with floods and droughts due to projected changes in the hydrological cycle are expected to rise in East, South and South-East Asia. Crop productivity is projected to increase slightly at mid-to high-latitudes for local mean temperature increases of up to 1°C to 3°C, depending on the crop, but decrease in some coastal regions. Crops in coastal areas are exposed to increasing climate risks such as coastal erosion due to storm surges and sea-level rise. The effect will be exacerbated by increasing human-induced pressures on coastal areas.

In Viet Nam

The total economic loss due to extreme events in the recent years (1996-2008) accounted for 1.5 per cent of annual GDP (Hoc 2009). With a shoreline of 3,200 km, the main impacts of climate change in Viet Nam are sea-level rise, seawater intrusion and salinization, and floodings caused by typhoons and storm surges; crop yield loss caused by temperature increase in some regions; and extended drought areas in South Central region.

Red River Delta (RRD) and Mekong River Delta (MRD) are the largest deltas in the country with a total area of 2.09 and 4.06 million hectares (ha) respectively. Of these, 0.80 and 2.56 million ha respectively are agricultural land (GSO 2009). Although relatively small by country average, these two deltas are home for the country's 43 per cent population, and together they comprise 67.6 per cent of rice cultivation areas and constitute 71 per cent of total rice production for the country. The MRD contributes up to 95 per cent of exported rice (more than 5 million tonnes/year).

According to national climate change scenario (MONRE 2009), with an A2 scenario (*), 0.65 million ha in RRD will be flooded because of higher water level in the drainage river over the field; 1.51 million ha of MRD will be flooded with strong salinization, and this excludes the other three smaller regions of North Central Coast, South Central Coast and South East (Trinh *et al.* 2009).

Climate change adaptation measures

Climate change mitigation can be seen as the long-term strategy towards sustainable development with the introduction of new technologies and by saving energy. However, adaptation has been ongoing in Viet Nam for quite a long time, and this was clearly evident in the cases of extreme floodings in 2003, 2005 and 2008, and the broken dike incident in 2004 when some villages had to be removed and many hectares of rice lands were salinized. Many infrastructure activities took place immediately, for instance, reconstructing/maintaining/raising the sea and river dikes. Many river mouths had to be closed to prevent sea-water intrusion, and a huge number of water inlets along the rivers that led river water to the fields had to be concrete constructed. Many irrigation systems have to be changed or reconstructed to suit the salty condition. All such adaptation measures need a huge budget to carry out, and these may be seen as unrealistic and exceeding a developing country's capacity. Unfortunately there are no other better options. "Living with floods" in Mekong river delta is the easiest option, but it is not a cheap and acceptable option from the perspectives of the communities. In addition, it does not satisfy human, social and economic development.

Searching for optimal adaptation measures

We can have many adaptation measures, for example, engineering crop varieties with higher tolerance to salt, acid, flood and drought conditions; collecting and implementing autonomous adaptation from other local people; and

optimal use of natural resources, energy, etc. But these would be mostly suitable for low emission scenarios. What happens in high emission scenarios? Also, even though the new and more resistant varieties are a good option, studies into these are not getting high enough priority or attention. All plant breeding institutions offering biotechnology should become focal points for such studies.

Climate change is not just a story that involves the IPCC, UNDP, and countries. It should become a concern for all individuals, who should think that saving energy is not only for themselves, but also for society. However, all individuals should understand well the impact of climate change, the gains and losses, and their current and future missions. Networking at all levels of institutions and individuals are very important and that adaptation and mitigation measures should be complementary and mutually supportive.

With very best regards,

Mai Van Trinh, PhD
Chair, Environmental Modelling and Information Group
Institute for Agricultural Environment (IAE)
Phu Do, Me Tri, Tu Liem,
Hanoi, Viet Nam

Note

(*) A2 family: A very heterogeneous world; self-reliance and preservation of nations; continuously increasing population in the 21st century; regionally-oriented economic development; technological change; and per capita economic growth are more fragmented and slow (high emission scenario, similar to A1FI) (MONRE 2009).

About the contributor

Mai Van Trinh is the Chair of the Environmental Modeling and Information Group, Institute for Agricultural Environment (IAE). He is working on several projects on climate change, including Study on the Economics of Adaptation to Climate Change in Viet Nam Agriculture; Vulnerability to Climate Change: Adaptation Strategies; Agricultural Mitigation Options in Viet Nam; and Analyzing the Impact of Climate Change in Viet Nam Agriculture, and Developing Adaptation and Mitigation Measures.

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Bonheur Neou, Kien Tran Mai, Pornsook Chongprasith, and Pak Sum Low wrote:
Facilitator's note (Bernarditas Muller): The contribution informs on the important Climate Change Adaptation Initiative (CCAI) of the Mekong River Commission (MRC), a regional collaborative programme on the Mekong, one of the world's longest rivers that flows through six countries in Asia. The CCAI has a budget of about US$15 million for its intermediate and Phase 1 stages. The outcomes include planning and implementation, enhanced human and institutional capacity, improved policy frameworks to integrate adaptation into development planning, and increased regional partnerships and networking for climate change adaptation. The work will be backed by a Mekong Panel on Climate Change, likely to be modelled after the Intergovernmental Panel on Climate Change (IPCC), to "provide regular and comprehensive scientific, technical and socio-economic assessments" for the development of regional policies, strategies and action plans for adapting to the adverse effects of climate change. The contribution concludes with a listing of remaining specific issues to be addressed, including how countries would use the modelled outputs for longer-term adaptation planning, and better information on the changes in the countries' ecosystems to climate impacts to enable adaptation.

Dear Network Members,

Climate change adaptation initiative of the Mekong River Commission

Mekong, one of world's longest rivers that stretches 4,800 km, is shared by six countries: China, Myanmar, Cambodia, Lao PDR, Thailand and Viet Nam. The headwaters of Lanchang River, as it is known in China, and Mekong River, is originated from Qinghai-Tibet plateau. Its water resources have been used for hydropower and agricultural irrigation. The Lower Mekong Basin (LMB), which covers an area of approximately 606,000 km2 within the countries of Cambodia, Lao PDR, Thailand and Viet Nam (MRC 2009a), is home to approximately 60 million people (http://www.mrcmekong.org/about_mekong/people.htm).

Climate change is having profound impacts around the globe, and the Mekong River Basin is no exception. How has climate change affected, and will continue to affect, the people and their livelihoods of the LMB in terms of changing water resources, ecosystems and related socio-economic sectors? As an intergovernmental organization, the Mekong River Commission (MRC) (*) is fully aware of the importance of the above issues to its member countries.

The First MRC Summit that was held on 2-5 April 2010 in Hua Hin, Thailand, and attended by the Heads of Governments, adopted the MRC Hua Hin Declaration (2010) that highlights the need for regional cooperation in the following areas, which are affected by climate change: "reducing the loss of life and assets at risk from flooding and loss of livelihoods from drought conditions; better integrating sustainability considerations into the development of the Basin's significant hydropower potential; ensuring effective management of water for agricultural production, particularly as part of drought management strategies; preparing for climate change adaptation measures to minimise poverty and food insecurity among vulnerable communities; minimising any deterioration of water quality, loss of wetlands and deforestation, which present risks to biodiversity and peoples' livelihoods; better managing the Basin's unique natural fisheries; and reducing the risks associated with expansion of river transport." The Declaration has requested the MRC to focus on "Intensifying efforts to effectively manage the risks from flood, drought and sea level rise including establishment of forecasting and warning systems across the whole basin" (MRC 2010), and "Researching and addressing the threat to livelihoods posed by climate change and cooperating with other regional partners in addressing haze pollution" as priority areas for action, among others (MRC 2010).

MRC and the Climate Change Adaptation Initiative (CCAI)

The MRC is currently addressing the climate change issues through its Climate Change Adaptation Initiative (CCAI), a regional collaborative initiative that is being implemented under its Environment Programme. The CCAI aims to ensure "An economically prosperous, socially just, environmentally sound Mekong River Basin responsive and adapting to the challenges induced by climate change", so as to ensure that the following objective is achieved: "Climate change adaptation planning and implementation is guided by improved strategy and plans at various levels and in priority locations throughout the Lower Mekong Basin" (MRC 2009b).

The CCAI is a relatively long-term project that is composed of the following phases, which will last until 2025 (MRC 2009b):

- Intermediate phase (till end of 2010): Inception; partnerships;
- Phase 1 (2011-2015): Adaptation planning process and implementation of new initiatives; feedback to improvement of tools; Strategic Plan 2011-2015;
- Phase 2 (2016-2020): Follow-on implementation; replication and upscaling; feedback to improvement of tools; Strategic Plan 2016-2020;
- Phase 3 (2021-2025): Consolidation of adaptation measures; regional agreements and institutionalization; devolution to national agencies; Strategic Plan 2021-2025.

The budget for the Intermediate and Phase 1 is about US$15 million.

The intermediate and Phase 1 of the CCAI activities will include the following in all member countries:

- **Policy frameworks** to facilitate and guide adaptation;
- **Integrated assessment** of impacts and vulnerability;
- **Adaptation strategy and options** for priority sectors and areas;
- **Pilot projects and demonstration** of adaptation planning and implementation;
- **Stakeholders engagement** (including community involvement and gender responsiveness);
- **Reporting, monitoring and evaluation;**
- **Capacity-building, education, awareness raising and training** (e.g., training of trainers)

There are four expected outcomes from the CCAI activities, as follows:

- Outcome 1: Climate Change Adaptation Planning and Implementation
- -Through demonstration projects to increase resilience to climate change
- Outcome 2: Improved Capacity to Manage and Adapt to Climate Change
- -Through human and institutional capacity-building, including communities in adaptation planning and implementation; using tools developed under Outcome 1
- Outcome 3: Strategies and Plans for Climate Change Adaptation
- -Through improved policy frameworks to promote adaptation and, most importantly, to integrate adaptation as a key ingredient into development planning at different levels
- Outcome 4: Regional Exchange, Collaboration and Learning
- -Through partnerships and networking

Mekong Panel on Climate Change (MPCC)

So often, national policy is formulated or adopted based on political considerations rather than scientific assessments. In order to assist the member states in formulating their national adaptation policies and strategies, the CCAI will be establishing a Mekong Panel on Climate Change (MPCC), which will provide regular and comprehensive scientific, technical and socio-economic assessments, including integrated *Impact, Vulnerability and Adaptation Assessments,* so that realistic national and regional policies, strategies and action plans can be developed based on these assessments. The need for the establishment of national panel on climate change is likely to become a future trend. For example, Viet Nam is also in the process of establishing a Vietnam Panel on Climate Change (VPCC) (**) as part of the country's National Target Programme on Climate Change (Le Cong Thanh, personal communication, March 2010).

The Terms of Reference for the MPCC is being developed. However, it will likely be based on the model of Intergovernmental Panel on Climate Change (IPCC), and likely to have various working groups (i.e., science, adaptation and mitigation) or specific task forces (e.g., traditional knowledge on adaptation) that will undertake the following activities:

1. To assess on peer-reviewed and published scientific, technical and socio-economic literature relating to climate change (science, adaptation and mitigation) in the Mekong River basin in a comprehensive, objective, open and transparent manner;

2. To facilitate and promote national and regional research on all aspects relating to climate change and assist researchers in the Mekong region in publishing their research findings in international peer-reviewed journals;

3. To provide input to the IPCC Fifth Assessment Reports which will be completed in 2013/2014.

Some major areas for MPCC assessments are suggested as follows:

- Existing and projected climate change (e.g., temperature increase, spatial and temporal changes in rainfall patterns) in 20, 50 and 100 years and associated environmental, social and economic cost in the Mekong River Basin;
- Ecological consequences of climate change in Mekong River Basin in 20, 50 and 100 years (e.g., phenological changes in plants and animals-the effects on the life cycles of the species);
- Vulnerability of water resources due to melting of glaciers in Qinghai-Tibet plateau and existing water resources management practices in 20, 50 and 100 years and associated impacts on natural (e.g., ecosystems) and human environment (e.g., settlements; agriculture; rice production; socio-economic development);
- Existing and future frequency of occurrences, intensity and duration of tropical cyclones that hit the region, such as Typhoon Ketsana that hit Viet Nam, Cambodia and Lao PDR on 30 September 2009;
- The relationship between El Niño and drought in the Mekong region;
- The relationship between La Niña and the frequency of occurrences, intensity and duration of tropical cyclones/typhoons in the Mekong region;
- Integrated assessment of climate change impacts based on observation and modelling;
- Sea-level rise and associated impacts;
- Adaptation and disaster risk reduction;
- Mitigation (including REDD).

In particular, the following specific issues would need to be addressed:

1. Given the inherent uncertainties in the projections of climate models, how do the MRC member countries use the modelled outputs for their longer-term adaptation planning?

2. The MRC member countries depend on their ecosystems for environmental, social and economic services:
   (a) How are the countries going to adapt in the changing ecosystems?
   (b) How much is known about the adaptation of the countries' ecosystems to climate change?

To answer the above questions, it is clear that more research is needed!

With best wishes,

Bonheur Neou, Kien Tran Mai, Pornsook Chongprasith, and Pak Sum Low
MRC Secretariat, Vientiane, Lao PDR

Notes

(*) The MRC was formed on 5 April 1995 by the governments of Cambodia, Lao PDR, Thailand and Viet Nam, which signed The Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin to jointly manage their shared water resources and development of the economic potential of the river. The MRC has been built on a foundation of more than 50 years of knowledge and experience in the region starting from 1957 when it began life as the UN-founded Mekong Committee. In 1996 China and Myanmar became Dialogue Partners of the MRC and the countries now work together within a cooperation framework (http://www.mrcmekong.org/).
(**) The idea of Vietnam Panel on Climate Change (VPCC) has been advocated by Dr. Pak Sum Low, who was International Expert of National Disaster Mitigation Programme based in the Ministry of Agriculture and Rural Development (MARD), Viet Nam, and Dr. Hoang Minh Hien of Disaster Management Centre, Department for Dyke Management, Flood and Storm Control (DDMFSC), MARD, since late 2008.

About the contributors

Dr. Bonheur Neou has been the Task Leader of the CCAI since December 2009. He was Deputy Director of the Department for Nature Conservation and Protection, Ministry of Environment, Cambodia, responsible for the management of 23 protected areas and international designated areas across Cambodia. He was also Deputy Permanent Secretary of Tonle Sap Biosphere Reserve Secretariat, an inter-ministerial coordination body that facilitates policy coordination and integrated natural resources planning; acts as an information clearinghouse mechanism; and provides a connection to a network of national and international communities. As Project Coordinator of the Tonle Sap Environmental Management Project, he supervised three project components: natural resources coordination and planning, community fishery organization, and capacity-building for biodiversity conservation of the Tonle Sap Biosphere Reserve.

Dr. Kien Tran Mai has been the Climate Change Programme Officer of the MRC Secretariat since October 2008. He was senior researcher at the Institute of Meteorology, Hydrology and Environment (IMHEN), Ministry of Natural Resources and Environment, Viet Nam. He has participated in the development of the National Target Programme to address climate change issues, as well as the National Strategy for Clean Development Mechanism (CDM). Before joining the MRC, he was a postdoctoral fellow of the Graduate School of Global Environmental Study, Kyoto University, undertook research on climate change impacts on human health.

Dr. Pornsook Chongprasith has been the Director of Environment Division of the MRC Secretariat since May 2007. She was Director, Marine Environment Division, Water Quality Management Bureau, Pollution Control Department, Ministry of Natural Resources and Environment, Thailand. She received her PhD in Marine Biology from James Cook University, Australia, in 1993. She has extensive experience in marine and coastal ecosystems management, including national and international pollution studies in the marine environment. She also has a very strong interest in climate change issues.

Dr. Pak Sum Low is Adjunct Professor at the Faculty of Science and Technology, Universiti Kebangsaan Malaysia, and at the School of Sustainable Development, Bond University, Australia. He has also been International Adviser for the CCAI of the MRC Secretariat since March 2010, and a member of Expert Group on Technology Transfer (EGTT) of the UNFCCC since this year. He has previously worked in UNEP (1991-1999) and UNESCAP (2001-2008), and served as a consultant for the UNFCCC Secretariat, UNCCD Secretariat and UNDP.

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Sudip Mitra wrote:
Facilitator's note (Bernarditas Muller): Sudip Mitra examines the challenges posed by the exacerbation of natural phenomena due to climate change, resulting in increased disasters, and cites the importance of enhancing adaptive capacity. The contributor sees the need to analyze disaster management from a development perspective, going beyond immediate relief operations to enhancing preparedness, as was recognized for the first time in India's 10th five-year plan. He also looks at opportunities offered by addressing the adverse impacts of climate change to shift planning and policy-making to more closely coordinated efforts at sustainable development at national levels. In order to achieve this, the contributor believes that it would be necessary to get the authorities dealing with disaster management and those dealing with climate change to undertake action together, in particular at ground level.

Dear Network Members,

Reducing disaster risks under changing climate: A major challenge

Climate change may exacerbate hazards caused by natural climate variability. Climate change and natural disasters should be dealt with mutually and not exclusively. Almost five-fold rise in disaster events has been observed from 1960 to 1990 and most of those are of hydro-meteorological origins (Chung 2006). Disaster mitigation and preparedness are necessary for a sustainable growth of any society. It has also been observed that the number of people killed due to disasters is higher in places where human development is low. Data also show that the hydro-meteorological disasters cause more damages than the disasters which are of geophysical nature. Not all impacts caused by climate-related hazards could be attributed to climate change. But, changing trends and irreversible processes poses new challenges to us. For these impacts, it is generally less clear whether suitable technologies for adaptation exist. Here, climate change presents a new challenge, which requires further analysis to identify technology needs. A good starting point is to focus on enhancing adaptive capacity.

In India, in the history of country's five year plans, for the first time the 10th five year plan recognised the need to look at disasters from a development perspective and also recognised the importance of preparedness over relief (see Planning Commission 2002). The Tenth plan has paved the way for mainstreaming disaster mitigation into development. The need of the hour is to identify feasible and flexible implementable tools/mechanisms and then practise those on the ground.
Disaster is increasingly being considered as a development constraint; hence, mainstreaming it into development policy is all the more pertinent in the current context. Incorporating disaster risk reduction (DRR) into relief and development policy and practice is nothing but 'mainstreaming' it. A systematic approach towards disaster mitigation is the need of the day. Since disasters are a human phenomenon, we can change our ways to reduce our risks. Shifting of focus from hazards to risk management could make our life safer.

Often impacts of climate change and disasters are seen as "opportunities":

- At this hour P. Sainath's book *"Everybody loves a good drought"* comes to my mind. It is hoped that we could utilize the "opportunities" offered by these disasters for the real development of the area/country/community.
- Our approach towards DRR has to be a true professional one. Lots of good initiatives have been initiated in the recent past, but we need professional management for the effective running of these initiatives.
- Often it happens that if we look at drought as an impact of ***climate change***, it gets addressed by one institution/organization/ministry/group. But if we look at drought as a potential ***disaster***, then it is addressed by a different one. There is an urgent need that disaster communities and climate change communities speak the same language at least at the ground level as at this level to a poor farmer the impact of drought is no different whether it is managed by disaster managers or climate change experts/managers.

With best regards,

Sudip Mitra
Assistant Professor at the School of Environmental Sciences
Jawaharlal Nehru University, New Delhi

About the contributor

Sudip Mitra is Assistant Professor at the School of Environmental Sciences, Jawaharlal Nehru University (JNU), New Delhi. He has worked in various national and international organizations, viz. The Energy and Resources Institute (TERI); the National Institute of Disaster Management (NIDM), Government of India; the Division of Ecology and Natural Resources at the Centre for Development Research (ZEF), University of Bonn, Germany, etc. Before joining his present position at the JNU he was the Project Director at MS Swaminathan Research Foundation (MSSRF), Chennai. Dr. Mitra is having many years of experiences in working with farmers and village communities and thus played a significant role in connecting science with the societies.

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Wong Poh Poh wrote:

Facilitator's note (Bernarditas Muller): Wong Poh Poh points out that not only climate-related hazards but also disasters resulting from natural phenomena such as tsunamis should be taken into account in undertaking climate change adaptation (CCA) in coastal areas. Innovative measures involving local solutions with the use of local resources should be explored to overcome problems of financing as well as difficulties in integrating CCA measures in national development planning. He cites in particular the rehabilitation of mangroves to address sea-level rise as an example of these measures.

Dear Network Members,

Climate change adaptation and disaster risk reduction: Innovations required

The IPCC 2007 report does not consider the 26 December 2004 Indian Ocean tsunami in the climate change adaptation as the tsunami is not a climate change event. However, it is clear that coastal communities, especially in the Asia-Pacific region, require measures against coastal hazards and climate change (World Vision 2008).

Today coastal communities cannot consider climate change adaptation without considering other coastal hazards which are not climate-related. We know that a wide range of measures is available and various methodologies of implementation are possible. The main problems include available funding and mainstreaming the measures in national planning. In some cases, where local communities have been successful in their measures, these have been overlooked and not given sufficient support on the ground (Sengupta 2009).

Given the economic plight of the least developed and developing countries, more efforts need to strengthen local measures, using local resources where possible, and to consider inexpensive innovations. For example, after much controversy, mangroves are now regarded as an important measure for coastal protection and as an adaptation measure against sea-level rise as this coastal ecosystem can establish on various substrates and not just the usual mudflats. New ways for deploying mangroves and other related measures for small islands facing a rising sea level are given in a recent publication (Wong 2010).

With best regards,

Dr Wong Poh Poh
Associate Professor
Department of Geography
National University of Singapore

About the contributor

Dr Wong Poh Poh has served as a Lead Author and Coordinating Lead Author in the IPCC Third and Fourth Assessment Report, respectively. He holds a Ph.D. from McGill University and receives additional professional training in coastal management, disaster management, and seismology and tsunami warnings. His field experiences cover 30

countries and he publishes widely on coastal issues especially of the Asian region-geomorphology, tourism, coastal management, small islands, climate change and tsunami impacts.

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4. Closing Message

Dear Network Members,

Fourteen contributions were received to enrich the discussions under this sub-theme, which in many ways continued the exchange started in the first sub-theme on climate resilience as well as the second sub-theme on mapping and measuring tools. I would like to thank the following contributors, all experts on the ground: Lisa Schipper; Nishadi Eriyagama; Alain Lambert and Ioana Creitaru; Ramesh Gampat; Stephanie Hodge, Suchita Sugar and Sonia Sukdeo; Ilan Kelman and J.C. Gaillard; G. Padmanabhan; Amelia Supetran; Patrina Dumaru; Heather Bell and Ray Shirkhodai; Pradeepa Malkanthi; Mai Van Trinh; Bonheur Neou, Kien Tran Mai, Pornsook Chongprasith, and Pak Sum Low; and Sudip Mitra.

It seems however that there remains the need to clarify the understanding of the nature of the linkages among the concepts of climate resilience, climate change adaptation and disaster risk management. Is there a hierarchy of relationships among them, or do they represent various stages of one comprehensive strategy to address the adverse effects of climate change? How could management of both lead to sustainable development? Some answers can be gleaned from the discussions and the concrete examples provided by the contributors.

The contribution of **Ilan Kelman and J.C. Gaillard** constituted one end of the spectrum of views, and held that climate change adaptation (CCA) can be encompassed within disaster risk reduction (DRR) strategies. Other contributors, such as **Heather Bell** and **Ray Shirkhodai** as well as **Pradeepa Malkanthi**, view the linkages between CCA and DRR clearly within the context of sustainable development. **Lisa Schipper** called for a "real shift in development paradigms" in order to address both DRR and CCA effectively.

Still others clearly recognized the opportunities offered and challenges faced in redefining development in sustainable terms, including **Amelia Supetran** on the Philippine experience in implementing programmes on DRR that advance CCA. Concrete experiences were provided in the contributions of **Alain Lambert** and **Ioana Creitaru** on the Maldives and South Mexico; **Nishadi Eriyagama** on adaptation options in the water sector in Sri Lanka; **Mai Van Trinh** on adaptation strategies in the two main river deltas in Viet Nam; and **Sudip Mitra** in citing the recognition of this perspective shown for the first time in the 10th five-year plan of India. The Climate Change Adaptation Initiative of the Mekong River Commission, contributed jointly by **Bonheur Neou**, **Kien Tran Mai**, **Pornsook Chongprasith**, and **Pak Sum Low**, gave detailed information on an important initiative on the largest river system in Asia.

Other important aspects that impact on the effective implementation of DRR and CCA activities were demonstrated in the contribution of **Stephanie Hodge**, **Suchita Sugar** and **Sonia Sukdeo** on the importance of quality education, particularly for children. Patrina Dumaru's contribution on a pilot project in Fiji underlined the importance of an integrated approach to climate change adaptation, making use of traditional and local knowledge and the involvement of indigenous communities for successful implementation of adaptation strategies. For this reason, the UN Framework Convention on Climate Change (UNFCCC) provides for support for the development and enhancement of endogenous capacities and technologies of developing countries. The importance of people-oriented interventions was also highlighted by **G. Padmanabhan** in his contribution on the climate-related disasters in India.

Almost all contributions touched on the financing and technology aspects of climate change adaptation. **Amelia Supetran** pointed to innovative means of financing that would be needed for adaptation strategies, one free from conditionalities that inhibit innovation and that would instill a sense of ownership essential for long-term responses to a decidedly long-term challenge of adaptation. I would add that adequacy and predictability of financing are necessary in order to allow for long-term planning for adaptation.

Lisa Schipper is correct in her observation that "funding structure for development assistance may be seen as a barrier to getting adaptation to work." It is for this reason precisely that developing countries in the UNFCCC have tabled a proposal that would clearly demonstrate that financing climate change is distinct and separate from development assistance. Not only is financing a commitment of developed countries under the UNFCCC because of their responsibilities for historical emissions that resulted in the concentration of greenhouse gases in the atmosphere, but also because of the failure of current delivery systems of financing to respond effectively to the objective of the UNFCCC.

The same applies to the discussion in **Ramesh Gampat**'s contribution of a proposal for a "global carbon-price target" and the establishment of a "Green Fund" to reward compliance with this target. These proposals would be feasible and acceptable within the current climate change process if differentiated responsibilities for historical emissions are factored in the determination of a price target, and if the Green Fund would be under the authority of the Parties to the UNFCCC which would provide policy guidance, determine programme priorities and set eligibility criteria for the use of the Fund.

It is a misperception to state that insufficient funding is portrayed within the context of the UNFCCC as a limit to getting societies to adapt to the adverse effects of climate change. Financing to address climate change and its adverse effects has specific provisions under the Convention, and is clearly not limited to adequacy alone. Moreover, what is "adequate" can only be determined by the countries themselves, and for this, the UNFCCC has programmes for financial and technology needs assessments. Adaptation in particular is considered to be country-specific, even site-specific, and its financing, including for technology, cannot be fully assessed in terms of global estimates.

As I have stated in my opening message, adaptation and mitigation are mutually supportive, and the "glue" that holds them together is sustainable development. One must also keep in mind the first of the Rio Principles: "Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature." (United Nations 1992).

With best regards,

Bernarditas Muller
AP-HDNet Facilitator

Reference

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Sub-theme 4

Human Security (including food and nutrition, and energy security) and Human Rights

1. Opening Message

Dear Network Members,

In recent years, the adverse effects of climate change on various aspects of human security have been increasingly explored and extensively discussed, with increasing volumes of literature on these topics being written by the United Nations, academic and research institutions, non-governmental organizations, and even the intelligence agencies and the military, among others. Sir David King, former Chief Scientific Adviser of the UK Government, has even commented in January 2004 that "climate change is the most severe problem that we are facing today - more serious even than the threat of terrorism." (King 2004).

In particular, attention has been paid to the following issues:

- **"Climate refugees"**: People who are or will be displaced from their homes and countries because of climate-related extreme events, such as tropical cyclones, storm surges, floods and droughts. The expected large number of transboundary "climate refugees" could potentially become a serious "security" issue for many countries. This issue will be linked to future increases in global air temperature, which, in turn, will link to greenhouse gas (GHG) emissions. Higher GHG emissions will lead to higher atmospheric GHG concentrations, which will lead to higher global air temperature. For example, the small island developing states have expressed the view that the 2°C limitation of global air temperature as provided for in the Copenhagen Accord will make them more vulnerable to inundation compared to the 1.5°C limitation, which they propose themselves. This is a key issue in the climate change negotiations.

- **Food and nutrition security:** The adverse effects of climate change are likely to affect food production in many parts of the world due to the spatial and temporal changes in precipitation patterns, as well as the projected increase in the frequency and/or intensity of extreme events. These will affect crop yields, and hence will have profound implications on food and nutrition security in many parts of the world, especially in poor countries.

- **Energy security:** The ever increasing demand for limited fossil fuel resources and their depletion in the foreseeable future has raised the concern of energy security in the future, especially in the Asian and the Pacific countries, which depend heavily on imported oil. What are the new policies, strategies and paradigms for moving away from fossil fuels that contribute to the emission of greenhouse gases, which induce global warming and climate change?

- **Conflicts over scarce resources:** Conflicts have arisen and continue to arise as a result of scarce natural resources because of climate change, such as the increasing lack of water resources in some parts of the world. Other conflicts could also be caused by loss of livelihoods; food shortage; health impacts due to epidemics and insect outbreaks; mitigation and adaptation inequality; among others (Wisner *et al.* 2007).

- **Loss of biodiversity and ecosystem goods and services:** Climate change will have profound implications for the loss of biodiversity and ecosystem goods and services (e.g., supporting services, provisioning services, regulating services and cultural services), which are "of vital importance for the functioning of the biosphere, and provide the basis for the delivery of tangible benefits to human society" (Fischlin *et al.* 2007), and hence they are indispensible for human well-being and security. Up to 50 per cent of the Asia's total biodiversity is at risk due to climate change (Cruz *et al.* 2007).

- **Loss of indigenous knowledge:** Ecosystem degradation is likely to lead to the loss of indigenous knowledge as the indigenous communities impacted are often repositories for natural resource knowledge, and hence the susceptible loss of knowledge when their ways of life are irreversibly damaged. This issue is linked to the human rights of indigenous peoples.

- **Human rights:** Climate change will exacerbate issues relating to human rights, such as decent living standards (e.g., clean air and water as part of their environmental rights); access to education, adequate food, water, housing and health care; and loss of indigenous culture. It will have an especially large impact on the particularly

vulnerable groups, including women, children, disabled and disadvantaged persons, and indigenous peoples (e.g., Inuit in the Arctic regions).

However, apart from climate change impacts, human rights also extend to justice issues relating to other aspects of climate change, including mitigation and adaptation strategies and measures (e.g., "assigning accountability for extraterritorial harms; allocating burdens and benefits, rights and duties among perpetrators and victims, both public and private; constructing reliable enforcement mechanisms" (International Council on Human Rights Policy 2008)).

- **Rights to development:** This issue has been repeatedly raised and debated in the international negotiations. While every country has its rights to development, it is important to emphasize that countries should aim for sustainable development, i.e., the "good" development that integrates environmental, social and economic development as an entity rather than the "bad" development that pursues economic development at all costs (including environmental and social costs) without taking environmental and social parameters into consideration.

The above are but a few of the key issues falling within the scope of sub-theme 4, which aims to explore the implications of climate change on *Human Security (including food and nutrition, and energy security) and Human Rights.* Contributors may further expand the scope of the discussion as long as they are related to the sub-theme. A focus on analysis, solutions and policies will be helpful. I hope that we will receive many insightful and analytical contributions, including case studies and good practices, on this sub-theme, of which I have the great honour to be the facilitator.

With best wishes,

Pak Sum Low
AP-HDNet Facilitator

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2. Contributions

The following authors, with their respective contributions, helped to enrich the discussion on the sub-theme *Human Security (including food and nutrition, and energy security) and Human Rights:*

Ulrik Halsteen, *Linking human security and human rights in the context of climate change*
Ranjani K. Murthy, *Gender, diversity, human security and human rights in the context of climate change*
Sribas Chandra Bhattacharya, *Energy security of the Asia-Pacific region*
Susan Wong, *Wetland ecosystem and human livelihood and well-being linkages in the context of climate change*
Ohnmar Khaing, *Climate change proofing: Food security, water, livelihoods and social dynamics*
Usha Natarajan and Kishan Khoday, *Sustainable development as freedom*
Manoja Wickramarathne, *Consequences of climate change on food security in the Pacific*
Kishan Khoday, *Asia's quest for energy security: The external implications*
Khurshid Alam, *Gender, climate change and human security in Bangladesh: Key policy lessons*
Keith Openshaw, *Energy security and GHG sequestration based on renewable carbon fuels*
Shiming Ma, *Cost-benefit analysis of northward winter wheat in Ningxia, China: Adaptation options and implications for food security*
Abdul Qadir Rafiq, *Ensuring human security of vulnerable communities through local coping strategies*

3. Online Discussion

Ulrik Halsteen wrote:
Facilitator's note (Pak Sum Low): Ulrik Halsteen highlights that "human security" should be looked at "in the broadest sense", and "the concept encompasses not only the absence of conflict but also the effective protection and enjoyment of human rights, including access to education and adequate food, housing and health care". He cites a number of UN and other reports on "climate change and its possible security implications", especially on "the threats climate change pose to the well-being of the most vulnerable communities", such as "indigenous peoples", "women, older persons and persons with disabilities", and thus "policies and measures" are required to protect these "vulnerable individuals and groups". Ulrik believes that "the human rights and human security perspectives" "should guide effective and sustainable climate change policy", and "both perspectives underline the need for a comprehensive approach to climate change adaptation that takes into account and directs attention to the underlying causes of vulnerability and insecurity". He emphasizes the importance of the national and international human rights laws, which "provide important safeguards and guidelines for the protection of affected individuals and communities".

Dear Network Members,

Linking human security and human rights in the context of climate change

There is general agreement that climate change and its effects on human societies have a range of security implications. In 2007, climate change was discussed within the Security Council and over the past years the security-climate change nexus has been the subject of numerous reports and studies. In 2009, the General Assembly adopted by consensus resolution 63/281 entitled "Climate Change and its possible security implications" and in implementation of that resolution the Secretary-General subsequently issued a report with the same title (A/64/350).

The security-climate change nexus is often considered narrowly in terms of how climate change may fuel violent conflict. However, it is useful to consider "security" in a broader sense, as captured by the concept of "human security", to get a more full understanding of the security implications of climate change and to capture the interrelationship between security and human rights. Instructive in this regard is the Nobel Committee's presentation speech in 2007 when the Nobel Peace Prize was jointly awarded to the Intergovernmental Panel on Climate Change (IPCC) and Al Gore for raising awareness of human-made climate change: *"Those who attach importance to "human security" argue that the main thing is to protect individuals. The chief threats may be direct violence, but deaths may also have less direct sources in starvation, disease, or natural disasters. A goal in our modern world must be to maintain "human security" in the broadest sense"* (Danbolt Mjøs 2007).

When one looks at "human security" in the broadest sense, it becomes clear that the concept encompasses not only the absence of conflict but also the effective protection and enjoyment of human rights, including access to education and adequate food, housing and health care. Thus understood, "human security" and the human security implications of climate change are also at the fore of the 2009 report of the Office of the United Nations High Commissioner for Human Rights (OHCHR) on the relationship between human rights and climate change (A/HRC/10/61) which was considered by the Human Rights Council in March 2009.

The OHCHR report (2009) makes a number of key observations similar to those presented in the Secretary-General's report on climate change and its possible security implications. In particular, both reports underline (1) that climate change-related effects exacerbate a range of existing threats which are already causing human insecurity and placing human rights under strain, and (2) that these adverse effects/threats can be addressed and minimized through appropriate policy measures.

One of the key threat multipliers identified in both reports relate to the threats climate change pose to the well-being of the most vulnerable communities. Looking at the increasingly well-documented observed and projected effects on climate change on human health and well-being, one observation stands out clearly: climate change affects people differently and certain groups tend to be particularly vulnerable to climate change-related risks. For example, women often rely more than men on natural resources for their subsistence; indigenous peoples often depend on natural resources for their livelihood and live in fragile ecosystems; and women, older persons and persons with disabilities tend to be particularly vulnerable in natural disasters caused by extreme weather events. Another observation which stands out is that the adverse effects and threats associated with climate change are not only related to environmental/climatic factors but also-and to a large extent-to policies and measures to protect vulnerable individuals and groups.

The Fourth Assessment Report of the IPCC (2007), the Millennium Ecosystem Assessment (2005), and a range of other recent reports (e.g., Stern Review 2007; UNDP Human Development Report 2007/2008; Commission on Climate Change and Development 2009) detail adverse effects of rising global temperatures on human health and well-being. Whether one looks at these data from a human rights or a human security perspective, it is clear that climate change threatens the basic living conditions required for a life in security and the effectively enjoyment of human rights. The OHCHR report illustrates this point by describing the implications of climate change-related threats for the effective enjoyment of a number of specific human rights: the rights to life, to health, to food, to safe and adequate drinking water, and to adequate housing (*).

The human rights and human security perspectives both provide important insights which should guide effective and sustainable climate change policy. First, they bring into focus the "human" aspect, underlining that the adverse effects of climate change are felt not only by States and economies, but also-and more fundamentally-by individuals and communities. Second, both perspectives underline the need for a comprehensive approach to climate change adaptation that takes into account and directs attention to the underlying causes of vulnerability and insecurity.

In the face of climate change-related threats, the human rights perspective adds one important dimension. National and international human rights law provide important safeguards and guidelines for the protection of affected individuals and communities. Giving priority to protecting the most vulnerable and ensuring access to adequate health services, information and education, are not only indispensable to strengthening climate change resilience and reducing risks; such measures are dictated by the legal obligations of States under human rights law.

With best regards,

Ulrik Halsteen
Human Rights Officer
OHCHR, Geneva

Note

(*) For more information on the OHCHR's work on climate change and the deliberations of the Human Rights Council on human rights and climate change, see: http://www2.ohchr.org/english/issues/climatechange/index.htm

About the contributor

Ulrik Halsteen is Human Rights Officer at OHCHR where he works on issues related to climate change and the environment. He has also recently served as OHCHR migration advisor and is currently secretary of the Committee on the Protection of the Rights of all Migrant Workers and Their Families.

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Ranjani K. Murthy wrote:

Facilitator's note (Pak Sum Low): Ranjani K. Murthy draws attention to "how different groups of women and men are affected differently" by climate change "based on caste, class, pregnancy status, marital status and other aspects of identity and diversity". She cites a few examples of "pre-existing gender inequities" in social relations and development. These include the extreme vulnerability of "dalit and tribal women" to "sexual exploitation in times of economic crisis following floods"; high "female illiteracy levels" means that they are unaware of "early warning on floods and cyclones (especially through newspapers)"; the "low female labour force participation" in Andaman and Nicobar islands implies that women find it more difficult to cope with and adapt to loss of husbands in disasters; and the importance of having strong women organizations (e.g., India Sneha-a women's organisation in Kariakal Puducherry) to fight for their rights. Ranjani points out that both government and donor policies have to be "sensitive to sex/

gender differentiated human security needs and human rights interests of women and men in the context of climate change", and that the "diversity in needs and interests across marital status, economic status, caste, and pregnancy/ lactation status etc. of women" must be recognized in policy and practice.

Dear Network Members,

Gender, diversity, human security and human rights in the context of climate change

The fact that human security and human rights of women are more affected by climate change than men is well recognised, and has been pointed to by several contributors to other sub-themes. This contribution seeks to draw attention to how different groups of women and men are affected differently based on caste, class, pregnancy status, marital status and other aspects of identity and diversity. The effects of these power relations and diversity could be sex or/and gender specific ways, and need to be recognised in policy and practice.

Sex, gender and climate change: Climate change is often associated with an increase in temperature and increase in droughts and floods. In drought situation, an increase in women's work load has been observed in parts of Gujarat and Rajasthan, India, as women have to go longer distances to fetch water, fuel, etc. (Ariyabandu and Wickramasinghe 2003). Even pregnant women have to put in long hours of work, increasing their chance of miscarriage (especially first and third trimester). Male migration is high. In the absence of men, decisions on dealing with complications during pregnancy are delayed posing risks to women's maternal health (Murthy 2009). Floods, as in Dhaka slums, pose their own set of problems, like heightened vulnerability of females to urinary tract infections when compared to males due to biological factors, as well as lesser access to toilets (Rashid and Michaud 2000).

Pre-existing gender and social relations: Pre-existing gender and social relations and outcomes are likely to have a bearing on the impact of climate change on human security and human rights. To give an example, an exemplarity study from Orissa, India found that dalit women tended to live near the rivers and also live in (single storied) huts. The upper caste women tended to live a bit inside, and also in pucca houses with a roof on top. While male migration was common in the village, the upper caste women could protect themselves against floods better by moving up to the roof, as well as recover fast by moving their belongings to a safe place. The lives and resilience of dalits living in high risk areas and in huts were much higher. The ability of dalit women to access safety of the upper caste roof in floods was less than the middle caste women (Ray-Benett 2009). It is dalit and tribal women who are extremely vulnerable to sexual exploitation in times of economic crisis following floods (Murthy 2009).

Pre-existing gender and development outcomes: Female adult literacy rates, female labour force participation rates and norms on mobility vary widely across and within countries. Female literacy levels have a bearing on access to early warning on floods and cyclones (especially through newspapers) and labour force participation influences ability to earn a livelihood for the family in the event of household livelihood crisis arising out of droughts and floods. To give an example, in coastal Andaman and Nicobar islands the female labour force participation is lower than that in coastal Tamil Nadu, and the ability of households to diversify livelihoods post tsunami was less than that in Tamil Nadu where women in coastal areas were actively involved in fisheries. In the event of husband's death, single women in Andaman and Nicobar could cope and recover much less effectively than women in Tamil Nadu (Murthy and Sagayam 2006).

Pre-existing levels of women's organizations: The extent of women's organization seems to have a positive bearing on human security and human rights of women in the context of climate change. To give an example, in Kariakal Puducherry, India Sneha (a women's organisation) had formed a district federation of women. Some of the women deserted by their husbands found that their husbands came back to claim compensation post cyclone and then left with it again. The federation took up the matter with government authorities and traditional village councils and ensured that the compensation got into the hands of single women. Further, while the government only provided compensation for loss of boats (which men managed), they fought successfully and demanded compensation for loss of fish stock, selling vessels, shells etc. (which women managed). In neighbouring states such compensation was not given (*). While compensation does not contribute to resilience, the same women's organization fought against removal of bio-shields on the coast in the name of putting cement walls! The bio-shields protected them, acted as open toilets, as well as allowed easy access to the coast.

Government and donor policies have to hence be sensitive to sex/gender differentiated human security needs and human rights interests of women and men in the context of climate change, as well as diversity in needs and interests across marital status, economic status, caste, and pregnancy/lactation status etc. of women. The challenges are more where pre-existing gender inequities are high and women's organizations are weak.

With best regards,

Ranjani Murthy
Independent Researcher on gender, poverty and health
Chennai, India

Note

(*) Personal knowledge of facilitating organization development process with the NGO Sneha (2007-2009).

About the contributor

Ranjani K. Murthy is an independent researcher on gender, poverty, disasters and health, with a particular focus on Asia/South Asia. She is on the editorial board of the journal Gender and Development and serves on the board of several organizations in India. She has finished a term as a Advisory Team member of the Asian Pacific Research and Resource Centre for Women, Malaysia (2008-2010).

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Sribas Chandra Bhattacharya wrote:
Facilitator's note (Pak Sum Low): Sribas Chandra Bhattacharya discusses the energy security of the world, particularly the Asia-Pacific region, which faces "formidable challenge" of meeting "the growing demand in the face of declining reserves of oil", while keeping the "emissions of greenhouse gases (GHG) low for avoiding catastrophic consequences of climate change". The Asia-Pacific region is "very vulnerable to oil shocks" due to its dependence "on imports for meeting its energy requirements". Thus, huge investments and "unprecedented coordinated efforts by the global community" to "develop clean and energy efficient technologies" and "alternative energy sources" will be needed. However, "it is not clear whether and to what extent" nuclear energy "would really contribute to energy security" due to "some serious unresolved problems, including disposal of wastes, and potential security threats to nuclear installations". He concludes that by mid-2100, "rapid changes and developments are expected to take place in energy supply as well as end-use technologies in all the sectors of the economy", and coping pace with these changes, "attracting necessary investments, involving the private sector, facilitating technology transfer etc. will present great challenges and opportunities" for the countries in the Asia-Pacific region to ensure their energy security "in the years to come."

Dear Network Members,

Energy security of the Asia-Pacific region

The term "energy security" normally implies the continuous availability of energy services provided at reasonable prices and in an environmentally benign manner. Based on the above definition, the Asia-Pacific region, which has about 1.68 billion people still depending on biomass fuels for meeting cooking/heating needs, and about 1 billion people lacking access to electricity, is far from being energy secure at present (ADB 2008).

The most serious threat to energy security of the world arises from the fact that oil, the reserves of which are declining and production of which may peak soon, is the largest source of energy at present; in 2008, oil accounted for 34.8 per cent of global primary conventional energy consumption (BP 2009). Also, global energy demand has been growing ever since the beginning of the industrial revolution and, is likely to continue growing for a number of decades to come as a result of industrialisation of developing countries. Meeting the growing demand in the face of declining reserves of oil presents a formidable challenge, particularly for the Asia-Pacific region, which is poorly endowed with fossil resources. The share of the region in global proved reserve of oil and natural gas at the end of 2008 was only 3.3 per cent and 8.3 per cent respectively (BP 2009). The region is therefore very vulnerable to oil shocks and has to depend heavily on imports for meeting its energy requirements. Imports accounted for about 57.5 per cent of oil requirement of the region in 2005; it is projected that the oil dependence will grow to 66.4 per cent in the year 2030 (APEC and ADB 2009). The growing oil import and soaring import bill pose a serious threat to the energy security of the region.

Satisfying the growing global demand is made even more challenging by the need to reduce consumption of fossil fuels in order to keep emissions of greenhouse gases (GHGs) low for avoiding catastrophic consequences of climate change. Addressing the twin challenges of meeting growing energy demand and reducing GHG emissions at the same time would require unprecedented coordinated efforts by the global community to: i) develop clean and energy efficient technologies in order to keep growth of energy consumption/emissions low; and ii) develop alternative energy sources in order to reduce our dependence on fossil fuels, particularly oil.

An analysis of the International Energy Agency (IEA) estimated that for long-term stabilisation of greenhouse-gas concentration at 450 parts per million of CO_2 equivalent, energy-related emission of these gases would be 25.7 Gt in 2030 compared with a reference scenario in which world energy demand is assumed to grow by 1.6 per cent per year during 2006-2030, and energy related GHG emissions would rise from 28 to 41 Gt (IEA 2008). The estimated shares of different options in emission reduction compared with the reference scenario are: energy efficiency-54 per cent; renewable energy-23 per cent; carbon capture and storage-14 per cent; and nuclear energy-9 per cent (Tanaka 2008). Huge investments will be needed in all regions of the world, including the Asia-Pacific region, to ensure their energy security by meeting their growing energy demands, while keeping their GHG emissions low through deployment of advanced energy technologies.

In the Asia-Pacific region, cooperation among different countries for development of energy resources (e.g., natural gas reserves, hydropower resources, offshore wind, methane hydrate, etc.) would be important in enhancing energy security. Some countries of the region have quite ambitious plans for the expansion of nuclear power generation. Considering that nuclear energy has still some serious unresolved problems, including disposal of wastes, and potential security threats to nuclear installations, it is not clear whether and to what extent nuclear fission-based power generation would really contribute to energy security.

In the run-up to the mid-twenty first century, rapid changes and developments are expected to take place in energy supply as well as end-use technologies in all the sectors of the economy; for example, the expected changes in the road transport sector include large market shares of fuel cell, electric, hybrid and biofuel-based vehicles so that roads will look much different in the future than they do today. Coping pace with the changes in the energy scene, attracting necessary investments, involving the private sector, facilitating technology transfer etc. will present great challenges and opportunities to the countries of the Asia-Pacific region for their ensuring energy security in the years to come.

With best regards,

Prof. Sribas Chandra Bhattacharya, PhD (Cambridge, UK)
President, International Energy Initiative
Adjunct Professor, Indian Institute of Social Welfare and Business Management (IISWBM), Kolkata, India
Former Professor & Coordinator, Energy Program, Asian Institute of Technology

About the contributor

Professor Sribas Chandra Bhattacharya obtained his Ph.D. degree from the University of Cambridge in 1976. He joined the Asian Institute of Technology (AIT) as a faculty member of its Energy program in 1982 and retired from there in December 2004.

During his tenure at AIT, he served as the Coordinator of the Energy Program of the Institute and also as the coordinator of two regional research programmes funded by the Swedish International Development Cooperation Agency (SIDA). One of these was on Energy, Environment and Climate (http://www.arrpeec.ait.ac.th) and the other was on Renewable Energy Technologies (http://www.retsasia.ait.ac.th).

Prof. Bhattacharya has more than 170 publications to his credit, including 90 in international refereed journals. He was felicitated in recognition of eminence and contribution to the profession of Mechanical Engineering by the Institution of Engineers (India) at the 22nd National Convention of Mechanical Engineers held at Guwahati on 9-10 September 2006.

Currently he is the President of International Energy Initiative, which is a small, independent, international non-governmental public-purpose organization led by internationally recognized energy experts, and with regional offices in Latin America and Asia. He is also a founding member of the Board of World Bioenergy Association.

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Susan Wong wrote:
Facilitator's note (Pak Sum Low): Susan Wong stresses the importance of wetland ecosystems for human well-being and future security, including provision of "goods and services" (e.g., fish and water availability; water purification; climate regulation; climate change mitigation and cultural services); "as means to help 'build opportunities for improving people's livelihoods, particularly for wetland-dependent, marginalized and vulnerable people'"; and "as the planet's natural infrastructure for addressing climate change". However, all these vital roles of wetlands, or the wetland livelihood characteristics, will be "severely threatened or lost" by the adverse effects of climate change. She also makes an interesting observation regarding the possible loss of "both the human repositories for traditional knowledge along with generations of that priceless knowledge" of the indigenous communities through the destruction of ecosystems

and hence the loss of their livelihoods, "food security and sovereignty", among others. Thus, a "healthy natural wetland infrastructure" is not only "a major asset in combating and adapting to climate change", but also essential in ensuring the preservation and enhancement of indigenous communities' livelihoods, cultures and traditional knowledge.

Dear Network Members,

Wetland ecosystem and human livelihood and well-being linkages in the context of climate change

Human well-being and the future security of humankind depend on many of the benefits provided to people by ecosystems, some of which come from healthy, intact wetlands (*). Fish and water availability are two of the most important of wetland goods and services. For some rural communities in developing countries, inlet waters fish and fishery products are their primary source of animal protein. Up to 3 billion people depend on water supply from groundwater which is often recharged through wetlands. Other benefits with strong linkages to human well-being include water purification, climate regulation, climate change mitigation and cultural services (MEA 2005).

The Ramsar Changwon Declaration on Human Well-being and Wetlands 2008 (Ramsar n.d.-a) emphasizes the importance of wise use (**), management and restoration of wetlands as means to help "build opportunities for improving people's livelihoods, particularly for wetland-dependent, marginalized and vulnerable people". In a similar vein, "wetland degradation affects livelihoods and exacerbates poverty, particularly in marginalized and vulnerable sections of society".

The Declaration also highlights the vital role of wetlands as the planet's natural infrastructure for addressing climate change. Degradation and loss of wetlands would worsen the impact of climate change. Consequently, human's vulnerability to floods, droughts and famine would increase.

This contribution seeks to draw attention to the adverse effects of climate change on wetland ecosystems and explain how that may jeopardize human well-being and security. When the structure and function of wetlands are severely threatened or lost, human livelihoods may be irreversibly damaged.

What constitutes wetland livelihood?

Wetland livelihood characteristics may be identified in terms of: diversity in activity to allow people to minimize risks to their livelihoods and maximize the benefits the environment offers; dynamism in people's mobility and ability to alter their activities in response to seasonal and annual variations, in particular the changing patterns of flooding and water recession; and adaptive capacity to innovate, using knowledge and skills acquired over generations to adapt their environments to their needs (Friend 2007).

Impact of climate change on wetland ecosystem and human livelihood and well-being

WI (2002) indicates climate change as one of the proximate drivers or "the forces which have direct influence on the ecosystem services" of shoreline erosion, rise in sea surface temperature, and saline intrusion. Communities are at risk of climate-induced floods to residential areas, roads and infrastructure and exposure to water-borne diseases; erosion and siltation threatening food and income security; and salinization of water supplies.

Floods can be a positive and invigorating role for wetland ecology but in greater intensity or duration than expected, they often severely affect communities. Accordingly, climate change is likely to enhance the severity of floods in the future. Further, a shorter, more intense rainy season will result in increase floods during the wet season and drought during the dry season. Although impacts sustained from floods may not necessarily be dramatic, but yet, families affected may be "kept in the grind of poverty - or fall into poverty - directly due to these losses". In this respect, the "potential of climate change to increase floods, and to pull a greater proportion of a community into poverty, would be a great burden". It may start from a "low-grade stress on the community to a real threat to its survival" (MWBP 2005).

Traditional and indigenous communities may have the "smallest carbon footprints in the world" but they are "extremely hard hit by climate change". Degradation to ecosystems would impact their "food security and sovereignty; health issues; cultural and spiritual impacts; demographic changes (including displacement from their traditional lands and territories); economic impacts and loss of livelihoods; and water shortages" (Galloway McLean 2009). Through loss of livelihoods, it is possible to destroy both the human repositories for traditional knowledge along with generations of that priceless knowledge (Friend 2007; Galloway McLean 2009).

A healthy natural wetland infrastructure needs to be recognised as "a major asset in combating and adapting to climate change" with strong linkages to human well-being (Ramsar n.d.-a).

With best regards,

Susan Wong
International Consultant
Human Development Report Unit
UNDP Regional Centre for Asia-Pacific, Colombo Office

Notes

(*) Article 1.1 of the Ramsar Convention defines wetlands as "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres" (Ramsar 1996). The Convention on Wetlands of International Importance, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources (Ramsar n.d.-b).
(**) The wise use of wetlands is defined as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development". "Wise use" therefore has at its heart in the conservation and sustainable use of wetlands and their resources, for the benefit of humankind (Ramsar n.d.-b).

About the contributor

Susan Wong worked for Wetlands International before joining the UN system in 1997. She is currently an International Consultant for the Human Development Report Unit, UNDP Regional Centre for Asia-Pacific, Colombo Office.

Susan holds postgraduate degrees in Development Economics and Research in International Development.

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Ohnmar Khaing wrote:

Facilitator's note (Pak Sum Low): Ohnmar Khaing discusses how the reduced rainfall and the lack of water in the dry zone of Myanmar in recent years has led to the significant decline in crop yields and livestock production, and hence the food insecurity. The drier condition has affected the farmers' incomes, livelihoods and social dynamics (e.g., migration and out-migration). She suggests a few possible "climate-proofing" measures, such as "improving storage of rainwater and limiting runoff" (e.g., through proper land-use planning, efficient land utilization and water management; improved irrigation practices, etc.); "improving agricultural practices" (e.g., research on drought resistant varieties; changing cropping systems, patterns and growing seasons; soil fertility management; among others). Some of these "adaptation" practices could reduce the emission of greenhouse gases. Indeed, as discussed by a number of previous contributions, adaptation and mitigation (e.g., the use of renewable energy) are mutually supportive. Ohnmar finally stresses the important role of NGOs in analysing "the magnitude and impacts of climate change", determining "the best possible strategy for adaptation/mitigation", and developing "the capacity of civil societies and all stakeholders by sharing experiences and knowledge on adaptation and mitigation measures".

Dear Network Members,

Climate change proofing: Food security, water, livelihoods and social dynamics

Climate change has worldwide effects, from which the Asia-Pacific region will not be spared. Millions of people have been living under the threat of extreme climate-related events (Henson 2006). Recent climate scenario analysis undertaken by the Myanmar Government confirms that most parts of Myanmar are expected to subject to one degree Celsius temperature increase within the next two decades (Climate Information Center, Personal Communication, 18 February 2010).

Climate change at local level and the dry zone of Myanmar

Climate change is affecting rainfall patterns, as well as the total annual precipitation variability, duration and intensity. Longer periods of severe drought are expected to alternate with shorter periods of excessive rainfall. This would result in an increase of livelihood insecurity, especially in semi-arid areas.

The dry zone receives an annual precipitation of no more than about 700 mm. As of September 2009, monsoon rains were scarce, with an average decrease of about 45-65 per cent of rainfall in the last 5 years. The crops most severely affected were those planted in the pre-monsoon and monsoon phases, mainly rice (50 per cent-70 per cent drop in transplanted areas), sesame and sunflower (80 per cent-90 per cent drop in crop yield-practically a crop collapse). This negatively affected the farm labour opportunities and thus livelihood. Cereal prices increased by 10-20 per cent, but this was normal for this time of the year (WFP 2009).

Moreover, an abundance of agricultural crop pest (leaf roller) was recorded. The grazing areas for livestock were also affected. Farmers had extraordinary expenses for buying fodder. This has reduced their incomes, as their livestock were sold at a loss. Livestock health deteriorated, but no livestock mortality was recorded. The trade for cattle also decreased (by 30 per cent) (International Development Enterprise 2009). This was an indication of difficulties for animal breeding, although it was still not critical.

With regard to drinking water, water sources and reservoirs were apparently sufficient for household consumption, but not for livestock and agriculture. Families often needed to dig deeper or to travel longer distances for accessing water. In some places, however, there was extreme water scarcity. Thus, there is a need to build/maintain water harvesting infrastructure, fodder distribution, and evaluate existing measures for emergency water response.

The effects also included the decrease in farm labour opportunities associated with the failure in rice and oilseeds crops; failure in agricultural loan repayment in the worst affected areas, as interest rates rose as high as 30 per cent. Further, out-migration, including that of women, increased.

Thus, it is clear that special assistance to support the upcoming summer cropping season may be needed. Crops with still some chances to be successful are: chick peas (planting), pigeon peas (harvest), onion, chilly, summer paddy. Summer cropping season may start earlier (late October) to take advantage of the soil humidity.

The preliminary findings from the dry zone assessment in December 2009 have highlighted the following situations:

- Because of the lack of water, food insecurity was worse in 2009 compared to previous years. In the second half of the year 2009, the level of food insecurity increased further. Poor transportation and poor land access can make the situation more vulnerable;
- The negative impact on crop production increased. For example, sesame, mostly a monsoon crop, suffered heavy loss. The production of pulses, and chilly recorded a 50 per cent loss for the monsoon crop;
- Migration (west towards Shan state) increased since the previous year;
- Ponds need to be re-dredged to remove sand and silt and to prepare for forthcoming rain;
- As repair of ponds takes time, for an immediate water delivery, tinkered trucks could be used. Further, household-level rain catchments, such as tube wells, could be built in alluvial soil by private contractors, and the well water could then be pumped by treadle pumps. Loans could be made available for tube wells, and Cash For Work could be implemented to renovate ponds.

Possible measures for climate-proofing

The livelihoods of people in dry zone should be climate-proofed to the extent possible. Both adaptation and mitigation measures are required. Some examples are:

Improving storage of rainwater and limiting runoff (adaptation/mitigation)

- *Land use planning (adaptation/mitigation)*
  Increasing the scale of catchment areas and/or changing the location and/or larger areas permanently under agroforest/grassland. Major emissions of greenhouse gases from land-use sector are associated with changes in land use (Adger and Brown 1994). The Location Approach aims to plan various land uses and activities within each catchment area so that they affect each other as little as possible. Land uses that place greater demands on water quality are located upstream of more polluting ones, while locating more vulnerable uses in areas of groundwater seepage implies placing certain requirements on activities in the infiltration areas. Clean land-use activities should be practised in the infiltration areas.

- *Land utilization (adaptation/mitigation)*
  Conservation tillage, agroforestry, i.e. fruit trees and grassland management. Ridge planting (conservation tillage) benefits poorly–drained soils such as vertisols, because ridges are usually drier and aerated than furrow bottoms or land that is managed in flat condition. Mulching is a multi-pronged approach to conserve soil and water and manage weeds. This can prevent evaporation and mitigate drought.

- *Water storage and irrigation (adaptation)*
  Increasing water storage capacity, improving drinking water management, more efficient/alternative irrigation techniques and improved irrigation practices (Goedhart 2010). Rainwater storage systems may reduce water abstractions for irrigation during dry periods. In some cases, groundwater abstraction should be stopped in favour of riverbank filtration. Water from the river can be pumped into the ground under the banks and later abstracted when it has been sufficiently filtered by passing through the sand and clay in the sub-soil.

Improving agricultural practices (adaptation)

Research on drought resistant varieties, changing cropping systems, intercropping (the practice of growing two or more crops simultaneously in the same field), choice of crops, growing seasons, soil fertility management (i.e., organic manure) and animal husbandry could help to improve agricultural practices.

A number of such changes in agricultural practices will lead to reduction of greenhouse gas emissions too, but it may be difficult to quantify the reduction of these emissions (Goedhart 2010).

Reducing the use of fossil fuels (mitigation)

The importance of increasing the use of renewable energy has been recognised. Introducing biogas, smokeless woodstoves (a measure that would also help to reduce fossil fuels consumption) and the use of solar/wind energy at village/household level (*) are among the strategies that could be used.

Follow-up

NGOs in Myanmar can play an important role in climate change activities. Through their collaboration with all parties, they could:

- Analyse the magnitude and impacts of climate change and thus on food security, water resources management and related issues;
- Determine the best possible strategy for adaptation/mitigation;
- Develop the capacity of civil societies and all stakeholders by sharing experiences and knowledge on adaptation and mitigation measures.

With best regards,

Ohnmar Khaing
National Coordinator
Food Security Working Group (FSWG)
Yangon, Myanmar

Note

(*) Some NGOs have introduced and adopted solar/wind energy systems. For example, the New and Renewable Energy Group (NREG) has introduced solar and wind energy systems in Myanmar since 2007. International NGOs such as GRET have introduced home-based solar energy systems in the highland area of Myanmar.

About the contributor

Dr. Ohnmar Khaing is the National Coordinator of the Food Security Working Group (FSWG) in Myanmar. After receiving a Master in Agricultural Science from Yezin Agricultural University (Myanmar), she started her professional career as a Farm Manager at the Ministry of Agriculture and Irrigation. She then earned a PhD from Kasetsart University (Thailand) (1999-2002) before joining the Thailand Royal Agricultural Project in 2003. One year after, she returned to Myanmar and worked as a Senior Researcher at the Department of Agricultural Research. In 2006, she joined the UN World Food Programme (WFP) as Agriculture Specialist to coordinate partner NGOs, government institutes and local authorities for Protracted Relief Livelihood Programme of Ex-opium farmers. She also worked as a part-time Technical Consultant for different local and international NGOs in Myanmar. In 2008, she volunteered emergency response for delta communities affected by Cyclone Nargis. In the same year, she was awarded the Hubert H. Humphrey Fellowship and spent a year at Cornell University in New York (USA). She also worked for Oxfam America as an intern in 2009, mainly focusing on developing humanitarian response strategy (2009-2019) for the East Asian Region.

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Usha Natarajan and Kishan Khoday wrote:
Facilitator's note (Pak Sum Low): Usha Natarajan and Kishan Khoday discuss the "link between the right to development and global environmental change", and that a "stable climate is an essential underlying element of the right to development". Among the many factors that threaten "human security and the right to development" in Asia, they regard melting of glaciers in the Himalayas, which "provide food and water security for hundreds of millions of people in the region" as one of the "most prominent and serious challenges", especially the glaciers in the Tibetan Plateau, where many of Asia's great rivers originate (e.g., Yangtze, Yellow, Mekong and Brahmaputra rivers). Concerns "over ecological change are aligning with cultural norms and traditions" "to sustain the environment and express a respect for nature", "a key element of the Millennium Declaration". Thus, they have expanded Amartya Sen's "Development as a Freedom" model to a "Sustainable Development as Freedom" model, and added "ecological security" as the sixth freedom in addition to the "five freedoms outlined in the original framework". Their concluding sentence is very thought-provoking: "Beyond being a mere market externality, climate change is now shifting the foundations of human security, exacerbating existing challenges for achieving human rights and human development goals".

Dear Network Members,

Sustainable development as freedom

Human security and the right to development

Communities across Asia face increasingly severe floods and typhoons, less predictable rainfall patterns and melting glaciers. Climate change poses a fundamental threat to people's security – food and water security, the ability to sustain standards of living and local ways of life, and exercise of the right to development. The UN Declaration on the Right to Development was adopted by the General Assembly in 1986 by an overwhelming majority. Article 1 states that the right to development is 'an inalienable human right by virtue of which every human person and all peoples are entitled to participate in, contribute to and enjoy economic, social, cultural, and political development in which all human rights and fundamental freedoms can be fully realized'. Thus, individuals and communities have the right to achieve the MDGs and other national social and economic development goals.

A stable environment is critical to achieving social and economic rights. The process of integrating environmental concerns into the human rights paradigm started in 1972 when the *Stockholm Declaration on the Human Environment* stated that people have 'the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being'. This was taken forward in Principle 1 of the 1992 Rio Declaration on *Environment and Development* that stated 'human beings are at the center of concern for sustainable development' and that they are 'entitled to a healthy and productive life in harmony with nature'. The UN Special Rapporteur on Human Rights and the Environment further elaborated a link between the right to development and

global environmental change, calling for a 'right to prevention of ecological harm' as part of the right to development (Dias 2000). A stable climate is an essential underlying element of the right to development. It is part of the enabling environment for achieving human development results, allowing present and future generations to lead secure and productive lives.

In Asia, human security and the right to development are threatened by many factors. One of the most prominent and serious challenges is glacial melting in the Himalayas (Mool *et al.* 2001). These glaciers provide food and water security for hundreds of millions of people in the region, but according to some estimates two-thirds of them are now retreating at an alarming rate (WWF 2005). At the center of this challenge lies the Tibetan Plateau, sometimes called the 'third pole' due to the magnitude of its frozen water content (Xu *et al.* 2005). Many of Asia's great rivers originate here, including China's Yangtze and Yellow rivers, and the Mekong and Brahmaputra rivers flowing south into India and Bangladesh. Most of Nepal's waterways and part of the water flows of India's Ganges and Pakistan's Indus rivers also begin here (Singh and Bengtsson 2005). In coming decades, melting will result in decreased water flows, alteration of river systems, and threats to water and food security for local communities living on the plateau and for the hundreds of millions of people in downstream communities directly reliant on these rivers (Yan-Zhi *et al.* 2006). Low per capita water availability and rising resource scarcity in the region will combine with rising temperatures and melting trends, placing at risk the ability of communities to sustain their hard-won development gains beyond 2015.

Adapting our paradigm of progress

In the Tibetan plateau region, as well as across Asia, concerns over ecological change are aligning with cultural norms and traditions regarding, not just rights, but also the duty to sustain the environment and express a respect for nature (Khoday 2007). A respect for nature is also a key element of the Millennium Declaration. In the Buddhist sacred text, *Sutta Nipata*, the Buddha argued that since humanity is far more powerful than other species, we have special duties to the environment linked with this asymmetry of influence. The growing sense of urgency in the region, with regard to environmental problems, brings an opportunity to engage this responsibility, and support local capacities based on both communities' right to development and a growing sense of duty to address risks from climate change as an issue of human rights and a common concern of humanity.

In his classic text, Development as Freedom, Professor Amartya Sen argued that development is 'not the mere accumulation of goods but the enhanced freedom to choose, to lead the kind of life one values' (Sen 1999). Since then, climate change has become central to the concept of human development and as such a new paradigm is needed, moving from Sen's original 'Development as Freedom' model towards a 'Sustainable Development as Freedom' model. In addition to the five freedoms outlined in the original framework, one may argue that ecological security has become a sixth freedom. As noted by Professor Sen himself: 'The question can thus be asked whether environmental priorities should also be seen in terms of sustaining our freedoms. Should we not be concerned with preserving-and when possible expanding-the substantive freedoms of people today without compromising the ability of future generations to have similar, or more, freedoms?' (Sen 2004). Beyond being a mere market externality, climate change is now shifting the foundations of human security, exacerbating existing challenges for achieving human rights and human development goals.

Regards,

Usha Natarajan, Legal Research Fellow, Centre for International Sustainable Development Law, Canada
Kishan Khoday, Deputy Resident Representative, UNDP Saudi Arabia

About the contributors

Usha Natarajan holds a PhD in Third World approaches to international law and served as Assistant to the UN Special Ambassador for the MDGs in Asia and the Pacific (2003-2004). She is currently based in Riyadh from where she serves as Legal Research Fellow with the Centre for International Sustainable Development Law, Canada. She may be contacted at unatarajan@cisdl.org.

Kishan Khoday served as UNDP Sustainable Development Advisor and Deputy Coordinator for Environment in Indonesia (1997-2005), UNDP Assistant Resident Representative and Team Leader for Energy & Environment in

China (2005-2009), and currently as UNDP Deputy Resident Representative in Saudi Arabia. He may be contacted at kishan.khoday@undp.org.

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Manoja Wickramarathne wrote:

Facilitator's note (Pak Sum Low): Manoja Wickramarathne highlights that "ocean warming, frequent tropical cyclones, flash floods and droughts", "prolonged variations from the normal rainfall", sea-level rise, ocean acidity and coral bleaching, "are likely to have dramatic impact on food production system in the Pacific Islands", including agriculture, fisheries, forests (a source of traditional medicines), and water resources, and hence "the people's food and economic security". She emphasizes that long-term policy responses require "accurate information about the economic impacts of future climatic conditions", which is "still extremely limited"; "strengthening of the adaptation enabling environment and implementation of adaptation measures", as well as enhancing the "understanding of how society can adapt to climate change in the context of multiple stresses"; capacity development, such as refining "ability to project climate

change at local scales" and "expanding capacity to provide decision makers and the public with relevant information on climate change and its impacts". However, it is likely that food and economic insecurity in the Pacific islands will lead to "climate refugees", a human security issue that has increasingly attracted the international attention.
Dear Network Members,

Consequences of climate change on food security in the Pacific

Climate change - as a multiplier of food insecurity in the Pacific

Climate change is already affecting livelihood in the Pacific Island Countries and Territories (PICTs). These countries and territories are particularly vulnerable to the effects of global warming, including more frequent and intense natural disasters, such as cyclones, floods and land droughts, because of their unique geophysical features, social, economic and unique cultural characteristics. The primary food sources (e.g., agriculture, fisheries and forests) and water have been already negatively impacted by climate change in PICTs. Natural disasters are badly pressing food supplies, commercial crops, livestock, and the water supply in the region. Climate variations and extremes have disrupted food production, water supply and economies of PICTs. As a result, food availability and people's accessibility to food have also been adversely affected (FAO 2008).

At the World Food Summit of 1996 it was indicated that food security exists "when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary and food preferences for an active and healthy life" (FAO 2006). Thus, food security is built on three pillars: the availability of food, the ability to access it, and to use it. The availability of food highly depends on local food production. In most Pacific Island Countries, there has been poor performance both in food and agricultural production compared with the performance in Asia, in the period of 1997 to 2002 (Sharma 2005).

Food insecurity may rise in the future in the Pacific Island countries, given that climate change is likely to have many negative impacts on the factors that determine food security (Sharma 2005).

Climate change: Impacts on agriculture, fisheries, forest and water resources

Ocean warming, frequent tropical cyclones, flash floods and droughts are likely to have dramatic impact on food production system in the Pacific Islands. Local food production is vital to the Pacific Islands where the majority of rural people still live and depend on subsistence agriculture. Agricultural production in the Pacific is heavily dependent on the seasonal rainfall. Climate change predictions for the region suggest prolonged variations from the normal rainfall which could be devastating to agriculture. In particular, key future impacts are related to extended periods of drought and, on the other hand, loss of soil fertility and degradation as a result of increased precipitation, both of which will negatively impact agriculture and food security (IFAD 2009).

The combination of increasing temperatures and sea-level rise will result in changes to coastal circulation patterns, thereby affecting nutrient supply, lagoon flushing, coastal erosion, and possibly ocean acidity and coral bleaching (ESCAP and PIFs 2008). These will affect both the reef-building capacity of corals as well as the spawning cycles of reef fishes and invertebrates. Given that coastal fisheries represent a significant source of food and livelihood (most Pacific Islanders are coastal dwellers), climate change poses a serious threat to people's food and economic security.

Beside the ecological functions of the forests, they are sources for food, income, medicine, fuel and building materials and, therefore, are linked to the overall food security of communities near these "biological warehouses". Wild harvests of edible nuts, fruits, plants and meat from the forests form a significant source of food for Pacific island people. In a region where the delivery of medical services is often limited by physical isolation and affordability, traditional medicines from the forest are often the only difference between life and death (FAO 2008).

Safe drinking water is also a means for food security and also has close linkages to food and nutrition. Water resources in Pacific Island are extremely vulnerable to changes and variations in climate because of their limited size, availability and geology and topography, especially in rainfall (IFAD 2009).

Way forward

The information about climatic threats to food security in developing countries is still extremely limited. The exact magnitude and nature of climate change impacts on food sources are relatively unknown in PICTs. Long - term policy responses require accurate information about the economic impacts of future climatic conditions.

Nevertheless, addressing the challenges of food security by taking into account current and future changes in climate is significant. However, the strengthening of the adaptation enabling environment and implementation of adaptation measures are also important. Refining ability to project climate change at local scales, expanding capacity to provide decision makers and the public with relevant information on climate change and its impacts, and enhance understanding of how society can adapt to climate change in the context of multiple stresses can be considered as high prioritized areas that have to be addressed.

With best regards,

Manoja Wickramarathne
Statistics Officer
Human Development Report Unit
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About the contributor

Manoja Wickramarathne is a Statistics Officer with the HDRU, UNDP Regional Centre for Asia-Pacific, Colombo Office. Her areas of work focus on quantitative analysis, poverty and human development. Her prior work includes assignments for the International Monetary Fund, Save the Children in Sri Lanka, International Water Management Institute.

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Kishan Khoday wrote:

Facilitator's note (Pak Sum Low): Kishan Khoday discusses the external implications of Asia's quest for energy security as a result of economic growth, particularly in the Arab region. This has led to the "New Silk Road" and provided "both the opportunities and the risks". He identifies three key areas where such opportunities exist: (1) Asian multinational energy corporations should take corporate social responsibility by adopting a "more preventive and proactive approach" "to integrate concepts of environmental sustainability and human development into their outward investments", so as "to set Asia as a leader in socially and environmentally responsible investment"; (2) As oil reserves in the Arab region are declining, "new South-South cooperation" "can bring to bear the successful experiences of Asia in shifting from natural resource-export oriented economies to what is today a major force in global manufacturing and service sectors", as in the case of China and India; (3) South-South cooperation "can bring to bear the successful experiences of Asia in establishing enabling policy environments for local development of clean energy technologies and establishing public-private partnerships for their rapid commercialization in the domestic market". Indeed, this is an important regional cooperation mechanism for addressing climate change, not only in the development and transfer of mitigation technologies, but also adaptation technologies.

Dear Network Members,

Asia's quest for energy security: The external implications

As countries like China and India seek to secure energy resources towards the goal of sustained economic growth and human development, they are increasingly looking outwards, and to the Arab region in particular. As noted in the 2009 Arab Human Development Report on the theme of human security, the Arab region hosts the majority of the world's oil reserves, the exports of which play a central role in national economies. As noted by H.E. Ali Ibrahim Al-Naimi, Saudi Arabia's Minister for Petroleum and Mineral Resources at a 2009 International Energy Conference in New Delhi, the 'New Silk Road' is a "potent metaphor for Asia's stunning growth and growth potential, and the far-reaching implications as developing nations take their places at the global table." (Al-Naimi 2009).

Issues of energy security are now at the centre of the revival of Arab-Asia trade. China and India are expected to contribute over 50 per cent of the world's new energy demand over the coming decades, catalysing geopolitical and economic reconfigurations, with twenty-first century energy security issues increasingly focused along this New Silk Road (IEA 2009). As we think about issues of energy security in Asia, it will be critical to understand the emerging external implications of Asia's growth in terms of both the opportunities and the risks. Three key issues can be identified.

Corporate social responsibility (CSR) in Asian multinational energy corporations: Asia now hosts some of the world's largest energy firms, increasingly focused outward in oil-rich countries in various regions across the world. With a large increase in outward Asian foreign direct investment (FDI) into the Arab region comes the risk of exacerbating pre-existing social and environmental issues. With a long history of lessons learned from the practices of Western energy firms, an opportunity now exists for a more preventive and proactive approach by Asian multinational corporations, to integrate concepts of environmental sustainability and human development into their outward investments. This seeks to build on the rapid emergence over the past several years of vibrant CSR platforms and dialogues within Asia, and expand such approaches to companies' activities abroad, to set Asia as a leader in socially and environmentally responsible investment. Priorities include support to ensure local employment generation for the large youth population in Arab countries, actions to assess and prevent environmental impacts and support new research into carbon capture and clean energy, and actions to address issues of human rights and labour rights.

South-South Cooperation to support the goal of diversifying local economies beyond oil exports: A major priority in Arab states is to support a diversification of national economies beyond oil exports. This is in response to the eventual decline of oil reserves during the twenty-first century and the need to further develop manufacturing and service sectors for future employment opportunities for the region's large and growing youth population. While national strategies and policies are in place, new South-South cooperation among Governments from Asia and Arab regions, alongside growing energy cooperation, can bring to bear the successful experiences of Asia in shifting from natural resource-export oriented economies to what is today a major force in global manufacturing and service sectors. China and India stand as cases on point; having shifted from natural resource dependent economies to what are today two of the most vibrant manufacturing and knowledge-driven economies in the world. A major opportunity now exists to

build on this reservoir of knowledge to bridge experiences in setting economic diversification policies and achieving results for the future.

South-South Cooperation for development and transfer of clean energy technologies: Alongside increased levels of Arab-Asia cooperation around the issue of energy security, an opportunity also exists to develop stronger ties around issues of clean energy development. Countries in Asia have made major progress over recent years in developing local capacities for the production and application of renewable energy and energy efficiency technologies, with steady reductions in the energy intensity of gross domestic product (GDP) growth witnessed across the region over the past decade. Meanwhile, countries in the Arab region are now placing heavy emphasis and large investments into research and development of such technologies. This is in response to the need to conserve declining oil resources for future export earnings, rather than its use for local power generation, while also bringing the benefits of reduced energy intensity of GDP growth and reduced per capita greenhouse gas emission levels. While national strategies and policies are in place in various Arab countries for expansion of clean energy use, new South-South cooperation can bring to bear the successful experiences of Asia in establishing enabling policy environments for local development of clean energy technologies and establishing public-private partnerships for their rapid commercialization in the domestic market.

Regards,

Kishan Khoday
Deputy Resident Representative
UNDP Saudi Arabia

About the contributor

Kishan Khoday served as UNDP Sustainable Development Advisor and Deputy Coordinator for Environment in Indonesia (1997-2005), UNDP Assistant Resident Representative and Team Leader for Energy & Environment in China (2005-2009), and currently as UNDP Deputy Resident Representative in Saudi Arabia. He may be contacted at kishan.khoday@undp.org.

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Khurshid Alam wrote:

Facilitator's note (Pak Sum Low): Khurshid Alam highlights the key conclusions of a case study conducted in Bangladesh in 2008 regarding gender, climate change and human security. These are: (1) Women are more vulnerable to climate-related impacts due to their limited ability to cope; (2) Women are facing more social, economic, political and informational barriers; (3) Women's contributions to non-farm activities and services in rural economy and growing urban informal sector are not recognized; (4) Food security, including intra-household food distribution, affected by climate change will "exacerbate pre-existing inequalities in the society, in which women's share of household food will most likely go down"; (5) "Women face more hurdles than men during the process of migration", both nationally and internationally, as a result of "disaster impact" and "unemployment"; (6) Women's key role in disaster risk reduction and adaptation has not been fully recognized and appreciated, and their participation in pre-and post-disaster planning and decision-making process has often been limited or denied; and (7) There is a need to learn from, and scale up, "micro-level good practices that promote women leadership in various activities, such as economic empowerment, disaster risk reduction and political empowerment".

It is hoped that the above important findings will further strengthen women's role in climate-related disaster risk reduction and adaptation, not only in Bangladesh, but also elsewhere, so as to enhance human security.

Dear Network Members,

Gender, climate change and human security in Bangladesh: Key policy lessons

These are the key conclusions of a bigger case study on Bangladesh conducted in 2008 for Women's Environment Development Organization (WEDO) based in USA. The paper was appeared first in WEDO publication *Gender, climate change and human security: Lessons from Bangladesh, Senegal and Ghana.*
Key policy lessons

1. *Poor women in Bangladesh are already experiencing some of the impacts of climate change:* They experience increasing frequency, intensity and impact of floods, cyclones, droughts and salinity intrusion. This changing nature of disasters has an impact on their current ability to cope. This is most likely to have far reaching consequences on their security, i.e., lives, livelihood, food and nutrition, physical and physiological protection against violence. Women from different backgrounds (i.e., economic, social, physical ability and marital status) face climate change impacts differently.

2. *Opportunities and barriers for women to cope with disasters today will play similar role in adapting to climate change:* These factors include: protection of their economic livelihoods, property ownership, access to services and justice, fair wage for women engaged in the informal sector, political participation in the decision making, access to information and protection against disasters with enhanced leadership. But these factors may not work in a similar way in the climate change context; thus the current policy approach to tackle these problems should be reviewed.

3. *Women's changing role in the society is overlooked in the climate change discussion:* Sectoral approach dominates this discussion. Being the single major source of livelihood, most studies on the climate change impact focus on agriculture. Emerging non-farm activities in rural economy (*) and growing urban informal sector are the areas largely under-researched. 'For example, during 1987-2000, women have increased their involvement in poultry, homestead gardening (significant contribution to household income) and non-farm services, but reduced their labour in crop cultivation. Women involvement in livestock, homestead gardening and cottage industry are significantly higher than that of men' (CPD 2001). Attention has not been paid to how the market led economy exacerbates the impact of climate change on women.

4. *Discussion on food security includes intra-household food distribution:* There has been a scientific consensus that food security at the household level will severely be affected by climate change. While food security has always been receiving highest political importance, the current way of addressing the problem may not work in the climate change context. For example, the decrease in national rice production due to disasters has been managed by the government through import of food from the rice exporting countries such as India, Thailand and Viet Nam who are equally facing the impact of climate change on their rice production.

Existing social capital in which poor households borrow money to purchase food will not be available when everyone is affected and affected more frequently and massively. This raises an important policy challenge. Such a problem will most likely exacerbate pre-existing inequalities in the society, in which women's share of household food will most likely go down.

5. *When migration is an adaptation:* Most types of migration are an important form of coping with disaster impact. Seasonal and permanent loss of employment and income is often addressed by migration by the rural poor households in Bangladesh. Almost two-fifth of the rural households send adult members to the nearest towns due to lack of year round employment (Afsar and Baker 1999). While disaster and unemployment play a 'push role', the job opportunities (e.g., ready-made garment, transport and construction sector) pull city-ward migration. Yet, more men than women migrate to the cities (Afsar 2003).

But migration, both national and international, has not been discussed as an adaptation measure in Bangladesh. The issue is complicated because of the fine boundary between migration and displacement. Women face more hurdles than men during the process of migration. Often, they do not have the right information.

The city-ward migration will continue to grow in the context of climate change. Around half of the poor migrants in the capital Dhaka had been agricultural labour. The key question that is overlooked is whether cities are prepared to host such an influx of people impacted by climate change. Migrants in Dhaka generally reside in the slums and squatters, without having any basic facilities. For example, a female slum resident must travel on average 69 meters daily, adding to her workload (Afsar 2003).

Most migrants, especially women, are engaged in the informal sector. Their informal employment is not regulated like formal employment. The urban poor people are also not part of the social safety net programme.

6. *Women are viewed as a vulnerable group rather than active agents in risk reduction and adaptation:* Women play a key role in protecting, managing and recovering their household during and after a disaster. They have knowledge and capacity to contribute towards adapting to the changing nature of disasters.

Over the years there has been a shift into the community's perception of the role of women. Evidence suggests that communities are now more ready to accept women leading their disaster risk reduction. Women are now involved in local disaster management committees formed within local government system. They also play a lead role in the NGO led disaster committees at local level. However, the unaddressed specific vulnerabilities of women (mentioned above) that form a barrier must be addressed before women can play a meaningful leadership role at the community level. As the role of these committees are limited in pre-and post-disaster decision-making, women's economic contribution continues to be an overlooked area in economic planning as well as disaster assessment. As a result they do not get a fair share from the post-disaster assistance.

7. *Good disaster risk reduction is the better adaptation that suffers limited scale up:* But most disaster risk reduction programmes are designed on previous disaster trend, not on the likely characteristic of disaster in the climate change context. A number of factors, i.e. lack of resources, knowledge to design concrete activities for adaptation, perception about uncertainty in climate change impact and capacity to focus long term issues (executive and legislative are busy with immediate priorities), limit the country's ability to facilitate such a policy shift.

There are micro-level good practices that promote women leadership in various activities, such as economic empowerment, disaster risk reduction and political empowerment. But there has been a lack of effort to learn from these activities and scale them up.

With best regards,

Khurshid Alam
Independent researcher on disaster and climate change
Managing Director, ThinkAhead Limited
Dhaka, Bangladesh

Note

(*) In 1995/96, the sector accounted for over one third of the country's GDP, which grew at 4.4 per cent per year during 1990s, currently contributing 40 per cent of the rural employment and half of rural household income (Planning Commission 2005).

About the contributor

With extensive experience in 25 countries in Africa, Europe and Asia, Khurshid Alam is an independent researcher and consultant on disaster and climate change. His work focuses on understanding how empowerment of people, social actions and better governance can solve the disaster and climate change problems. He has written widely on independent publications (including two books) and journals on global humanitarian policy, climate change adaptation, livelihood, humanitarian response and disaster risk reduction.

Khurshid Alam offers consultancy to government and non-governmental bodies including UN and international NGOs. He earned a Master's in anthropology from prestigious Jahangirnagar University in Bangladesh. Currently he lives in Dhaka, Bangladesh.

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Keith Openshaw wrote:

Facilitator's note (Pak Sum Low): Keith Openshaw highlights the issue of growing population, which must be tempered as "a priority" to address climate change. He points out that "there are limits to growth based on natural resources, especially fixed resources". Thus, instead of "promoting economic growth per se", the emphasis may be shifted "to the division of the existing wealth within and between countries and promoting the 'Gross National Happiness' (GNH) as is happening in Bhutan". He then discusses the importance of "the expanded use of 'traditional' biomass", a renewable and low-cost option for "low income" countries, but "its end-use and intermediate efficiency and use" still need to be improved, including the utilization of biomass or its products to generate electricity. He proposes a number of measures to ensure energy security and sustainable development. These include biomass both as a carbon sink and an energy source; expanded use of biomass energy efficiently and effectively, such as "better management of existing biomass resources, increased tree planting on all land use types, and improved intermediate and end-use efficiencies"; promotion of biomass "as a feedstock for other biofuels" and "for heat and power production"; improved management of natural resources, particularly forests and woodlands, by local people; "irrigation systems that limit the supply of water to the plants requirements"; and family planning that is supported by improved drinking water supply, medical services, and biomass production and use; among others. He concludes that "Without continual and concerted investment in people and products from renewable resources, especially biomass, the world will not be able to have sustainable development."

Dear Network Members,

Energy security and GHG sequestration based on renewable carbon fuels

I would like to concentrate on energy security, but this impinges on the other topics in this and other sub-themes.

Mukherjee (2010) highlighted how population pressure is affecting climate change and human development. The population forecasts for Asia and Oceania and the world for 2010, 2030 and 2050 are presented in Table 1.

Table 1. Population Projections for Asia/Oceania and the World-Medium Variant

Mid Year	World (W) (billions)	Asia/ Oceania (A/O)	A/O % W	India/China (I/C)	I/C % A/O
2010	6.909	4.203	61	2.568	61
2030	8.309	4.962	60	2.947	59
2050	9.150	5.282	58	3.031	57

Note: The population of Oceania is less than 1% of the Asia/Oceania population in all years.
Source: UN Population Division 2010.

Asia has the highest percentage of the world's population and China and India dominate the population of Asia. While it is forecast that the world's population will grow by 2.241 billion between now and 2050, that of Asia/Oceania (A/O) will grow by 1.079 of which China/India forecasted contribution is 0.463 billion, less than half of the A/O total. The largest cause of deforestation and land degradation is caused by clearing land for agriculture to meet the needs of the increased population and to grow cash crops to improve the standard of living. Therefore, tempering population increase must be given priority.

Most, if not all, governments promote economic growth as the principal way to increase the living standards of their population and to temper population increase. However, there are limits to growth based on natural resources, especially fixed resources. Several studies have been undertaken to estimate the carrying capacity for the population. It is estimated that between 4 and 5 billion people can be supported with a lifestyle of 'developed countries' (Cohen 1995). Median estimates of 14 assessments give a low estimate of 2.1 billion people and a high estimate of 5 billion (Richard 2002). However, two researchers estimated that based on Net Primary Production of Biomass (NPP) the range could be from 2 billion up to 14 billion (Richard 2002). This is shown in Table 2.

Table 2. Estimates of Socially Sustainable Human Carrying Capacity

Source	Estimated population (billion)		Basis of estimation	Assumptions
	Low	high		
Whittaker & Likens 1975[2]	2-3	5-7	NPP[1]	2-3 billion could be supported at a "more frugal European standard" if "steady-state systems of resource use and cycling established". 5-7 billion with most humans living as peasants.
Heilig[2] 1993	12	14	NPP[1]	Based on NPP for biophysical capacity, accounting for increased technology and "with ecological care and in the framework of an economically sound and socially-just development policy".
Median of 14 estimates	2.1	5.0		

Notes: (1) Net Primary Productivity (NPP) is defined as that part of the total or gross primary productivity of photosynthetic plants that remains after some of this material is used in the respiration of those plants. NPP provides the energy and material for life on earth. The world's total NPP is 172×10^9 dry tonnes/year. Equivalent to about 80×10^9 t/year carbon. (2) Cohen 1995.
Source: Extracted from Richard 2002.

Most development is based on the use of fossil fuels. However, only coal will be available in adequate quantities after 2050. But the present and increased use of fossil fuels could lead to serious climate changes that will adversely affect the world's population, especially in developing countries. Increased sea levels will affect low lying areas and small island countries and this, in turn, will affect low lying agriculture. Increased temperature will negatively affect grain production, especially of rice, although increased CO_2 may increase plant growth. Water supply may increase in some areas and decrease in others. All these facts could lead to massive migration and human conflict. Perhaps the emphasis should be shifted from promoting economic growth per se to the division of the existing wealth within and between countries and promoting the 'Gross National Happiness' (GNH) as it is happening in Bhutan!

Thus, in order to try and reduce the rate of atmospheric CO_2 increase, there has to be a shift away from the use of fossil fuels to an increased use of renewable energy. At present, most renewable energy development is based on electricity generation through the use of solar, wind and water power. Recently, there has been an upsurge of interest in the production of biofuels, particularly ethanol and biodiesel. However, there are some concerns about diverting maize to ethanol production and the cutting down of tropical forests to grow palm oil for biodiesel.

Little attention has been paid to the expanded use of 'traditional' biomass, even though about half the world's population cook with it (Openshaw 2010a). It is thought that cooking with fuelwood and charcoal is unsustainable, thus leading to deforestation. However, for developing countries as a whole, the annual growth of wood on all land formations including Asia and Oceania, is about 3-5 times the total annual use. It is clearing land for agriculture that is the principal cause of deforestation. Therefore, it is possible to use more wood provided that the resource is properly managed. For 'low income' countries of Asia and Oceania, including China and India, biomass accounts for about 30 per cent of *primary energy* demand for 85 per cent of the population (Openshaw 2010c). As about 80 per cent to 85 per cent of biomass energy is used in the house, principally for cooking, the number of households cooking with biomass may be more than 50 per cent. Of course, the aim should be to provide energy at the turn of a knob or the flick of a switch. Eventually this could be achieved with the products of biomass or using biomass to generate electricity. In the meantime one aim should be to improve and expand biomass supply and improve its end-use and intermediate efficiency and use.

Therefore, to try to ensure energy security, I would propose the following:

1. Emphasize that biomass is a legitimate and renewable fuel, especially 'traditional biomass'. Apart from household use, fuelwood, crop residues and, to a lesser extent, charcoal, are important (rural) industrial and service sector fuels. Biomass is a feedstock for electricity generation or heat/power co-generation. It is a feedstock for gaseous, liquid and solid fuels, which usually have a higher energy value. Also, plants are grown that produce plant oils or exudates, which can be used as fuels after processing. Many of these plants can be grown on marginal lands. The sale of biomass for energy purposes is an important source of revenue especially for rural people. An estimate of 30 million people can be employed in the production, transport and trade of biomass fuels (Openshaw 2010b). Therefore, it can be an important solution for poverty alleviation.

2. Determine areas where biomass use can be expanded and promote measures to do so.

3. Locate areas of biomass shortage and propose measures on the supply and demand side to make these areas sustainable. These include better management of existing biomass resources; increased tree planting on all land use types; and improved intermediate and end use efficiencies.

4. Reduce and eventually reverse deforestation, increase agricultural productivity at least in line with population increase. Trees can assist in this endeavour with shelterbelts, agro-forestry trees on arable and pastoral land etc. Wood ash, leaves, manure and biogas slurry can be used as fertilizers and soil enhancers.

5. Promote family planning as part of a rural initiative to improve drinking water supply, medical services, and biomass production (crops and trees etc.) and use. All too often, there is little coordination and cooperation from and between government ministries, donors, NGOs etc. regarding family planning. Women are usually the mainstay of village communities, yet their needs are often neglected. Thus, the provision of such a package of services should lead to improved health and productivity and the spacing of children. As a consequence, fewer, but healthier children will be born: this should eventually reduce the pressure on resources.

6. Promote irrigation systems that limit the supply of water to the plants requirements.

7. Promote improved efficiency in the intermediate and end-use of biomass. Countries should have biomass efficiency units. Formal industry usually has funds for innovation. Informal industry has little funds, yet the largest efficiency gains can be made in this sector. This is where help should be directed.

8. Biomass is a feedstock for other biofuels. Where required, help should be given to promote these fuels if economically

but not necessarily financially viable:

- *Gaseous fuels:* producer/water gas; biogas; syngas. This latter fuel is the feedstock for liquid fuels such as kerosene and petroleum.
- *Liquid fuels:* methanol (wood alcohol); ethanol; gelfuel; biodiesel; black liquor. Methanol can be the feedstock for organic chemical and octane, etc.
- *Solid fuels:* apart from charcoal, densified wood, briquetted biomass etc. can be produced.

9. Promote biomass for heat and power production. In many countries there has been an upsurge in power and co-generation power/heat plants using biomass as a substitute for fossil fuels or using biomass that otherwise would be wasted.

10. Promote biomass as a carbon sink and an energy source. Biomass is a convenient store of the sun's energy that can be used when required. Tree crops sequestrate atmospheric carbon and can help mitigate carbon dioxide accumulation from fossil fuels. In addition, using the annual growth for energy and other purposes as a substitute for fossil fuels and construction etc. will reduce carbon dioxide emissions. The optimum solution is use and sequestration, not just sequestration.

11. Involve local people in managing their surrounding natural resources, particularly forests and woodlands. They should help draw up management plans and benefit when forest products are used. They can be encouraged to establish private tree nurseries or given contracts to grow tree seedlings. They could be paid to protect watersheds and areas of wild habitat importance. They can be trained in improved tree management and shown various agro-forestry practices. Governments should see them as the solution rather than as a problem of deforestation and degradation.

Without continual and concerted investment in people and products from renewable resources, especially biomass, the world will not be able to have sustainable development. Developing countries already use considerable quantities of renewable energy. They could expand its use and show many highly industrialized nations a path to energy and ecological sustainability.

With best regards,

Keith Openshaw
Retired Forester and Economist

About the contributor

Keith Openshaw, now retired, has had a varied career working with donor and international agencies, governments, NGOs and private firms, in the field of natural resources, economics, renewable energy and the environment. He has lived in Africa and Asia for 17 years and worked in over 50 countries. For five years, he was head of the forest economics section at the University of Dar es Salaam (Morogoro Campus), now Sokoine University. He was a staff member at FAO and the World Bank and was a Senior Fellow at the Beijer Institute, now the Stockholm Environmental Institute. He was a member of the ALGAS (Asia Least-cost Greenhouse Gas Abatement Strategy) project team that documented GHG emissions for 11 Asian countries and proposed strategies for GHG mitigation. This was sponsored by UNDP/GEF and executed by the ADB. He has over 150 publications including one book and several book chapters and is a leading proponent of biomass energy.

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Shiming Ma wrote:

Facilitator's note (Bernarditas Muller): The contribution from Shiming Ma informs on an interesting case study conducted in Ningxia, an autonomous region in northwest China, "to investigate and evaluate the cost-benefit effectiveness of northward winter wheat as an adaptation option to climate change both in the field and in farmers' households". The case study used two scenarios of the Intergovernmental Panel on Climate Change (IPCC) to provide the bases of projections on the climate change context and yield trends for this particular food crop. The option is examined to adapt to favourable impacts of changing temperature conditions in order to increase cereal crop production in the region. The contributor concludes that "the results show that the multiple cropping of winter wheat and vegetable had the best economic benefits", although it entailed maximum costs. Under these conditions, therefore "winter wheat could not totally substitute the spring wheat". More work has to be undertaken, such as improvement in the quality of wheat seeds, adjustment in irrigation systems, as well as enhancing mechanization to sow the wheat on time.

Dear Network Members,

Cost-benefit analysis of northward winter wheat in Ningxia, China: Adaptation options and implications for food security (*)

Ningxia Hui Autonomous Region is the only Hui (Chinese Muslim) autonomous region in China. Ningxia is located in the middle reaches of the Yellow River in northwest China, and lies between north latitude 34°14-39°23 and east longitude 104°17-107°39, with the total area of 66 400 sq. km and with a population of 5.95 million in which the Hui nationality takes up over one-third of the population (Bureau of Statistics of Ningxia Hui Autonomous Region 2009).

Climate change has significant impacts on agriculture in Ningxia. As a mature agricultural technology, the northward winter wheat growing could utilize the favourable conditions of increased temperature and increase in total cereal crop production, which would enhance food security in the region. A case study was carried out to investigate and evaluate the cost-benefit effectiveness of northward winter wheat as an adaptation option to climate change both in the field and in farmers' households in Ningxia.

The investigations were made in three counties (namely Wuzhong, Yongning and Helan) in Ningxia and covered 50 small farmers' households. The inputs and outputs of the northward winter wheat growing were recorded in 2007-2008. As a baseline, the characteristics of the temperature changes during the growing period of winter wheat were analysed. The climate change context and the yield trends of wheat during 2022-2050 under climate change scenarios were estimated. Based on the above analysis, adaptation strategies for the further development of the northward winter wheat were recommended.

According to the observed temperature data of 1961-2004 at eleven stations in North Ningxia, the temperature conditions were ready for the northward winter wheat growing. The mean temperatures both in winter and in spring have gradually increased. The mean temperature in winter significantly increased after 1978. The gradual rise of

the average minimum temperature both in winter (December, January and February) and in January provided the prerequisite for the safe overwintering of the winter wheat in North Ningxia.

The temperature trends during growing period of wheat from 2022 to 2050 under A2 and B2 scenarios were also analysed (**). The winter mean temperature is projected to gradually increase, and the trend is projected to be more significant after 2035. The fluctuation of the mean temperature in spring is projected to rise, and then fall after 2043-2045 according to the scenario results. The results of moving t-test are in accordance with the above projections. The sudden change in temperature to minus value under B2 scenario was more significant than that under A2 scenario. The number of days of average maximum temperature above 32 °C with 3 days in succession was compared. The frequency of occurrence of high temperature under B2 scenario is projected to be higher than that under A2 scenario.

The wheat yields during 2022-2050 were simulated by using CERES-Wheat model, which has been specially developed for wheat yield simulation. The yields of both winter and spring wheats are projected to decrease under A2 and B2 scenarios, while the yield of winter wheat is projected to increase slightly in the 2040s under B2 scenario, possibly related to the temperature trends of winter and spring.

The results show that the multiple cropping of winter wheat and vegetable had the best economic benefits, but with maximum cost. The winter wheat could not totally substitute the spring wheat even with the best economic benefit.

The inter-decadal trend of economic benefit of three planting patterns during 2021-2050 was analysed. The Net Present Values (NPVs) of the multiple cropping of winter wheat and vegetable were the highest among all of the cropping patterns.

To further develop and enhance the adaptive effects of the growing of northward winter wheat, it is necessary to improve the seeds quality of winter wheat for planting in the region, adjust the irrigation systems for new cropping systems, and enhance mechanization for sowing the winter wheat on time.

With best regards,

Prof. Dr. Shiming Ma
Institute for Environment and Sustainable Development in Agriculture (IEDA)
Chinese Academy of Agricultural Sciences (CAAS)
Beijing

Notes

(*) This is a short summary of a case study which Ms. Yaqiong Wang and I are working on.
(**) The IPCC published a new set of scenarios in 2000 for use in the Third Assessment Report (Special Report on Emissions Scenarios-SRES). The SRES scenarios were constructed to explore future developments in the global environment with special reference to the production of greenhouse gases and aerosol precursor emissions. A2 *storyline and scenario family:* a very heterogeneous world with continuously increasing global population and regionally oriented economic growth that is more fragmented and slower than in other storylines. *B2 storyline and scenario family:* a world in which the emphasis is on local solutions to economic, social, and environmental sustainability, with continuously increasing population (lower than A2) and intermediate economic development.

About the contributor

Since 2002 Dr. Shiming Ma has been Professor at the Institute of Environment and Sustainable Development in Agriculture (IEDA), Chinese Academy of Agricultural Sciences (CAAS). He received his PhD in Agricultural Science from the Department of Agronomy and Ecological Security, Institute of Crop Cultivation and Breeding, Justus-Liebig-University Giessen, Germany, in 2001. Between January 1982 and December 2001, he was a Lecturer, and then Associate Professor at the Department of Agronomy, Ningxia Agricultural College, Ningxia, China. His areas of interest and work are climate change impacts and adaptation on agriculture, and nutrients cycling in ecological system.

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Abdul Qadir Rafiq wrote:

Facilitator's note (Pak Sum Low): Abdul Qadir Rafiq highlights that the threats of climate change "are increasing the vulnerability of the poorest segments of the Pakistan's society and imperil human security with reduction in food supplies, water stresses, unreliable access to the sources of energy and diminishing livelihoods at the local level". In particular, he describes how the adverse effects of climate change affect the livelihoods and the security of the communities in the coastal, arid and mountainous regions, which are facing different aspects of climate-related risks unique to the regions. He stresses that local "short and medium term coping strategies that address the human security issues" are needed, while fully recognizing "the unequal impact on men and women". As "rural women are the principal contributors of basic foods, and the agricultural sector is highly susceptible to risks of drought and uncertain precipitation", any impact on "food security" would threaten women's well-being and their capacity to survive".

Dear Network Members,

Ensuring human security of vulnerable communities through local coping strategies

Human beings have traditionally adapted to changes in environment, including climate change and climate variability, and therefore to realigning means for living and livelihoods, often referred to as coping strategies. However, such changes to a large extent were evolutionary and required gradual adaptation. Consequently social systems were able to draw upon their intrinsic resilience and allow for changes in environmental conditions. Climate change as we understand it today is different; changes are proving to be rapid, more intense and randomly frequent. Thus, poor people face higher and more complex risks which negatively impact their lives.

The adverse impacts of climate change are most striking in the developing nations, including Pakistan. This is because of their geographical and climatic conditions, high dependence on natural resources, and lack of capacities to adapt to a changing climate. The most important climate change related threats to Pakistan are:

- Increased variability of monsoon;
- Rapid recession of Hindu Kush-Karakoram-Himalayan glaciers with reduction in water inflows to the Indus river system;
- Increased incidence of droughts and floods (including Glacial Lakes Outburst Floods-GLOFs);
- Water stress and heat waves in arid regions of the country;
- Sea water intrusion and increased cyclonic activity.

These threats are increasing the vulnerability of the poorest segments of the Pakistan's society and imperil human security with reduction in food supplies, water stresses, unreliable access to the sources of energy and diminishing livelihoods at the local level. Recent climatic events in different parts of the country have shown that population living in extremely fragile areas have the least capacity to cope with the climate change incidences and are most vulnerable to the associated risks. These areas cover the coastal region, arid region and the mountain region. Incidentally, the communities living in these areas are also most disadvantaged and vulnerable to the impacts of climate change. The major short to medium climate change driven factors ultimately undermining human security of these vulnerable community groups are:

Communities of the Coastal Region: The livelihoods of coastal communities of Sindh and Balochistan (the two southern provinces of the country) are dependent on marine resources. These communities are already under stress because of lack of availability of fresh water that has been contaminated by sea water intrusion. Increased frequency of cyclonic activity is giving rise to loss of livelihoods leading to population displacement towards urban centres. The damage to infrastructure due to the extreme events also limits the timely access to the health facilities, damages the local education facilities and further limits the availability of safe water.

Communities of the Arid Region: The arid region of Pakistan is home to the communities of sedentary as well as migratory herders. These communities maintain livestock that feed on the rangelands and are traded as their main source of livelihood. During the drought years livestock of the herders die in large numbers because of water stress and depletion of grazing lands. It takes years for these communities to come back from such losses. Local conflicts also arise between the farmers (in irrigated agricultural areas) and the herders who move to the farm lands in search of food and water. The revival of the arid ecosystem after prolonged drought is slow and sometimes irreversible that puts extra stress on the dependent communities.

Communities of the Mountain Region: Climate change is having major impacts on the communities living in the mountain regions of the country. The mountain ecosystems are most fragile. Heavy rainfalls, snow storms and Glacial Lakes Outburst Floods (GLOFs) result in land/mud slides, erosion of the productive top soil and loss of lives. Mountain communities also have peculiar population dynamics in Pakistan. Most of the earning men working in urban areas of down country leave behind women, elderly and children. In such situations women act as the head of the family and undertake all the chores from house keeping to agriculture and domestic animals rearing. Therefore, in the event of any climatic disaster, women of these areas are the one who are hit most. The rising GLOF factor has shown that the loss of land due to floods and mud slides will take years to recover. Women who were dependent on these lands cannot resettle over a short time. Many of the community members who get physically hit by floods do not get medical help and can end up in agony for life.

It is important and urgent to come up with "local" short and medium term coping strategies that address the human security issues. While doing so the unequal impact on men and women must be fully recognized. For example, rural women are the principal contributors of basic foods, and the agricultural sector is highly susceptible to risks of drought and uncertain precipitation. This means that climate change endangers food security as well as women's well-being and their capacity to survive.

With best regards,

Abdul Qadir Rafiq
Programme Specialist/Officer-in-Charge
Environment and Energy Unit
UNDP Pakistan

About the contributor

Abdul Qadir Rafiq, Programme Specialist and Officer-in-Charge for Environment and Energy Cluster in UNDP-Pakistan, has worked in the last 12 years with the UNDP Country Office. His key areas of focus have been environment, energy and climate change. UNDP-Pakistan has been supporting the national partners in climate change negotiations and preparation of the recently launched report of a national task force on climate change. Currently, the Country Office is assisting in the preparation of national policy and action plan on climate change.

4. Closing Message

Dear Network Members,

The discussion of sub-theme 4 on *Human Security (including food and nutrition, and energy security) and Human Rights* has now been successfully completed. The sub-theme has attracted 12 contributions from 13 authors: Ulrik Halsteen, Ranjani K. Murthy, Sribas Chandra Bhattacharya, Susan Wong, Ohnmar Khaing, Usha Natarajan and Kishan Khoday (joint contribution), Manoja Wickramarathne, Kishan Khoday, Khurshid Alam, Keith Openshaw, Shiming Ma and Abdul Qadir Rafiq, respectively. We would like to thank them for their informative, interesting and perceptive contributions.

The contributions covered the implications of the adverse effects of climate change on human security, and the issues covered range from human rights, energy security, food security, livelihoods, gender, population, disaster risk reduction, mitigation, adaptation, to wetland ecosystems. While some contributions focused on a single and unique issue, others touched upon multiple issues. Case studies, examples or experiences from Bangladesh, China, India,

Myanmar, Pakistan and the Pacific Islands, have been shared. A number of specific response measures, at both policy and operational levels, on all the issues discussed have been proposed.

Ulrik Halsteen set the scene by highlighting that the concept of "human security" "encompasses not only the absence of conflict but also the effective protection and enjoyment of human rights, including access to education and adequate food, housing and health care". In particular, he stressed that "policies and measures" are required to protect the "well-being of the most vulnerable communities", such as "indigenous peoples", "women, older persons and persons with disabilities". Both national and international human rights laws have provided "important safeguards and guidelines for the protection of affected individuals and communities".

On the same issue on human rights, **Usha Natarajan and Kishan Khoday** highlighted that a "stable climate is an essential underlying element of the right to development". They regarded melting of glaciers in the Himalayas, which "provide food and water security for hundreds of millions of people in the region" as one of the "most prominent and serious challenges", especially the glaciers in the Tibetan Plateau, where many of Asia's great rivers originate (e.g., Yangtze, Yellow, Mekong and Brahmaputra rivers). They have expanded Amartya Sen's "Development as a Freedom" model to a "Sustainable Development as a Freedom" model, and added "ecological security" as the sixth freedom in addition to the "five freedoms outlined in the original framework".

Three contributions focused on energy security. **Sribas Chandra Bhattacharya** highlighted that huge investments and "unprecedented coordinated efforts by the global community" to "develop clean and energy efficient technologies" and "alternative energy sources" will be needed. He concluded that by mid-2100, "rapid changes and developments are expected to take place in energy supply as well as end-use technologies in all the sectors of the economy", and coping pace with these changes, "attracting necessary investments, involving the private sector, facilitating technology transfer etc. will present great challenges and opportunities" for the countries in the Asia-Pacific region to ensure their energy security "in the years to come". **Keith Openshaw** emphasized the importance of utilizing "traditional" biomass energy, which is renewable and low cost. He proposed a number of measures to ensure energy security and sustainable development, including the expanded use of biomass energy efficiently and effectively, and family planning that is supported by improved drinking water and medical services and biomass production; among others. He concluded that "Without continual and concerted investment in people and products from renewable resources, especially biomass, the world will not be able to have sustainable development." **Kishan Khoday** discussed the external implications of Asia's quest for energy security as a result of economic growth, particularly in the Arab region. He identified three key areas where opportunities exist for Asia-Arab (South-South) cooperation: (1) promotion of socially and environmentally responsible investments; (2) diversification of oil-dependent economies by shifting to global manufacturing and service sectors; and (3) establishment of enabling policy environments for local development of clean energy technologies, including public-private partnerships for their rapid commercialization in the domestic market.

Three contributions discussed food security. **Ohnmar Khaing** described how the reduced rainfall and the lack of water in the dry zone of Myanmar in recent years has led to the significant decline in crop yields and livestock production, and hence the food insecurity. These have also affected the farmers' incomes, livelihoods and social dynamics (e.g., migration and out-migration), especially the vulnerability of women. She suggested a few possible "climate-proofing" measures, and stressed the important role of non-governmental organizations in sharing experiences and knowledge on adaptation and mitigation measures. **Manoja Wickramarathne** highlighted the challenges that the Pacific islands are facing as a result of "ocean warming, frequent tropical cyclones, flash floods and droughts", "prolonged variations from the normal rainfall", sea-level rise, ocean acidity and coral bleaching, all of which "are likely to have dramatic impact on the food production system", including agriculture, fisheries, forests (a source of traditional medicines), and water resources, and hence these will have profound implications for "the people's food and economic security". She emphasized the need for "accurate information" relating to "the economic impacts of future climatic conditions"; strengthening of "enabling environment" for adaptation measures and their implementation, especially within the context of multiple stresses; and capacity development for decision makers and the public. **Shiming Ma** informed on an interesting case study conducted in Ningxia, northwest China, "to investigate and evaluate the cost-benefit effectiveness of northward winter wheat as an adaptation option to climate change both in the field and in farmers' households". The case study, which has implications for food security, used two IPCC scenarios to project yield trends for this particular food crop. The results "show that the multiple cropping of winter wheat and vegetable had the best economic benefits", although it entailed maximum costs. Thus, "winter wheat could not totally substitute for spring wheat". However, further research is needed.

Two contributions specifically focused on women issues. **Ranjani K. Murthy** drew our attention in India to "how different groups of women and men are affected differently" by climate change "based on caste, class, pregnancy status, marital status and other aspects of identity and diversity". She cited a few examples of "pre-existing gender inequities" in social relations and development, including the extreme vulnerability of "dalit and tribal women" to "sexual exploitation in times of economic crisis following floods"; high "female illiteracy levels" means that they are unaware of any "early warning on floods and cyclones (especially through newspapers)"; among others. Thus, both government and donor policies have to be "sensitive to sex/gender differentiated human security needs and human rights interests of women and men in the context of climate change", and that the "diversity in needs and interests across marital status, economic status, caste, and pregnancy/lactation status etc. of women" must be recognized in policy and practice. On the other hand, **Khurshid Alam** highlighted that in Bangladesh, women are more vulnerable to climate-related impacts due to their limited ability to cope, and they are facing more social, economic, political, informational and migration barriers. He added that food security, including intra-household food distribution, affected by climate change will "exacerbate pre-existing inequalities in the society, in which women's share of household food will most likely go down". In addition, women's key role in disaster risk reduction and adaptation has not been fully recognized and appreciated, and their participation in pre-and post-disaster planning and decision-making process has often been limited or denied. There is a need to learn from, and scale up, "micro-level good practices that promote women leadership in various activities, such as economic empowerment, disaster risk reduction and political empowerment". The contributions from **Ulrik Halsteen, Ohnmar Khaing and Abdul Qadir Rafiq** also touched upon women issues, though not as the main focus.

One contribution (**Susan Wong**) stressed the importance of wetland ecosystems for human well-being and future security. These include provision of various important "goods and services", including the opportunities "for improving people's livelihoods, particularly for wetland-dependent, marginalized and vulnerable people""; and as the "the planet's natural infrastructure for addressing climate change". Thus, a "healthy natural wetland infrastructure" is not only "a major asset in combating and adapting to climate change", but also essential in ensuring the preservation and enhancement of indigenous communities' livelihoods, cultures and traditional knowledge.

The last contribution came from **Abdul Qadir Rafiq**, who highlighted many challenging issues experienced in Pakistan, especially the vulnerable communities in the coastal, arid and mountainous regions, where the threats of climate change "are increasing the vulnerability of the poorest segments of the Pakistan's society and imperil human security with reduction in food supplies, water stresses, unreliable access to the sources of energy and diminishing livelihoods at the local level". He stressed the need for local "short and medium term coping strategies that address the human security issues", while fully recognizing "the unequal impact on men and women". As "rural women are the principal contributor of basic foods, and the agricultural sector is highly susceptible to risks of drought and uncertain precipitation", any impacts on "food security" would threaten their well-being and capacity to survive.

A number of interesting observations have surfaced from the contributions. For example, **Usha Natarajan and Kishan Khoday** have expanded Amartya Sen's "*Development as a Freedom*" model to a "*Sustainable Development as a Freedom*" model, and highlighted the importance of "ecological security". This is very much along the same thinking of my opening message dated 19 April 2010, in which I pointed out that "*While every country has its right to development, it is important to emphasize that countries should aim for sustainable development, i.e., the "good" development that integrates environmental, social and economic development as an entity rather than the "bad" development that pursues economic development at all costs (including environmental and social costs) without taking environmental and social parameters into consideration*". **Keith Openshaw** raised the issue of "limits to growth", and cited Bhutan's 'Gross National Happiness' (GNH) as a model for sustainable development. Indeed, what makes people happy has been a focus of discussion in recent years by many social scientists. **Susan Wong** noted that the destruction of ecosystems is likely to cause the loss of "both the human repositories for traditional knowledge along with generations of that priceless knowledge" of the indigenous communities through the loss of their livelihoods, "food security and sovereignty".

Other human security issues relating to climate change include climate refugees and conflicts over scarce resources. These are important issues that are expected to feature more prominently in the near future. However, they have not been discussed in the contributions.

With best wishes,

Pak Sum Low
AP-HDNet Facilitator

Sub-theme 5

Mitigation, Technology Transfer and Financing

1. Opening Message

Dear Network Members,

Mitigation, technology transfer and financing, together with the main subject of our previous discussions, adaptation, make up the four main building blocks of the Bali Action Plan (BAP), the process currently being negotiated under the UN Framework Convention on Climate Change (the Convention), to which all countries in the Asia-Pacific region are Parties. All of these areas are subject to contentious negotiations. These four elements also make up the obligations of all Parties to the Convention, in accordance with its principles and provisions. A brief overview of the main points of these elements would provide the scope of the discussions under this sub-theme, and clarify the context under which almost all countries in the region are considering their mitigation actions.

The overarching principle governing the Convention is that of common but differentiated responsibilities that permeates each and every provision of the Convention, and determines in which context the main elements of mitigation, technology transfer and financing are discussed. The provision is found in Article 3.1 of the Convention, and is taken from Principle 7 of the Rio Principles of 1992 (UN 1992a) that explicitly lays it out as follows: *States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit to sustainable development in view of the pressure their societies place on the global environment and of the technologies and financial resources they command.*

On mitigation

- It is essential to keep in mind that in the light of the scientific assessment of the origins of climate change, there are differentiated responsibilities under the Convention. Developed countries "commit themselves specifically" to "adopt national policies and take corresponding measures on the mitigation of climate change" (Article 4.2 a). These commitments were subsequently turned into targets for developed countries in the Kyoto Protocol to the Convention, in the form of quantified emission limitation and reduction commitments.

- All Parties, including all developing countries, have the obligation to "formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change", as well as to facilitate adequate adaptation (Article 4.1 b). There are specific provisions related to the reporting, the content of the reporting, and the consideration of the national communications of Parties covering this obligation.

- While both have obligations to undertake mitigation and adaptation measures, only developed countries have commitments to mitigate. Developing countries have no such commitments but must take measures to allow them to mitigate and to adapt.

- Financing for mitigation includes all the enabling means that would allow developing countries to reduce, control or prevent emissions. These are: scientific, technological, technical, socio-economic and legal cooperation; research, systematic observation and development of data archives; as well as education, training and public awareness-raising, among others.

On financing

- The developed country Parties have the obligation to "provide new and additional financial resources" to developing country Parties "including for the transfer of technology" (Article 4.3) through the financial mechanism of the Convention.

- They also have the obligation to "assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects." (Article 4.4). A definition of particularly vulnerable circumstances of countries is contained in paragraph 19 of the Preamble to the Convention, and covers all of the vulnerable situations of developing countries.

- Financing, both for mitigation and adaptation, is therefore a commitment of developed countries to developing countries. It is not development assistance, not voluntary contributions, nor aid.

- A financial mechanism is defined in the Convention, to "function under the guidance of and be accountable to the Conference of the Parties", and which "shall have an equitable and balanced representation of all Parties within a transparent system of governance." (Article 11). One or more operating entities can be entrusted with the operation of the financial mechanism. The Global Environment Facility (GEF) is currently an operating entity of the financial mechanism. The GEF operates through 3 main implementing agencies, namely, the International Bank for Reconstruction and Development (World Bank), the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP).

- Financing can also voluntarily be channeled through "bilateral, regional and other multilateral channels." (Article 11.5). These channels have been the main channels of financing for climate change activities. However, since they are not under the governance of the Parties, they are not obliged to follow the guidance on policies, programme priorities and eligibility criteria for funding that are given in the decisions of the Parties. This has resulted in problems arising from conditions placed by these institutions that are not necessarily compatible with the objective of the Convention, and the difficulty of determining whether this financing is taken away from development assistance that does not address climate change in particular, such as budgetary support. The same problems arise with the GEF that is equally under another governance, that of the GEF Council, although it does report regularly to the Parties.

- Financing for the preparation of national communications is at agreed full costs basis. National communications are fundamental to taking measures leading to mitigation and adaptation actions. They consist of inventories of sources and sinks of emissions, vulnerability assessments, technical and financial barriers to implementation, and other circumstances that would allow all countries to meet their obligations under the Convention.

- All other financing is at the agreed full incremental costs basis. What this means at national level and in the light of concrete experience would be an interesting part of the discussions under this sub-theme.

On transfer of technology

- Developed country Parties have the obligation to "promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how" particularly to developing country Parties "to enable them to implement the provisions of the Convention." (Article 4.5) Therefore, transfer of technology, like financing, covers both adaptation and mitigation.

- It is important to note that under this provision, support should be given to "the development and enhancement of endogenous capacities and technologies of developing country Parties." In the light of the lack of any effective transfer of technology that has taken place under the Convention, despite the annual decisions taken by the Parties on the subject and the numerous workshops and seminars that have been held, many developing countries have reported that they have undertaken mitigation measures of their own using their own resources and technologies. Contributions might wish to explore these endogenous practices on mitigation.

- The Convention, and Conference of the Parties (COP) decisions, provide for cooperation in the whole spectrum of the "development, application and diffusion, including transfer of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases … in all relevant sectors, including the energy, transport, industry, agriculture, forestry, and waste management sectors." (Article 4.1 c).

The key to the balance of common but differentiated responsibilities, which clearly lays out the linkages of these three elements of this sub-theme, is found in Article 4.7 of the Convention which states that: *"The extent to which developing country Parties will effectively implement their commitments under the Convention will depend on the effective implementation by developed country Parties of their commitments under the Convention related to financial resources and transfer of technology and will take fully into account that economic and social development and poverty eradication are the first and overriding priorities of the development country Parties."*

Contributions on specific country experiences on mitigation, technology transfer and financing, lessons learned that can be shared, and reflections on further areas of concrete action that can be taken given the difficulties in implementation, would greatly enhance our discussions. Innovative ideas that could allow equitable sharing of the remaining environmental and developmental space to address climate change are very much welcome.

I am looking forward to a very interesting exchange under this sub-theme.

With best wishes,

Bernarditas Muller
AP-HDNet Facilitator

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2. Contributions

The following authors, with their respective contributions, helped to enrich the discussion on the sub-theme *Mitigation, Technology Transfer and Financing:*

Massimo Tavoni, *The role of technology innovation in achieving climate stabilization*
K. Madhava Sarma, *Technology transfer mechanism for climate change*
Lu Qi, *Desertification and its mitigation strategy in China: Implications for climate change mitigation*
Gørild Heggelund, Andrea De Angelis, and Inga Fritzen Buan, *The role of technology in China's low-carbon future*
Kishan Khoday, *Trade and climate change*
Pak Sum Low, *From Second Lagos State Summit on Climate Change 2010 to global inequality in consumption*
Keith Openshaw, *Population growth, resource use and climate change mitigation*
Yang Youlin, *Climate change and desertification: The significance of mitigation policies*
Thanakvaro De Lopez, *Anaerobic digesters for swine farms: An experience of technology transfer for greenhouse gas mitigation in Cambodia*
Sarwat Chowdhury, *Capacity building for mitigation, technology transfer and financing: Highlighting the least developed countries perspective*

3. Online Discussion

Massimo Tavoni wrote:
Facilitator's note (Bernarditas Muller): Massimo Tavoni focuses on the crucial role of technological progress, in particular research and development (R&D) for innovation, in achieving the stabilization of greenhouse gas (GHG) concentrations in the atmosphere to address climate change. Such progress would require "increase in, and reallocation of, the financial resources channeled into energy-related R&D", extending to demonstration, deployment and diffusion of technology. This would reduce costs of available technologies, expand the pool of existing ones, and enhance their mitigation potential. However, in the light of the decline in energy-related expenditures, other measures could be explored that may include carbon pricing and R&D-specific policies, although these alone would not be sufficient. The contributor concludes that "R&D focusing on major technological breakthroughs could significantly reduce future mitigation costs and would give a far greater role to induced technological change in containing such costs". Moreover, external costs of GHG emissions should be internalized into traditional technologies to stimulate "sustained increase in R&D investment needed to develop advanced technologies", to overcome market penetration time lags, and to obtain more cost-effective responses to fossil fuel-based energy production.

Dear Network Members,

The role of technology innovation in achieving climate stabilization (*)

Any policy framework to address climate change would not be effective unless it manages to foster substantial research and development (R&D), innovation and diffusion of low carbon technologies. Technological progress will be needed both to reduce the cost of available technologies which in many key emitting areas remains significantly more expensive than the fossil fuel-based technologies they could potentially displace, and to expand the pool of available technologies and their mitigation potential (Anderson 2006; IEA 2008). Given the many constraints that separate us from a low carbon energy system, a broad portfolio of technological options will probably have to be involved in mitigating climate change (see for example Pacala and Socolow 2004).

Speeding up the emergence and deployment of low carbon technologies will ultimately require increase in, and reallocation of, the financial resources channeled into energy-related R&D, at all stages of the development process, from R&D upstream to demonstration, deployment, and ultimately diffusion.

This is important because empirical evidence suggests that most emerging low carbon energy technologies are subject to sizeable "learning effects". Thus, significant technology deployment costs may have to be incurred before low carbon technologies can become competitive at market prices.

However, energy-related R&D expenditure across the developed countries has declined dramatically since its peak in the early 1980s, and its share in overall private R&D spending is low compared with other sectors. Various types of public policies may correct this and influence the rate and direction of technological change, including carbon pricing, R&D policies and subsidies to the deployment of existing technologies.

Results from integrated assessment models (Bosetti *et al.* 2010) indicate that carbon pricing has sizeable effects on R&D and technology deployment, but that additional benefits can be achieved by means of R&D specific policies. However, one should note that R&D policies alone would not suffice to achieve any target of climate stabilization.

Findings also indicate that in the absence of major technological breakthroughs, induced technological change associated with higher R&D investment and technology deployment may have only modest effects on policy costs, especially under less stringent GHG concentration stabilisation objectives. By contrast, R&D focusing on major technological breakthroughs could significantly reduce future mitigation costs and would give a far greater role to induced technological change in containing such costs. However, lower long-term mitigation costs come at the price of higher medium-run costs. This reflects the large and sustained increase in R&D investment needed to develop advanced technologies, the lags required for any breakthrough technologies to penetrate the market and, more fundamentally, the difficulty of out-performing fossil fuel-based energy production if the external costs of GHG emissions are not priced into traditional technologies.

With best regards,

Massimo Tavoni
Senior Researcher, Fondazione Eni Enrico Mattei
Research Associate, Princeton University

Note

(*) This note is based on the following papers:

Bosetti, Valentina, Carlo Carraro, Romain Duval, and Massimo Tavoni. 2009. *What should we expect from innovation? A model-based assessment of the environmental and mitigation cost implications of climate-related R&D*. FEEM working paper 2010.042. Milano: Fondazione Eni Enrico Mattei.

Bosetti, Valentina, Carlo Carraro, Romain Duval, Alessandra Sgobbi, and Massimo Tavoni. 2009. *The role of R&D and technology diffusion in climate change mitigation: New perspectives using the WITCH model.* OECD Economics Department Working Papers No. 664. Paris: OECD.

About the contributor

Massimo Tavoni is senior researcher at the Fondazione Eni Enrico Mattei (FEEM), Milano, Italy and research associate at the Princeton Environmental Institute, Princeton, USA. His research is about energy and climate economics. He focuses on the evaluation of international climate mitigation policies, with a focus on technological evolution and uncertainty, and the role of tropical deforestation. He is also interested in the relation between consumption and environment, especially in countries in economic transition.

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Pacala, S., and R. Socolow. 2004. "Stabilization wedges: Solving the climate problem for the next 50 years with current technologies". *Science* 305 (5686): 968-972.

K. Madhava Sarma wrote:

Facilitator's note (Bernarditas Muller): In this important contribution, K. Madhava Sarma shares his wide experience on technology transfer as implemented under the Montreal Protocol on the phase-out of ozone-depleting substances. He starts by defining the different types of transfer, such as goods and equipment, skills for operation and maintenance, and knowledge for effecting technological change. He then identifies barriers to effective technology transfer to developing countries, including the lack of resources and capacity for implementation, high costs and inappropriate technologies, and problems of international financing due to requirements of the suppliers of technologies. K.M. Sarma points out, however, that in practice "fewer problems were encountered" "than were put forth in theory". He also correctly observes that technology transfer in the climate change context might be more complex, due to the need for government regulation to encourage the development of technology. The protection given to the technology producer "that has benefited from public funding at the development stage" has resulted in a bias against transfer of technology to developing countries. The contributor ends by citing the need for a technology transfer mechanism and listing areas where the Montreal Protocol model could provide positive lessons for transfer of technology in climate change.

Dear Network Members,

Technology transfer mechanism for climate change

What is technology transfer?

There are essentially three different flows that make up the technology transfer process:

1. Capital goods and equipment
2. Skills and know-how for operating and maintaining equipment
3. Knowledge and expertise for generating and managing technological change

Barriers to technology transfer

The barriers have been identified by many scholars and have been confirmed recently by a study on the technology transfer in the Montreal Protocol and its lessons to the climate protection (Andersen *et al.* 2007). These include lack of resources; poor infrastructure and utilities; inadequate/poorly implemented laws and regulations; shortage of trained technical and managerial personnel; cumbersome government and banking agencies; weak local supporting industry; high cost of certain technology agreements and inappropriateness of technology transferred; overall political and macroeconomic instability in some countries; problems at the international implementing and financing agency level due to unnecessary procedures and problems created by suppliers of equipment.

What is notable, however, is that fewer problems were encountered in practice than were put forth in theory, and they rarely created barriers to phase out of ozone-depleting substances under the Montreal Protocol. Intellectual property protection rules kept some countries from using specific process technologies to manufacture particular alternatives to ozone-depleting substances. In two cases where intellectual property considerations constituted significant barriers to technology transfer, developing country enterprises developed their own processes to avoid paying licensing fees or accepting conditions they considered to be unacceptable.

This issue may be more complicated for climate change. The economics of renewable energy often requires government regulation if the technology is to be developed (e.g., a feed-in law requiring that a portion of the electricity on a grid be supplied from renewable sources). Developed country governments are likely to seek to ensure that national manufacturers are favoured in the process of licensing technology that has benefited from public funding at the development stage. This builds a bias against developing nations. It is possible to eliminate this bias if developed countries will agree to forego their national favouritism in licensing publicly funded inventions, at least with respect to technologies of global environmental importance. This would be similar to the "humanitarian clauses" being considered in the medical and nutritional areas. It would be far better to go even further-for developed countries to commit themselves to devote a portion of their technology development to the special needs of developing countries, and to ensure that developing country firms have the opportunity to participate in the efforts.

Need for an active Technology Transfer Mechanism (TTM)

The present mechanisms are diffused, without coordination and directionless without goals (GEF, World Bank, Regional Multilateral Banks, many UN organizations, many bilateral aid organizations, non-governmental organizations etc.). The Conferences of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) have not been successful over the past fifteen years in agreeing on the basic parameters of the TTM or in coordinating these many sources of finance for technology transfer. There is an urgent need to have a working TTM for the climate treaties. What are its elements?

(a) A prior agreement on costs that will be met by the TTM: An 'indicative list of incremental costs' in line with that approved by the Parties to the Montreal Protocol when they approved their financial mechanism in 1990 is needed for the climate agreements. Will they be grants or loans? What terms? On the "Montreal Protocol Pattern" these could be for:

- **Institutional strengthening:** A country focal point for climate change is essential to develop and implement country programmes in developing countries.
- **Networks for knowledge sharing:** Networks of such focal points would promote exchange of knowledge and experience, mutual assistance, and competitive spirit to achieve the goals.
- **Preparation of country programmes:** Country programmes prepared by the countries themselves, setting short-and long-term specific voluntary goals tailored to individual countries, is an essential ingredient for success. The periodical replenishment of funds to the TTM can be calculated only if such goals are set.
- **Awareness and training of decision makers**
- **Establishment of appropriate regulations and policies:** Countries could formulate regulations and policies for regulation of energy markets, environmental regulations, energy efficiency standards, and energy and emission taxes etc.
- **Licensing fees of alternative technologies:** The technologies in public domain or in an oligopoly situation will cost only reasonable resources. Technologies owned by only a few companies, protected by intellectual

property rights (IPR) and owners either unwilling to transfer their technologies at any cost or put a large cost and unreasonable conditions for transfer, will pose greater problems. Some relaxation of the current IPR rules will be necessary, on a case-by-case basis in the interest of climate protection and achievement of goals. Sometimes, if we wait for a few years, more companies would develop the same technologies and the prices would quickly come down. Also, the developing countries can develop such technologies themselves.

- **Incremental capital and operating costs:** These costs have been included as grants in the Montreal Protocol since it is known they will be small and for a limited time. Will they be included under climate change? This is a matter for negotiation.

(b) Clarity is needed on which countries will receive assistance for what activities on what terms: The Non-Annex 1 list in climate agreements also includes some rich countries. The Montreal Protocol list of developing countries also contains some rich countries but these have been treated as ineligible for receipt of the Protocol's Multilateral Fund (MLF) grants by specifying that only developing countries consuming ozone-depleting substances per capita less than the limits set in Article 5 of the Montreal Protocol (UNEP Ozone Secretariat 2009) can receive the assistance. Some such rule is needed in the climate agreements.

(c) A single-window facility: At present the donor money for climate change flows through many agencies like GEF, Bilateral Aid Agencies, UN organizations etc. The activities are dispersed, uncoordinated and with no long term goals. The TTM has to be the focal organization through which all the programmes of all the agencies pass through.

(d) Assured periodical replenishment of the TTM: The final costs of TTM to achieve country goals as agreed to by the TTM Board will not be known and can only be refined as the activities go along. So there is no use to fix the size of the fund now. The donors have to agree to fund the TTM periodically to meet its requirements till the agreed country goals are achieved. The contributions by the donors can be in an agreed ratio (such as the UN scales of contribution).

(e) Independent technical advice: The Subsidiary Body of Scientific and Technological Advice (SBSTA) of UNFCCC consists of government delegates and cannot give high-level detailed technical advice. The advice from the Intergovernmental Panel on Climate Change (IPCC) is only once in 5 years. What UNFCCC needs is an independent body, modelled after the Technology and Economic Assessment Panel (TEAP) of the Montreal Protocol to help countries set their goals through frequent reporting on climate-safe technologies. Their reports will be tabled before the Parties as they are without any change. The Parties and TTM can make use of these reports for finalizing the projects and activities.

(f) Administration of the TTM: The TTM has to be administered in such away as to inspire the confidence of all the Parties in its functioning. The MLF is a good example. It is administered through an Executive Committee consisting of equal number of representatives of donors as well as recipients. The decisions are through a consensus or through a double majority of both the groups.

With best regards,

K. Madhava Sarma
Former Executive Secretary, Ozone Secretariat (retired)
UNEP

About the contributor

K. Madhava Sarma held senior positions in the State and Central Governments in India, including the Ministry of Environment and Forests (MOEF), Government of India. He was the Executive Secretary, Ozone Secretariat, UNEP for nearly ten years. After retirement from UNEP in the year 2000, he has been a consultant for UNEP on many environmental issues and for the UNFCCC on technology transfer issues. He holds many honorary positions, including in the Government of India. (Note: Mr. Sarma passed away on 30 September 2010.)

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Andersen, Stephen O., K. Madhava Sarma, and Kristen Taddonio. 2007. *Technology transfer for the ozone layer: Lessons for climate change.* London: Earthscan.

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Lu Qi wrote:

Facilitator's note (Bernarditas Muller): The contribution focuses on China's policies on programmes and projects to halt desertification through restored vegetation, afforestation and reforestation as cost-effective measures for mitigating climate change through the enhancement of carbon sinks. Lu Qi sets the context of these efforts by citing that 37.5 per cent of China's territory is classified as drylands and 27.5 per cent of landmass falls under the definition of desertified lands under the United Nations Convention to Combat Desertification (UNCCD), affecting over 400 million inhabitants, and causing direct economic losses of an estimated over 64 billion yuan. Mitigation efforts in China began in the late 1950s, consisting of a number of high-profile programmes, as a result of which "20 per cent of the desertified lands have been brought under control." Given current technology and estimates of areas of desertification subject to restoration and mitigation under existing plans, China's mitigation efforts to address desertification are expected to last between 45 to 70 years. The contributor concludes by listing recommendations for "required institutional arrangements and policymaking for future anti-desertification efforts", including enabling a multi-stakeholder approach; setting priority zones within restorable areas: restructuring national investment to foster acquisition of planted/greened areas; and adopting preferential policies covering tenure and compensation for ecological services. Research continues on the quantification of carbon sinks as a result of anti-desertification measures.

Dear Network Members,

Desertification and its mitigation strategy in China:
Implications for climate change mitigation

Mitigation of desertification through revegetation, afforestation and reforestation, would have profound implications for enhancing the carbon sink, and hence it may be regarded as one of the most cost-effective measures for reducing the atmospheric concentration of carbon dioxide and mitigating climate change. Here I would like to share with you the efforts of China in mitigating desertification and its implications for improving local livelihoods and promoting economic development and poverty reduction, and for mitigating global climate change.

China is one of the countries most severely impacted by desertification, as 37.2 per cent of the country's territory- some 3.57 million km^2 - is classified as drylands (which include hyper-arid, arid, semi-arid and semi-humid arid areas). Of the drylands, 2.64 million km^2 falls under the category of desertified land in accordance with the definition of the UNCCD, and these desertified lands are distributed in 18 provinces and account for 27.5 per cent of the country's landmass. China's desertified lands can be largely attributed to wind erosion, water erosion, salinization, and freezing-thawing processes. Over 400 million residents are affected by desertification, and the annual direct economic losses exceed 64 billion yuan (*) (Ci and Wu 1997; Zhu 2006; Lu and Wu 2002).

China's desertification mitigation efforts began in the late 1950s. Through a number of high - profile programmes, such as the Three - North Shelterbelt Development Programme initiated in 1978, the National Programme on Combating Desertification initiated in 1990, the Sandification Control Programme for Areas in the Vicinity of Beijing and Tianjin launched in 2000, and the Conversion of Croplands to Forests and Grasslands Programme (Grain for Green) initiated in 2000, the Government of China has poured, on average, 0.024 per cent of the country's annual gross domestic product (GDP) into desertification mitigation efforts. As a result, some 20 per cent of the desertified lands have been brought under control.

Approximately 50×104 km^2 of the existing desertified lands are considered restorable given the current technology. When the potential desertification increments induced by climate change are taken into account, the overall area of desertification that is subject to restoration and mitigation in the future planning horizon is projected to range from 55×104 to 100×104 km^2. With the approximate restoration rate of 1.5×104 to 2.2×104 km^2 per annum, China's anti-desertification battle is expected to last between 45 - 70 years. The current strategic plans set restoration targets at 22×104 km^2 by 2015, with an additional 33×104 km^2 by 2030, and the final 45×104 km^2 of the 100×104 km^2 restored by 2050. The plans also specify a number of cross-cutting strategies to integrate rehabilitation of vegetation and planting for the improvement of local livelihoods and promotion of economic development and poverty reduction. The mitigation approaches are required to reflect local conditions and to combine prevention, restoration and utilization.

On the basis of an examination of state investment in mitigation and current rehabilitation strategies, the following suggestions are made on required institutional arrangements and policymaking for future anti-desertification efforts: (1) expanding the previous sectoral perspective to embrace a multi-stakeholder approach; (2) setting priority zones within the restorable area, and establishing National Special Eco-Zones (e.g., forest farms, protected areas, and headwater areas); (3) restructuring the state anti-desertification investment portfolio by changing the government direct investment in tree plantations to government acquisition of planted/greened areas; and (4) introducing preferential policies in favour of combating sandy-desertification, such as permitting land tenures for up to 70 years and compensating for ecological services (Lu *et al.* 2004).

All the above mitigating desertification efforts would undoubtedly have significant implications for mitigating global climate change. Our current research is also focusing on the quantification of the carbon sink as a result of the above efforts.

With best regards,

Prof. LU Qi
Chief Scientist and Chief Executive Officer (CEO)
Institute of Desertification Studies, Chinese Academy of Forestry
Beijing

Note

(*) This amount was equivalent to US$8 billion at the time the calculations were made in 2002.

About the contributor

Dr. Lu Qi is the Chief Scientist and the CEO of the Institute of Desertification Studies, Chinese Academy of Forestry. He also serves as the Executive Secretary of the National Research and Development Center for Combating Desertification. He has been listed in the UNCCD/CST Independent Expert Roster and Consultant of ADB/GEF Project. Professor Lu received his Ph.D. in Ecology at the Chinese Academy of Sciences in 1995. He has been engaging in combating desertification and integrated ecosystem management for over 20 years, and he has successfully conducted a number of research, assessment and demonstration projects. In addition, he has headed and completed several international and national cooperative research programmes. He has published more than 15 books and 150 research papers in international and national scientific journals.

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Gørild Heggelund, Andrea De Angelis, and Inga Fritzen Buan wrote:
Facilitator's note (Bernarditas Muller): The contribution notes that progress on four interrelated elements of a low-carbon economy, namely people as agents of change, sustainable development of cities, technologies to achieve emissions reductions, and markets for dissemination and commercialization of low-carbon technologies, is necessary to achieve a low-carbon development, and focuses on the crucial role of technologies. There are existing technologies that are being used and investments to be made in future technologies, but there is a need to overcome technological constraints through improvements in energy infrastructure, development innovation and technological capacity. It must also be ensured that a low-carbon development pathway would support human development. While significant investments are needed for the "acquisition of new technologies, their dissemination, and research and development components", a holistic approach integrating these four elements would likely result in long-term co-benefits such as "a healthier population, green jobs creation, more sustainable cities, and economic stimulus."

Dear Network Members,

The role of technology in China's low-carbon future (*)

The China National Human Development Report (NHDR) 2009-10 *China and a Sustainable Future: Towards a Low Carbon Economy and Society* concludes that China has made great achievements in human development in the last three decades, but is now at a crossroads where there is a need to decouple human development from high growth rates, and to make growth more oriented around quality and efficiency. Our commentary is based on the point of view that from a long-term perspective, and given the negative impacts of China's unsustainable growth model at present, a low-carbon economy and society is the only choice for promoting human development. Technology is one important determinant in this transition and the China NHDR 2009-10 emphasizes that technology options and their emissions reductions potential will influence the extent to which development pathway China will take. The development of a low-carbon economy and society will also likely bring about considerable co-benefits for the Chinese people.

Development towards a low-carbon economy will require progress on four interrelated fronts: people, cities, technologies and markets. *People* are central as consumers, producers and agents of change. Sustainable cities development and urbanization will determine the degree to which an increasingly large share of the Chinese population leads sustainable, low-carbon lives. Cities could even be observed as possible "solutions to greenhouse gas emissions" as "well-planned, well-managed cities can play a central role in helping to mitigate climate change" (Dodman 2009). *Technologies* are drivers necessary to achieve emission reductions and to shift the development to a low-carbon path. Finally, *markets* are critical to the dissemination and commercialization of low-carbon technologies. Here, we focus on how technology will play a major role in the transition to a low-carbon economy and society.

Substantial innovation is direly needed. However, some technologies already exist that can make a substantial impact on emissions reduction, and create incentives for the next wave of necessary technological advances. Investing in advanced technologies now could avoid lock-in effects in the energy sector and in physical infrastructure in general (CCICED 2009). China has become a leader in renewable energy technologies, but still faces technological constraints in other areas. It will need to eliminate outdated production capacities, adopt efficient energy-saving technologies, improve the energy infrastructure, make major efforts to develop renewable energies, strengthen innovation and technological capacities.

At the same time, China needs to ensure that the shift to a low-carbon development path is carried out not at the expense of human development, but in support of it. This will require a well-coordinated holistic approach, so that low-carbon investments simultaneously address pressing human development needs. The expected massive migration to urban areas of millions of people will make this transformation to low carbon particularly challenging. More research is needed to explore how this necessary change can best take place.

In the long run, a low-carbon economy and society can improve the efficiency of energy and resource use, reduce emissions and mitigate the adverse impact of climate change. By investing more in low-carbon and high-energy efficient infrastructures, developing and utilizing new energy resources, new engines of economic growth and job

opportunities can be created, the economic growth model can be optimized, and the problem of environmental pollution and damage can be mitigated. China will be able to build a harmonious, energy-saving, and environmentally friendly society that also advances human development, helping to increase equitable growth as well as reducing the vulnerability of different groups, including women, as residents of low-income regions.

The extent to which China is able to achieve low-carbon development will depend on how its people, cities, technologies and markets will be integrated into one process. China needs to strengthen its capacity for innovation, which remains limited for a variety of reasons. Acquisition of new technologies, their dissemination, and research and development (R&D) components involve significant upfront investments and high operating costs for the Chinese Government, but in the long run, co-benefits will likely include a healthier population, green jobs creation, more sustainable cities, and economic stimulus.

With best regards,

Gørild, Andrea, and Inga
Gørild Heggelund, Senior Climate Change Advisor, UNDP China
Andrea De Angelis, Senior Climate Change Advisor, UNDP China
Inga Fritzen Buan, UNDP Internship/Researcher, Fridtjof Nansen Institute, Norway

Note

(*) The commentary is based upon UNDP China and Renmin University of China. 2010. *China Human Development Report 2009-10 - China and a sustainable future: Towards a low carbon economy & society.* Beijing: China Translation and Publishing Corporation. [http://www.undp.org.cn/pubs/nhdr/nhdr2010e.pdf]. Last accessed on 14 May 2010.

About the contributors

Before joining UNDP China in May 2009, Gørild Heggelund has worked as Senior Research Fellow and acted as Director of Global Programme at the Fridtjof Nansen Institute, Norway for a number of years. She completed a Ph.D in 2002 at the University of Oslo on the environmental and resettlement policies for the Three Gorges Dam, published as a book in 2004 (Environment and Resettlement Politics in China: The Three Gorges Project). Heggelund has studied and worked in China for a number of years, including in the UNDP China office with responsibility for energy and environmental projects.

Andrea De Angelis has more than 12 years of experience in bilateral and multi-lateral institutional relationships with governments and international organizations (in China and Eastern Europe), and as advisor on climate change projects and policies, particularly on Clean Development Mechanism (CDM). Before joining the UNDP, between 2001 and 2006, as envoy from the Italian Ministry of the Environment to China, he started up and directed a bilateral cooperation programme, the Sino-Italian Cooperation Program for Environmental Protection in Beijing, leading the initiatives related to address, bilaterally, Climate Change. De Angelis completed a Master degree in Political Science on International Law, University of Rome.

Together, Heggelund and De Angelis have contributed to the Air Management chapter (Energy and Transport) as well as the International Cooperation chapter (Climate Change) of the "Environmental Performance Review" of China, published by the OECD in 2007.

Inga Fritzen Buan, UNDP Internship/Research Fellow at the Fridtjof Nansen Institute, Norway. Inga Fritzen Buan works on Chinese climate change and energy issues, and co-authored together with Heggelund, the article "China in the Asia-Pacific Partnership: Consequences for UN Climate Change Mitigation Efforts?". Buan also carries out research on general Chinese economic, industrial and environmental development as well as the international climate change negotiations, the Kyoto Protocol and the CDM. Climate change as a national security issue is a current research topic.

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Dodman, David. 2009. "Blaming cities for climate change? An analysis of urban greenhouse gas emissions inventories". *Environment and Urbanization* 21 (1): 185-201.

Kishan Khoday wrote:

Facilitator's note (Bernarditas Muller): Kishan Khoday, in his contribution, tackles the complex issue of trade and climate change and their effects on Asia's increasingly important role in world trade. He notes that policy conflicts occur between the need to fuel Asia's economic growth and the efforts to address climate change mitigation at national levels, leading to potential adverse implications on global trade. Kishan Khoday illustrates these potential adverse effects through three policy measures taken at national levels, starting with fossil fuel subsidies that "serve as a major barrier in Asia and globally to expanding the commercialization and trade in low-carbon technologies." He claims that the G20 process, which recognized wasteful consumption due to inefficient fuel subsidies, "will be critical for achieving climate mitigation goals". Turning to carbon tariffs, such as those envisaged in the United States' proposed legislation, the American Power Act, the contributor believes that its provisions would have significant implications on Asia exports, especially those of China, and in fact could constitute a means of "arbitrary or unjustifiable discrimination" or a "disguised restriction on international trade", and could be challenged under World Trade Organization (WTO) rules. The third area would be "rare earth" export restrictions, referring to minerals that are used in renewable and alternative energy production. China holds the world's largest reserves of these minerals and controls "97 per cent of the world market" in them. China plans to restrict exports of these minerals as finite sources, raising concerns over the future of clean energy development. Such a move would likewise give rise to conflicts under WTO rules, if these measures are not accompanied by restrictions on domestic production and consumption of these minerals.

Dear Network Members,

Trade and climate change

The 2007 UN Climate Change Conference in Bali saw the first ever high-level meeting of global Trade Ministers on the topic of climate change, convened to discuss synergies and potential conflicts between trade and climate change regimes. Since then many important issues have emerged, with particular relevance to Asia, given its centrality to world trade, heavy reliance of Asia on export-oriented growth, and the carbon intensity of its export-industries.

Fossil Fuel Subsidies: Domestic subsidies to the fossil fuel sector serve as a major barrier in Asia and globally to expanding the commercialization and trade in low-carbon technologies. While Governments forge ahead with new investments into clean energy with one hand, they continue to provide large subsidies to the fossil fuel sector with the other, thereby limiting the cost competitiveness and global market penetration of clean technologies. Current fossil fuel subsidies may be as much as US$500 billion/year globally, or about 1 per cent of global gross domestic product (GDP) (IISD 2009). This also happens to be the amount of climate change financing called for by the Stern Report to keep temperatures from increasing beyond 2°C.

The G20 Pittsburg Summit in September 2009 brought this to the forefront of global decision-making for the first time. Heads of State recognized that "inefficient fossil fuel subsidies encourage wasteful consumption, distort markets, impede investment in clean energy sources and undermine efforts to deal with climate change" and pledged to "rationalize and phase out over the medium term inefficient fossil fuel subsidies that encourage wasteful consumption" (The Pittsburgh Summit 2009). Alongside targets for emission reductions and clean technology expansion under the Bali Action Plan, the G20 process will be critical for achieving climate mitigation goals. A key step in this process will be the detailed policy proposals to be tabled at the G20 Summit in Canada, 26-27 June 2010, including those by developing country members of the G20 such as China, India, Indonesia and Saudi Arabia.

Carbon Tariffs: On 12 May 2010, the draft American Power Act (known as the Lieberman-Warner bill) was released in the US Senate for deliberation. In addition to its focus on reducing US emissions through a cap-and-trade scheme, it also has important implications for Asia through measures that seek to prevent "economic competitors from exploiting the American market if they shirk their responsibility to minimize carbon pollution" (Kerry *et al.* 2009). Under the draft law, US importers would be required to purchase emission allowances for carbon-intensive imports, unless they come from a country that (i) has a comparable emission reduction policy in place, (ii) is a least developed country, or (iii) emits a minimal share of global emissions (Lo 2009).

The American Power Act could have significant consequences for exports from Asia. In China, for example, upwards of 33 per cent of carbon emissions are from export industries, 27 percent of whose products are destined for the US (Ibon Foundation 2009). If the bill passes into law with its import restrictions retained, it could well be challenged through the World Trade Organization (WTO) as "arbitrary or unjustifiable discrimination", a "disguised restriction on international trade" or failing to be the "least trade-restrictive measure" to achieve legislative goals. It could also lead to counter-measures by major trading partners in Asia.

Rare Earth Export Restrictions: Central to the global expansion of renewable and alternative energy technology is the sustainable supply of 'rare earth' minerals, indispensible components in electric vehicle batteries, wind power turbines, compact fluorescent light bulbs and other leading clean energy technologies. China has the world's largest reserves of rare earth, currently controlling 97 per cent of the world market (Hurst 2010). As recognized in 1992 by the Chinese leader Deng Xiaoping, "the Middle East has oil, but China has rare earth" (Baotou National Rare Earth Hi-Tech Industrial Development Zone n.d.). However, with a global surge in demand for clean energy technology, and rare earth materials in turn, China's reserves could be exhausted in 20 to 30 years (Korinek and Kim 2010). According to the current draft of China's Rare Earth Development Plan (2009-2015) China intends to restrict export of rare earths, which has in turn caused concerns around the world for the sustainability of trends in clean energy development (MIIT 2009).

As expressed on 17 March 2010 in the US Senate's first-ever session on "Rare Earth Minerals and the 21st Century", export restrictions could create an unfair advantage for China's clean energy industry (Correy 2010). China has held firm that the goal of its policy is to conserve 'exhaustible natural resources', which under WTO rules is valid only if done "in conjunction with restrictions on domestic production or consumption" (Korinek and Kim 2010). In 2009, the US, EU and Mexico initiated a WTO case against China over similar export restraints for other types of raw materials. The outcome of that process and growing global concern over rare earth scarcity will shape not only the future of China's export policy but possibly also global strategies for climate change mitigation and technology.

Regards,

Kishan Khoday
Deputy Resident Representative
UNDP Saudi Arabia

About the contributor

Kishan Khoday has served with UNDP since 1997, as UNDP Sustainable Development Advisor and Deputy Coordinator for Environment in Indonesia (1997-2005), UNDP Assistant Resident Representative and Team Leader for Energy & Environment in China (2005-2009), and currently as UNDP Deputy Resident Representative in Saudi Arabia. He may be contacted at kishan.khoday@undp.org.

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Pak Sum Low wrote:

Facilitator's note (Bernarditas Muller): In this highly insightful contribution, Pak Sum Low reflects on a fundamental issue underlying climate change mitigation discussions, that of equity. Invited to participate in the Second Lagos State Summit on climate change, Pak Sum Low listened to accounts of what measures are undertaken in the African region to address climate change, including proposals for "changes in lifestyles so as to prevent over-consumption, which has profound implications for greenhouse gas emissions". Struck by the poverty that he saw during a group tour for the participants of the Summit, he wondered whether it would be fair to demand that these poor people who "are trying to make ends meet", and "do not have much money to spend and consume" change their consumption lifestyles. Pak Sum Low cites recent data that have shown that more people in developing countries live in poverty, or extreme poverty in terms of international poverty levels, given population growth, even while there might be slight reductions in percentage terms. Taken together with studies that show that "In 2005, the wealthiest 20% of the world accounted for 76.6% of total private consumption. The poorest fifth just 1.5%.", and that "the wealthiest 10% accounted for 59% of all the consumption" and the "poorest 10% accounted for just 0.5%", is it therefore justifiable to require these poor people to reduce their consumption lifestyles further? The Facilitator notes that under the UN Framework Convention on Climate Change, the mitigation obligations of developed countries have the objective of demonstrating that these would lead to "modifying longer-term trends in anthropogenic emissions", relating to production and consumption lifestyles, whereas it is recognized that "economic and social development and poverty eradication are the first and overriding priorities of developing country Parties."

Dear Network Members,

From Second Lagos State Summit on Climate Change 2010 to global inequality in consumption

Thanks to my old friend, Dr Ademola Salau, formerly Climate Change Coordinator of UNDP/GEF in Africa, I was invited to participate in the Second Lagos State Summit on Climate Change 2010 held on 4-7 May 2010. The Summit was hosted by the Ministry of the Environment of the Lagos State Government, Nigeria, under the leadership of the Hon. Commissioner for the Environment, Dr Muiz Adeyemi Banire, and the Governor of Lagos State, His Excellency Mr Babatunde Raji Fashola.

The first day of the Summit was devoted to the Governors' Session, in which the Governors of seven states (Lagos, Kaduna, Borno, Niger, Ondo, Abia and Edo) were invited to a panel discussion. They spoke on the efforts and the progress made in their respective states relating to environmental protection and addressing climate change. The panel session was moderated by Brent Sadler, international correspondent of CNN and broadcasted live on Lagos television. We heard from the governors of various environmental problems in their respective states, such as deforestation; desertification; gas flaring from oil extraction platforms; pollution; coastal erosion; etc. These are the same environmental problems that have been encountered by many developing countries in the Asia-Pacific region, and thus there is much to learn from African experiences, and vice versa. The Governors panel discussion must be the first of its kind in Africa. All governors commented that they could do more to enhance the environmental sustainability of their states, including the need to raise public awareness.

The next three days were technical sessions that covered topics ranging from adaptation to climate change, including financing and sharing of good practice; United Nations Industrial Development Organization (UNIDO)/Lagos State study on vulnerability assessment and adaptation strategy; mitigation strategy for a low-carbon economy; financing for climate change mitigation activities; partnerships and collaboration for addressing climate change shipwreck and coastal erosion; Lagos State and World Health Organization (WHO) Partnership; to climate change negotiations: post-Copenhagen and Mexico 2010. The sessions were lively from the beginning to the end. Each expert presentation was followed by many questions and comments from the participants. The estimated number of participants was about 1,200, including a large number of young people.

A number of expert presentations have proposed ways to mitigate climate change, including the changes in lifestyles so as to prevent over-consumption, which has profound implications for greenhouse gas emissions. Thus, sustainable consumption is one of the most cost-effective ways to mitigate climate change.

On the final day of the Summit, the hosts kindly organized a group tour for the participants in the afternoon. During the shuttle between the three sites that we visited, including a solid waste collection site and an organic waste disposal site, we passed by quite a few poor areas, including very crowded local markets, where poor people are striving to make a living and running their small businesses.

"These are low-class areas", commented one official who accompanied us in the field trip.

All of a sudden, the comments on "changes in lifestyles" made by the experts at the Summit echoed loudly in my ears. Looking at the poor living conditions of the people in these "low-class areas", I wondered whether it would be fair for us to request or demand that these poor people change their consumption lifestyles, given that they are trying to make ends meet, and they really do not have much money to spend and consume. Some of these people could be the poorest of the poor.

The poverty data of the *2008 World Development Indicators* published by the World Bank (2008) have provided the following statistics that reflect the poverty situation in the developing world. The data also reflect the inequality in consumption between developed and developing/least developed countries:

- 25.2 per cent (1.374 billion people) of the population of developing countries were living in extreme poverty in 2005 (i.e., less than 2005 Purchasing Power Parity (PPP) US$1.25 a day, which is the new international poverty line based on new measurements). In sub-Sahara Africa, 50.9 per cent (388 million) of the population in 2005 were living below this poverty line, while it was 40.3 per cent (596 million) in South Asia, and 16.8 per cent

(316 million) in East Asia and the Pacific. China had notably and significantly reduced its extreme poverty from 84.0 per cent (835 million) in 1981 to 15.9 per cent (208 million) in 2005. While the proportion of extreme poverty in sub-Sahara slightly reduced from 53.4 per cent in 1981 to 50.9 per cent in 2005, its actual number almost doubled from 212 million in 1981 to 388 million in 2005. In South Asia, the actual number of extreme poverty increased from 548 million in 1981 to 596 million in 2005, though its proportion decreased from 59.4 per cent to 40.3 per cent. The same is the case in India, the actual number of extreme poverty increased from 420 million in 1981 to 456 million in 2005, though its proportion decreased from 59.8 per cent to 41.6 per cent (World Bank 2008, Table 3: Regional poverty estimates; also see World Bank 2010);

- If we use the median poverty line of 2005 PPP US$2.00 a day as a reference, then the poverty figures almost doubled (47.0 per cent or 2.564 billion of the population of developing countries were living below this poverty line). In sub-Sahara Africa, 72.9 per cent (556 million) of the population in 2005 were living below 2005 PPP US$2.00 a day, while it was 73.9 per cent (1,092 million) in South Asia, and 38.7 per cent (729 million) in East Asia and the Pacific, largely due to the significant decrease in China from 97.8 per cent (972 million) in 1981 to 36.3 per cent (474 million) in 2005. While sub-Sahara slightly reduced the proportion of its poverty from 73.8 per cent in 1981 to 72.9 per cent in 2005, its actual number almost doubled from 294 million in 1981 to 556 million in 2005. In South Asia, the actual number of people living on less than 2005 PPP US$2.00 a day increased from 799 million in 1981 to 1,092 million in 2005, though its proportion decreased from 86.5 per cent to 73.9 per cent. In India, there was a similar trend. The actual number of people living on less than 2005 PPP US$2.00 a day increased from 609 million in 1981 to 828 million in 2005, though its proportion decreased from 86.6 per cent to 75.6 per cent (World Bank 2008, Table 3: Regional poverty estimates; also see World Bank 2010).

The "global inequalities" in private consumption can be highlighted by the following figures. In 2000, 11.6 per cent of the world's population in North America and Western Europe accounted for 60.2 per cent of private consumption expenditures, while 22.4 per cent of the world's population in South Asia and 10.9 per cent of the world population in sub-Saharan Africa accounted for only 2.0 per cent and 1.2 per cent of private consumption expenditures, respectively (Gardner *et al.* 2004, Table 1-1, page 6).

The above disparities seem to have widened since 2000. Based on the Development Indicators 2005 data, Shah (2010) found that "In 2005, the wealthiest 20% of the world accounted for 76.6% of total private consumption. The poorest fifth just 1.5%.", and that "the wealthiest 10% accounted for 59% of all the consumption" and the "poorest 10% accounted for just 0.5%".

It will be interesting to look at the more updated data, which do not seem to be available from the World Bank database. However, it is likely that the above trends will remain the same.

For the extreme poor and the poor who are living on less than 2005 PPP US$1.25 and US$2.00 a day respectively, which accounted for nearly 50 per cent (or 2.564 billion) of the population of the developing world in 2005, they really do not have any consumption lifestyles to change or to be changed, as they only consume the least to meet their basic survival needs. Thus, while we demand that the wealthy people of all societies do not over-consume, I think it would be unfair or even unrealistic to demand the same of the extreme poor and the poor. Indeed, for the extreme poor and the poor, we have no right to request or demand them to change the only consumption lifestyle that they have: how to live decently and in dignity so as to pursue possible future opportunities.

With best wishes,

Pak Sum Low
Adjunct Professor
Faculty of Science and Technology, Universiti Kebangsaan Malaysia; and
School of Sustainable Development, Bond University, Australia

About the contributor

Dr. Pak Sum Low is Adjunct Professor at the Faculty of Science and Technology, Universiti Kebangsaan Malaysia, and at the School of Sustainable Development, Bond University, Australia. He is International Adviser for the Climate Change Adaptation Initiative of the Mekong River Commission (MRC) Secretariat (since March 2010), and a member of Expert Group on Technology Transfer (EGTT) of the UNFCCC (since January 2010). He has previously worked in UNEP (1991-1999) and UNESCAP (2001-2008). He has provided consultancy services to the UNFCCC Secretariat, UNCCD Secretariat, UNDP and UNEP.

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Keith Openshaw wrote:
Facilitator's note (Bernarditas Muller): In identifying four dominant factors that impact negatively on the habitat and on climate, Keith Openshaw argues that the fourth, rising population growth, exacerbates the other three factors of increased use for resources to meet basic needs, the push for better living standards, and the use of non-renewable sources of energy, in particular fossil fuels. Citing studies showing population growth increase, he states that it is this growth in population, coupled with the increase in wealth that it needs that is putting more pressures on the world's resource base and at the same time, places more people at heightened risk of disasters from natural and man-made causes. In absolute terms, he claims that the largest population increase is in Asia and the Pacific region. Comparing projected population growth as a result of population policies among various countries in Asia, those of China and India, Pakistan and Bangladesh, and in Thailand, the Philippines and Indonesia in South-East Asia, the contributor demonstrates that more development takes place in countries where population growth is controlled. He also adds that more resources could then be freed for use in mitigation and education.

Dear Network Members,

Population growth, resource use and climate change mitigation

Four dominant factors that have a negative impact on the habitat and climate are: the (over)use of resources to satisfy the need for basic necessities; the push to increase living standards; the use of non-renewable resources, especially fossil fuels; and the expanding population that is exacerbating the above three factors and increasing the human population on existing areas and expanding their presence into areas that are fragile and/or critical to maintain biodiversity. The recently concluded third UN Global Biodiversity Outlook (GBO-3) says that some ecosystems may soon reach "tipping points" where they rapidly become less useful to humanity (Secretariat of the Convention on Biological Diversity 2010). The Earth's ongoing nature losses may soon begin to hit national economies, the report has warned. The impact will be more serious in countries that are witnessing relatively large population increases. In 1950, the world population was about 2.5 billion. Over the last sixty years, it has increased 2.8 times, but that of developing nations by 3.3 times (Asia 3.0 times) and the rest of the world by "only" 1.4 times. By 2050, it may grow by 3.7 times compared to 1950, and for developing nations by 4.6 (Asia 3.8 times) times over 100 years (UN Population Division 2010)! It is this growth in population, coupled with the increase in wealth that is putting and will put escalating stress on the world's resource base and place populations at heightened risk of disaster from natural and man-made causes. While in percentage terms, the forecasted population increase in Asia and the Pacific between 2010 and 2050 is not

as large as that in Africa, in absolute terms, it shows the largest increase. This is illustrated in Table 1 which shows the forecasted population increase for the world, Africa, Latin America & Caribbean and Asia-Pacific from 2010 to 2050.

Table 1. Population forecast for specific regions 2010-2050: Medium variant
Unit: billion

Year	World	Asia-Pacific	(Of which China & India)	Africa	Latin America & Caribbean	Rest of the world
2010	6.909	4.203	2.568	1.033	0.589	1.084
2030	8.309	4.962	2.947	1.524	0.690	1.133
2050	9.150	5.282	3.031	1.998	0.729	1.141
% of total 2050	100	58	(33)	22	8	12
Increase: 2010-2050 (%)	2.241 (32%)	1.079 (26%)	0.463 (18%)	0.965 (93%)	0.140 (24%)	0.057 (5%)

Source: UN Population Division 2010.

There are technical solutions available to mitigate disasters, but in many instances the finances are not adequate and the increase in population exacerbates the problems. Thus, natural disasters like the earthquake in Haiti, which devastated a population that was living on the country's margins, had made it dependent on external aid. The high population density in that country and the havoc the earthquake wreaked is an example what could occur when man-made interventions and climate change consequences have adverse effects.

More and more people are occupying fragile land areas such as steep slopes, areas prone to drought or flooding and low-lying areas in danger of being inundated by brackish water. Already, this year, there had been mud slides in the Philippines, inundations in Bangladesh and an earthquake in Sumatra: these had resulted in loss of life and the displacement of people. Perhaps billions of dollars are needed each year to tackle the risks of climate-related disasters, but governments priorities may be focused on providing essential services such as schools, hospitals/clinics, roads etc. for the existing and ever increasing population. Many of these services may be inadequate to meet the dangers from disasters!

It is interesting to compare the actual and forecasted increase in population of various countries that have different population policies. First, Table 2 examines the population projections of India and China from 1990 to 2050. At present, China has an aggressive population policy with a target of one child per family in urban areas and two in rural areas, whereas India does not have such a policy. In India, it is hoped that through education and increase in wealth the increase will tail off.

Table 2. India and China: Population and population increase 1990 to 2010 with forecasts to 2050
Population million; increase % between two time periods

Year	India		China	
	Number	% increase	Number	% increase
1990	862.2	1990-2010: 1.73	1,142.1	1990-2010: 0.85
2010	1,214.5	2010-2030: 1.01	1,354.1	2010-2030: 0.39
2030	1,484.6	2030-2050: 0.42	1,462.5	2030-2050: -0.16
2050	1,613.8		1,417.0	

Source: UN Population Division 2010.

If India had an aggressive population policy as in China, then between 2010 and 2050, the population could be an estimated 1.4 billion by 2030, assuming the average annual population growth rate is 0.7 per cent and 1.5 billion in 2050, assuming a growth rate of 0.35 per cent. With such an estimated decrease in population of over 100 million, the

Indian government would have more money to spend on education and climate mitigation. In addition, any decrease in India's population would mean a decrease in resources consumption and production, and hence a reduction in greenhouse gas emissions.

However, there are concerns about the present policies both in China and India. According to the Leader in the Economist (2010), the number of males surviving to the age of one is much more than it should be (120 boys per 100 girls). In both societies, boys are favoured and some girls are aborted or neglected at birth. This is or will create problems for the present under-25 population. Education, especially valuing girls as much as boys, has to be fostered at the highest level.

Table 3 looks at the past, present and forecasted population in three countries with different social backgrounds, namely Thailand, the Philippines and Indonesia. From the 1970s, Thailand had an active population control policy with birth control methods being one prong of improving village life. The Philippines did not have such a policy and in Indonesia, birth control was not high on the government's agenda.

Between 1970 and 2050, the population of Thailand is expected to double that of Indonesia, to increase 2.5 times, whereas in the Philippines, it may increase four times! If the government of the Philippines had pursued an active policy as in Thailand, it would have over 20 million less people today, and by 2050, over 70 million people less. If the government adopts an active population control policy, as in Thailand, then the population could be reduced by between 17 million and 27 million, if the average annual population increase can be reduced to 0.8 per cent (17 million) or 0.6 per cent (27 million). The government of the Philippines would have millions of dollars more each year to spend on climate mitigation. If Indonesia adopts a more hands-on population policy, then its population could be reduced by 15 million with a target annual increase of 0.4 per cent between now and 2050.

Table 3. Thailand, the Philippines and Indonesia: Population and population increase 1970 to 2010 with forecasts to 2050

Year	Thailand		Philippines		Indonesia	
	Number	% increase	Number	% increase	Number	% increase
1970	37.2	'70-'90: 2.1	36.6	'70-'90: 2.6	116.9	'70-'90: 2.1
1990	56.7	'90-'10: 0.9	62.4	'90-'10: 2.0	177.4	'90-'10: 1.4
2010	68.1	'10-'30: 0.4	93.6	'10-'30: 1.4	232.5	'10-'30: 0.8
2030	73.5	'30-'50: -0.16	124.4	'30-'50: 0.8	271.5	'30-'50: 0.3
2050	73.4		146.2		288.1	
Possible population by 2050 taking 2010 as the base year (a)			128.7 (0.8% per year) 118.9 (0.6% per year)		272.8 (0.4% per year)	

Note: (a) Calculations for Thailand have not presented as population is predicted to fall between 2030 and 2050. Two options are made for the Philippines. The first is a vigorous population reduction growth rate (0.8% per year) and the second is an aggressive one (0.6% per year).

Source: UN Population Division 2010 and author's estimates.

In 1990, the population of Pakistan and Bangladesh were very similar, at about 116 million in each country. However, by 2050, according to the UN Population Division, the population of Pakistan may increase to 335 million, whereas that of Bangladesh is estimated to be 222 million, some 113 million less! It seems that Bangladesh has a much more active population programme than Pakistan. Population density is also a driving factor in Bangladesh.

Thus, it can be seen that the population policy of governments can help or hinder climate mitigation.

Again, increasing temperature may adversely affect food production and considerable effort and funds may have to be spent on breeding and cultivating, for example, rice to overcome the consequences of higher night-time temperatures, and crops that are brackish and drought-prone tolerant. Will funds and expertise be available to counter these climate change effects? Without such efforts, disaster relief efforts may always be too little and too late. The demand for food security will be further compounded by an increase in population.

With best regards,

Keith Openshaw
Retired Forester and Economist

About the contributor

Keith Openshaw, now retired, has had a varied career working with donor and international agencies, governments, NGOs and private firms, in the field of natural resources, economics, renewable energy and the environment. He has lived in Africa and Asia for 17 years and worked in over 50 countries. For five years, he was head of the forest economics section at the University of Dar es Salaam (Morogoro Campus), now Sokoine University. He was a staff member at FAO and the World Bank and was a Senior Fellow at the Beijer Institute, now the Stockholm Environmental Institute. He was a member of the ALGAS (Asia Least-cost Greenhouse Gas Abatement Strategy) project team that documented greenhouse gas (GHG) emissions for 11 Asian countries and proposed strategies for GHG mitigation. This was sponsored by GEF/UNDP and executed by the ADB. He has over 150 publications including one book and several book chapters and is a leading proponent of biomass energy.

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Yang Youlin wrote:
Facilitator's note (Bernarditas Muller): Yang Youlin examines the cause-and-effect interaction between climate change and land degradation and desertification, and their implications for mitigating climate change. Based on his long experience as the Assistant Regional Coordinator of the Asia Regional Coordination Unit of the UN Convention to Combat Desertification (UNCCD) Secretariat, Yang Youlin discusses the techniques and related technologies for addressing desertification, land degradation and drought (DLDD), as applied and used in China, India, and Viet Nam. He arrives at the conclusion that policymaking is the "backbone for guiding actions", including establishment of policy frameworks, institutional capacity-building in various sectors, awareness raising and strengthened legislation. Yang Youlin then lists areas of specific policies that "may be developed to benefit both people's livelihoods and the environment", ranging from financial incentives, land tenure for women and youth, and administrative coordination. He cites as examples land management programmes in India, the "Grain for Green" national project in China on rehabilitation of farmlands, hills and mountain slope areas, and the *Forestry Development Strategy 2006-2020* in Viet Nam covering the necessary policy measures for forest management, as well as programmes and projects. The Facilitator notes that the UNCCD, as one of the three Rio Conventions on sustainable development, is closely interlinked with the UN Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD), all of which have been negotiated in accordance with the Rio Principles of the UN Conference on Environment and Development (UNCED) of 1992.

Dear Network Members,

Climate change and desertification: The significance of mitigation policies

Climate change will exacerbate desertification, which, in turn, will compound the effects of climate change. Thus, prevention and rehabilitation of land degradation and combating desertification will have profound implications for mitigating climate change.

After more than 20 years of studies on the different approaches to combat desertification, rehabilitate land degradation and mitigate the effects of drought in many developing countries, both in the Asia-Pacific region and in Africa, I would like to share some information, including some good practices, on the issues.

There are many useful techniques or technologies to combat desertification, rehabilitate land degradation, and mitigate the effects of drought. These include revegetation of degraded rangeland/steppe/desert steppe, reforestation of deforested lands, and transformation of deteriorated soils. These approaches include biological and botanical plantations; engineering means, such as mechanical solutions; and chemical mulching (The Secretariat of China National Committee for the Implementation of United Nations Convention to Combat Desertification 1999). Many countries have allocated special funds (e.g., national desertification funds) and aligned their national action plans (NAPs), so that they are integrated into national development strategy or five-year plan. China, India and Viet Nam have provided good examples. In terms of policy, some countries have also revised, reinforced and reorientated their national and local policies and laws/regulations relating to mitigating desertification, land degradation and drought (DLDD).

Techniques and technologies: Examples from Asia-Pacific

In China, desertification covers 2.64 million km^2 or 27.5 per cent of China's territory (Lu *et al.* 2010). Desertification causes the degradation of ecological environment, induces natural disasters (e.g., dust and sandstorms), and takes a heavy toll on human livelihoods by sharply reducing the availability of arable land, lowering soil fertility, and aggravating poverty in the affected areas. In particular, it causes serious damages and drastic economic losses to communication and transportation systems, water facilities and the mining industries in the affected regions and beyond. Direct annual economic losses were estimated at more than 64 billion yuan, equivalent to about US$8 billion in 2002 (Lu and Wu 2002; see also Lu 2010). Statistics shows that approximately 400 million people, or 30.7 per cent of China's population, are directly and indirectly affected by desertification, resulting in a considerable number of "environmental refugees" and "disaster migrants" in severely affected provinces (Lu *et al.* 2010).

In India, a series of useful techniques have been developed to control land degradation in Rajasthan by both academic and technical development institutions. For instance, the research and experiments on soil fertility, rehabilitation and management of degraded lands, water and watershed management, crop management practices, agro-horticulture system, pasture and silvo-pasture system and microclimate have harvested great successes in mitigating the DLDD issues in the affected areas of the country.

In Viet Nam, a priority area is the rehabilitation of degraded lands through establishment of major forestry programmes, including forest protection and conservation, afforestation projects, sustainable forest management, and poverty alleviation and forest resources management. Since the late 1980s, the Vietnamese government has promulgated the establishment of 11 national parks, 49 national conservation zones, 29 historic, cultural and environmental vestige zones with a total area of 1.169 million hectares (ha) (about 3.3 per cent of total land area of the country) (Nguyen 2001).

In short, many Asia-Pacific countries have made great efforts in mitigating the DLDD issues with visible results and benefits. However, apart from the technical, financial and administrative approaches, it is also important to pay attention to policy issues.

Policy interventions in Asia-Pacific

Based on my analysis and assessment of the policy performance in addressing DLDD issues in the Asia-Pacific region, I have come to the conclusion that policy is the backbone for guiding actions. Thus, a comprehensive policy that integrates environmental, social and economic aspects of sustainable development is critical to the success of addressing the DLDD issues.

Indeed, many developing countries in the Asia-Pacific region have recognized the significance of having sustainable overall and sectoral policies to guide the implementation of their NAPs. These include: financial, technical, administrative and organizational policy frameworks; institutional capacity-building in various sectors, including planning, performance and governance; awareness raising; legislation and law reinforcement. Sustainable policy in tenure system would enable villagers, officials and local community to implement projects, or carry out activities to combat desertification, rehabilitate land degradation and mitigate the effects of drought.

The following special policies may be developed to benefit both people's livelihoods and the environment:

- Free taxation for (i) agricultural products, especially in the affected regions; and (ii) preservation and development of wastelands.
- Policies on (i) free loans to grass-root stakeholders for revegetating degraded land from both central and local governments; (ii) land ownership and land use right in rural areas; (iii) land care contract between users and governors; (iv) farmland protection and ecological service payment; (v) provision of incentives for encouraging advanced land users at rural community level; (vi) volunteer plantation in desertification-prone regions; (vii) land contract for enterprises to manage and develop the affected lands; (viii) wasteland auction for tourism and industry development; (ix) rewarding champions of land managers and land governors.
- Preferential policy to enable women and youth to enjoy land tenure in rural and affected regions.
- Administrative decisions on internal coordination and collaboration among policymakers, planners and governmental agencies.

The following are two good examples in mitigating DLDD in developing countries in Asia-Pacific:

China: "Grain for Green" is a state-run national project that has been financed by China's central government since 1999. It is estimated that 9.0498 million ha of rejected farmland have been replanted and/or revegetated, 12.6213 million ha of barren mountain or hilly lands have been revegetated, and 1.2565 million ha of mountain slope lands were reserved for new plantations. Totally, 120.242 billion yuan (1 US$=7.28 yuan in 2007. 1 US$=6.82 yuan in May 2010) have been allocated to the beneficiary households and 13.928 billion yuan (US$1.913 billion, at exchange rate 1 US$=7.28 yuan in 2007) have been provided to grass-root level stakeholders as the livelihood subsidiary payment at the project sites (State Forestry Administration 2007). A State Law on Combating Desertification was endorsed by the National Congress and came into force in 2001.

Viet Nam: On 2 May 2007, the Prime Minister of Viet Nam issued the *Viet Nam Forestry Development Strategy 2006-2020*. It is reported that due to unsustainable management and a very high need for conversion of forest land and for forest products for socio-economic development, the forest area and forest quality in Viet Nam have continuously decreased over the years (Government of Viet Nam 2007). From 1995 to 2005, a series of approaches have been adopted to reforest the deforested lands and the forest area had increased from 9.3 million ha in 1995 to 11.31 million ha in 2000, and to 12.61 million ha in 2005. It is certain that more achievements will be accomplished with the effective implementation of this 15-year Strategy, including through the rapid regeneration of natural forests zoned for protection (Government of Viet Nam 2007).

In conclusion, any suitable techniques, sound technologies, good practices and optimum approaches to mitigate DLDD cannot be successful if they are based on weak or impractical policies. Thus, sustainable policies are critical to the success in implementing projects, programmes or initiatives to mitigate DLDD, in both the affected developing and developed countries.

With best regards,

Yang Youlin
Assistant Regional Coordinator and OIC of Asia Regional Coordination Unit
UNCCD Secretariat
UN Building, Bangkok

About the contributor

Yang Youlin is the Assistant Regional Coordinator and OIC of the Asia Regional Coordination Unit of the UNCCD Secretariat, co-hosted by UNESCAP since 2004. He has worked with various organizations, including the National Desert Research Institute, the Chinese Academy of Sciences, the China National Bureau to Combat Desertification and China National Committee for Implementation of UNCCD (CCICCD). From 1994 to 2000 he was the Senior Engineer and Division Director of the China National Bureau to Combat Desertification and the CCICCD, respectively. He was responsible for the implementation of national action programme (NAP) to combat desertification. He was entrusted to assess the operation of national programmes of land degradation rehabilitation and combating desertification, while supervising the China National Research and Development Centre, National Training Centre

and National Monitoring Centre for Combating Desertification. These were financed and operated under the umbrella of the China NAP.

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Thanakvaro De Lopez wrote:

Facilitator's note (Pak Sum Low): Thanakvaro De Lopez shares a unique yet possibly common dilemma of a least developed country like Cambodia, trying to acquire unsuccessfully anaerobic digesters for capturing methane, a strong greenhouse gas, from the wastewater of swine farms and using it as an energy source. The simple greenhouse gas mitigation technology has suffered from repeated setbacks in finding its roots in Cambodia due to the lack of national technical capacity, as well as the small market that does not attract enough external interest, despite the potential Certified Emission Reductions (CERs) that could be generated under the Clean Development Mechanism (CDM). He has drawn the following thought-provoking lessons from this unfortunate experience: "(1) a least developed country, even surrounded by neighbours with the appropriate technology, will face difficulties in transferring even the most simple equipment if there is no well-established national market for it; (2) south-south transfer of technologies may face the same market and institutional barriers as north-south transfer of technologies, and require appropriate government support; and (3) awareness raising of greenhouse gas mitigation technologies is a requisite of technology transfer but not a sufficient condition for laying the foundation of a market."

Dear Network Members,

Anaerobic digesters for swine farms: An experience of technology transfer for greenhouse gas mitigation in Cambodia

Simple proven technologies are not always simple to implement. This short essay aims to share Cambodia's experience in acquiring anaerobic digesters for the treatment of wastewater from swine farms.

As petroleum products were approaching new highs in late 2007, it became imperative for Cambodian swine farms to reduce their expenditures in order to remain competitive with cheaper meat imports from Vietnamese breeders. Swine farm operations are both large consumers of electricity and large emitters of greenhouse gases (CRCD 2006). Electricity is used to keep piglets, especially newborns, constantly warm, thus considerably reducing mortality rates; as well as to power mechanical equipment for the preparation of animal feed. Wastewater from animal enclosures is collected in open air lagoons and ponds, producing significant quantities of methane, a potent greenhouse gas.

A technical solution to this predicament has been known for years and is commonly used throughout the developed and developing worlds. The wastewater ponds are lined and covered with high density polyethylene, which turns them into anaerobic biodigesters. The methane captured from the ponds is cleaned up and combusted in a gas engine to produce electricity, in essence a modified electric generator. Often times, the surplus electricity is sold at a profit to neighbouring communities, contributing to rural electrification and development. The environmental benefits are equally significant in terms of improved water quality and prevention of odours. Turnkey suppliers of such installations are easily found in the yellow pages and business directories of Cambodia's neighbours where there is a plethora of suppliers of the different pieces of the necessary equipment.

As part of its support activities to local project developers, the Cambodian Designated National Authority (DNA) for the Clean Development Mechanism (CDM), and the Cambodian Research Centre for Development (CRCD), a non-governmental organization for sustainable development, attempted to assist Cambodian swine farmers in acquiring methane capture and combustion technologies as well as in drafting Project Design Documents (PDD) for submission as CDM projects. Most Cambodian swine farms had the potential to reduce greenhouse gas emissions in the range of 5,000 to 10,000 tonnes CO_{2eq} a year, putting them below the limit of simplified small-scale methodologies for the CDM. The main interest of local farmers was in the savings in fuel expenditure, while the sale of Certified Emission Reductions (CERs) under the CDM would contribute to the purchase of the necessary equipment.

Although there were several experienced suppliers of gas generators in Cambodia, none had the experience to set up a turnkey installation with a methane capture component such as an anaerobic digester. Thai and Vietnamese suppliers were contacted over the course of six months with little success. Their lack of interest stemmed from the fact that the Cambodian market was estimated to be too small to justify the cost of sales and maintenance operations. In addition, these companies were not able to provide accurate quotes without site visits, which in their opinion, were not justified given the handful of potential buyers in Cambodia. It is likely that had a small group of swine farmers been able to successfully install anaerobic digesters, others may have followed suit, laying the foundation of a market. After a year of dealings, an environmental consultancy firm from the Philippines offered its services, but was equally unable to find interested suppliers. Most of the smaller Cambodian swine farms have since succumbed to market forces and are no longer in operation. It is ironic that the leading Cambodian engineering firm now provides a turnkey service for biogas digesters.

Simple technology such as methane capture from wastewater ponds and combusting for electricity production remains a guarded secret in Cambodia, and a competitive advantage for those businesses with access to it. A few of the larger factories, swine farms and breweries have been able, through their international business connections, to contract the services and purchase the equipment from suppliers outside the country (Samrong Thom Animal Husbandry 2008; Carbon Bridge 2008). However, for the community-and family-based entrepreneurs, these greenhouse gas mitigation technologies, although common place in most of South-East Asia, remain difficult to acquire.

A number of lessons can be learned from Cambodian swine farmers' unfortunate experience in their attempt to acquire greenhouse gas mitigation technologies: (1) a least developed country, even surrounded by neighbours with the appropriate technology, will face difficulties in transferring even the most simple equipment if there is no well-

established national market for it; (2) south-south transfer of technologies may face the same market and institutional barriers as north-south transfer of technologies, and require appropriate government support; and (3) awareness raising of greenhouse gas mitigation technologies is a requisite of technology transfer but not a sufficient condition for laying the foundation of a market.

With best regards,

Thanakvaro De Lopez
Researcher
UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC)
Roskilde, Denmark

About the contributor

Dr. Thanakvaro De Lopez is a Cambodian researcher in climate change and sustainable development at the UNEP Risoe Center, Technical University of Denmark. He holds a Ph.D. from Cambridge and graduate degrees from Oxford, Yale and Paris. He is currently involved in technology needs assessment and the preparation of technology action plans for climate change adaptation and mitigation in South-East Asia. He has recently published academic papers on changing the rules of the Clean Development Mechanism towards simplified procedures for least developed countries and community projects. His interests are in the development aspects of climate change mitigation and adaptation activities.

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Sarwat Chowdhury wrote:
Facilitator's note (Pak Sum Low): Sarwat Chowdhury highlights the particular vulnerability of least developed countries (LDCs) to climate change because they are "least prepared to deal with its impacts", and "hindered by various barriers" in technology transfer, including the "lack of adequate financing, poor institutional structure, lack of capacity to utilize existing financing mechanisms for technology transfer and/or for developing new and innovative technology options". She cites the very few or no Clean Development Mechanism (CDM) projects in these countries as an example. Thus, "capacity development to meet the challenge of climate change (for mitigation and adaptation)", including CDM project development, "is needed both in the public and the private sector", as well as non-governmental organizations (NGOs), so as to facilitate "supportive conditions" "to enable them to develop, deploy, diffuse and transfer" mitigation and adaptation technologies. She also discusses the usefulness of the 'Handbook for Conducting Technology Needs Assessment for Climate Change' developed under the auspices of the Expert Group on Technology Transfer (EGTT) and the associated online tools, Climate TechWiki and TNAssess, that will assist developing countries in assessing technological needs and "taking decisions on prioritized technologies". She concludes that although the "capacity development needs" in the region vary, "special attention should be given" to the LDCs in terms of meeting their needs in both mitigation and adaptation technologies and financing.

Dear Colleagues,

Capacity building for mitigation, technology transfer and financing: Highlighting the least developed countries perspective

The present sub-theme, as it covers three of the four building blocks of the Bali Action Plan, is of particular relevance for the least developed countries (LDCs) of the Asia-Pacific region. While the region covers two of the world's largest economies (China, India), it also hosts multiple middle-income countries and economies in transition. Additionally, all the 14 LDCs in the Asia-Pacific region (*) are particularly vulnerable to climate change and are least prepared to deal with its impacts. In these countries, development, deployment and diffusion of low emission and mitigation and adaptation technologies are hindered by various barriers, which include lack of adequate financing, poor institutional structure, lack of capacity to utilize existing financing mechanisms for technology transfer and/or for developing new and innovative technology options.

As an example, I would like to highlight the Clean Development Mechanism (CDM). According to Kyoto Protocol Article 12, this market-based mechanism was set up to help countries meet the emission targets of Annex I Parties, and to encourage the private sector and developing countries to contribute to emission reduction efforts. However, whether the CDM has been able to become a true "offset mechanism with global reach" and to make the expected contributions to sustainable development remains open to question. According to the CDM project database, as of 18 May 2010, of the 2,594 projects registered so far, only 11 are hosted by the LDCs of the Asia-Pacific region. To illustrate the disparity further, I would like to underscore that one of the most vulnerable countries, Bangladesh, has only two registered projects so far; and another most vulnerable island country, Maldives, has no projects registered at all. This is in contrast to 850 projects registered for China and 507 projects registered for India. This uneven distribution of the CDM projects is known. It is also known that while there is a huge potential for CDM project development in many of the LDCs, the capacity to prepare such projects in many of these countries is very low, and capacity development efforts, in general, lag behind.

I believe capacity development to meet the challenge of climate change (for mitigation and adaptation) is needed both in the public and the private sectors. For example, when considering the CDM, the private/public sector actors that require support include Designated National Authority, other government institutions, private sector and non-governmental organizations (NGOs). An important aspect integral to the capacity development requirement is the need for substantial investment in research and development so that technological innovations can happen. Related to this is the need for sustained efforts to enable strengthening of institutional capacity to accelerate the deployment and diffusion of innovative technologies as well as the existing ones. While the country specific contexts in developing countries may differ in terms of the state of national institutions and private sector capabilities (as clearly seen in the experience with CDM), it is vital that due emphasis is placed on facilitating supportive conditions in least developed countries to enable them to develop, deploy, diffuse and transfer mitigation and adaptation technologies.

The Expert Group on Technology Transfer (EGTT) has emphasized the need for supporting countries not only to adopt "existing environmentally-friendly technologies but also to develop the capacity to innovate new technologies and practices…" (EGTT 2009: 11). It is also becoming clear that the need for familiarizing and prioritizing existing technologies and the potentially innovative ones should be met not only from the mitigation dimension (low-emission technology) but also from the adaptation dimension. From this perspective, useful tools are becoming available to countries. An example of this is the *Handbook for Conducting Technology Needs Assessment for Climate Change* jointly developed by UNDP and UNFCCC Secretariat under the auspices of the EGTT and in cooperation with Climate Technology Initiative (UNDP and UNFCCC 2009). A revised version of this Handbook and its associated tools, Climate TechWiki (an online database with easily accessible, up-to-date and "up-datable" technology descriptions in different sectors and categories), and TNAssess (through an interactive software programme, this tool supports the process of taking decisions on prioritized technologies for mitigation and adaptation in a country and justifies the choices made) are currently being finalized. The revised Handbook will be published soon (**), and along with the support tools, are planned to become available to everyone through a web portal. Such a website can serve as a platform for climate technology resources that facilitate technology choices for development in a changing climate, and can potentially be a very useful resource for countries facing the climate change challenge, especially LDCs.

To sum up, the issues under discussion are undoubtedly very complex. However, I think that it is important to recognize that capacity development needs in terms of climate change varies widely, and this is true even when considered from a regional perspective. Therefore, efforts for meeting those needs in terms of both mitigation and adaptation technologies, as well as financing, should remain cognizant of these varying ranges and special attention should be given to the least developed countries.

Best regards,

Sarwat Chowdhury
Consultant
EEG/BDP
UNDP, New York

Notes

(*) The LDCs in Asia-Pacific are: Afghanistan, Bangladesh, Bhutan, Cambodia, Kiribati, Lao PDR, Maldives, Myanmar, Nepal, Samoa, Solomon Islands, Timor Leste, Tuvalu and Vanuatu.
(**) The revised version will become available online in June 2010.

About the contributor

Sarwat Chowdhury is an 'Energy access, climate change and MDGs consultant' at the Environment & Energy Group, Bureau for Development Policy, UNDP. She is working on the revision of the 'Handbook for conducting technology needs assessment for climate change'. Previously, she worked as a Programme Specialist at Regional Bureau for Asia and the Pacific at UNDP, NY. For the last ten years, she has been working on climate change, energy and disaster management issues for international organizations including DfID, UNDP, GEF/UNDP, the World Bank and NGOs such as Grameen Bank, Greenpeace and SciDev.net. She was the Task Manager of a World Bank report on Climate Change Adaptation in Bangladesh during 1999-2000. Her Ph.D. thesis from University of Maryland (2003) focused on renewable energy development in rural Bangladesh.

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4. Closing Message

Dear Network Members,

All of the ten contributions received for this sub-theme covered very important aspects of climate change mitigation in developing countries in Asia, and the role of financing and technology development in these activities. I would like to thank the following: Massimo Tavoni; K. Madhava Sarma; Lu Qi; Gørild Heggelund, Andrea De Angelis and Inga

Fritzen Buan (joint contribution); Kishan Khoday; Pak Sum Low; Keith Openshaw; Yang Youlin; Thanakvaro De Lopez; and Sarwat Chowdhury, for their contributions.

Many contributions underlined the crucial role of technology in climate change mitigation. **K. Madhava Sarma** shared the valuable experience on technology development and transfer in the Montreal Protocol on the phase-out of ozone-depleting substances, and offered areas that might be explored further for climate change mitigation. **Massimo Tavoni** also focused on the need for increased research and development in technology, both for present and innovative future technologies, for climate change. Citing the case of Cambodia, **Thanakvaro De Lopez** gave an analysis of the difficulties faced by small developing countries in acquiring the necessary technology for the implementation of mitigation actions. The importance of technology for the pursuit of a low-carbon economy, especially in China, was also the focus of the contribution from **Gørild Heggelund, Andrea De Angelis and Inga Fritzen Buan**. All contributions touched on financing as crucial for whole spectrum of technology, from research and development, to diffusion, deployment and transfer.

I note, however, that the big advantage of the Montreal Protocol is the dedicated fund, the Multilateral Fund (MLF), which is focused on the objective of the Montreal Protocol and through which development and transfer of technology is financed. Climate change financing, on the other hand, is mainly channelled through what is known as voluntary donor institutions comprised of multilateral financing institutions, regional development banks and bilateral aid agencies, considered to be outside of the framework of the financial mechanism of the United Nations Framework Convention on Climate Change (UNFCCC). Very little progress has been made both on the ground and in the discussions on the implementation of developed countries' commitments on technology development and transfer in the UNFCCC, including in the current negotiations. Studies have also shown that little or no technology transfer has taken place through the Clean Development Mechanism (CDM).

The contributions by **Yang Youlin** and **Lu Qi** showed that much is being done for mitigation in Asian developing countries, in China in particular, through policies and programmes on sustainable land management. These demonstrated that developing countries are undertaking mitigation actions, even without the financing and technology resources from developed countries, but that they could do much more if these legal obligations would be met under the UNFCCC. These two contributions also underlined the co-benefits that are derived from climate change mitigation activities, in terms of providing better livelihoods for the people, and preserving biological diversity.

Kishan Khoday's analysis of the impacts on global trade of national mitigation policies was a focus of the current negotiations because of the economic and social consequences of response measures to climate change. Article 3.5 of the Convention, taken from the Rio principles, stipulates that "measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade" (United Nations 1992). The danger exists not only in the projected legislation in the United States, but also in Western Europe, especially France. This illustrates that policy responses to address climate change and its adverse effects should be dictated not by economic interests alone.

Least developed countries (LDCs), as demonstrated by **Sarwat Chowdhury**, face many difficulties in taking mitigation actions. It is for this reason that, in the climate change negotiations, developing countries have taken the position that there must be a balanced consideration of adaptation and mitigation, in particular for financing. It is indeed true that LDCs have little project activities under the CDM. This is also because many LDCs, especially in Africa, are sinks instead of sources of greenhouse gas emissions. The recognition that many developing countries, especially LDCs and small island countries, have little mitigation capabilities is the main reason that the Adaptation Fund was set up under the CDM in the Kyoto Protocol. The Adaptation Fund, mainly financed through shares of certified emission reductions (CERs) under the CDM, is a solidarity fund through which the developing countries that have CDM projects share the benefits derived from these projects with other developing countries. Furthermore, the CERs are added to the assigned amount of developed countries which means that whatever is reduced in developing countries can be emitted by developed countries, and therefore have no direct climate benefits. The CDM is only beneficial for emission reduction if the project activities assist developing countries in their pursuit of sustainable development, or a low-emission pathway to growth.

In this regard, developing countries refer to a low-emission growth, rather than merely to low-carbon development that covers only reductions in carbon dioxide emissions. Many developing countries in Asia have a large amount of emissions coming from agriculture, in particular rice production, and need to address these emissions as well.

Keith Openshaw's contribution on the detrimental effects of unrestricted population growth on development in general and climate change mitigation in particular made valid arguments. A sustainable population policy in developing countries would, however, need to be accompanied by other sustainable development objectives. It has been shown that empowerment of women, education and the availability of basic services are also powerful "contraceptives". **Pak Sum Low**'s important contribution on the need for equity in the consideration of mitigation actions in terms of changes in consumption lifestyles, given the poverty in developing countries struck the right note, and went to the heart of the need for climate change responses.

The UNFCCC has stipulated that all countries shall "protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities" as its first principle. "Accordingly", it continues, "the developed country Parties should take the lead in combating climate change and the adverse effects thereof".

Both in mitigation and adaptation, therefore, developed countries should lead. This means of course that developing countries will follow that lead, but that the extent to which this is done is determined by the implementation of obligations for the provision of financial resources and transfer of technology to developing countries. Moreover, the Convention provides that the commitments for emissions reductions by developed countries "will demonstrate that developed countries are taking the lead in modifying longer-term trends in anthropogenic emissions…" (Article 4.2), that is in production and consumption lifestyles. On the other hand, the Convention also recognizes that "… economic and social development and poverty eradication are the first and overriding priorities of the developing country Parties…" (Article 4.7).

I wish to thank all the contributors for enriching these discussions and for providing concrete examples of mitigation activities of developing countries and how they can further be pursued.

With best regards,

Bernarditas Muller
AP-HDNet Facilitator

Reference

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Sub-theme 6

Research, Education, Training and Public Awareness

1. Opening Message

Dear Network Members,

The sub-theme for the next three weeks will focus on issues relating to climate change research, education, training and public awareness, especially from the perspective of human development. While research in both physical and social sciences (including economics) will provide the basis for learned policy-and decision-making, education and training will enhance the human and institutional capacity. Raising public awareness is essential to empower all stakeholders so that actions for change can be taken, both individually and collectively, if the world community is going to achieve the ultimate objective of the UN Framework Convention on Climate Change (UNFCCC) (*) (United Nations 1992).

Let us recall the following articles of the Convention that are relevant to the above issues, especially Articles 4.1 (g) and (i) and Articles 5 and 6.

Article 4.1 of the UNFCCC has committed all Parties, *"taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances"* to:

- *Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies (Article 4.1 (g));*

- *Promote and cooperate in education, training and public awareness related to climate change and encourage the widest participation in this process, including that of non-governmental organizations (Article 4.1 (i)).*

The above provisions have been further elaborated in Article 5 (RESEARCH AND SYSTEMATIC OBSERVATION) and Article 6 (EDUCATION, TRAINING AND PUBLIC AWARENESS) of the Convention.

Article 5 provides that *"In carrying out their commitments under Article 4, paragraph 1 (g), the Parties shall:*

(a) Support and further develop, as appropriate, international and intergovernmental programmes and networks or organizations aimed at defining, conducting, assessing and financing research, data collection and systematic observation, taking into account the need to minimize duplication of effort;

(b) Support international and intergovernmental efforts to strengthen systematic observation and national scientific and technical research capacities and capabilities, particularly in developing countries, and to promote access to, and the exchange of, data and analyses thereof obtained from areas beyond national jurisdiction; and

(c) Take into account the particular concerns and needs of developing countries and cooperate in improving their endogenous capacities and capabilities to participate in the efforts referred to in subparagraphs (a) and (b) above."

And Article 6 provides that *"In carrying out their commitments under Article 4, paragraph 1 (i), the Parties shall:*

(a) Promote and facilitate at the national and, as appropriate, subregional and regional levels, and in accordance with national laws and regulations, and within their respective capacities:

(i) the development and implementation of educational and public awareness programmes on climate change and its effects;

(ii) public access to information on climate change and its effects;

(iii) public participation in addressing climate change and its effects and developing adequate responses; and

(iv) training of scientific, technical and managerial personnel;

(b) Cooperate in and promote, at the international level, and, where appropriate, using existing bodies:

(i) the development and exchange of educational and public awareness material on climate change and its effects; and

(ii) the development and implementation of education and training programmes, including the strengthening of national institutions and the exchange or secondment of personnel to train experts in this field, in particular for developing countries."

Thus, for the purpose of this sub-theme, any contributions relating to the above articles, such as the following, will be most welcomed:

- **Research and systematic observation:** Any new scientific research findings, including methodologies; temperature and precipitation trends; melting of mountain glaciers and associated formation of glacial lakes in some Asian countries; coastal sea-level rise; national or regional climate modelling; uncertainties estimation; trends in frequency and intensity of tropical cyclones; possible influence of El Niño and La Niña on the frequency and intensity of tropical cyclones; ecosystems assessment, such as the phenological changes in plants and animals (e.g., how will the various local ecosystems in the Asia-Pacific region respond to a 2.0°C temperature rise adopted in Copenhagen Accord?); endogenous knowledge; and financing;

- **Education and training or capacity-building programmes and activities** in various aspects relating to climate change (e.g., scientific research; greenhouse gases inventory; mitigation; vulnerability assessment; adaptation; technology transfer; and financing), including school and tertiary curriculum on climate change; subregional and regional cooperation, including South-South cooperation; and

- **Public awareness programmes and activities,** including available human and financial resources (**); methodologies and tools; networking; sharing of data and information; conducting campaigns; case studies and good practices at national, subregional, regional and international levels, especially those relevant to human development and sustainable development in the Asia-Pacific region.

While recognizing the great efforts made by the national governments in the Asia-Pacific region on all the above-mentioned issues, especially the developing and least developed countries, despite their limited human and financial resources, as reflected in their national communications, it seems that a large amount of work undertaken by the national and international NGOs at the country-level have not been reported in the national communications. We hope that this e-forum will provide a platform for the NGOs, especially the national NGOs, to share their unique experiences and lessons learned with a wider audience, as called for by Article 4.1 (i) mentioned above.

Apart from the NGOs, we also warmly welcome contributions from the private sector regarding its research, education, training and public awareness efforts relating to climate change in the Asia-Pacific region, either individually or through public-private partnership.

We look forward to receiving your valuable contributions on this sub-theme, and to another useful and lively discussion in the next three weeks.

With best wishes,

Pak Sum Low
AP-HDNet Facilitator

Notes

(*) Article 2 (OBJECTIVE) of the Convention stipulates that *"The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."*
(**) Under the national communication projects of developing and least developed countries, available funds for supporting public awareness activities are very limited.

Reference

United Nations. 1992. *United Nations Framework Convention on Climate Change.* FCCC/INFORMAL/84. GE.05-62220 (E) 200705. [http://unfccc.int/resource/docs/convkp/conveng.pdf]. Last accessed on 24 May 2010.

2. Contributions

The following authors, with their respective contributions, helped to enrich the discussion on the sub-theme *Research, Education, Training and Public Awareness:*

Prathivadi Bhayankaram Anand, *A social science perspective on researching climate change*
Trevor Booth, *Marine climate change in Australia*
Sukthawee Suwannachairop, *Why should we not establish the truth about climate change too conveniently?*
Purba H. Rao, *Climate change initiatives and SMEs … a perspective from Kolkata area*
Michele Martin, *Climate change education and awareness: Experiences from the Seychelles Islands*
Paula Pons and Binoy K. Choudhury, *Energy security, education and public awareness*
Elena Borsatti, *Knowledge, attitudes and behaviour to combat climate change*
Va Dany, *Role of vulnerability assessment in adaptation process and a Cambodian study*
Chew-Hung Chang, *Education for Climate Change (ECC) – Four questions to think about*
Linda Too, *Nurturing eco-sensitive building occupants – A green marketing perspective*
Kishan Khoday, *Gold, silver, bronze … and green: The 2008 Beijing Olympics and environmental awareness*
Stephanie Hodge and Suchitra Sugar, *Inequities and barriers to sustainable development exacerbated by climate change: A role for quality education*
Tim Taylor, *Research, education, training and public awareness: A comment*
Ruwanthi Senarathne, *How and why ecological footprint can be used to increase awareness about climate change*

3. Online Discussion

Prathivadi Bhayankaram Anand wrote:
Facilitator's note (Pak Sum Low): Prathivadi Bhayankaram Anand highlights six important issues relating to climate change research: (i) the need for the social science input, especially governance; (ii) "large numbers bias" may lead to "anything that cannot be measured gets sidelined or ignored"; (iii) "the ethical and normative issues", including "equity and common but differentiated responsibilities" and "who should bear the cost of adaptation to climate change"; (iv) "How to engage wider public and how to use deliberative public reasoning for policymaking"; (v) the need for "maintaining an approach of critical scrutiny"; and (vi) the need to prioritize mitigation and adaptation measures due to scarce resources in developing countries and to avoid "incorrect priorities". His work in Mongolia seems to suggest that "there is considerable level of awareness about climate change issues, though some of this could have been a result of priority given to certain issues by the media". Further work will be undertaken in this area.

Dear Network Members,

A social science perspective on researching climate change

It is easy for discussions on research to focus mainly on the 'research what' question identifying an agenda for research. Here, I would like to take a slightly different perspective, step back a little bit and argue that we need to also ask 'research how'.

There are six main issues with regard to researching climate change and, in my view, a Human Development Report (HDR) can make a significant difference on all six of these:

(i) Even as physical science provides the dominant discourse on climate change, how to develop a comparable and robust social science discourse on climate change? While we do need to focus on impacts, vulnerability, or economic justification for decisive actions now, there is also a need to examine governance issues.

(ii) In trying to goad a reluctant audience, the Intergovernmental Panel for Climate Change (IPCC) assessment reports and other mainstream literature have tended to use large numbers to emphasize the urgency to act. This creates a 'large numbers bias'-and triggers a search for ever more convincing numbers (e.g., of people to be affected, square kilometres of land, cubic metres of water, and so on). This bias also leads to the trap of hyperbole to justify policy discussions. As a consequence of 'large numbers bias', anything that cannot be measured gets sidelined or ignored.

(iii) The positive aspects of what should we do about climate change cannot be divorced from the ethical and normative issues of who ought to do it, especially in social sciences. These would include how to interpret 'equity and common but differentiated responsibilities' and who should bear the cost of adaptation to climate change. Similarly, the issue concerning definition of responsibility and moral obligations needs to be clarified.

(iv) How to engage wider public and how to use deliberative public reasoning for policymaking is also an issue.

(v) Another issue concerns the need for maintaining an approach of critical scrutiny. However, in a polarised situation, there is a real risk that anyone expressing critical opinions is tarnished as being a 'climate sceptic'.

(vi) There is a north-south divide of sorts in priority given to mitigation vs. adaptation issues. Mitigation, such as "becoming carbon neutral", is a priority in the developed countries while adaptation is a priority for developing countries. However, mitigation measures have greater visibility and are easier to implement. Also there is a risk that these become the pet themes of educated urban elite who inadvertently become champions of such measures which, they see from their travels to developed world, being implemented there. There is a need to develop ways of prioritizing to avoid spreading scarce resources either too thin or on incorrect priorities which look great but have little real impact.

On public awareness, our current work on Mongolia's National Human Development Report (NHDR) suggests that there is considerable level of awareness about climate change issues, though some of this could have been a result of priority given to certain issues by the media. We are exploring ways to pursue these through qualitative methods and are always eager to learn.

With best regards,

Dr. Prathivadi Bhayankaram Anand
Principal International Consultant to Mongolia NHDR

About the contributor

Dr. Prathivadi Bhayankaram Anand is Reader in Environmental Economics and Public Policy at the University of Bradford, UK. Anand's research focuses on examining environmental issues from a human development perspective. His work on applying capability approach to issues concerning access to water in southern India is reported in his papers published in Journal of International Development and Journal of Human Development and his book titled *'Scarcity, entitlements and the economics of water in developing countries'.* His professional experience includes work on local governance in India, and improving public investment appraisal process in Ethiopia, Nigeria, and the Caribbean. He has also conducted grass root level surveys for understanding social and economic aspects of well-being of citizens in Khorog in the Pamirs in Tajikistan.

Trevor Booth wrote:
Facilitator's note (Pak Sum Low): Trevor Booth highlights the development of a Marine Climate Change Report Card, "the first-ever Australian benchmark of climate change impacts on marine ecosystems", which was inspired by the UK Marine Climate Change Impacts Report Card. The preparation of the Report Card was coordinated by CSIRO's Climate Adaptation Flagship project team and involved contributions from 70 scientists from various research institutions. It aimed to "(i) build an information base and consolidate evidence of observed and expected marine climate change impacts in Australia, (ii) transfer this information in an efficient and user-friendly form, and (iii) identify information gaps and focus adaptation efforts". The Report Card "has been an inexpensive, inclusive, and highly successful tool for climate change scientists to reach out to those Australians interested in the marine environment in

a format that provided balanced and reliable reporting of climate change". Its great success is reflected by the fact that currently it is being used "as a template for a similar Report Card for Australian terrestrial environments and sectors". Other Asia-Pacific countries may learn from this experience and adapt the template in accordance with their national circumstances, including the development of communication programmes to convey relevant messages to a broad audience, such as through websites for sharing of information and experience.

Dear Network Members,

Marine climate change in Australia

The following paragraphs describe the development of a Marine Climate Change Report Card for Australia. This summarises current knowledge of marine climate change impacts for Australia, highlighting key knowledge gaps and outlining adaptation responses. The Report Card exists as a hardcopy three double-sided A4 page foldout, a website, and a 289 page book for libraries. The hardcopy version is written in plain English suitable for the general public, while the website and book provide access to state-of-the-art knowledge about climate change and marine systems. The preparation of the Report Card was coordinated by a three-person project team from the Commonwealth Scientific and Industrial Research Organisation's (CSIRO) Climate Adaptation Flagship. Contributions came from 70 authors from 35 universities and organizations across Australia.

Background

In December 2008, CSIRO and the Department of Climate Change held an international symposium *'In Hot Water'* to consider options available to Australian science to inform Government, resource managers and the marine community of the range of observed and potential impacts of climate change on Australia's marine environment.

Evidence from the workshop showed convincingly that the marine environment was responding to climate change. Key concerns included waters around Australia becoming warmer and more acidic, increases in strengths of major warm-water currents such as the East Australian current (made famous in the movie *Finding Nemo*), changes in the productivity of marine ecosystems, and shifts in the distribution and abundance of species. On both sides of the continent, there was clear evidence of ocean warming. This was a message that needed to be disseminated to the Australian public. Australia is a maritime nation with over 90 per cent of its population living within 120 km of the coast and Australian waters generate considerable economic wealth through important industries such as tourism, shipping, fisheries and aquaculture.

For some time, a core group of marine scientists had been building an understanding of these impacts, gathering evidence and presenting their findings to colleagues and industry. They built on a shared concern and real interest in the science and options for adaptation, and the increasing number of scientific publications being produced. The Department of Climate Change sought several reviews of literature around which it could shape a response to the issue. The result was a report - *Implications of Climate Change for Australian Fisheries and Aquaculture: A preliminary assessment* (Hobday *et al.* 2008). This review identified that there were already significant climate change impacts on the biological, economic, and social aspects of Australian commercial and recreational fisheries and found that there is little consolidated knowledge of the potential impacts of climate change. Both positive and negative impacts could be expected. The report noted the need for fisheries and aquaculture management policies to enhance the resilience of marine biodiversity and the adaptive capacity of the fisheries and aquaculture industries.

A communication programme was required to convey all these messages to a broad audience – resource and environmental managers, the professional and recreational fishing communities, marine user groups, scientists, schools and the public. Inspired by the UK Marine Climate Change Impacts Report Card (www.mccip.org.uk), the Australian Report Card on impacts of marine climate change and options for adaptation was developed. In November 2009 the Report Card became the first-ever Australian benchmark of climate change impacts on marine ecosystems. Led by a three-person CSIRO Climate Adaptation Flagship project team, the research group included 70 scientists from Australian universities, State and territory environmental agencies, the Australian Institute of Marine Science, Bureau of Meteorology and CSIRO.

With growing public scepticism about climate change and the need for a concise, clearly understood and measured message, only by bringing together a broad and extensive team and the right mix of communication tools the public and Government can be confident that the information is robust and balanced.

Specific objectives of the Report Card were to: (i) build an information base and consolidate evidence of observed and expected marine climate change impacts in Australia; (ii) transfer this information in an efficient and user-friendly form; and (iii) identify information gaps and focus adaptation efforts. It highlights, for all marine community users and managers, observations of impacts on 17 species groups and climate variables over the past decade, projecting forward to 2030 and 2100 with assessments of likely status. It then offers adaptation responses that can inform policymakers.

National print and electronic media coverage focused through the specially-created website (www.oceanclimatechange.org.au), and carried messages reaching target audiences through professional associations (i.e., the Australian Marine Sciences Association) and environmental and marine adaptation networks. All detailed information behind the summary Report Card was made available on the website, which has received 276,443 hits and 9,187 unique visits (27 November 2009-7 May 2010).

Of the website, one science blog wrote: "Whilst the majority of the information presented on the website is available in various scientific papers, having it all combined on a common site, and in plain English is a real leap forward in making marine issues accessible to the public" and described it as an "A-plus for marine scientists" (McLeod 2004).

The Report Card has been an inexpensive, inclusive, and highly successful tool for climate change scientists to reach out to those Australians interested in the marine environment in a format that provided balanced and reliable reporting of climate change.

The success of the marine Report Card has been noted in other sectors. It is being used as a template for a similar Report Card for Australian terrestrial environments and sectors with some of the marine project team contributing to the development of the terrestrial card. Running these projects in tandem should enhance the communication of all aspects of climate change to the Australian public.

Regards,

Trevor H. Booth
Theme Leader
Managing Species and Natural Ecosystems
CSIRO Climate Adaptation Flagship
Clayton South VIC, Australia

Note

The main part of the description of the Report Card presented here was prepared by the Project Team (Elvira Poloczanska, Anthony Richardson and Alistair Hobday working with Craig Macaulay, Communications & Information Officer, CSIRO Marine and Atmospheric Research, Hobart). For more information please contact: Elvira.Poloczanska@csiro.au

About the contributor

Dr. Trevor H. Booth leads the 'Managing Species and Natural Ecosystems' research theme in the Climate Adaptation Flagship. This aims to protect Australia's marine and terrestrial species and ecosystems from the impacts of climate change by developing adaptation options that will minimize climate-related species loss. (For more information see www.csiro.au/people/Trevor.Booth.html).

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Sukthawee Suwannachairop wrote:

Facilitator's note (Pak Sum Low): Sukthawee Suwannachairop cautions that adaptation to climate change in the Mekong basin should not be biased to urban areas and cities and ignore "most of the affected communities" in the rural areas. He also cautions not to be too "obsessive" with computer modelling and ignore the participation and the empowerment of communities, which are rich in traditional knowledge, skills and cultures. Thus, he proposes two approaches to reverse the above trends: (1) promotion of community-led participatory research, such as the "villagers' research", which "must be supported, funded, and disseminated", and "through this empowerment process", the villagers "would then become the excellent advocates" in various events, forums, and stakeholder consultation meetings; and (2) supporting a constructive and functioning Track III diplomacy, such as to provide the NGOs with "parallel meeting where climate change adaptation issues can be discussed openly and the marginalized groups can make their voice heard", as in the case in Bali in 2007. These two approaches are complementary to each other. He sees "the importance of policy advocacy" that "targets structural changes", and hence "a more participatory and empowering approach" rather than "over-emphasis on pure science-oriented mentality" is needed, especially in vulnerability and adaptation assessment, as well as in the implementation of adaptation activities. The Facilitator notes that whatever the approach and process adopted for vulnerability and adaptation assessment, they still need to be science-based, and the findings must be peer-reviewed.

Dear Network Members,

Why should we not establish the truth about climate change too conveniently? (*)

Since 2008, we are witnessing the dramatic proliferation of climate change-related efforts in the Mekong region where high profile organizations are proposing various projects to deal with this hot and lucrative issue.

Although many types of climate change activities are carried out, I find a similar trend for all of them: centralization and technocratization of environmental conservation and livelihood improvement works under the climate change and adaptation themes.

According to the Mekong River Commission's report (2009), the countries of the Lower Mekong Basin (LMB) are recognized as among the most vulnerable to climate change in the world. Their economies, ecosystem sustainability and social harmony are at risk.

Notably, most of the affected communities are not living in the urban and modernized cities; they are living in rural areas rich in cultural and traditional ways of life. Under globalization, where the concept of modernity permeates every aspect of life, traditional knowledge, skills, and, ultimately, worldview could be seen as incompetent and backward.

Empty participatory process

At some project sites in Lao PDR, where international organizations, non-governmental organizations (NGOs), UN and government agencies are implementing "adaptation" projects, communities and local authorities are systematically being disempowered through the "distorted" practice of participatory process. In various adaptation workshops, although being invited, villagers and local government officers are constantly reminded that the climate change impact assessment and the adaptation option selection process are highly technical processes and what they can do in this "participatory" activity is simply to provide information that the specialists may need for their reports.

This is a disturbing phenomenon, which is in contrast to the progressive trend of many NGOs and UN agencies' efforts to ensure sustainability of the projects and increase the communities' sense of ownership. Empowerment is also promoted by recognizing and respecting the importance and contribution of their traditions and cultures. At the same time, however, communities are equipped with skills in livelihoods improvement that aim at increasing income, conserving the surrounding environment, and reducing social problems.

According to the MRC Secretariat's Chief Executive Officer, Jeremy Bird, no-one knows exactly how rising world temperatures will impact on the Mekong basin. The absence of information on climate change vulnerability within countries and across various classes of societies is a major cause of concern. To Bird, "By improving the knowledge on the potential impacts, it will be possible to increase the ability to help the people of the region with capacity to confront such impacts" (MRC 2009).

Obsession with modelling

Everyone seems to agree that scientific research on climate change and its impacts is vital to the effort to deal with the issue. In response, international organizations employ modelling techniques as means to project climate change impact scenario. I agree that research is crucial, but, in my opinion, we must not solely focus on this computer generated document too obsessively. Time and again, critical academics and the civil society point out that the inherent simplification aspect of models and the richness and diversity of living nature always create debates on how to interpret ecological and social complexities adequately.

We should avoid creating a perception that climate change impact assessment and adaptation options selection process are highly technical and only qualified modellers are good enough to tell us how we should respond to climate change. Instead, initially, I would propose at least two ideas as possible means to reverse the trend:

- **Promoting community-led participatory research:** Community-led participatory research such as Vijai Tai Baan (villagers' research) or Sala Pum (the Cambodia version of Tai Baan) (**) must be supported, funded, and disseminated. Also, researchers, especially from the community, should be supported to present their findings at local, national, regional, or international venues.

  Possible research that would take the strategic advantage of the community include review of local adaptation experiences and knowledge, adaptation actions, sex disaggregated data collection on vulnerability to climate change, etc. Ultimately, through this empowerment process of participatory research, the villagers who have participated in the project would then become the excellent advocates. They should be invited and supported to participate in events, forums, and stakeholder consultation meetings.

- **Supporting a constructive and functioning Track III diplomacy:** We should initiate and seek to support the arrangement of constructive Track III (***) exchanges such as the NGOs organized parallel meeting where climate change adaptation issues can be discussed openly and the marginalized groups can make their voice heard. For example, at the climate change parallel meeting in Bali, civil societies from around the world gathered to discuss reducing emissions from deforestation and forest degradation in developing countries (REDD) and Clean Development Mechanism (CDM) in a critical and constructive manner and raise awareness of the issues to the public.

As Phillip Hirsch, Director of the Australian Mekong Resource Centre at the University of Sydney, puts it, "The politics of science versus indigenous research is thus based not only on the quality or reliability of information, but also on questions of ownership" (Hirsch 2004).

I see the importance of policy advocacy which also targets structural changes. In my view, these two levels of work are not separated but intertwined and must be implemented in collaboration to improve effectiveness. In terms of climate change, any organization that implements policy advocacy must aspire to empower and mobilize groups of people who are affected by climate change to raise their voice and be active as agents for social change, not merely doing it on their behalf.

Clearly, many aspects of climate change knowledge findings require scientific expertise but it is not sufficient. Over-emphasis on pure science-oriented mentality can lead to unwanted consequences as I have described. Therefore, I propose that a more participatory and empowering approach are employed as well, especially in the field of vulnerability assessment, study of adaptation options, and implementation of adaptation activities.

With best regards,

Sukthawee Suwannachairop
Climate Change and Adaptation Initiative Communication Officer
Mekong River Commission
Vientiane, Lao PDR

Notes

(*) The views expressed in this contribution are those of the author in his personal capacity.
(**) Tai Bann means villagers in Thai-northeast dialect (Lao). The name of villagers' research in Thai/Lao is Vijai Tai Bann. Vijai means research. Sala Pum means village school in Khmer. It is what the villagers' research work is called in Cambodia.
(***) Track III diplomacy is essentially "people to people" diplomacy undertaken by both individuals and private groups from non-governmental international organizations that are dedicated to promoting specific causes and enacting systematic social change. This type of diplomacy often involves organizing meetings and conferences, generating media exposure, and political and legal advocacy for people and communities who are largely marginalized from political power centres.

About the contributor

Sukthawee Suwannachairop was a visiting scholar at the University of North Carolina at Chapel Hill's Department of Anthropology and holds an Advanced Master Degree in International Studies from the University of Queensland. He has been working with the Mekong River Commission (MRC) as Climate Change and Adaptation Initiative Communication Officer since October 2009. Before joining the MRC, he worked with Sathirakoses-Nagapradipa Foundation as Coordinator of Community Development and Capacity-Building Project in Lao PDR (2007-2009), La Universidad Americana (Nicaragua) as Lecturer in Peace and Conflict Resolution (2006-2007), NHK as Researcher and Correspondent (2003-2004), Consortium (USAID, World Education) as Trainer at the Thai-Burma border refugee camps (2002-2003), and served as a consultant, freelance, and contributor for various organizations (i.e., WWF, Wall Street Journal, Pacarayasara magazine, Krungthep Thurakit, ITV, etc.).

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Purba H. Rao wrote:

Facilitator's note (Pak Sum Low): Purba H. Rao informs a sample survey of company executives/managers that she conducted in Kolkata area last year to assess their awareness on the impacts of climate change, and found that these executives/managers were particularly concerned about the health impacts of climate change. Although the "hundreds and thousands" of small and medium enterprises (SMEs) and entrepreneurs were also "aware of the climate change and its impacts", they "thought that the climate friendly initiatives were only for large companies that could afford them". These SMEs seem to have been left out in getting "climate friendly" projects due to the lack of funding, intensive capital, manpower and technical know-how. She proposes two ways to overcome this dilemma: (1) Let the large corporations show the way through forums and expertise advice by enabling the SMEs to follow their examples, so that "when the large corporations grow", "they can bring along with them multitudes of SMEs in the path of climate change mitigation". She terms this "inclusive growth to sustainability"; and (2) Green supply chain management, which has been practised elsewhere (e.g., Nestle company in the Philippines, which holds "regular awareness seminars for their suppliers and business partners, help them to go green and even send company experts to visit the supplier premises and provide advice."). If the above model can be adopted, then "the SME sector would turn green" and become "climate friendly within a short span of time."

Dear Network Members,

Climate change initiatives and SMEs … a perspective from Kolkata area

As it is well known, in recent times, there has been a very real concern over the adverse impacts of climate change all over the world. Not only does one come across conferences, seminars and policy forums on climate change, and the ways and means as how to mitigate its inevitable adverse effects, but one also encounters newspaper advertisements and TV commercials on corporations dedicated to minimize the emission of greenhouse gases (GHGs), climate friendly funding possibilities and energy companies going green.

All these initiatives bring back hope that, yes, the world is indeed taking steps to minimize the climate change impacts.

Last year, I was engaged in an empirical research to assess the awareness to climate change impacts, such as the various initiatives that one can take at the individual and at the corporate levels; the extent of propensity to personally start using solar energy, reducing gasoline use, and using GHG-free items, and to invest in climate change funds and donate to climate change movements. We took a sample of company executives/managers in Kolkata area, and obtained their perspectives.

Upon conducting statistical analysis, we concluded that: (1) managers were aware of climate change; and (2) out of awareness to different types of climate change impacts, it is indeed the impact on health which would significantly impel managers to take up initiatives at the personal level.

However, while doing the research I realized that the above findings were fine from the perspective of managers in large and well-established corporations.

But in India most of the manufacturing and service delivery of all kinds and, generally, business at large, are carried out by not large and well-established corporations but by small and medium enterprises (SMEs) and entrepreneurs. In Kolkata area there are only a handful of large companies, while there are hundreds and thousands of SMEs (e.g., leather processing, tanneries, metal working, manufacturing of electrical appliances, textile companies, cosmetic producing companies, soap and detergent companies, food producers of various types, packaging companies, paper producing companies, publishing works, auto parts manufacturers, etc.).

Some of them are suppliers to large and medium companies, while others have their own sales outlets and their own clientele. Most have a continuous shortage of funds and they think of nothing else in business but the return on investment (ROI).

While doing our empirical research for large companies, on the side I did manage to talk to some of the SMEs, generally asking about their business and about climate change.

Most of them told me that business was really down (this was 2009). Many finalized orders were cancelled. They were aware of climate change and its impacts, but they thought that the climate friendly initiatives were only for large companies that could afford them. They knew the world was in danger of going through climate change, but what could they do? All climate friendly projects were capital intensive, required extensive funding, manpower and technical know-how.

If they had to use emission-free production processes, who would fund them? And what was the point in doing such a thing because their customers were not looking for suppliers to have emission-free processes. They generally felt that to do anything to address climate change was not their business at all, and nobody was telling them to do such a thing and nobody would be interested in helping them anyway.

Listening to them I felt that what they were saying was actually true. While we see conferences and seminars and TV commercials and newspaper advertisements on climate change, they all appear to be too big-time, not feasible and achievable at the SME level. But then, it is the SMEs which are, and will be, carrying out manufacturing and service delivery in Asia in the next decade. And together they will emit a large amount of GHGs.

So what can we do? I think we can do the following:

(1) *Inclusive growth to sustainability*

Nowadays we often hear the phrase "inclusive growth". In the context of climate change, this means we request the large corporations in Kolkata area together to set up regular forums which will have (a) a pool of funds from all of them put together; (b) a team of climate change experts to guide the SMEs to go for GHG-free processes; (c) regular members/employees from the corporations supervise and monitor progress.

It may not be too difficult to set up such a forum because many large companies in Kolkata are aware of climate change and they are incorporating such initiatives in their processes. For instance, a new hotel in Kolkata called "Sonar" has made their entire operations green and GHG-free.

So someone needs to talk to all such enlightened corporations to develop such forums and then identify and start helping the SMEs.

Thus, when the large corporations grow, and may they grow, they can bring along with them multitudes of SMEs in the path of climate change mitigation.

This is what I would term as "inclusive growth to sustainability".

(2) *Green supply chain management with the climate change context*

In green supply chain management, we would look at company operations, such as a large organization, in terms of (a) inbound logistics; (b) production; (c) outbound logistics; and (d) reverse logistics. In each of these phases the company has suppliers, business partners, waste handlers, distributors, retailers, re-manufacturers and other service providers, all of whom are usually SMEs, involved with its operations. Such a large company usually has some influence on all of these business partners. So, if the company demands all such business partners to go for green operations, it may work.

I have seen the green supply chain concept working wonderfully at the Nestle company in the Philippines. This company holds regular awareness seminars for their suppliers and business partners, helps them to go green and even sends company experts to visit the supplier premises and provide advice.

I think we can somehow make the large corporations in Kolkata area to adopt this model and start the climate friendly initiatives for all of their SME suppliers and business partners.

If all companies do their share in this process, the SME sector would turn green and become climate friendly within a short span of time.

With best regards,

Purba H. Rao
Adjunct Professor
Calcutta Business School
Bishnupur, West Bengal, India

About the contributor

Over the last 20 years Dr. Purba H. Rao taught at the Asian Institute of Management (AIM), Manila, Philippines. In January 2009 she took voluntary retirement from AIM, and started teaching as visiting professor in two schools in India: (a) Calcutta Business School, teaching Marketing Research and Advanced Marketing Research; and (b) Great Lakes Institute of Management, Chennai, teaching "Business Analytics". She has done extensive research and published various papers in International refereed journals. The most recent publication (2010), co-authored with Dr. Indrani R. Halady, is "Does awareness to climate change lead to behavioral change?" *International Journal of Climate Change Strategies and Management* 2 (1): 6-22.

Dr. Purba Rao is a Fellow in Management (equivalent to Doctorate) from the Indian Institute of Management, Calcutta. She also has a Master's degree in Applied Mathematics from University of Calcutta and Bachelor's degree in Mathematics (honours) from Presidency College Calcutta.

Michele Martin wrote:
Facilitator's note (Pak Sum Low): Michele Martin shares the successful experience of the public awareness activities undertaken by Sustainability for Seychelles (S4S), "a non-governmental organization (NGO) established in 2007 to promote sustainable living in Seychelles". The S4S, partnered with a number of relevant organizations and government ministries and agencies, has undertaken extensive awareness raising activities targeted at various groups (e.g., children, post-secondary students, citizens, professionals in various sectors, tourists, members of parliament, various government ministries and private sector). Different means have been used, such as workshops; in-flight video for Air Seychelles; banner and posters; citizen's guide on climate change and its impacts on Seychelles; a creole play on climate change and sustainable living (in collaboration with local theatre troupe Comedie des Seychelles); media (television, radio and printing materials); documentary on sustainable living (in collaboration with the Seychelles Broadcasting Corporation); poetry, song, art, public speaking and drama competitions; among others. The impacts of the above activities are being evaluated. The S4S rightly links "climate change education to education for sustainability", as "the behaviours for sustainable living", which can "draw upon many of the traditional cultural practices", "are the same as those needed to mitigate, and adapt to, climate change". The Facilitator notes that the Asia-Pacific countries, especially the small island developing states, can learn much from Seychelles' good practices and experiences in climate change education and public awareness activities that are developed within the context of sustainability.

Dear friends,

Climate change education and awareness: Experiences from the Seychelles Islands

This contribution is on behalf of Sustainability for Seychelles (S4S), a non-governmental organization (NGO) established in 2007 to promote sustainable living in Seychelles.

In 2008, S4S was contracted by the UNDP Project Coordinating Unit to write a chapter on climate change education, training and awareness for Seychelles' Second National Communication (SNC) to the UNFCCC. The chapter included

a report on any climate change education and awareness initiatives since the first national communication, as well as a strategy for climate change education and awareness which was developed with inputs from a wide range of stakeholders, i.e., government, NGOs and civil societies which participated in a one-day workshop. This strategy was subsequently included by the Seychelles government as a section in Seychelles National Climate Change Strategy, launched in Copenhagen in December 2009.

In mid-2009, the Seychelles National Climate Change Committee agreed to allocate a portion of SNC funding towards implementation of the education and awareness strategy.

The S4S partnered up with the Sea-Level Rise Foundation, the Ministry of Environment, Natural Resources and Transport, and the Ministry of Education to develop a campaign for raising awareness of climate change issues among various target groups: children, citizens, professionals in various sectors, members of parliament, tourists, and post-secondary students. Sustainability for Seychelles has taken the lead on many of the activities under this campaign such as:

- Arts-based workshops on climate change for children on school days and during school holidays;
- One-day workshops with presentations and practical activities for post-secondary students in construction, education, tourism, business studies, arts and agriculture;
- One-day workshops for professionals in construction, journalism, and agriculture;
- One-day workshop including presentations and a field trip for members of the national assembly (Parliament) with a special focus on renewable energy options for Seychelles;
- The production of an in-flight video for Air Seychelles, on how tourists in Seychelles can reduce their carbon footprint, to be shown on all incoming flights as of 1 July 2010;
- The production of a banner to be hung in the capital and posters on climate change and sustainable living to be distributed to all schools, clinics and other public places (in final production stage now);
- The production and dissemination of a citizen's guide on climate change and its impacts on Seychelles, and how to mitigate and adapt to climate change at home (also in final production stage);
- The production and performance of a creole play on climate change and sustainable living (in collaboration with local theatre troupe Comedie des Seychelles).

Also as part of this campaign, the Ministry of Environment produced and aired a series of television (TV) spots on different ways people can mitigate, and adapt to, climate change at home, addressing issues such as home gardening, house design and sustainable living. The Ministry also produced and aired a 15-minute documentary on sustainable living in collaboration with the Seychelles Broadcasting Corporation.

The Ministry of Education has also been part of this campaign. It has organized a series of activities over the last few years targeting at schools, including poetry, song, art, public speaking and drama competitions, and has organized workshops for children and teachers to help them understand climate change, its expected impacts on Seychelles, and what can be done to help.

All of the above activities have been undertaken in a spirit of collaboration, and most of them have been part of a coordinated campaign which is ongoing. At first the different parties met regularly to coordinate, but this became more difficult during the implementation phase and we communicated instead by email to coordinate our efforts. The media has covered many of the activities extensively (on TV, radio and printing materials). Individuals working for the different organizations have led the campaign and networked widely with other organizations, such as the Public Utilities Corporation, the Energy Commission, Seychelles Tourism Board, the Department of Risk and Disaster Management, the media, professional associations, post-secondary schools, as well as various individuals and businesses from the private sector. The Liaison Unit for NGOs in Seychelles also provided some of the funding for workshops to professionals and post-secondary students.

Our challenge now will be to try and evaluate the impacts of this campaign in terms of the level of awareness of climate change in different sectors of society, and more importantly in terms of the ways in which people try to mitigate, and adapt to, climate change in their work and at home. We have tried as much as possible to link climate change education to education for sustainability-our thinking is that in many cases the behaviours for sustainable living are the same as those needed to mitigate, and adapt to, climate change. Also, by addressing sustainable living we

have been able to draw upon many of the traditional cultural practices that are more sustainable and have low-carbon footprints or actually helped people deal with problems such as drought and food security.
I hope the above experience will be of some use to others!

Sustainably yours,

Michele Martin
Environmental Education Consultant
Sustainability for Seychelles

About the contributor

Michele Martin has been working in Seychelles as an environmental educator since 1993. She worked for the Ministry of Education as environmental education coordinator; taught courses in environmental education to pre-service and in-service teachers; developed curriculum resources; helped establish the NGO Wildlife Clubs of Seychelles and more recently the NGO Sustainability for Seychelles. Currently she is also working on her PhD through the Faculty of Environmental Studies at York University in Canada - a participatory action research project looking at how art and culture can help engage schools more deeply in environmental education for sustainability. She can be contacted at martinzanlwi@yahoo.com

Paula Pons and Binoy K. Choudhury wrote:
Facilitator's note (Pak Sum Low): Paula Pons and Binoy K. Choudhury emphasize the importance of education and training in assisting the communities to better prepare for the adverse impacts of climate change. In particular, they discuss the need for research on appropriate technologies that encourage public participation as an important tool for achieving sustainable development, and thus there must be national policies that "are supportive of appropriate technologies". They also highlight the need to move away from oil to renewable energy, and hence the need for scientific research, education and training in renewable energy technologies, including "home-grown technologies", as exemplified by the Indian Institutes of Technology. People "should be included in the research team" as part of the empowerment process "when a technology has to be implemented as a solution to mitigate the disasters" due to climate change. In particular, "young people and farmer-inventors" should be provided "with a more scientifically sound basis" for their innovations. They also introduce their current research work on regional energy market potential mapping using GIS-based software, based on "the RAI (Relative Acceptance Index), calculated by adjusting several parameters, regarding economic, social and environmental issues, which reflects population necessities and demands related to energy consumption". Finally, they stress the importance of networking and sharing of experiences between researchers; and they suggest to promote national and international "annual competitions with prizes awarded to the innovations most likely to help alleviate poverty and climate change mitigation".

Dear Network Members,

Energy security, education and public awareness

Literacy, quality of education, full attendance at school, well-fed children, are essential for better preparing the community to face natural and human-made hazards. Energy security enables better quality education since electricity at night could increase hours of study, improving knowledge in students, and the same for electricity at schools. Beyond the Millennium Development Goal (UN Millennium Project 2005) on Primary Education, a higher and professional/university education is needed in order to train people to be teachers, medical officers, agricultural experts (Sachs 2005), IT and energy management engineers, to harness technologies for local use and address basic technical needs at the village level. Major problems include the lack of affordable textbooks and laboratory equipment; the lack of written or printed materials in the local languages; the failure of curricula to show connections between science and the natural world; and the meagre science background among teachers. Science is usually presented to the students as a set of abstract concepts to be memorized. A way out of the dilemma may be found by relating science more directly to the natural processes going on around students in their daily lives, by making low-cost laboratory equipment, and by using devices and materials that are normally found in the community. Students could then become directly involved in the systematic procedures of science, learning valuable problem-solving skills.

As noted by Low (2010), the United Nations International Strategy for Disaster Reduction (UNISDR) has observed that "The resilience of a community in respect to potential hazard events is determined by the degree to which the community has the necessary resources and is capable of organizing itself both prior to and during times of need." (UNISDR 2009). We are talking about the resilience of a community, but how they can know about their resilience and the tremendous climate change impacts that are likely to come if there is no knowledge transfer about that? In some areas, they realize that rainy seasons are getting less and less abundant, and this causes droughts, while in other areas, they are more frequent, and this causes floods. How can the communities be resilient to climate change if they do not know about the causes, the consequences and the solutions? Public awareness is one of the most important issues that we have to strengthen and even change to follow up with the technology transfer, capacity-building, policymaking and so on, in order to achieve a sustainable development by enabling people to be capable and self-sufficient when adversities come. Villages have the ability to gather together on the village green for discussions of village issues, this should be the place to enhance public awareness with such relevant knowledge in the different topics regarding climate change and human security.

Research on appropriate technologies

An appropriate technology is a technology that is designed with special consideration to the environmental, ethical, cultural, social, political, and economical aspects of the community it is intended for. It requires only small amounts of capital; emphasizes the use of locally available materials, in order to lower the costs and reduce supply problems; is relatively labour-intensive but more productive than many traditional technologies; is small enough in scale to be affordable to individual families or small groups of families; can be understood, controlled and maintained by villagers whenever possible, without a high level of specific training; can be produced in villages or small workshops; supposes that people can and will work together to bring improvements to communities; offers opportunities for local people to become involved in the modification and innovation process; is flexible, can be adapted to different places and changing circumstances; can be used in productive ways without doing harm to the environment. It permits local needs to be met more effectively because local people are involved in identifying and working to address these needs; for the same reasons, it is likely to be in harmony with local traditions and values; it means the development of tools that extend human labour and skills, rather than machines that replace human labour and eliminate human skills (Darrow and Saxenian n.d.). As it means an opportunity for public participation in their own developed tools, women are encouraged to participate in the decision-making process to develop these technologies. In other words, appropriate technology approach helps to be on the path to sustainable development.

Some examples of the appropriate technology approach have been developed over many years within the programmes of non-governmental organizations (NGOs) or government agencies, such as smokeless "chullah" ("kitchens" in an Indian local language); twin-pit latrines; biogas systems; vermi composting; technologies for rainwater harvesting systems (RASTA n.d.); and so on. Policymakers responsible for the national decisions that influence technological change also need to carefully examine whether their policies are supportive of appropriate technologies.

Bottom-up and top-down research

National governments should escape from petrol dependence and reinforce their energy policies with renewable energy, researching in this field and promoting training of technical workers on information, installation, operation and maintenance of renewable technologies, using participative methods and contracting specialized organizations for achieving that; including education and scientific research activities. The case of India with its Indian Institutes of Technology, created in the 1950s and 1960s, is an example of good practice for government investments in ways to develop a country (Sachs 2005). Currently, there are more than 30 engineering colleges in India approved by the All India Council for Technical Education (AICTE n.d.) and 20 engineering colleges are aided by the Government of India. Now we can see how powerful India is in terms of software and information technology (IT) development. Many examples of appropriate technologies adapted to local needs have been developed as well. In any developing country, in the same fashion, home-grown technologies will be needed to adapt global processes to local needs in areas ranging from energy production and use; construction; natural hazard mitigation; disease control; and agricultural production. Some efforts are needed to create a scientific capacity in low-income regions, since for that is required supports for financing and for infrastructure.

To empower people to face and to adapt to the disasters due to climate change, they should be included in the research team itself when a technology has to be implemented as a solution to mitigate the disasters. Such things like offering basic relevant science education geared to the challenges of local problems, with curricula adapted to employ available materials and common devices to illustrate principles, and providing young people and farmer-inventors with a more scientifically sound basis for their innovation efforts could help to increase the knowledge of the beneficiaries to create a better understanding about the environment itself.

Energy market potential mapping

Our research work is being focused to map the energy potential of a region by using GIS (Geographic Information System)-based software. The main idea is to obtain an index, the RAI (Relative Acceptance Index), calculated by adjusting several parameters, regarding economic, social and environmental issues, which reflects population necessities and demands related to energy consumption. This index should be useful to detect which technologies would be accepted by the community to use as energy generation systems. A first study is being developed on the acceptance of the solar photovoltaic technologies to obtain electricity by a pilot community (Choudhury 2004). This index is a great challenge where much work has to be done in order to collect such quantity of data from the field, since an important part of it depends on the customs and awareness of the people. This tool could be very useful for governments, international agencies, NGOs, and companies to see at a glance the regions more suitable for introducing a new technology, such as renewable energy, modern agricultural techniques, low-carbon emission technologies, etc.

Experiences sharing

An effective researchers' network is needed in order to keep researchers closer and to allow them to share their works and experiences for improving such research activities worldwide. Governments should promote national and international annual competitions with prizes awarded to the innovations most likely to help alleviate poverty and climate change mitigation, etc.

With best regards,

Paula Pons, Assistant Researcher
Binoy K. Choudhury, Associate Professor and Coordinator, Energy Management Department
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About the contributors

Ms. Paula Pons is an Energy Engineer working in a Training Placement as an Assistant Researcher of IISWBM, Kolkata, India. She has a Master in Politics and Processes of Development from the Polytechnic University of Valencia (UPV), Spain. She has experience as an Assistant Researcher on Renewable Energy, joining the Institute for Energy Engineering of Polytechnic University of Valencia for 2 years. She worked for a local NGO of Angola, Acção para o Desenvolvimento Rural e Ambiente (ADRA), in water management and food security issues. Ms. Pons is currently working in the areas of renewable energy systems market potential mapping, mitigation of impact of climate change through selected energy conservation and energy efficiency projects and modalities of electrification of un-electrified villages through renewable energy sources in remote villages in India.

Dr. Binoy K. Choudhury has about 20 years of experience and is currently acting as Associate Professor, Energy Management Department, Indian Institute of Social Welfare and Business Management (IISWBM), Kolkata, India, where he coordinated the post-graduate course on Energy Management for more than nine years. He has done his Bachelors in Mechanical Engineering from Jalpaiguri Government Engineering College and PhD in Solar Energy from the Indian Institute of Technology, Kharagpur, India. He secured National Scholarship in 1981 and Best Research Paper award of the Association of Indian Management Schools in 1998. He is a Certified Energy Manager of the Association of Energy Engineers, 2005, USA and Certified Energy Auditor of the Bureau of Energy Efficiency, 2004, Government of India. His main research area includes enhancement of output of solar photovoltaic/hybrid systems through tracking and concentration; solar cooling; renewable energy systems market potential studies; energy efficiency; audit and management; etc.

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Elena Borsatti wrote:

Facilitator's note (Pak Sum Low): Elena Borsatti emphasizes the critical importance of "changes in individual attitudes and behaviour" in preserving the environment and combating climate change, and hence the need for "knowledge and information" in raising the public awareness to initiate such changes "at the local, national, regional and global levels". She cites a number of good practices in office environment that reduce waste (e.g., recycling of used papers and promotion of paperless communication) and save energy (e.g. switch off air-conditioning, lights and fans when they are not needed). However, to translate information that raises concern into action, "people must see themselves as sharing personal responsibility for the problem". She highlights various initiatives that "increase awareness on climate change and promote environmentally friendly behaviour", such as art expositions/competitions, including photography, interschool art and letter writing, and painting competitions, as shown in the "Climate Change: Voices of Khumbu's Children" in Nepal, and children painting competitions in China; and theatre/movies (e.g., *The Inconvenient Truth*). UNEP supports "individuals who are undertaking exceptional personal feats, high-profile expeditions, and other acts of environmental activism" to publicize environmental causes. "Although only a few individuals" may become "climate heroes or heroines", "every individual has the potential to be an agent for change in his/her daily life."

Dear Network Members,

Knowledge, attitudes and behaviour to combat climate change

In the last few weeks the importance of technological innovations for climate change mitigation has been underscored by a number of contributors (see, for example, Tavoni 2010). Technological innovation towards a sustainable environment is obviously essential, but changes in individual attitudes and behaviour are also critical to preserve the environment and to combat climate change. To this effect knowledge and information can help to promote awareness

and ensure that the vast majority of the people around the world are involved in discussions and proactive actions at the local, national, regional and global levels.

Changes in attitudes and behaviour have started to occur over the past few years. In offices it is becoming more and more common to minimize copying and printing, to reduce paper use (using both sides of the paper), to maximize electronic means of communications, to have boxes beside photocopiers to collect used papers for recycling, to store electronic files instead of hard copies, etc. Yet, there are areas for improvement. For example, many employees do not use the standby mode on their computers when they go for a meeting or for lunch. Often people do not switch off the air-conditioning, lights and fans when they leave their desk. Although this can help reduce the energy demand, it is not a common practice thus far in many organizations. How to promote a change? Persistent efforts by the organization (e.g., staff association, management) through internal communications, including e-mails, white papers, newsletter articles, and brown bag discussions can help increasing awareness of energy saving and other eco-friendly opportunities. This, in turn, can help to change people's behaviour also at home.

Raising employee awareness can be highly effective in saving energy. Employees who are provided energy use and cost information can reduce their energy usage much more than employees who have installed a power management software but are not provided with energy usage information (DeVetter and Breton 2009).

It should be noted that providing people with information that arouses their concern about the dangers of climate change is not likely, in itself, to stimulate effective action. For concern to translate into action, people must see themselves as sharing personal responsibility for the problem and must be informed about specific actions that they can take and support to counter climate change (Patchen 2006).

Initiatives on the theme of energy use and climate change, including art expositions/competitions, photography competitions, theatre/movies, etc., can be instrumental to increase awareness among the general public. Many such initiatives do exist in Asia-Pacific. Some have also been linked to the celebrations of the World Environment Day. For example, in 2009, the International Centre for Integrated Mountain Development (ICIMOD) and Initiatives for Development and Eco Action Support (iDEAS), in collaboration with Sherwi Yondhen Tshokpa (a Sherpa youth organisation based in Khumjung), jointly organised the "Climate Change: Voices of Khumbu's Children" interschool art and letter writing competition. The aim of the competition was not only to encourage children from the Khumbu region to express their views on the possible impacts of climate change, but also to raise awareness of the effects of climate change among the mountain community of the Khumbu region. It also aimed at bringing the voices of mountain children from Khumbu to the 15th session of the Conference of the Parties (COP 15) in Copenhagen (ICIMOD n.d.).

One of the UNEP initiatives supports individuals who are undertaking exceptional personal feats, high-profile expeditions, and other acts of environmental activism to demonstrate their commitment and to raise awareness for the simple idea that "Your Planet Needs You". The Chinese environmental photographer Luo Hong is a climate hero. The Luo Hong Environment Foundation trains and rewards youth worldwide for environmental protection. In 2008 it sponsored UNEP's Painting Competition by Children in China, a hugely successful event with about 1.5 million participants. The competition was held again in 2009 (UNEP 2009).

But do art expositions/competitions, photography competitions, theatre/movies, etc., help to increase awareness on climate change and promote environmentally friendly behaviour? I believe so. As an example, let us consider the film *An Inconvenient Truth*, which won the Academy Award for Best Documentary in 2007. The online Nielsen survey, one of the largest of its kind to be conducted globally on the topic of consumer attitudes to climate change, was conducted in April 2007 in conjunction with the Environmental Change Institute of Oxford University. The survey polled 26,486 internet users across 47 countries in North America, Europe, Asia-Pacific and the Middle East. The results indicated that 66 per cent of viewers who claimed to have seen *An Inconvenient Truth* said that the film had "changed their mind" about global warming. Eighty-nine per cent said that watching the movie made them more aware of the problem. But more importantly, three out of four (74 per cent) viewers said they changed some of their habits as a result of watching the film (Nielsen 2007).

Although only a few individuals may become "climate heroes or heroines", every individual has the potential to be an agent for change in his/her daily life.

With kind regards,

Elena Borsatti
Consultant
HDRU
UNDP Regional Centre for Asia-Pacific, Colombo Office

About the contributor

Elena Borsatti has been part of the Human Development Report Unit (HDRU) team since 2007. She has been a member of the team working on the Asia-Pacific Human Development Reports *Tackling Corruption, Transforming Lives* and *Power, Voice and Rights: A Turning Point for Gender Equality in Asia and the Pacific.* For several years she lived and worked in India. At the UNDP India Country Office she was a member of the team responsible for promoting awareness of human development issues through the preparation of state-level Human Development Reports.

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Va Dany wrote:

Facilitator's note (Pak Sum Low): Va Dany discusses the concepts of adaptation and vulnerability, and "the role of vulnerability assessment in the adaptation process", which is "a central first step in informing adaptive decision-making". She highlights the different aspects of adaptation relating to "biophysical vulnerability" and the "social, economic, cultural and political processes". Various methodologies, including integrated assessment, have been used for vulnerability assessment (VA). She introduces an ongoing three-year (2009-2012) research study undertaken by the Royal University of Phnom Penh in collaboration with the Australian National University and the University of Melbourne "to evaluate the linkages of VA and adaptation strategy in the water and health sectors in Cambodia" within the context of national poverty reduction strategies, while strengthening "the links between VA and adaptation measures", as well as the "local and national capacity to conduct VA in order to enhance local and national adaptive capacity", among others. "The outcomes of this research will help facilitate the development of adaptation strategies and the use of climate change funds more efficiently".

Dear Network Members,

Role of vulnerability assessment in adaptation process and a Cambodian study

As the issue on adaptation to climate change has gained more attention in the international negotiation in recent years, the need for more research on adaptation and vulnerability assessment (VA), especially in developing and least developed countries, has also become more urgent. This contribution discusses the role of vulnerability assessment in the adaptation process and highlights an ongoing research activity on adaptation in Cambodia.

The concept of adaptation is closely linked to the concept of vulnerability. Adaptation has been defined and framed differently (Preston and Stafford-Smith 2009) and it usually emphasizes hazard, exposure and risk when it refers to biophysical vulnerability and will address social, economic, cultural and political processes when it refers to resilience and adaptive capacity. Adaptation can be generic or specific, autonomous or planned. Nonetheless, it is not always positive and there are always constraints, barriers and limits.

The authors raised four fundamental questions relating to the adaptation process, as follows: 1) What are we adapting to?, 2) Who adapts?, 3) How do we adapt?, and 4) What do we want to achieve?. Vulnerability assessment is a central first step in informing adaptive decision-making.

Different methodologies have been employed in assessing climate-related vulnerability; however, Preston and Stafford-Smith (2009) viewed climate change assessment as a process of social learning, contributing to education and building shared understanding, priority setting, evaluating decision alternatives, and implementing adaptation policy or measure. Integrated assessment is known to be able to generate more information.

Cambodia is a least developed country, and it is one of the most vulnerable countries in the South-East Asia region to climate-related hazards, and thus it is in need of proactive adaptations that are well-informed by VA. Preliminary climate VA was undertaken initially as part of the Initial National Communication in 2001 followed by a household survey in 2005 to inform the formulation of the National Adaptation Programme of Action (NAPA). Yet there has been a remarkable progress of VA in the recent years, for instance, not less than half a dozen of Cambodia related VA reports were published in 2009.

Though VA plays an important role in the adaptation process, there are biases especially associated with changes of climate as well as socio-economic factors in the future. Furthermore, its quality can be reflected by the employed methodologies and approaches that always lack uniformity. Therefore, it may be worth to evaluate them at some point.

The Department of Environmental Science of the Royal University of Phnom Penh in collaboration with Australian National University (ANU) and the University of Melbourne is undertaking a three-year (2009-2012) study, funded by AusAid, to evaluate the linkages of VA and adaptation strategy in the water and health sectors in Cambodia. This study is part of a three-country study in the Asia-Pacific region-Cambodia, Viet Nam and Fiji. It aims to understand what impacts do VA have on adaptation policy and practices in the water and health sectors and how can the linkages between VA and adaptation measures be strengthened to improve poverty reduction in the studied countries. The outcomes of this research will help facilitate the development of adaptation strategies and the use of climate change funds more efficiently.

The research team comprises Prof. Tony McMichael and Ms. Kathryn Bowen from ANU, Dr. Fiona Miller from the University of Melbourne, and a local research team of each country. The Cambodian local team consists of three faculties from the Department of Environmental Science, led by Ms. Va Dany. Key approaches in this study include refinement of methods, VA reviews, key informant interviews, and multi-stakeholder workshops to verify and communicate the findings. In Cambodia, the research team is currently undertaking document reviews and key informant interviews and a draft report will be prepared for comments next year.

The project expects to:

- Develop a formal, standardized methodology to evaluate assessment-policy linkages;
- Identify existing VA methods and processes and evaluate the strengths and limitations against the project;
- Analyze the extent to which existing national poverty reduction strategies considers vulnerability and adaptation in relation to health and water;
- Examine the policy context for adaptation with specific reference to health and water;
- Analyze the linkages between VA and adaptation policy and measures in water and health;
- Recommend strategies to strengthen the links between VA and adaptation measures; and
- Recommend strategies to strengthen local and national capacity to conduct VA in order to enhance local and national adaptive capacity.

With best regards,

Va Dany
Chair and Lecturer
Department of Environmental Science
Royal University of Phnom Penh

About the contributor

Va Dany is a Lecturer and Chair of the Environmental Science Department of the Royal University of Phnom Penh since 2000. She was a member of the Technical Committee for the Initial National Communication from 2000-2001 and involved in the formulation of the NAPA in 2004-2005. She continues to be involved in many climate change-related activities/projects. Lately she is a local research partner with the Australian National University and University of Melbourne in a study on "Evaluating the connections and contributions of climate change vulnerability assessments to adaptation strategies in water and health sectors: A three-country study in Asia-Pacific region".

Chew-Hung Chang wrote:
Facilitator's Note (Pak Sum Low): Chew-Hung Chang uses four important framework questions to "provide a semblance of a checklist" in crafting an education for climate change (ECC) programme based on his experience as a geography educationist in Singapore: (1) For whom is ECC intended and who provides it?; (2) What should be included in the content of ECC?; (3) How should the intended content be delivered?; and (4) How do the providers of ECC know if the intended outcomes have been achieved? Indeed, these questions are equally applicable in other countries. Chew-Hung uses these questions to gauge the progress of various environmental education activities that have been undertaken by both the government and the non-governmental organizations since the UN Conference on Human Environment held in 1972 at Stockholm, including the first Singapore Green Plan (SGP) in 1992 and its new SGP 2012 that "details plans to attain a vision of sustainability for 2012" (2002 version) and that provides "clear goals for carbon intensity reduction" "together with the education efforts" set out to "attain this vision" (2006 version). However, he is concerned how the "specific targets of SGP 2012 in relation to global warming" (e.g., mandatory eco-labelling "for all air-conditioners and refrigerators from mid-2007"; and "a 25% reduction in carbon dioxide emission per GDP dollar" from 1990 level by 2010) "will be deployed" and "evaluated continually in light of the development in the global warming discussion in the international scientific arena". His ideas of "green schools" and green workforce are innovative. He believes that "the person on the street has as much a role to play in mitigating climate change impacts as governments and industries", and uses the consumers' choice of products in Singapore (e.g., bottle of Indonesian (why not Singaporean?) water chosen over the Swiss Alp bottle at the supermarket) to illustrate the significant difference in terms of reducing "carbon miles".

Dear Network Members,

Education for Climate Change (ECC) – Four questions to think about

Much has been written about education for sustainable development (ESD) which focuses on informing knowledge, skills, attitudes and behaviour that will bring about sustainable economic, social, and environmental development. While there is a tacit understanding on the role of education for climate change (ECC) to support mitigation and adaptation strategies, a consensus on the conceptual approach to such an educative endeavour is yet within sight.

Accepting the need for ECC raises four questions, namely:

1. For whom is ECC intended and who provides it?
2. What should be included in the content of ECC?
3. How should the intended content be delivered?
4. How do the providers of ECC know if the intended outcomes have been achieved?

The framework proposed above is derived from a curriculum design framework for geography education in Chang *et al.* (2010). The approach uses the backward design idea based on an understanding by design framework (Wiggins and McTighe 2006). To elucidate this idea, the following paragraphs will explore how ECC can be carried out in this context, using examples from Singapore, the country the author resides in.

Education being the key role of the state as proposed by Dewey (1916) supposes that the democratic ideal of a nation can best be served by education. While it is a social process, education informs and provides knowledge from which individuals can make informed choices.

To this end, it is in the state's best interest to be a key player in ECC. However, this does not exclude the possible role of other stakeholders in society. In Dewey's argument, a solely state driven education may result in the exclusion of the "others'" voice, or worse, the absence of such voice due to socialization. Having said that, many non-governmental organizations (NGOs) have increasingly taken on more active roles in ECC, annulling the concern raised above. So the *who* includes both the state and civil society, within Dewey's context of an education for an ideal society.

While Singapore has just ratified the Kyoto Protocol in 2007, there is an antecedent presence of environmental education and action in Singapore, largely motivated by governmental and NGOs alike. The first Singapore Green Plan (SGP) was presented at the Earth Summit at Rio de Janeiro, Brazil, June 1992. In 2002, a new green plan called SGP 2012 details plans to attain a vision of sustainability for 2012. It is in the 2006 revision of the SGP 2012, that clear goals for carbon intensity reduction have been set, and together with the education efforts, it has set out attain the vision to "aim for a population that is not only environmentally aware, but also committed to positive action and crucial community partnerships" (MEWR 2006). Clearly, the Singapore case targets both students, and the general populace, providing ECC for all, thus answering the for whom question raised above.

The specific targets of the SGP 2012 in relation to global warming are to reduce the ambient particulate matter 2.5 level to within an average of 15μg/Nm^3 by 2014 and to reduce carbon intensity (i.e., carbon dioxide emission per gross domestic product (GDP) dollar) by 25% from 1990 level by 2012 (MEWR 2006). The action plans include raising public awareness on energy efficiency and climate change and making it mandatory for all air-conditioners and refrigerators to carry energy efficiency labels from mid-2007, while achieving a 25% reduction in carbon dioxide emission per GDP dollar can be seen as a critical step towards understanding global warming and its implications for a small island state like Singapore. The concern is how this action plan will be deployed and how the plan will be evaluated continually in light of the development in the global warming discussion in the international scientific arena.

The Singapore Government may have appeared to concentrate on education activities at this time. As early as 1972, a first concerted international effort to promote environmental education emerged at the United Nations Conference on Human Environment at Stockholm. Recommendation 96 of the Stockholm conference called for the establishment of an international programme in Environmental Education as one of the most critical elements to address the world's environmental crisis. By 1975, the International Environmental Education workshop at Belgrade

established an Environmental Education Charter which provided the global framework, goals, objectives and strategies for Environmental Education. The goal of Environmental Education was to "develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively towards solutions of current problems and the prevention of new ones". In addition, the International Charter on Geographical Education (1992) calls for Geographic Education to ensure that individuals become aware of the impact of their own behaviour and that of their societies, have access to accurate information and skills to enable them to make environmentally sound decisions, and to develop an environmental ethic to guide their actions.

In particular, the fourth guiding principle of the Belgrade charter states that environmental education should emphasize active participation in preventing and solving environmental problems. This raises the next question of what should be included in ECC. In Singapore, environmental education is infused through the curriculum to attain three main aims: knowledge related to environmental issues, attitudes to develop a greater sense of personal responsibility and concern for the environment and changes in behaviour to include care and concern for the environment. While the National Environment Agency (NEA), a branch of Ministry of Environment and Water Resources (MEWR) has begun to build up a network of environmental champions among students to reach out to their peers and NGOs like the Singapore Environment Council work with schools on programmes such as Schools' Green Audit Awards (Singapore Environment Council 2006), the approach is still largely informal. How do we reconcile concrete environmental action plans by the government targeted at climate change and the lack of formalized environmental education in Singapore?

I would like to propose that in addition to the action plans proposed by the MEWR, environmental education in schools and to the general public should be extended to include the following so as to answer the how question raised above:

a) Green schools which design and support opportunities for integrating the concepts and principles of education for sustainability into formal educational programmes from early grade school through the university level.
b) Identifying and formalizing a set of essential skills and knowledge for all students that reflect a basic understanding of the interrelationships among environmental, economic, and social equity issues.
c) Raising a workforce and public awareness of sustainability issues, conveying information on indicators of sustainable development, and encouraging individuals to adopt sustainable practices in their daily lives, such as at work.

These measures will only go as far as bringing about awareness. However, such awareness is critical for bringing about the remaking of local and global geographies into a more equal world. But then *how do we know* if these plans will be successful? The *what* question implies that in addition to simply knowing about the impacts of climate change and what are the mitigating and adaptation strategies, behaviour that is indicative of such an understanding will truly indicate if the education efforts have been successful. While the mass media has recently focused their spotlight on climate change, the plethora of reports is confined largely to the impacts of climate change and not what people can do to stop or even reverse these changes. Perhaps, the general perception is that there is little an individual can do and stopping climate change is the responsibility of policymakers and NGOs. In fact, the person on the street has as much a role to play in mitigating climate change impacts as governments and industries. It is important to consider how everyday things can contribute to climate change on a global scale and small changes in modern day living can culminate in substantial reduction in greenhouse gases (GHGs) and hence slow down or halt human induced climate change. The author proposes that there is much that people can translate what they have learnt from ECC as knowledge into behaviour. The author often provides a simple illustration of the carbon miles accrued on a bottle of drinking water. For a Singaporean, a bottle of Swiss Alps mineral water will definitely incur more carbon miles in transportation than a bottle of distilled water produced in Indonesia, other things being equal. Suppose, just for argument, that one gram of carbon mile is saved on each bottle of Indonesian water chosen over the Swiss Alp bottle at the supermarket, and assuming every person in Singapore drinks one bottle of drinking water a day, then a population of 5 million people will save 5 tonnes of carbon miles from this simple informed choice. However, this is just an illustration.

The point offered is not to encourage the change in consumption behaviour on this simplistic basis but to consider the power of an informed choice. Often, the content of ECC does not elucidate the measureable impact certain behaviours have on climate change. By describing the scenario above, for example, the target audience of such information will

then be able to easily translate what they know into what they can do, thus allowing us to evaluate with certainty the degree of success of our education endeavour.

In summary, the author proposes that ECC should consider the approach used in curriculum design in its cousin fields of environmental education and geographic education, to examine the questions of *for whom* is ECC targeted at, by *whom* is it provided, *what* is included in the content, *how* should it be delivered and *how do we know* if the outcomes have been attained. While this argument is applied for ECC in general and not a formalized curriculum in the original works of Wiggins and McTighe (2006), the four questions will provide a semblance of a checklist in crafting an ECC programme.

With best regards,

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Assistant Professor, Humanities and Social Studies Education Academic Group
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About the contributor

Dr. Chang is an Assistant Professor at the Nanyang Technological University, Singapore and the President of the Southeast Asian Geography Association (SEAGA). As part of SEAGA's outreach to society, he was an organizer and facilitator for a climate change workshop held in February 2009 in Singapore for the South-East Asian region. He is also active in climate change education through seminars in schools, public talks, radio and TV appearances.

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Linda Too wrote:
Facilitator's note (Pak Sum Low): In this interesting contribution, Linda Too shares her useful research experience on nurturing eco-centric behaviours. She observes that "personal benefit is a key determinant" for the "vast majority of the consumers/users" in making "their purchase decision". Thus, she discusses the need to nurture green building occupants for "better acceptance of the green features" from a green marketing perspective (i.e., to avoid "green marketing myopia"), as not all of them "belong to the deepest green niche and would readily embrace green features". Apart from environmental benefits, these consumers are also concerned about "cost-effectiveness, health and safety, performance, symbolism and status, and convenience", all of which could affect their "satisfaction" in staying in the green buildings. She evaluates "the extent to which green buildings are aligned to meet these consumer value propositions", so as to assist the building managers in developing "the strategy that is required to gain user acceptance and support, i.e., to encourage buy-in of green features". It is also essential to provide "actual operational support

in helping the occupants learn how to operate in a green space" so as to facilitate and enhance their acceptance and appreciation of the green features.

Dear Network Members,

Nurturing eco-sensitive building occupants - A green marketing perspective

Current green marketing literature suggests that consumers/users can be classified into different shades of green according to their inclination towards environmentally friendly products. As such, it would be folly to assume that all green building occupants belong to the deepest green niche and would readily embrace green features. In fact, according to Ottman *et al.* (2006), there are two important goals when marketing green products: improved environmental quality and customer satisfaction. The misjudgement of either or overemphasis of the former at the expense of the latter will result in user rejection of the green product. This phenomenon is termed "green marketing myopia".

For vast majority of the consumers/users, personal benefit is a key determinant in their purchase decision. Ottman *et al.* (2006) suggest that apart from environmental benefits, there are five qualities that consumers look for in a green product. These are cost-effectiveness, health and safety, performance, symbolism and status, and convenience. The following discussion will evaluate the extent to which green buildings are aligned to meet these consumer value propositions. This will then inform the strategy that is required to gain user acceptance and support, i.e., to encourage buy-in of green features.

Cost-Effectiveness - One of the biggest selling points of green products is its potential energy and resource efficiency. While the initial purchase price may be higher, long-term operational cost savings can convince consumers to buy green. Nonetheless, in the case of green buildings, these cost savings from energy-efficient lights and other features are passed on to the building owners and not the building users. As such, the cost-effectiveness value proposition is irrelevant to users who occupy a green building.

Health and Safety - Given the many reports on sick building syndrome and its direct impact on occupants, health and safety is an important choice consideration. Sick buildings with poor indoor air quality has been linked to headaches, eye, nose, and throat irritation, dizziness and fatigue among occupants. In this regard, green buildings are particularly well placed to meet this consumer value. However, the positive health effects on green building occupants may take time to become apparent.

Performance - This refers to the performance of the core attribute of a product. For example, consumers expect washing machines to deliver a clean yet gentle wash. What is the core attribute of a building? Occupants would expect a building they occupy to be functional and comfortable. In general, green buildings offer occupants generous access to natural lighting and ventilation. In addition, occupants are also provided with individual control of room temperature and lighting.

Symbolism and Status - This is to position green products as status symbols. Rather than having green product perceived to be only for "tree huggers" (i.e., strong green supporters), they are today marketed to appeal to the broader segment of consumers. Research has also shown that consumers respond to social pressure and hence would like to be seen as supporting a good social cause, i.e., the feel good factor (Kuusela and Spence 1999). To this end, green buildings provide a good fit in meeting the symbolism and status needs of the user.

Convenience - For many consumers today, time is the only true luxury. In a time-poor society, convenience thus plays an immense role in influencing consumer's choice of product. Green products that help save time are well placed for market growth. For example, energy-saving compact fluorescent light (CFL) bulbs are more durable and efficient than the traditional energy-intensive incandescent bulbs, and hence offer convenience to building managers through negating the need for frequent replacement. However, for occupants, it may be a source of inconvenience as maximum light emission may take longer than a conventional bulb.

Table 1. Summary of Green Building Benefits to Users

Consumer Benefits	Cost-Effectiveness	Health and Safety	Performance	Symbolism and Status	Convenience
High	Not applicable	X	X	X	
Moderate	Not applicable				
Low	Not applicable				X

From Table 1 it is clear that three out of five user-desired attributes are highly achievable in green buildings. To this end, a strategy that draws attention to these occupant benefits will increase the likelihood of user acceptance. Building managers of green buildings should develop a series of activities to communicate these benefits to the users of green building. At the same time, where the other consumer benefits, such as convenience, scores poorly in green buildings, the answer lies in managing user expectation and providing user support. The realisation of comfort and convenience is dependent upon proper usage of green features and minor adjustment to the conventional use of space. Building managers, therefore, play a crucial role in communicating this message to the users. With better understanding, user expectations are properly set up and, hence, better acceptance of the green features. Following the communication of the user benefits of green building and its proper operation, building managers also need to provide actual operational support in helping the occupants learn how to operate in a green space. Additional manpower may be required in the first month or so of moving into a green building for this purpose.

With best regards,

Linda Too
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About the contributor

Dr. Linda Too is currently an Associate Professor of Urban Development at the Mirvac School of Sustainable Development (MSSD), Bond University, Gold Coast, Australia. Her research interests include social and community planning focusing on nurturing eco-centric behaviours. The MSSD Building is Australia's first 6-Green Star rated educational building that has won numerous national and international awards in sustainable design.

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Kishan Khoday wrote:
Facilitator's note (Pak Sum Low): Kishan Khoday highlights the "high levels of citizen awareness within Asian countries on climate change and other environmental issues, many of whom surpass developed countries in terms of personal concern over climate change and commitment to take action". As an example, he cites China where "there is an increasing spirit of environmental rights, a desire particularly among the youth to address ecological change as a matter of human security and well-being of future generations". He captures the transformation of Chinese's environmental consciousness-from "Man Must Conquer Nature" (in fact this slogan means that human determination can overcome any difficulties posed by nature, including natural disasters) to "Ecological Civilization". Indeed, gone are the days when the Chinese were very proud of their "smoking stacks", which were once a symbol of "development", even though traditional Chinese culture has had a 'balance between humans and nature' that dates back "Confucianism,

Taoism and Buddhism". Against this background, it is heartening to see the green 2008 Beijing Olympic Games that showcased the growing environmental awareness of China. In particular, Kishan highlights four such key activities supported by UNDP: (i) *Olympic Film and TV Campaign* to publicize environmental themes; (ii) *Green Torch Relay* by "a group of eighteen local environmental champions on issues of climate change, water and biodiversity who served as Green Olympic Torch Bearers and ran the historic torch relay within China in the name of the environment"; (iii) *Low-Carbon and Resource Conserving Technologies* were integrated "into venue design and materials supply", together with "six locally-produced electric buses which transported Olympic visitors"; and (iv) *Water Conservation initiative* "to improve sustainable use of water in various parts of China towards goals of environmental sustainability and improving human health". The Facilitator wishes that the spirit of Beijing Olympic environmental awareness activities will sustain not only in Beijing, but also will flourish in every corner of China.

Dear Network Members,

Gold, silver, bronze … and green:
The 2008 Beijing Olympics and environmental awareness

As we mark the 10th anniversary of the UN Millennium Declaration, the Asia-Pacific Human Development Report (APHDR) serves as an important opportunity to review progress in Asia towards promoting 'Respect for Nature'- identified in the Declaration as one of the six "fundamental values (…) essential to international relations in the twenty-first century" (UN 2000). Much progress has been made and "changes in global awareness, thinking and concern about the environment have been truly fundamental over the UN's life, probably exceeding even changing ideas about human rights." (Jolly *et al.* 2009). In Asia, issues of environmental sustainability have indeed emerged into the public conscience as a central concern. Recent polls show high levels of citizen awareness within Asian countries on climate change and other environmental issues, many of whom surpass developed countries in terms of personal concern over climate change and commitment to take action (World Bank 2009).

In China, for example, there is an increasing spirit of environmental rights, a desire particularly among the youth to address ecological change as a matter of human security and well-being of future generations. There is growing awareness that "preventing the collapse of human civilization requires a transformation of cultural patterns of human behaviour." (The Worldwatch Institute 2010). Past Cultural Revolution slogans that 'Man Must Conquer Nature' and 'Battling with Nature is Boundless Joy' have been replaced by a new vision launched by the National People's Congress for China to emerge in the 21st century as an 'Ecological Civilization'. A renewed debate has arisen in society over the 'balance between humans and nature', a central concept in traditional Chinese worldviews like Confucianism, Taoism and Buddhism (Weller 2006).

Towards these ends, the 2008 Beijing Olympic Games represented a landmark national event of great historic and symbolic value, and a unique opportunity to raise awareness on issues of climate change, biodiversity loss and water security. To support implementation of the Environmental Action Plan for the Beijing Olympics, UNDP established a partnership with the Beijing Organizing Committee for the XXIX Olympic Games (BOCOG) with four key activities (BOCOG 2008).

Olympic Film and TV Campaign

The official Olympic mascots (known as the 'FuWa') represented five elements of nature in traditional Chinese thought and four threatened animals from diverse regions across China. Through the support of ArcelorMittal and Norway, UNDP supported BOCOG in production of a series of short films with story-lines that starred famous Chinese Olympic medalists together with animated versions of the mascots. The films were broadcast as public service announcements on China Central TV (CCTV), and the screens used within Olympic facilities, subways and buses, reaching hundreds of millions of people from around the country. UNDP, BOCOG and CCTV also undertook a process to select social and environmental leaders who contributed to Olympic preparations, with recognition and awards publicized locally and internationally through high profile concert events. This also built on cooperation forged with Al Gore's 2007 Live Earth Concert for which UNDP served as a partner in the Shanghai component of the Live Earth event.

Green Torch Relay

Through support of Coca Cola, an official sponsor of the 2008 Beijing Olympics, UNDP and BOCOG identified a group of eighteen local environmental champions on issues of climate change, water and biodiversity who served as Green Olympic Torch Bearers and ran the historic torch relay within China in the name of the environment. Green torch runners were leading civil society figures with a strong track record of advocating environmentalism in China-a courageous female environmental lawyer fighting challenging cases against the Government and private sector on behalf of victims of toxic pollution, gifted authors and advocates of change on issues of water conservation in China's countryside, local government champions on low-carbon approaches to growth, and visionary wildlife artists and photographers-all of whom are doing their part in galvanizing a renewed respect for nature in society.

Low-Carbon and Resource Conserving Technologies

A key part of Olympic preparations was the integration of low-carbon and resource conserving technologies into venue design and materials supply. UNDP and BOCOG partnered to design and display a Green Olympics exhibit in the Olympic venue raising awareness of the cutting-edge technologies and design approaches used in venue construction. Through support of the Global Environment Facility (GEF), UNDP also supported BOCOG in provision of six locally-produced electric buses which transported Olympic visitors during the Olympics and were integrated into the public transport system thereafter. This served to raise public awareness on climate change and clean energy solutions to public transport and public health, while also showcasing new clean technologies.

Water Conservation

Through support of Coca Cola, and in spirit of establishing a longer-term green legacy to the Olympics, UNDP and the Government launched an initiative to improve sustainable use of water in various parts of China towards goals of environmental sustainability and improving human health. Through the partnership a share of proceeds from the sale of Coca Cola Olympic souvenirs went to the initiative, engaging visitors to the Games on ways they could support a green legacy to the Games.

Through an increasing focus on outreach, advocacy and awareness, China and other Asian countries are now proactively supporting higher levels of environmental consciousness in line with the Millennium Declaration call for a renewed Respect for Nature. As goes the famous Chinese saying "one generation plants the seed, the other gets the shade." Actions to support environmental awareness can have strong long-term impacts in the future, shaping the young environmental leaders of the future and setting the foundations for new climate-friendly political constituencies within society to engage national and global policies to combat climate change.

Regards,

Kishan Khoday
Deputy Resident Representative
UNDP Saudi Arabia

About the contributor

Kishan Khoday has served with UNDP since 1997, as UNDP Sustainable Development Advisor and Deputy Coordinator for Environment in Indonesia (1997-2005), UNDP Assistant Resident Representative and Team Leader for Energy & Environment in China (2005-2009), and currently as UNDP Deputy Resident Representative in Saudi Arabia. He may be contacted at kishan.khoday@undp.org.

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Stephanie Hodge and Suchitra Sugar wrote:

Facilitator's note (Pak Sum Low): Stephanie Hodge and Suchitra Sugar rightly point out that climate change exacerbates existing disparities and inequities that have become barriers for countries to achieve the Millennium Development Goals. However, these barriers also offer "a great opportunity" for bringing "positive" changes and "societal transformation". The implementation of "inclusive, more relevant education" "is instrumental to bring about a radically changed environmental quality". Thus, they stress that "current education must be transformed to be inclusive, protective, democratic and child-centred". Moreover, it is important "to uphold a vision of **quality and access to education** for all" within the context of "Education for Sustainable Development (ESD)", which "is particularly well-suited to addressing climate change in terms of understanding its causes, recognizing its impact, and implementing appropriate responses". They highlight UNICEF's "model for quality education" and other UNICEF Education initiatives. These include "Education in Emergencies" that provides "disaster risk education" as part of "emergency preparedness work" in more than 25 countries; "Child-Friendly Schools" that include "the promotion of sustainable facilities in schools, including alternative energies, rainwater harvesting and school gardens"; contribution to the development of "a resource pack" that will be used in 2011 "to support the mainstreaming of climate change and environmental education into national policies and programmes, especially within the education sector"; and development (with UNDP) of a "joint learning and resources web-based platform and knowledge network that will promote and support implementation of quality education as key for climate change adaptation"; among others. The Facilitator thinks that it would have been useful if the authors can provide some analyses on how successful are these initiatives or activities, and what are the lessons learned.

Dear Network Members,

Inequities and barriers to sustainable development exacerbated by climate change: A role for quality education

Disparities, which are exacerbated by climate change, stand in the way of countries' achieving the Millennium Development Goals (MDGs) (McMichael *et al.* 2008). Climate change, however, also offers a great opportunity for change through the promotion of interventions aimed at positive societal transformation (reduction of disparities). Foremost among these interventions is the implementation of inclusive, more relevant education which is instrumental to bring about a radically changed environmental quality (Dahle 2007). As education to address climate change issues becomes more widespread and refined, UNICEF is considering how equity issues can be addressed and the exacerbation of disparities minimized through a quality education approach to complement governments' climate change adaptation activities.

Dimensions of equity in quality education for sustainable development (*)

Equity in education has two key dimensions. The first is fairness, which implies ensuring that personal and social circumstances (e.g., gender, socio-economic status or ethnic origin) should not be an obstacle to achieving one's educational potential. The second is inclusion, which implies ensuring a basic minimum standard of education for all- for example, everyone should be able to read, write and do simple arithmetic (OECD 2008). While equity in education

is a worthy goal in itself and links to human rights, equity-enhancing policies and practices, particularly an investment in quality, relevant education can, in the long run, boost economic growth and help reduce poverty (IMF 1998). It also supports long-and short-term environment outcome goals such as climate change adaptation (DFID *et al.* 2002).

Education institutions, programmes and processes can also work to disrupt patterns of inequality, disadvantage and marginalization, helping to minimize or reverse the exacerbation of inequity being caused by climate change impacts. Child-seeking, inclusive and relevant education - i.e., outlined by UNICEF's child-friendly schooling principles (outlined below) - can help communities and children prevent disparities and adapt to and mitigate climate change impacts.

Transformation through education

Climate change education must be a part of public awareness, learning and education for a sustainable future so that sustainable behaviours become daily habits. Children, thus, are our greatest assets in the battle against climate change. The 2.2 billion young people under the age of 18 (UNICEF 2007) will be the ones called to cope with the impacts of our action today and make decisions on climate change in the not so distant future. Empowered young people can be the greatest protagonists for change (**).

We know that education of quality can be transformative in challenging contexts (e.g., of economic crisis, political upheaval, environmental and climate change, the HIV/AIDs pandemic, conflict and insecurity, linguistic and cultural change). For this to happen, current education must be transformed to be inclusive, protective, democratic and child-centred and include Climate Change Education content and pedagogy as a life skills approach. Transformation of education is needed in order to uphold a vision of **quality and access to education** for all that is **climate change and child-friendly.**

This vision of quality and access to education is in line with the current thinking around Education for Sustainable Development (ESD). ESD seeks to enable individuals to make informed and responsible decisions and actions, now and in the future. Educating about climate change also enables relevant pedagogy to build the participation, skills and attitudes needed to question the way we think, the values we hold and the decisions we make in the context of sustainable development (UNESCO 2009). The integrated, multifaceted vision provided by ESD is particularly well-suited to addressing climate change in terms of understanding its causes, recognizing its impact, and implementing appropriate responses.

UNICEF promotes a model for quality education including content and pedagogy on and for climate change as a pathway to ESD. Currently, UNICEF Education for example, is supporting countries to address climate change through transformative education through child-friendly schooling in the following ways: 1) Supporting education that is relevant and child-centred-including climate change curricula to empower children with the knowledge, skills and values to survive in a disaster situation in the short term and be able to adapt to, thrive, and live sustainably in a changing environment in the long term; 2) Constructing safer schools which are more resilient to natural disasters such as the flooding and high winds caused by tropical storms and providing disaster risk education as part of UNICEF's emergency preparedness work within the context of the Education in Emergencies cluster. The cluster is currently active in 25+ countries and throughout all UNICEF country offices through the adaptation of the International Network on Education in Emergencies (INEE) (***) minimum standards for Education in Emergencies, which now include an emergency preparedness component advocated for by UNICEF Education.

In addition, children's empowerment (and inclusion) through education on environment and climate change is promoted as a component of the holistic Child-Friendly Schools (CFS) initiative and includes key features such as: the promotion of sustainable facilities in schools, including alternative energies, rainwater harvesting and school gardens.

UNICEF Education HQ is currently working closely with members of the inter-agency committee for the Decade for Education for Sustainable Development (DESD) in order to develop a resource pack to support the mainstreaming of climate change and environmental education into national policies and programmes, especially within the education sector. The work is being done in direct support of the goal to provide quality education for all (****). The resource pack will complement the Child-Friendly Schools manual with specific upstream guidance and resources in this field. These materials will be rolled out in conjunction with trainings on child-friendly schooling and in partnership with members of the UN inter-agency committee for DESD throughout UNICEF's network of regional and country

offices starting in 2011. In addition to developing a resource pack, UNICEF is working directly with UNDP to develop a joint learning and resources web-based platform and knowledge network that will promote and support implementation of quality education as key for climate change adaptation. The aim is also to share experiences and case studies of good practices. The platform will be linked within GEF/UNDP's Adaptation Learning Mechanism site.

Regards,

Stephanie Hodge, Cross Sector Coordination Specialist.
Suchitra Sugar, Consultant, Education Section
Programme Division, UNICEF, New York

Notes

(*) Sustainable development needs to be described for each of the following dimensions in their interrelation in time (past-present-future) and in space (near-far). Sustainable social development is aimed at the development of people and their social organization, in which the realization of social cohesion, equity, justice and well-being plays an important role. A sustainable environmental development (planet) refers to the development of natural ecosystems in ways that maintain the carrying capacity of the earth and respect the non-human world. Sustainable economic development (prosperity) focuses on the development of the economic infrastructure, in which the efficient management of our natural and human resources is important. It is the finding of balanced ways to integrate these dimensions in everyday living and working that poses, perhaps, the greatest challenge of our time as this requires alternative ways of thinking, valuing and acting.
(**) In the words of the United Nations Secretary-General, Ban Ki-moon (2008): "Young people are well placed to contribute to the fight even now. They are adept at spreading new habits and technologies. They are adaptable and can quickly make low-carbon lifestyles and career choices a part of their daily lives. Youth should therefore be given a chance to take an active part in the decision-making of local, national and global levels. And they can actively support initiatives that will lead to the passage of far-reaching legislation."
(***) The INEE was conceived in 2000 during the World Education Forum's Strategy Session on Education in Emergencies in Dakar during which the idea was proposed to develop a process which would improve inter-agency communication and collaboration within the context of education in emergencies. At a follow-up inter-agency consultation held in Geneva in November 2000, the INEE was officially founded to build upon and consolidate existing networks. Its work is founded on a number of international legal conventions and documents. The INEE is instrumental as global learning platform for developing Disaster Risk Reduction and Emergency Preparedness resources and guidance relating to increasing incident of disaster due to climate change. For further details please see http://www.ineesite.org/index.php/post/about/
(****) The Decade of Education for Sustainable Development (2005-2014) was created to emphasize the critical role of education in achieving sustainable development. The UN inter-agency committee on the Decade is lead by UNESCO. The chair is rotated among the 15 UN member agencies which work together to promote the goals of the Decade.

About the contributors

Stephanie Hodge and Suchitra Sugar work in the Education Section for UNICEF in New York. Stephanie focuses on cross-sectoral work (from the perspective of education), including work on climate change and environmental education. On a more historical note, she worked at the Environment and Energy group at UNDP for many years and helped set up the global network on Environment and Energy. Suchitra is working in the Section as a consultant on climate change and environmental education. Through her work she supports the mainstreaming of climate change and environmental issues into programmes and policies related to quality education and promotes quality education as key to successful programming on climate change and environmental issues.

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Tim Taylor wrote:

Facilitator's note (Pak Sum Low): Tim Taylor highlights the importance of "research to link in to awareness of climate change in the eye of the public", particularly in terms of getting "appropriate levels of adaptation". Apart from "clear thinking" that "is needed", it is also important to analyse future "socio-economic scenario impact on costs and benefits", taking "uncertainty" "into account". The "cost of adaptation" has significant implications for "raising awareness on climate change", and hence "appropriate training in assessing costs into the future" should "be given". He cites some of his work in the UK and Africa based on "historical analogues" (i.e., "using past weather events to present a picture of what climate change may do in the future"). The "significant costs that can be attributed to such events" (e.g., estimated costs of 1997-98 El Niño floods in Kenya) "help raise awareness and give support to negotiations". He emphasizes the important role of "education" for providing "the next generation" the "insights into the risks of climate change". It is clear that there is a "need for a better informed public and efficient policy", though the "difficulty is to ensure that appropriate action is taken", so as to avoid costly wrong decisions, such as "constructing in flood zones", and jeopardizing the needs of future generations.

Dear Network Members,

Research, education, training and public awareness: A comment

The importance of research to link in to awareness of climate change in the eye of the public is clear. To get appropriate levels of adaptation is particularly important, as the climate change debate has focused much on mitigation and has generally left adaptation to one side-leading to the potential risks for maladaptation.

Clear thinking is needed in addressing the issues of climate change. Policymakers and the public need to understand that action may be needed today to best prepare for the future. For example, in the construction of highways and drainage systems the demand of climate change needs to be considered.

This thinking can be aided by simple scoping exercises in workshops. In the UK, the United Kingdom Climate Impacts Programme (UKCIP) organized a number of workshops at the regional level to help identify major climate threats to different sectors. I was a facilitator at some of these, focusing on the economic evaluation of climate threats.

To simply think through the possible impacts on sectors and identify possible adaptation options is in itself useful, but further analysis is also needed.

Analysis of the costs and benefits of adaptation requires uncertainty to be taken into account. Uncertainty pervades the analysis of climate risks - and few probabilistic models exist of likely climate change impacts going into the future. In general, the use of scenarios is important to show that the likely implications vary by climate model and also by changes in society that may influence the analysis.

In our work, the socio-economic scenario impact on costs and benefits has been shown to be important. However, a few countries have developed such scenarios-some have 2020 sketches, few think ahead to the 2050s or 2080s.

It is important that the cost of adaptation be carefully considered in raising awareness on climate change. Some actions are relatively costless, and may have significant side benefits (e.g., using different materials may reduce cooling bills). Other actions come at a high cost-and here it is important that appropriate training in assessing costs into the future be given.

In our work in the UK and Africa, we have often used "historical analogues"-using past weather events to present a picture of what climate change may do in the future. This is useful to do-as it grounds the work in events that stakeholders can engage with. However, it does present some difficulties and ignores the potential benefits of adaptation. Using historical analogues can give significant support to awareness raising, because of the significant costs that can be attributed to such events. For example, in a recent project in Africa, we presented the costs for a number of weather events-including the 1997-98 floods in Kenya. These are shown in Table 1. Costs of US$850 to US$1213 million could be identified. Such numbers help raise awareness and give support to negotiations – as will be discussed in the next topic.

Table 1. Estimated Costs of 1997-98 El Niño Floods in Kenya

Impact category	Cost type	Estimated costs $mn
Damage to infrastructure	Water systems	9 to 45
	Road network, communication and buildings	670(1) to 777
Public Health	Treatment costs	56
	Mortality	2 to 100
Agriculture	Loss of crops	<1 to 122
	Livestock mortality	113
Total		850 to 1213

Note: (1) based on transport alone;
Sources: Based on Mogaka *et al.* (2006); Karanja and Mutua (2000) and own calculations.

In terms of education, I was fortunate enough to be able to do an exercise with teenagers in my home town of Bath and ask them to think about the likely consequences of climate change on teenagers-thinking through issues such as cancellation of sporting events due to heavy rain, the impact of hot summers on the activities done, the health implications. Such activities help to give the next generation insights into the risks of climate change.

The need for a better informed public and efficient policy is clear. The difficulty is to ensure that appropriate action is taken-so we can avoid constructing in flood zones, act to reduce the impacts without incurring huge costs in the future, and balance the needs of this generation against the needs of the next.

With best regards,

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Environmental Economist
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About the contributor

Tim Taylor is an Environmental Economist working at the University of Bath. He has worked as a consultant for the World Bank, DfID and UNEP on the costs of climate change and adaptation. Recent publications include an article in Tourism Economics on the impact of climate change on domestic tourism in the UK (with R. Ortiz) and a book chapter with Alistair Hunt exploring economic assessment of climate change impacts and appropriate methods in Adger, Lorenzoni and O'Brien (eds). *Adapting to Climate Change: Thresholds, Values, Governance* (Cambridge University Press).

His webpage can be found at http://www.bath.ac.uk/economics/people/tjtaylor.html.

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Ruwanthi Senarathne wrote:

Facilitator's note (Pak Sum Low): Ruwanthi Senarathne feels that "the debate" about climate change "is more among the scientific experts, the governments" and she wonders "how much the general public knows and debates about" it. She thus proposes to use "ecological footprint" to increase the public "awareness on climate change". Indeed, the concept of ecological footprint is simple, and it is an indicator for environmental sustainability within the context of "bio-capacity" or the Earth's "carrying capacity" (in terms of "the amount of biological productive land and water required to meet the needs of an individual, community or a population and absorb the waste they generate"). She discusses how the ecological footprint can be used to promote "environmental sustainability" in "waste management companies", "schools and universities", with the support of the media. Through these initiatives, "people can be more aware of the interdependence of our lifestyle and its environmental impacts", and hence creating "a social movement" that prevents "over-consumptions" and contributes to "reducing the adverse impacts of climate change". However, it may be noted that "ecological footprint" has its limitations, as "resources consumption" is not the only indicator for environmental sustainability. Other environmental issues, such as land degradation/desertification, toxic chemical pollution and possible synergistic effects of pollutants; and even innovative eco-designs (e.g., green buildings that create energy), can also affect environmental sustainability.

Dear Network Members,

How and why ecological footprint can be used to increase awareness about climate change

In recent years knowledge and awareness about climate change have increased mainly because of national and international efforts. The voice raised by international conventions like the United Nations Framework Convention on Climate Change (UNFCCC) and by the Intergovernmental Panel on Climate Change (IPCC), which won the Nobel Peace Prize (jointly with Al Gore) in 2007, should be acclaimed. However, I feel that the debate is more among the scientific experts, the governments, and I wonder how much the general public knows and debates about climate change. I think that in day-to-day life, climate change is not easily distinguished from climate variability, which is happening with or without global warming factors. Thus, it is imperative to make the general public aware of climate change and its impacts in such a way that they can contribute to reduce climate change adverse impacts. People should be at the centre of development and any development agenda will be futile if greater public support is unavailable.

To enlighten the public about this scientific related issue, it is important to make the message easily understandable. I would like to propose to use ecological footprint to increase awareness on climate change.

What is the ecological footprint? It is a measure of the demand human activity puts on the biosphere. It measures the amount of biological productive land and water required to meet the needs of an individual, community or a population and absorb the waste they generate (Ewing *et al.* 2009). It is a snapshot measure and typically refers to average annual consumption. Results are usually presented on a per capita basis using a standardized unit of area, the global hectare (gha) (Barrett *et al.* 2004).

While any indicator has its weaknesses, I believe that the ecological footprint can go a long way, as it can be applied in varied circumstances at an individual as well as global level. Further, this can be presented as a simple measure as it deals mainly with two aspects, namely, how much earth resources are available and how much resources are consumed.

There are many people-friendly ways for the public to comprehend what these footprints are. There are a number of websites developed to calculate even individual footprints. This may also be presented as a bank statement for easy understanding: are we living within our ecological budget or spending more than we can afford?

If the information about footprint of certain regions, industries and cities are publicized, much interest could be generated among public who could then look for more information. This interest could then be capitalized and should be fed into educational streams, media institutions and so on for wider knowledge. This can lead to a public debate on the sustainability of the existing lifestyle, and on the strategies to reduce the footprint (Ziaka 2005).

Considering the potential that ecological footprints have to increase awareness, the Global Footprint Network, in partnership with Angenius and Mediation & Environment, created an interactive tool for calculating the footprint of the waste collection portion of SITA's (SITA, is one of the largest waste management companies in France) operations. SITA also uses the ecological footprint as a conceptual tool to help them and their customers understand the ecological value of waste as an opportunity for creating footprint savings. By creating and making awareness of their footprint calculator and embracing the footprint conceptual framework, SITA has successfully emerged as green waste managers and was able to compete for waste management bids in the industry (Global Footprint Network 2010).

Students in schools and universities could be given mini projects to find out the ecological footprints of certain areas and certain institutions etc. Some competitions could be also created (Ziaka 2005). In Abu Dhabi, directors of 27 schools have signed a pledge demonstrating their commitment to the Sustainable Schools Initiative. They pledged to reduce their schools' ecological footprints. The initiative links them with the community through varied activities and promotes environmental sustainability in Abu Dhabi Emirate with concrete deliverables. The schools will work to reduce their ecological footprint as they target to reduce their water and energy consumption and waste, and will build capacity of their teachers through training. Their students will be empowered through environmental clubs and they will take their students 'back to nature' through hands-on field experiences (AMEInfo.com 2009)

The media can also be used to increase awareness of people, by creating questions and answers sessions with experts on how to calculate the footprints, how to reduce certain footprints etc. The production of mini soap operas monitoring certain footprints, and the involvement of celebrities in publicity can also help promote awareness.

Through these calculations and initiatives, people can be more aware of the interdependence of our lifestyle and its environmental impacts on the rest of the world, regions and cities. Therefore, we can enhance a social movement towards reducing our over-consumptions and contribute to reducing the adverse impacts of climate change.

Regards,

Ruwanthi Senarathne
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About the contributor

Ruwanthi Senarathne is working as a Programme Associate in HDRU. She is interested in working for environmental and poverty-related issues. She holds a postgraduate in environmental science.

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4. Closing Message

Dear Network Members,

We have had very good responses to the discussion of sub-theme 6: *Research, Education, Training and Public Awareness* in the past three weeks. Sixteen authors have contributed to the discussion, with a total of 14 contributions. The contributors were Prathivadi Bhayankaram Anand, Trevor Booth, Sukthawee Suwannachairop, Purba H. Rao, Michele Martin, Paula Pons and Binoy K. Choudhury (joint authorship), Elena Borsatti, Va Dany, Chew-Hung Chang, Linda Too, Kishan Khoday, Stephanie Hodge and Suchitra Sugar (joint authorship), Tim Taylor, and Ruwanthi Senarathne, respectively. I would like to express my sincere thanks to these authors for their interesting, informative and useful contributions that touched upon a diverse range of important issues relating to the sub-theme.

Six contributions have mainly focused on various aspects of ***research*** (Prathivadi Bhayankaram Anand, Trevor Booth, Sukthawee Suwannachairop, Paula Pons and Binoy K. Choudhury, Va Dany, and Linda Too); while two contributions were specially focusing on ***education and training*** (Chew-Hung Chang, and Stephanie Hodge and Suchitra Sugar); and another six contributions on ***public awareness*** (Purba H. Rao, Michele Martin, Elena Borsatti, Kishan Khoday, Tim Taylor, and Ruwanthi Senarathne). However, a few contributions have also touched upon multiple issues (e.g., research, education and training by Paula Pons and Binoy K. Choudhury; research and communication by Trevor Booth; awareness and education by Michele Martin; research, awareness and education by Tim Taylor).

On research, **Prathivadi Bhayankaram Anand** emphasized the need for the social science input, especially governance; the need for "maintaining an approach of critical scrutiny"; and the need to prioritize mitigation and adaptation measures due to scarce resources in developing countries and to avoid "incorrect priorities". He also emphasized the importance of engaging the wider public for better policymaking. **Trevor Booth** highlighted the development of a Marine Climate Change Report Card, "the first-ever Australian benchmark of climate change impacts on marine ecosystems", including the development of communication programmes to convey relevant messages to a broad audience (e.g., through websites). This has provided useful experience for other Asia-Pacific countries. **Sukthawee Suwannachairop** stressed the importance of community-led participatory research (or the villagers research) in vulnerability and adaptation assessment, as well as the need to support a constructive and functioning Track III diplomacy, such as to provide the NGOs with "parallel meeting where climate change adaptation issues can be discussed openly and the marginalized groups can make their voice heard". **Paula Pons and Binoy K. Choudhury** discussed the need for research (and also education and training) on appropriate technologies that encourage public participation as an important tool for achieving sustainable development, and national policies must be "supportive of

appropriate technologies", such as renewable energy technologies, including "home-grown technologies". They also stressed the importance of tapping the innovativeness of people, particularly "young people and farmer-inventors". **Va Dany** discussed the concepts of adaptation and vulnerability, the role of vulnerability assessment (VA) in the adaptation process, and methodologies. She introduced an ongoing research study (2009-2012) undertaken by the Royal University of Phnom Penh "to evaluate the linkages of VA and adaptation strategy in the water and health sectors in Cambodia" within the context of national poverty reduction strategies, while strengthening the "local and national capacity to conduct VA in order to enhance local and national adaptive capacity". **Linda Too** observed that "personal benefit is a key determinant" for the "vast majority of the consumers/users" in making "their purchase decision", and thus there is a need to nurture green building occupants for "better acceptance of the green features" from a green marketing perspective. Apart from environmental benefits, the consumers are also concerned about "cost-effectiveness, health and safety, performance, symbolism and status, and convenience", all of which could affect their "satisfaction" in staying in the green buildings. Thus, a strategy, with "actual operational support", "is required to gain user acceptance and support, i.e., to encourage buy-in of green features".

On *education and training,* **Chew-Hung Chang** used four important framework questions to "provide a semblance of a checklist" in crafting an education for climate change (ECC) programme: (1) For whom is ECC intended and who provides it?; (2) What should be included in the content of ECC?; (3) How should the intended content be delivered?; and (4) How do the providers of ECC know if the intended outcomes have been achieved? He also used these questions to gauge the progress of various environmental education activities that have been undertaken by both the government and the non-governmental organizations in Singapore since 1972, including the first Singapore Green Plan (SGP) in 1992 and its new SGP 2012. His ideas of "green schools" and green workforce are innovative. He believes that "the person on the street has as much a role to play in mitigating climate change impacts as governments and industries", and the consumers' choice of products could make a significant difference in terms of reducing "carbon miles". **Stephanie Hodge and Suchitra Sugar** stressed that "current education must be transformed to be inclusive, protective, democratic and child-centred", and it is important "to uphold a vision of quality and access to education for all" within the context of "Education for Sustainable Development (ESD)", which "is particularly well-suited to addressing climate change in terms of understanding its causes, recognizing its impact, and implementing appropriate responses". They highlighted UNICEF's "model for quality education" and other UNICEF Education initiatives, such as "Education in Emergencies" that provides "disaster risk education" in more than 25 countries; and "Child-Friendly Schools" that include "the promotion of sustainable facilities in schools, including alternative energies, rainwater harvesting and school gardens". **Paula Pons and Binoy K. Choudhury**, apart from stressing the importance of technological research (see above), also emphasized the importance of education and training in assisting the communities to better prepare for the adverse impacts of climate change. **Tim Taylor** also emphasized the importance of education that provides "the next generation" the "insights into the risks of climate change".

On *public awareness,* **Purba H. Rao** found from their survey that both the executives/managers of large corporations and the "hundreds and thousands" of small and medium enterprises (SMEs) and entrepreneurs were aware of climate change and its impacts. However, unlike large corporations, the SMEs found it difficult to get "climate friendly" projects because they lack funding, intensive capital, manpower and technical know-how. She proposed two ways to overcome this dilemma: (1) "inclusive growth to sustainability" (i.e., let the large corporations show the way through forums and expertise advice by enabling the SMEs to follow their examples); and (2) Green supply chain management that holds "regular awareness seminars" to help suppliers and business partners to go green. **Michele Martin** shared the successful experience of the various public awareness activities undertaken by Sustainability for Seychelles (S4S), "a non-governmental organization (NGO) established in 2007 to promote sustainable living in Seychelles". The S4S activities used various means, including workshops, media and art forms, targeting at different groups (e.g., children, post-secondary students, citizens, professionals in various sectors, tourists, members of parliament, various government ministries and private sector), and linked "climate change education to education for sustainability", including traditional cultural practices. **Elena Borsatti** emphasized the critical importance of "changes in individual attitudes and behaviour" in preserving the environment and combating climate change, and hence the need for "knowledge and information" in raising the public awareness to initiate such changes "at the local, national, regional and global levels". She cited a number of good environmental practices to reduce waste and save energy, and highlighted various initiatives that "increase awareness on climate change and promote environmentally friendly behaviour", including "individuals who are undertaking exceptional personal feats, high-profile expeditions, and other acts of environmental activism" to publicize environmental causes. Her conclusion was particularly perceptive: "Although only a few individuals" may become "climate heroes or heroines", "every individual has the potential to be an agent for change

in his/her daily life." **Kishan Khoday** highlighted the "high levels of citizen awareness within Asian countries on climate change and other environmental issues" and cited China where "there is an increasing spirit of environmental rights, a desire particularly among the youth to address ecological change as a matter of human security and well-being of future generations". The growing environmental awareness in China was best captured in the green 2008 Beijing Olympic Games. He highlighted the significance of four key activities supported by UNDP: (i) *Olympic Film and TV Campaign* to publicize environmental themes; (ii) *Green Torch Relay* by "a group of eighteen local environmental champions" who served as Green Olympic Torch Bearers; (iii) *Low-Carbon and Resource Conserving Technologies* were integrated "into venue design and materials supply"; and (iv) *Water Conservation initiative* "to improve sustainable use of water in various parts of China towards goals of environmental sustainability and improving human health". **Tim Taylor** highlighted the important linkage between "research" and "awareness of climate change in the eye of the public". In particular, the analysis of future "socio-economic scenario impact on costs and benefits" (within limits of "uncertainty"), and the "cost of adaptation", can "help raise awareness and give support to negotiations", and hence there should be "appropriate training in assessing costs into the future". He cited some of his work in the UK and Africa based on "historical analogues" (i.e., "using past weather events to present a picture of what climate change may do in the future"). There is a "need for a better informed public and efficient policy", though the "difficulty is to ensure that appropriate action is taken", so as to avoid costly wrong decisions, such as "constructing in flood zones", and jeopardizing the needs of future generations. **Ruwanthi Senarathne** proposed to use "ecological footprint" (i.e., "the amount of biological productive land and water required to meet the needs of an individual, community or a population and absorb the waste they generate") to increase the public awareness on climate change. She discussed how this simple concept can be used to promote "environmental sustainability" in "waste management companies", "schools and universities", with the support of the media. Through these initiatives, "people can be more aware of the interdependence of our lifestyle and its environmental impacts", and hence creating "a social movement" that prevents "over-consumptions" and contributes to "reducing the adverse impacts of climate change".

The above contributions are a small but useful sample of a range of diverse issues that have been discussed in the international forums. Under the UNFCCC, the discussion on Article 5 (RESEARCH AND SYSTEMATIC OBSERVATION) and Article 6 (EDUCATION, TRAINING AND PUBLIC AWARENESS) will continue, especially the aspects relating to financing, technology transfer and capacity-building that are very much needed in the effective implementation of these two Articles. I hope that these issues will be further discussed under the next sub-theme 7 on *Global Climate Change Negotiations From Copenhagen To Mexico: Implications For Future Generations,* which will be kindly facilitated by my esteemed colleague and one of the most experienced and respected negotiators, Mrs. Bernarditas Muller, in the next three weeks.

With best wishes,

Pak Sum Low
AP-HDNet Facilitator

Sub-theme 7

Global Negotiations from Copenhagen to Mexico: Implications for Future Generations

1. Opening Message

Dear Network Members,

Global climate change negotiations have started more than twenty years ago, and indeed scientists have observed climate change for decades before the negotiations leading to the UN Framework Convention on Climate Change (UNFCCC) which began in 1990. However, the world's attention has been focused on these negotiations since the Bali Action Plan was adopted in 2007. In Copenhagen, the expectations were that these negotiations would be ended and that all world leaders would then give their final approval of the "agreed outcome".

The travesty of the multilateral, intergovernmental process which occurred in Copenhagen did not allow this to happen, and the negotiations were then extended, with the hope that they will be ended in Mexico in December 2010. Contrary to what is propagated in the mainstream media, the Copenhagen Conference of the Parties (COP) did not fail because of the failure of the multilateral process. Rather, it failed because it did not respect the intergovernmental, multilateral process usually followed within the United Nations. Agreement was reached among a very limited number of countries, and indeed in the months leading up to Copenhagen, agreement was promoted through a limited group of countries that became part of "high-level meetings", "circles of commitment", and other groupings and meetings outside of the UNFCCC process. Sovereign equality of States is the first principle of the UN Charter, and this was trampled upon in Copenhagen.

It is now disconcerting to note that in many statements, some countries, in particular developed countries, are indicating that the negotiations might not end in Mexico but could be extended to the 17th COP session in South Africa in 2011. Developing countries, through the Group of 77 and China, have made it clear that they seek a concrete legally-binding outcome in cancun, Mexico, one that would be balanced, comprehensive and equitable in nature.

The Bali Roadmap is made up of two parallel processes. The first, handled through an *ad hoc* Working Group on the further commitments of Parties included in Annex I of the Convention under the Kyoto Protocol (AWG-KP) started in 2006, based on the legal mandate given in Article 3.9 of the Protocol. It provides for negotiations on the commitments for subsequent periods of these Parties, started seven years before the end of the first commitment period in 2012, to ensure that there would be no gap between the first and the second commitment periods. The Protocol is the quantification of the legally-binding commitments for emission reductions of developed country Parties (Annex I countries) under the Convention, in terms of "quantified emission limitation or reduction commitments" (QELRCs).

The United States, a Party to the UNFCCC, signed but did not submit the Kyoto Protocol (KP) for ratification under its internal ratification process. The US has also made it clear that they will not ratify the KP. Under the ongoing negotiations, it became evident that some developed countries, which are Parties to the KP, are intending to get out of their obligations under the KP and to define these obligations only under the Convention. Other Annex I countries, if they continue with the KP, would like to see comparable obligations between them and the US as an outcome of these processes.

The second process is that of the Bali Action Plan (BAP), which launched a process for the "long-term cooperative action for the full, effective and sustained implementation of the Convention" in 2007, with the objective of arriving at an "agreed outcome" at the fifteenth session of the Conference of the Parties (COP 15) which took place in Copenhagen in 2009. The *ad hoc* Working Group on long-term cooperative action (AWG-LCA) started working on this process in March 2008. Developing countries see this process as one which would, as its objective states, bridge the implementation gaps of the Convention, in particular on the four main building blocks of the BAP, that is, mitigation, adaptation, financing and technology, to which was added a separate group dealing with capacity-building.

The BAP has no legal basis under the Convention. The only new issue in the BAP is the paragraph dealing with developing countries' "nationally-appropriate mitigation actions" (now known as NAMAs), which, together with the enabling means and support provided by developed countries to developing countries, would be subject to measurement, reporting and verification (MRV). The two main objectives of developed country Parties are to get developing countries, starting with a group they refer to as "major developing economies", but also to be extended to all developing countries, to undertake mitigation actions, even targets or commitments, and to subject these actions

to measurement, verification and reporting at international levels. The "major developing economies" are made up of the biggest economies in the developing world, namely, China, Brazil, South Africa, and India (even if the latter, by all criteria, can be included among the least-developed economies), known under the acronym BASIC countries since late 2009.

Under the Convention, the only legally-mandated reporting and reviews are related to mitigation commitments of developed country Parties, and their obligations to provide financial and technology support and enabling means, including for adaptation, to developing country Parties.

Developing country Parties have no binding commitments for mitigation under the UNFCCC, unlike developed country Parties, and their obligations related to mitigation are on the formulation, implementation, publication, and regular updating of national programmes containing measures to mitigate and measures to facilitate adequate adaptation to climate change (Article 4.1-b of the Convention). The "first and overriding priorities" of developing countries are "economic and social development and poverty eradication", and the extent to which they will effectively implement their commitments under the Convention "will depend on the effective implementation by developed country Parties of their commitments under the Convention related to financial resources and transfer of technology", taking into account these overriding priorities (Article 4.7).

It is also important to keep in mind that the objective of the Convention consists not only of its ultimate objective, but provides the parameters under which this ultimate objective is to be reached, that is "within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner" (Article 2).

This understanding of the context in which the current negotiations are being undertaken is crucial for the evaluation of the ongoing global climate change negotiations, and their implications for future generations.

Developing countries are fighting for their rightful share of the remaining environmental and developmental space much of which have been occupied by developed countries since the industrial revolution through their unrestricted growth which led to an accumulation of the long-lived greenhouse gases in the atmosphere and caused climate change.

Developed countries are focused on striving to guard the benefits that they have derived from this over-occupation of the atmosphere, and limiting the economic consequences to them of any equitable sharing of this environmental and developmental space. They start by offering financial "fast-track" financing and other financial amounts that are totally inadequate to meet the needs of developing countries to adapt to the adverse effects of climate change, develop in a sustainable manner and contribute their equitable share in mitigation, while struggling to provide a decent living standard for their populations.

This financing is to be channelled by voluntary contributions through existing financial institutions, subject to the conditionalities which have rendered such financing ineffective in the past, without the recognition that the provision of financial resources is a commitment that the developed countries have agreed to under the Convention, except by some lip service to it. Financing under the Convention is a commitment of developed countries, and is not development assistance nor bilateral aid, although these channels can provide supplementary sources of financing.

Moreover, most of the financing for climate change have been related to mitigation whereas adaptation is an urgent and crying need for all developing countries. Developing countries have contributed least to the problem of climate change and yet they are the most exposed to its adverse effects. Meeting costs of adaptation for countries that are "particularly vulnerable to the adverse effects of climate change" is likewise a commitment of developed countries under the Convention (Article 4.4), and yet much of adaptation financing is seen as some kind of "social responsibility" or supplementary financing to mitigation, in particular as it does not lend itself to any kind of "global benefit".

The Convention specifies "particularly vulnerable" situations in countries in its preambular paragraph 19, and states that "low-lying and other small island countries, countries with low-lying coastal, arid and semi-arid areas or areas liable to floods, drought and desertification, and developing countries with fragile mountainous ecosystems are particularly vulnerable to the adverse effects of climate change". These cover situations that could be found in all developing countries. References to "most" vulnerable are judgmental in nature, and are not found in the Convention.

Very little transfer of technology has taken place, even under the Clean Development Mechanism (CDM), a mechanism through which developing countries undertake mitigation project activities whose "certified emissions reduction units" are added to the assigned amounts of developed countries. This means that reductions made in developing countries can be bought to allow developed countries to emit a similar amount, which accounts for the CDM to be considered as a "flexible mechanism", used by developed countries to allow them some flexibility to reach their mitigation targets.

Developing countries are seeking to address these gaps in implementation of the Convention under the AWG-LCA, while maintaining the integrity of the KP intact. It must also be noted that the KP targets of developed countries are very low, even compared to the findings of the second assessment report of the Intergovernmental Panel on Climate Change (IPCC) in 1996. Given the remaining atmospheric space, developing countries are seeking targets that would limit the temperature increase from 1 to 1.5°C under the AWG-KP process, even while regional differences would mean that this limit would be higher in some regions, especially Africa. Moves by some developed countries to abandon the Protocol, clearly stated by them under the ongoing negotiations, mean that the negotiations will go on until an outcome is reached under the AWG-LCA.

In the contributions under this sub-theme, network members might address topics such as:

- The implications of a "below 2°C" limit of temperature increase to countries in the Asia-Pacific region, both in scientific and technical terms as well as its impacts on the economic and social development of present and future generations;
- All relevant activities that are taking place in the region to demonstrate that Asia-Pacific countries are contributing their share to the global effort to address climate change and its adverse effects;
- Financing and technology needs assessments in countries in the region in order to undertake both mitigation and adaptation activities;
- How can developing countries in the region make a difference in the ongoing negotiations;
- What would another failure in Mexico mean to developing countries in the region; and
- What would consist of a "success" in Mexico and how countries in the region could influence this success.

The well-being, indeed for some even the existence of future generations of developing countries in the region, as in much of the developing world, is at stake in the ongoing negotiations. The financial and technological implications are enormous, but little compared to what is being spent in other activities in the developed world. Much remains to be done, and countries in the region are in a position to do something about it.

I am looking forward to rich and meaningful discussions under this sub-theme. I would be grateful if contributions could be submitted latest by 28 June.

With best regards,

Bernarditas Muller
AP-HDNet Facilitator

Reference

UN (United Nations). 1992. United Nations framework convention on climate change. [http://unfccc.int/resource/docs/convkp/conveng.pdf]. Last accessed on 14 June 2010.

2. Contributions

The following authors, with their respective contributions, helped to enrich the discussion on the sub-theme *Global Negotiations from Copenhagen to Mexico: Implications for Future Generations:*

Marcia V.J. Kran, *Global negotiations from Copenhagen to Mexico: Implications for future generations and the need for a human rights-based approach*
Maria Melinda Ando, *Justice, equality and rights (and not population reduction): The answer to climate change*
Kishan Khoday and Usha Natarajan, *Fairness in international environmental law or how much should a person consume?*

Pak Sum Low, *Copenhagen Accord and national communications for Non-Annex I Parties*
Mukul Sanwal, C*ancun must focus on operationalizing equity: The shared vision requires a focus on national carbon budgets*

3. Online Discussion

Marcia V.J. Kran wrote:
Facilitator's note (Bernarditas Muller): Marcia V.J. Kran's contribution examines a human rights-based approach (HRBA) to climate change both as a recognition of the reality of the impacts of climate change on human rights, and a call to action by applying human rights obligations and commitments to climate change policymaking. She sees the direct impacts of climate change on individuals and communities as exacerbating factors of existing vulnerabilities, in particular on women, children, the disabled, the poor, and the elderly. Human rights of these vulnerable groups including those for participation in decision-making, access to education, adequate health services and housing, are critical elements for climate change adaptation. She cites the work done in UN agencies in using HRBA in the development assistance as a means of integrating human rights considerations in responses to climate change and its adverse effects through adaptation. More than the mere reflection of human rights in current negotiating texts in climate change, she promotes the need "to ensure that human rights are in fact respected and protected in the actual implementation of climate change policies and programmes, to the benefit of people, especially the most vulnerable", as is being done by the Office of the High Commissioner on Human Rights (OHCHR) of the United Nations.

Dear Network Members,

Global negotiations from Copenhagen to Mexico: Implications for future generations and the need for a human rights-based approach

Climate change and the impact on human rights

When the Human Rights Council adopted a resolution last year (Human Rights Council 2009 (*)) calling attention to the many impacts of climate change on human rights, and warning that its effects "will be felt most acutely by those segments of the population who are already in a vulnerable situation", it was making a statement of fact about the crisis. But when it affirmed that "human rights obligations and commitments have the potential to inform and strengthen international and national policymaking in the area of climate change," it was issuing a call to action, and reminding us of the urgency of applying a human rights-based approach (HRBA) to the global response to the crisis. Responding to that call will require clear thinking, and urgent action. Here is what I mean.

A human rights-based approach (HRBA)

A HRBA underlines the need to bring the human dimension to the centre of the climate change debate, with a focus squarely on rights-holders. Yes, climate change has a negative impact on States and economies. But, more fundamentally, the threat is to individuals and communities. Applying a HRBA therefore requires an assessment of how climate change-related threats affect individuals and communities, especially the most vulnerable, among them women, children, the elderly, persons with disabilities, and people living in poverty. Let us face it, climate change exacerbates existing vulnerabilities, which, in turn, are determined by factors such as discrimination, health status, and restricted access to food, water, housing, and land. A HRBA recognizes that human rights, including the ability to participate in decision-making processes, access to education, adequate health services and housing, are critical elements of effective climate change adaptation. In other words, it is not only about deserts and glaciers, political negotiations and conferences. It is about people, and their ability to live, as the Universal Declaration of Human Rights (UDHR) tells us we are born, "free and equal in dignity and rights" (Article 1).

This analysis takes account, as well, of duty bearers. The climate change crisis, after all, is not an accident of nature. A human rights approach begins with the recognition that both the causes of climate change, and options for responding to it and mitigating its effects, are matters of human choice-choices that are in the hands of governments, companies, and other actors at the local, national and international levels. In practical terms, a HRBA can be used to guide policies and measures of response and mitigation. It can inform assessments, and strengthen processes, ensuring access to essential information, effective participation, and the provision of effective remedies. Thankfully,

a forthcoming Guidance Note for UN country teams (UNCTs) on *Integrating Climate Change Considerations in the Country Analysis and the United Nations Development Assistance Framework (UNDAF)* integrates a HRBA, requiring that UNCTs consider in what ways, and to what extent, anticipated changes in climate will impede economic and social development at relevant levels, including consideration of poverty reduction, strengthening human rights and improving human health and well-being.

For our part, the Office of the High Commissioner for Human Rights (OHCHR) is working to support the development of UNCT capacity to mainstream human rights in UN programmes. For example, human rights and gender equality were mainstreamed in the design, implementation, monitoring and evaluation of programmes in the UNDAF for the Pacific sub-region for 2008-2012 (United Nations Development System Fiji and Samoa 2007) (**). And in cooperation with the UNDP Pacific Centre, OHCHR has examined human rights issues in disaster management, which are often exacerbated by climate change, with the aim of reducing the vulnerability of affected populations and special groups, enabling the transition to normalcy and reducing protection risks within a rights-based framework (OHCHR n.d.; OHCHR Regional Office for the Pacific and UNDP Pacific Centre 2007). More concretely, the UN system participated in the drafting of an Early Recovery Framework shortly after the tsunami on 29 September 2009 in Samoa, which intends that future early recovery efforts "premised on rights based principles will integrate environmental standards and mitigation measures for climate change and disaster risk reduction" (Office of the UN Resident Coordinator 2009).

Global negotiations and the way forward – 'Delivering as one' on climate change

The UN will continue to play an essential role in supporting the international community's efforts to combat climate change as the world prepares for the 16th session of the Conference of the Parties (COP 16) in cancun. And there are encouraging signs that our collective support will have a strong human rights foundation. References to human rights and to Human Rights Council Resolution 10/4 are included in the latest UNFCCC text to facilitate negotiations among Parties (UNFCCC 2010). The UN Development Group task team on climate change and environmental sustainability, and the UN system Chief Executives Board for Coordination (CEB), have led an initiative on "delivering as one" (***) on climate change in the run up to Copenhagen. Its Statement of Purpose notes that climate change impacts are "disproportionately affecting the poor and vulnerable, those who have the weakest capacity for resilience", and that "climate change in all its dimensions must be addressed within the broader context of sustainable development, which includes economic advancement, poverty eradication and environmental protection, elements that are ***essential to the realization of human rights*** and the achievement of the MDGs and other internationally and nationally agreed goals and aspirations" (CEB n.d.-b). The CEB has itself emphasized that "upholding human rights in all their aspects has to be a core component of adaptation action" (CEB n.d.-a), and identified OHCHR as a specific actor with regard to monitoring climate impacts and vulnerability (CEB 2008).

We are ready to do our part. OHCHR will continue to contribute to specific UN system initiatives, and to press the case that "human rights standards and principles should inform and strengthen policymaking in the area of climate change, promoting policy coherence and sustainable outcomes" (OHCHR 2009). We will continue to draw attention to the importance of ensuring that references to human rights in the agreed outcome text at COP 16 be consistent with relevant international human rights instruments. And we will continue to advocate for a human rights-based approach to the global response to climate change. But the **real** challenge will be to ensure that human rights are in fact respected and protected in the actual implementation of climate change policies and programmes to the benefit of people, especially the most vulnerable.

With best regards,

Marcia V.J. Kran
Director, Research and Right to Development Division
OHCHR, Geneva

Notes

(*) For more information on OHCHR's work on climate change and the deliberations of the Human Rights Council on human rights and climate change, see: http://www2.ohchr.org/english/issues/climatechange/index.htm

(**) For more information, please visit www.undp.org.ws and www.un.org.fj
(***) For more information on the UN system's work on climate change, see: www.un.org/climatechange

About the contributor

Marcia V.J. Kran is the Director of the Research and Right to Development Division of the Office of the High Commissioner for Human Rights. She thanks colleagues Craig Mokhiber and Estelle Askew-Renaut for contributing content for this posting.

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Maria Melinda Ando wrote:

Facilitator's note (Bernarditas Muller): In her contribution, Maria Melinda Ando disputes the claim that population control and reduction would be an adequate response to the challenge of climate change. She begins by citing the lessons learned from the International Conference on Population and Development and its Programme of Action of 1994 and the shift to a people-centred, rights-based and women-empowerment approach to development. The contribution correctly argues that growing populations are not synonymous with higher emissions if one considers *per capita* emissions, and that the focus on population growth ignores other driving factors for high-energy use such as consumption patterns. The contribution also notes that fertility rates are already declining in many developing countries and that in China, these have reached below replacement levels. It affirms that other mitigation policies focused on reducing energy consumption would have a greater impact on climate change than reducing birth rates, especially on the lowest-level energy consumers. Maria Melinda Ando also recalls that the greater responsibility for historical emissions is on countries that have the lowest population levels as stated in scientific findings for the causes of climate change. "Equitable and just climate change strategies should not displace responsibility for carbon emissions upon those least responsible for them", the contribution concludes.

Dear Network Members,

Justice, equality and rights (and not population reduction): The answer to climate change

Two years after the Earth Summit in Rio de Janeiro in 1992, 179 governments signed the International Conference on Population and Development Programme of Action (ICPD POA) in Cairo in 1994. The ICPD POA marked a historic global paradigm shift, from a population control development approach to one that is people-centred, rights-based and considers women's empowerment as a cornerstone of development.

However, the renewed international concern over climate change has resulted in setbacks. Arguments that overpopulation is the main driver of climate change, and that population reduction is more cost-effective and politically feasible than other means of carbon emission reduction, are gaining new ground.

It is thus critical that ongoing and future climate change negotiations, including at the next gathering of the Conference of the Parties in cancun, Mexico at the end of the year, consider lessons learned from ICPD. Development actors and negotiators need to be wary of an undue emphasis on population reduction to address climate change.

Silliman (2009) argues that narrowly focusing on reducing birth rates disregards other demographic factors, such as migration patterns, per capita resource consumption and consumption patterns that are part of, and perhaps even more significant components of, the population-climate change equation. Climate change measures that do not take account of these other factors are likely to fail.

Silliman also notes that 1/6 of the world population live in countries with extremely low rates of consumption, including energy consumption, and therefore have minimal impact on climate. Yet, most of these countries have higher rates of population growth. Hence, they are targeted by population control advocates, who argue that it is the large and growing populations of these countries that threaten climate change. However, according to the UN Framework Convention on Climate Change (UNFCCC), the largest emissions of greenhouse gases (both historical and current) originate in developed countries. Industrialized countries with 20 per cent of the world's population are responsible for 80 per cent of the accumulated carbon build-up in the atmosphere. In contrast, per capita emissions in developing countries are low. For example, in 2007, the US per capita emission was 19.1 tons of CO_2 per person, compared to 0.25 tons of CO_2 per person in Bangladesh (IEA 2009). Equitable and just climate change strategies should not displace responsibility for carbon emissions upon those least responsible for them.

The emphasis on reducing birth rates also overlooks that in many countries, including in the Asia and the Pacific, fertility rates are already declining. In some countries with large populations, such as China, the total fertility rates are already below replacement level. Additionally, a focus on population reduction ignores that corporations and the military industrial complex contribute significantly to climate change and environmental degradation.

Moreover, according to Silliman (2009), history shows that "population control strategies have inevitably led to abuses, coercion and the violation of women's fundamental rights." Despite the promise of ICPD, the 2009 ICPD+15

monitoring study by the Asian Pacific Resource and Research Centre for Women (ARROW) reveals that these violations persist on the ground (Thanenthiran and Racherla 2009). Fertility levels were considered as 'too high' in 9 of 12 Asian population policies examined, and policies aimed at lowering them focused narrowly on birth control. The burden of contraception mostly fell on women. A case study in Bogor, Indonesia (Habsjah 2009) shows that the population control approach, both in policy and practice, still prevails. Forced to reach numeric targets, family planning workers resort to mass campaigns which have serious implications on women's rights. A climate change agenda centred on population reduction would no doubt exacerbate this situation, and erode gains made by rights-respecting policies and programmes.

Silliman (2009) further asserts, "As a matter of human rights, women's right to control their own fertility should not be sacrificed to protect the environment. Nor is that sacrifice necessary. Cutting CO_2 emissions through new energy-saving technologies and changed consumption patterns would do a great deal more to protect the climate. For example, increased public transport, fuel-efficient cars and a reduction in the number of automobiles would have a greater, more immediate impact on reducing climate change than reducing birth rates, especially the birth rates of the lowest level consumers." Furthermore, it must be recognised that when women have greater access to education and employment, more say in household and community decision-making (including over their own fertility), access to quality sexual and reproductive health services (which includes quality contraceptive services as one aspect), and are assured of the future prospects of their children, fertility rates inevitably decline.

Finally, population control strategies may also crowd out other important development agendas related to women's health and rights, as well as exclude those who fall outside the ambit of 'married women of reproductive age' favoured by such policies and programmes, such as adolescents, sex workers, women with disabilities, and people of diverse sexual orientation and gender identities. Additionally, Silliman (2009) observes that it may endanger funds for climate adaptation and mitigation strategies since developed countries may opt to limit their climate change strategy to fund family planning in developing countries. Furthermore, she observes that population reduction may also "undermine efforts by developing countries to incorporate legitimate demographic concerns in national climate adaptation plans."

Going to Mexico and beyond, our agenda to address climate change must not only challenge the seemingly solid links between climate change and overpopulation, it must also integrate concepts of social justice, gender equality and human rights. Climate change solutions must not only ensure that those most responsible for carbon emissions have the greatest responsibility in solving the climate change problem. These measures must also address the gender dimensions of climate change. For example, these must consider the increased vulnerability of women to the environmental impacts of climate change and the impact of climate change disasters, as well as recognise women's roles as natural resource managers and community and household decision-makers who are not just victims but are part of the solution. These solutions must also ensure that they do not deepen the injustice, inequities and inequalities among and within genders (not just men and women, but also transgender people); and ultimately, challenge and change unequal gendered relations. This also includes ensuring that women and gender issues are included in the forthcoming climate change negotiations, not in the margins but as part of formal decision-making processes. Finally, responses to climate change must help women and girls achieve reproductive justice, which the Asian Communities for Reproductive Justice defines as having "the economic, social and political power and resources to make healthy decisions about [their] bodies, sexuality and reproduction for [them]selves, [their] families and [their] communities in all areas of their lives." (Rojas-Cheatham *et al.* 2009).

Thanks and best regards,

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About the contributor

Maria Melinda (Malyn) Ando is a Programme Officer at ARROW, a regional non-profit women's NGO based in Kuala Lumpur, Malaysia, that is committed to advocating and protecting women's health needs and rights, particularly in the

area of women's sexuality and reproductive health. Malyn serves as the Managing Editor of ARROWs For Change, an action-oriented, peer-reviewed bulletin that aims to provide clear women's, gender and rights-based perspectives on key sexual and reproductive rights issues concerning women in the Asia and the Pacific region. For more information on ARROW and the bulletin, visit www.arrow.org.my

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Kishan Khoday and Usha Natarajan wrote:

Facilitator's note (Bernarditas Muller): The contribution focuses on the fundamental issue of equity in climate change negotiations, and primarily on "the need for greater coherence between issues of equity and sustainability in global policy formulation". Kishan Khoday and Usha Natarajan claim that in the run up to the recent 15th session of the Conference of the Parties (COP 15) of the UN Framework Convention on Climate Change (UNFCCC) in Copenhagen in 2009, "equity and fairness remained in the background, overtaken by issues of effectiveness of technology transfer, (…) finance mechanisms, and enforceability of emission reduction targets". In contrast, they assert that the issue of fairness arose as the key roadblock to successful negotiations at COP 15. They cited a side event held at COP 15 by The Energy and Resources Institute (TERI) that proposed methods to redress the "fairness deficit" by focusing on consumption patterns, on the basis of an equal right to sustainable development of all people. They show that emissions in such big Asian developing countries as India and China are increasing mainly in areas experiencing "rapid urban industrial growth", while internal disparities exist in both countries in consumption and emissions between urban and less developed rural areas. "Fairness" is defined as a principle both of retributive and distributive justice in reducing tensions, and legal institutions could thus play a role in climate governance. The contributors cite a case in the United Sates where the court has found that under the US Constitution, "climate change impact was a justiciable harm for which legal rights could be claimed in court." In Asia, China has set up environmental courts and tribunals in the past two years, and India has adopted the "National Green Tribunal Act" of 2 June 2010, establishing a network of local courts country-wide to manage conflicts related to environment and natural resources. The contribution concludes by asserting that local governance innovations in Asia will emerge as a key mechanism for bridging global and local climate policy and addressing issues of equity and fairness. The Facilitator notes that the first principle of the UNFCCC stipulates that climate change action must be "based on equity and in accordance with their common but differentiated responsibilities…" and that this principle permeates each and every article of the UNFCCC.

Dear Network Members,

Fairness in international environmental law or how much should a person consume?

The international climate change regime has always been a contested project. Since its emergence in 1992, and perhaps more than any other aspect of international environmental law, the climate change regime has had to face criticism

that it corrects the mistakes of industrialized countries at the expense of developing countries. The impasse at the United Nations Framework Convention on Climate Change (UNFCCC) 15th Conference of the Parties (COP 15) in Copenhagen was a poignant reminder of the conflicting attitudes of developed and developing countries and the need for greater coherence between issues of equity and sustainability in global policy formulation.

In the run up to COP 15, concerns about equity and fairness remained in the background, overtaken by issues of effectiveness of technology transfer, climate finance mechanisms, and enforceability of emission reduction targets. However, the most formidable challenge at COP 15-and indeed the roadblock to successful negotiations-was the issue of fairness. The accepted wisdom in the build up to Copenhagen was that, after nearly twenty years of the UNFCCC, international environmental law on climate change had already reached a level of normativity, and thus focus should be on improved systems of compliance rather than debating basic principles. The re-emergence of Asia at the centre of the world economy, and as a primary source of future carbon emissions, challenged these assumptions.

At COP 15, the US and many other developed countries were interested in persuading large developing countries such as China and India to commit to emission reduction targets because of Asia's large share of future emissions. However, as China and India have low per capita emissions levels, and as developed countries have high per capita emissions levels-both historical and future emissions-this sparked an unresolved argument about fairness. For some policymakers and civil society activists, decades of debate have come down to this fundamental question: How much should a person consume? The India-based research institute, The Energy and Resources Institute (TERI), hosted a side event on 12 December 2009 proposing methods of redressing the fairness deficit by focusing on the aforementioned question. TERI proposed a climate regime based not only on national emission levels and future emissions, but also based on the premise that every global citizen holds an equal right to consumption (TERI 2009). Thus, historic patterns of consumption in developed countries should be balanced with the right of citizens in developing countries to adequate levels of energy consumption for sustainable human development.

As all people enjoy an equal right to human development, it is unfair to constrain per capita energy consumption increases in poor communities to compensate for the historic and ongoing overconsumption of a relatively small group of rich citizens and industries. By taking this logic further, one has to move beyond the developed and developing country dichotomy. While large emerging economies like China and India will produce the majority of future emissions, such emissions will come mainly from those provinces and states witnessing rapid urban industrial growth. These areas are also the main focus of voluntary energy intensity reduction initiatives. But significant internal disparities exist in per capita energy consumption and emissions in China and India, both between urban and rural areas, and between different provinces/states. The rural poor and less developed provinces/states have unmet needs for energy consumption towards achieving MDGs and national development goals. Thus, combining equity with sustainability is not only central to agreement on the global level, but it is equally important at the national and subnational levels, as countries seek to balance global and national energy intensity reduction targets with the right of the poor to increased consumption and development.

As illustrated at COP 15, the discourse on resource consumption and climate change is increasingly focusing on the gap between the rich and poor, both between and within countries. Thus, there is growing urgency and momentum for finding coherence between equity and sustainability in new climate governance regimes (Meadowcroft 2009). Fairness in climate governance is being defined both globally and locally as a principle of retributive justice (fairness as redress for past emissions by the wealthy) and as a principle of distributive justice (fairness as need-based or capacity-based burden-sharing for the benefit of the poor). However, understanding the interplay between institutions at global, national and subnational levels of governance is still limited (Gunningham *et al.* 1998; and Young 2002), with current systems described as "nested structures of rules within rules, within further rules" (Ostrom 2007). Thus, we need to explore new institutional capacities through which climate regimes can be made fair, and through which fairness of climate-related decision-making can be improved at global and local levels.

Judicial institutions will be of particular importance in resolving tensions between global and local regimes and in crafting new jurisprudence on the balance between environment and development. For instance, in 2007, the US Supreme Court in *Massachusetts v. Environmental Protection Administration (EPA)* issued the first climate decision in the US. A group of NGOs and coastal local governments argued that the Government's failure to regulate emissions was partly the cause of increased storms, loss of land to sea level rise, and so on. Among other findings, the court held that under the US Constitution, climate change impact was a justiciable harm for which legal rights could be claimed

in court and that the EPA was empowered to regulate CO_2 emissions, now an important basis for planned emission control regulations by the Obama administration.

Similar trends as to the expanding role of the judiciary in sustainable development are evident in Asia. In China, new environmental courts and tribunals have been established in seven provinces in the past two years. India's *National Green Tribunal Act* was approved on 2 June 2010 and seeks to establish a system of local courts across the country for the effective management of conflicts related to environmental and natural resources. India's regime will be the most extensive network of environmental tribunals in the world (Pring 2009). Green tribunals can address a host of pollution concerns in local communities, and given the importance of climate mitigation and impact policies for local communities, could well emerge in the future as a key element of climate change policymaking at the subnational and national level. The emergence of a proactive judicial role in Asia will serve as an important element of emerging climate governance regimes at national and subnational levels and could well shape the nature of engagement with global climate policy.

As we move towards COP 16 and beyond, the focus of climate policymaking and implementation will need to go beyond the age-old system of international relations driven by political negotiations among nation-states, to also engage emerging systems of local climate governance and access to justice as a means of balancing global and local climate policy and putting concerns of equity and fairness at the centre.

Regards,

Kishan Khoday, Deputy Resident Representative, UNDP Saudi Arabia
Usha Natarajan, Legal Research Fellow, Centre for International Sustainable Development Law, Canada

About the contributors

Kishan Khoday holds a Juris Doctor in Law, specializing in international and environmental law, and has served with UNDP since 1997 as Sustainable Development Adviser and Deputy Coordinator for Environment in Indonesia (1997-2005), Assistant Resident Representative and Team Leader for Energy & Environment in China (2005-2009), and currently as Deputy Resident Representative in Saudi Arabia. He may be contacted at kishan.khoday@undp.org.

Usha Natarajan holds a PhD in international law, specializing in Third World approaches to international law. She has worked for the UN Special Ambassador for MDGs in Asia and the Pacific (2003-2004) and UNESCO on peace and development programming in South-East Asia (2002). She is based in Riyadh, from where she serves as Legal Research Fellow for Human Rights and Poverty Eradication with the Centre for International Sustainable Development Law. She may be contacted at unatarajan@cisdl.org.

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Pak Sum Low wrote:

Facilitator's note (Bernarditas Muller): In this important contribution, Pak Sum Low focuses on one of the major elements in which the Copenhagen Accord, a contentious result that was "taken note of" at the 15th session of the Conference of the Parties (COP 15) of the UN Framework Convention on Climate Change (UNFCCC), is inconsistent with the provisions of the Convention, those dealing with the preparations of national communications. Drawing upon his wide experience in training and capacity-building for developing countries in their preparations of national communications as a main obligation under the UNFCCC, Pak Sum Low notes that paragraph 5 of the Copenhagen Accord contains provisions that are not in accordance with Article 12.5 of the UNFCCC in at least two main areas. First of these is the provision for the COP itself, and for no other entity, to decide on the frequency of submissions of national communications for all Parties. Secondly, the Accord, in its paragraph 5, requires the developing countries to include in their national communications information on their nationally appropriate mitigation actions (NAMAs) to be submitted every two years, whereas no such provision is contained in Article 12.5 of the Convention. The Accord also states that least developed countries (LDCs) and small island developing States (SIDS) have no such time limits. However, the contributor points out that the inadequate financing received by these developing countries makes it unlikely for them to spend "more than three years in most cases, depending on the local operational cost and project management cost", thus effectively setting a deadline for these countries' submissions as well. Because the preparation of national communications is "not only a reporting process, but also a national capacity-building process", this time limit is likely to deprive many developing countries of much-needed capacity-building. The contributor also correctly observes that the Bali Action Plan provides for support and enabling means for NAMAs for all developing countries and not only to specific groups among them. In conclusion, Pak Sum Low also notes that paragraph 10 of the Copenhagen Accord on the establishment of the Copenhagen Green Climate Fund as an operating entity of the financial mechanism puts in question the role of the Global Environment Facility (GEF) as the only operating entity and channel of financing for climate change projects, including the preparation of national communications, but whose operations have given rise to many concerns among the developing country Parties of the Convention.

Dear Network Members,

Copenhagen Accord and national communications for Non-Annex I Parties

Much has been analyzed regarding the shortcomings of the Copenhagen Accord, including the lack of emission reduction targets for Annex I Parties both in 2020 and 2050, and the limit on the increase in global temperature below 2 degrees Celsius rather than well below 1.5 degrees Celsius as demanded by small island states and least developed countries (LDCs). Bolivia even calls for limiting the temperature increase to 1 degree Celsius. The impacts of temperature increase are likely to have regional variations. Apart from temperature increase, other parameters such as changes in precipitation patterns, frequency of occurrence and intensity of extreme events, combined with other environmental, as well as socio-economic and even policy factors, are likely to cause further impacts. It is important for Non-Annex I Parties (developing and least developed countries and some countries with economies in transition) to analyze and assess the implications of the Accord before they decide whether or not they should formally (fully or partially) associate with it based on their national circumstances.

There are elements in the Accord that are not consistent with the United Nations Framework Convention on Climate Change (UNFCCC). Here I will focus on the issue relating to national communications for Non-Annex I Parties.

Article 12.5 of the UNFCCC states that "Each developed country Party and each other Party included in Annex I shall make its initial communication within six months of the entry into force of the Convention for that Party. Each Party not so listed shall make its initial communication within three years of the entry into force of the Convention for that Party, or of the availability of financial resources in accordance with Article 4, paragraph 3. Parties that are least developed countries may make their initial communication at their discretion. The frequency of subsequent communications by all Parties shall be determined by the Conference of the Parties, taking into account the differentiated timetable set by this paragraph."

It is clear from the above Article that it is the Conference of the Parties (COP) that has the authority to determine "the frequency of subsequent communications by all Parties". For Non-Annex I Parties, the current standard national communication cycle is three years based on Article 12, with funding provided by the Global Environment Facility (GEF), an operating entity of the financial mechanism of the UNFCCC. Under the "expedited procedures" (or "expedited financing"), an eligible country is provided with a fixed amount of funding by the GEF. For example, up to US$350,000 for the preparation of the Initial National Communication (GEF 1997), and up to US$420,000 for the Second National Communication, including US$15,000 for national stocktaking workshop (GEF 2003). It is unknown how the above funding limits were derived.

With such limited financial resource, it is unlikely for the national communication cycle to last for more than three years in most cases, depending on the local operational cost and project management cost.

However, paragraph 5 of the Copenhagen Accord requires that "Mitigation actions taken by Non-Annex I Parties will be subject to their domestic measurement, reporting and verification the result of which will be reported through their national communications every two years." This two-year national communication cycle for Non-Annex I Parties was not a decision adopted by the COP.

Based on available data, not a single Non-Annex I Party had submitted its initial national communication within two years. Indeed, many Non-Annex I Parties even took longer than three years to complete their initial national communications.

National communication requires reports on greenhouse gas inventory; policy and technical measures to mitigate climate change; vulnerability and adaptation assessment; technology transfer; education, training and public awareness; and capacity-building. It is not only a reporting process, but also a national capacity-building process. Thus, a two-year national communication cycle is likely to deprive some of the much-needed capacity-building activities for Non-Annex I Parties.

For LDCs, the two-year national communication cycle is not applicable, as Article 12.5 of the Convention does specify that "...Parties that are least developed countries may make their initial communication at their discretion…". This implies that there is no time limit for LDCs to submit their initial national communications. This also applies to subsequent national communications unless otherwise decided by the COP. However, with the limited amount of funding through the GEF "expedited procedures" (or "expedited financing"), even the LDCs cannot go beyond three or four years to prepare their national communications despite the fact that they are allowed to do so, otherwise they will also run out of their limited fund after three or four years (depending on the local operational cost and project management cost).

Indeed, paragraph 5 of the Copenhagen Accord states that "Least developed countries and small island developing States may undertake actions voluntarily and on the basis of support" regarding mitigation actions and hence the communication of information on nationally appropriate mitigation actions (NAMAs) for Appendix II.

Thus, it seems that as far as the Copenhagen Accord is concerned, LDCs and small island developing states (SIDS) may not undertake NAMAs unless they have received support. This seems to imply that LDCs and SIDS can be "excused" from providing information for Appendix II if they have not received any support for "voluntary action". Of course no one will object if the LDCs and SIDS would like to provide information on NAMAs for Appendix II even if they have not received any financial and technical support.

The above "exemption" for the LDCs and SIDS under the Copenhagen Accord seems to be different from the language used in paragraph 1(b)(ii) of the Bali Action Plan, which states that "Nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner". This paragraph provides that the NAMAs of all developing country Parties are to be "supported and enabled by technology, financing and capacity-building", not only the LDCs and SIDS.

COP 15 has mandated the continuation of the two-track negotiation processes under the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA) and the Ad Hoc Working Group on Further Commitments for Annex 1 Parties under the Kyoto Protocol (AWG-KP) until COP 16 (and perhaps further as may be decided by COP 16?). It would be interesting to see how the elements of the Copenhagen Accord can be "harmonized" with, or "incorporated" into, the outcomes of the AWG-LCA and the AWG-KP at COP 16.

It is also interesting to note that paragraph 10 of the Copenhagen Accord states that "We decide that the Copenhagen Green Climate Fund shall be established as an operating entity of the financial mechanism of the Convention to support projects, programme, policies and other activities in developing countries related to mitigation including REDD-plus, adaptation, capacity-building, technology development and transfer.". Thus, the Copenhagen Green Climate Fund (CGCF) will be an operating entity of the financial mechanism of the Convention, just like the GEF. Currently the respective roles of the CGCF and the GEF are being discussed, including whether or not existing entities should be used or a "finance board" should be established for the CGCF to oversee funding allocation and the Measurable, Reportable and Verifiable (MRV) of finance. In any case, many developing countries seem to have had problems with the GEF, including its long project cycle and complex application procedures, as well as the ten GEF Agencies, which have different operational rules and procedures, and their efficiency and effectiveness (including cost-effectiveness) have often been questioned, though some may be better than others.

With best wishes,

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About the contributor

Dr. Pak Sum Low is Adjunct Professor at the Faculty of Science and Technology, Universiti Kebangsaan Malaysia, and at the School of Sustainable Development, Bond University, Australia. He is International Adviser for the Climate Change Adaptation Initiative of the Mekong River Commission (MRC) Secretariat (since March 2010), and a member of Expert Group on Technology Transfer (EGTT) of the UNFCCC (since January 2010). He has previously worked in UNEP (1991-1999) and UNESCAP (2001-2008). He has provided consultancy services to the UNFCCC Secretariat, UNCCD Secretariat, UNDP and UNEP. Dr. Low has edited a book entitled *Climate Change and Africa* that was published by Cambridge University Press in 2005. His newly edited book entitled *Sustainable Development: Asia-Pacific Perspectives* will soon be published by Cambridge University Press. He has recently been appointed as one of the three Senior Editors for the Berkeley Electronic Press journal, *Risk, Hazards & Crisis in Public Policy* jointly managed by the Policy Studies Organization and the Pacific Disaster Center at the University of Hawaii (http://www.psocommons.org/rhcpp/news.html).

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Mukul Sanwal wrote:

Facilitator's note (Bernarditas Muller): Mukul Sanwal provides new perspectives on an old debate in climate change negotiations and proposes an innovative approach that operationalizes equity as the main outcome for the 16th session of the Conference of the Parties to the UN Framework Convention on Climate Change (UNFCCC) in cancun, Mexico. He suggests that the shared vision for long-term cooperative action, the overarching element of the Bali Action Plan process leading to cancun should "ensure policy space" for the economic growth of developing countries within the context of a new sustainable development framework. This would be necessary because current emission reduction pledges under the Copenhagen Accord, including developing country pledges that are more than those of developed countries, are largely inadequate to meet the 2°C limit of temperature increase envisioned in the Accord. Equitable sharing of the remaining carbon space requires a science-based determination of necessary mitigation actions from each country, with the allocation criteria to be negotiated that would be directly linked to outcomes. Carbon budgets would be established at multilateral levels and taken as the bases for domestic mitigation actions. This would shift the debate from the focus on developed country targets alone to the establishment of equitable sharing of carbon space that would allow developing countries to grow in a sustainable manner. Mukul Sanwal justly observes that "eradication of poverty requires equitable access to atmospheric space" to be enabled not only with the provision of financial resources but more importantly through transfer of technology. In summary, he states that equitable allocation of the remaining global carbon budget could be agreed at international levels and should be used as the basis for the formulation and implementation of national carbon budgets, accompanied by a timetable for joint research and development and transfer of technology.

Dear Network Members,

Cancun must focus on operationalizing equity:
The shared vision requires a focus on national carbon budgets

Equity is central to the multilateral negotiations on climate change, but even after twenty years of discussion the concept has yet to be operationalized. Therefore, the statement of Minister Jairam Ramesh, India, at the Major Economies Forum, that an agreement on equitable access to carbon space is a precondition for an international agreement on climate change, seeks to establish a new framework for the ongoing negotiations.

Such a developing country-led strategic initiative will safeguard the ecological health of the planet, ensure policy space for developing countries to grow and focus on the transformation of the world economy and human activity. As future increases in global emissions of carbon dioxide are going to come from developing countries, they must not only be innovative in modifying growth pathways but also take the lead in developing a new sustainable development framework for the climate negotiations.

A new agenda is needed because the global goal of keeping increase in temperatures to below 2 degrees Celsius requires 14 Giga tonnes (Gt.) of emissions abatement by 2020, whereas the firm pledges made after the Copenhagen Conference amount to only around 9 Gt, with developing countries contributing more than the reduction commitments of the developed countries. Moreover, the countries with per capita emissions and incomes below the global average, and this includes India, collectively would need at least as much carbon budget as the developed countries are about to take up from now until 2050, if they are to develop their infrastructure necessary for the eradication of poverty, and merely reach average global greenhouse gas (GHG) emissions of 4 tonnes per capita by 2050, that is recognized as a legitimate aspiration in the Copenhagen Accord.

The key global climate policy-or equity-issue is that without developed countries sharply reducing their emissions immediately, other countries cannot get their fair share of the carbon space for economic growth, if the global goal of limiting rise in global temperature to 2 degrees Celsius is to be met. Since the available carbon space is part of the global atmospheric commons, every country's fair share of carbon space is proportional to its share of the global population.

Consequently, the climate negotiations must recognize that both global temperature and GHG concentration targets are needed as the basis for long-term cooperation to meet the climate challenge. Post Copenhagen, emissions of GHGs cannot be seen only in terms of environmental damage, as they also have a development dimension, and global policy requires agreement on allocation criteria directly linked to outcomes that can be measured.

As climate change is caused by the cumulative stock of emissions and not just present or future flows, allocating national carbon budgets provides a much more scientific approach to specifying mitigation action at the global and national level, compared to the current method of first determining peaking years and/or specifying the annual emissions percentage reduction with respect to 1990 levels to be achieved in some milestone year towards mid-century. It also provides a better basis for comparing the adequacy of national mitigation actions.

Recent research in developed countries emphasizes the importance of such an approach in monitoring, review and verification (MRV), which is one of the most contested issues in the current negotiations. For example, the United Kingdom already has a legislation establishing a national carbon budget. A recent report of the National Academy of Sciences of the United States (National Academy of Sciences 2010) suggests that the policy goal must be stated as a quantitative limit on domestic GHG emissions over a specified time period-in other words a GHG emissions budget. It rightly concludes that national shares of global emissions need to be agreed at the multilateral level as the basis for developing and assessing domestic strategies.

A carbon budget based approach also enables a review of long held developing country positions that have been seen as hindering progress in the multilateral negotiations. Developed country overuse of the carbon space, or two-thirds of their cumulative emissions, has occurred after 1970 (Kanitkar *et al.* 2010), and such emissions should be considered as their current, rather than historical, responsibility for the overuse of the atmospheric resource. Climate change came onto the global agenda in the UN Conference on the Human Environment held in Stockholm, in 1972.

Even after discounting historical emissions, the allocation of the remaining carbon space can be made to developing countries so as to ensure their fair share of carbon space by 2050, enabled and supported by development and transfer of innovative technology. More specificity can also be provided to the allocation criteria by limiting future energy use per capita to that of mid-level developed countries. The new agenda would reflect the greater responsibility developing countries are prepared to take in accordance with their respective capabilities.

Moreover, a sustainable development framework points towards evolution of the long held policy that our per capita emissions will never exceed those of developed countries. That would essentially be a defensive reaction specifying what we will not do. The shift to determining a carbon budget responds better to the Copenhagen Accord, and the internationalization of mitigation actions. Eradication of poverty requires equitable access to atmospheric space, and the gap cannot be met only through financial resources, as it requires transfer of technology as the basis of long-term cooperation on mitigation and adaptation.

As countries review global climate policy, the focus must shift from just considering annual emissions to the allocation of the remaining global carbon budget of cumulative emissions; national carbon budgets as the basis for developing and assessing strategies; and, a timetable for joint research, development and transfer of new technologies to meet the scale and speed of the response. The shared vision for long-term cooperation must recognize the overuse of the atmospheric commons, and ensure patterns of resource use are common for all countries, through agreement on criteria for the equitable allocation of the remaining carbon, or development space.

Best regards,

Mukul Sanwal
South Centre, Geneva

About the contributor

Mukul Sanwal has held senior policy positions in the Government of India, United Nations Environment Programme and in the UN Climate Convention (UNFCCC) Secretariat. Currently he is associated with the South Centre, Geneva. These are his personal views.

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4. Closing Message

Dear Network Members,

There is a widespread perception among observers of global climate change negotiations that the processes have grown extremely complex from the time that the UN Framework Convention itself was negotiated in 1991. Indeed, experience in the implementation of legal obligations of all Parties under the Convention resulted in the recognition that there are wide-ranging implications of any action taken to address climate change and its adverse effects. Negotiations have therefore expanded to cover these implications, such as global trade and economic impacts of mitigation and adaptation actions, and their impacts on sustainable development and the well-being of present and future generations.

Scientific findings have evolved as well as concrete manifestations of climate change impacts, providing the incentive for deeper public involvement and concern. Climate change has become the "defining challenge of our time" and expectations from climate change negotiations have been heightened.

The previous sub-themes have covered essential components of these negotiations and this might explain why contributions to the general theme of these negotiations are not as numerous as on the other sub-themes.

The five contributions received nevertheless correctly focused on the fundamental principles that underlie the negotiations and have made important inputs to these discussions. I would like to express my sincere gratitude to the contributors: Marcia V.J. Kran, Maria Melinda Ando, Kishan Khoday and Usha Natarajan (joint contribution), Pak Sum Low, and Mukul Sanwal.

Kishan Khoday and **Usha Natarajan** underlined the principle of equity, the primary basic principle of these negotiations. They called for "greater coherence between issues of equity and sustainability in global policy formulation" to address climate change and its adverse effects. Equitable sharing of environmental and developmental space indeed forms the basis of the negotiations on all the main elements of mitigation, adaptation, provision of financial resources, development and transfer of technology, and capacity-building.

The UN Framework Convention on Climate Change (UNFCCC), in its first principle provides that "the Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities". This principle permeates each Article of the UNFCCC, and forms the key to the balance of common but differentiated responsibilities. From this principle flows the commitment of developed country Parties, responsible for historical emissions that caused climate change, to "taking the lead in modifying longer-term trends in anthropogenic emissions" (Article 4.2a), referring to production and consumption lifestyles. From this principle also flow the obligations to provide financing and technology transfer from developed country Parties to developing country Parties. These form the basic elements under ongoing climate change negotiations.

Equity also underlay the contribution of **Marcia V. J. Kran** calling for a human rights-based approach to the negotiations and to national policy formulation on climate change and its implementation. People are at the centre of our concerns, as is stated in the first of the Rio Principles on sustainable development. This contribution recognized that "both the causes of climate change and options for responding to it" are in the hands of people. Climate change and its adverse effects exacerbate damaging impacts on vulnerable communities. Current negotiations, in particular on adaptation, but also on the economic and social consequences of response measures on mitigation, focus on these impacts on people and their well-being, indeed for some, on their very survival.

High populations are not synonymous with high-energy consumption, **Maria Melinda Ando** correctly observed in her contribution. Once again, equity should be observed, as the problem of climate change has its origins in historical emissions of greenhouse gases by countries with much lower populations than developing countries of today. More effective responses to climate change could be achieved by controlling consumption rather than by controlling birth rates, the contribution rightly stated. The conclusion encapsulated the crux of the negotiating positions of developing countries in these negotiations, that "equitable and just climate change strategies should not displace responsibility for carbon emissions upon those least responsible for them".

Pak Sum Low's contribution touched on one of the most sensitive issues under these negotiations, and that is the inconsistencies between the Copenhagen Accord and the UNFCCC, in particular as relates to the provisions on the preparation of national communications of non-Annex I Parties. The exclusive and non-transparent manner in which the Copenhagen Accord was concluded among a small group of countries caused the breakdown at the final plenary of the 15th session of the Conference of the Parties (COP 15) of the UNFCCC in Copenhagen in December 2009.

The great majority of developing countries were excluded from representation in the discussions leading to the Copenhagen Accord. This travesty of the multilateral intergovernmental process led to the rejection of the Accord that was then taken note of instead of being adopted by the COP. This means that the Accord has no legal standing in the current negotiations. However, developed country Parties of the Accord are pushing for its integration in the current process. While about half of the developing country Parties of the UNFCCC supported, endorsed or associated with the Accord, many of them did so subject to conditions stated formally in their letters of endorsement or association.

These conditions are mainly related to the provision of the necessary financial resources and development and transfer of technology in order to allow developing countries to take nationally appropriate mitigation actions (NAMAs) that can then be reported through national communications. **Pak Sum Low** pointed out that the conditions put forward by the Copenhagen Accord are inconsistent with the provisions of the UNFCCC, and that these work to the detriment of the interests of developing countries.

Once again, we are faced here with an issue of equity. Developing countries, starting with the big developing ones, but also extending to the second and third levels of developing economies, are being required to undertake NAMAs where they have no such obligations under the Convention. Moreover, any mitigation action to be undertaken voluntarily by developing countries should be accompanied by the necessary financing and transfer of technology in accordance with Convention provisions. In addition, financing obligations of developed countries under the Convention cover not only mitigation actions but also all the necessary conditions that would allow these actions to be formulated, published, and regularly updated, as well as implemented.

Mukul Sanwal proposed a shift in the approach to negotiations that would render operational the element of equity as a concrete outcome for cancun. Given the reality of the Copenhagen Accord, it must now be taken into account in the negotiations. As it stands, however, the pledges from those countries that have supported the Accord, as reflected in the appendices, remain totally inadequate to meet the objective of reaching a temperature increase "below 2°C" contained in the Accord, not to mention the intention of assessing the implementation of the Accord by 2015, "including in relation to temperature rises of 1.5°C". There is in fact nothing in the Accord that links the expressed goal of "below 2°C" with the listing of either emission targets for Annex I countries or NAMAs of non-Annex I countries.

In his contribution, **Mukul Sanwal** stated that in order to achieve equity in sharing the global carbon space, a global carbon budget must be agreed at international levels with allocation criteria based not only on the responsibility for historical emissions alone, but also with a closer base year of 1970, and take into account present and future emissions as well. It would shift the debate from a stalemate to a proactive approach that would reflect the willingness of all countries to do their fair share for achieving the objective of the Convention, including its ultimate objective, given the necessary financial resources and in particular development, transfer and access to technology.

Equitable sharing of the remaining atmospheric space must take into account the need for developing countries for economic and social development, as recognized in the Convention. The key to the balance of common but differentiated responsibilities of the Convention also recognizes that economic and social development and poverty

eradication are the first and overriding priorities of developing countries (Article 4.7). Greenhouse gas (GHG) emissions cannot be seen as damaging the environment alone, **Mukul Sanwal** pointed out, but also as an engine of growth. Developing countries should be allowed to have their rightful share of the remaining global budget in order to achieve sustainable development.

In climate change negotiations, developing countries have referred to their emissions as "survival emissions" as opposed to "luxury emissions" of developed countries that would like to maintain their lifestyles. Movement in the negotiations must come from both sides, and developing countries have the obligation to pursue economic and social development in a sustainable manner, at the same time the developed countries should adopt production and consumption lifestyles that would likewise be environmentally sustainable. Technology development and transfer is crucial to sustainable growth. The balance of obligations carries the key to a successful outcome in cancun. In this manner, equitable sharing of the atmospheric space could be achieved, one that would fully serve the objective of the Convention.

All five contributions to this sub-theme focused on the fundamental element of equity in negotiations. For this reason, developing countries, including those in the Asia-Pacific region, call for an equitable, comprehensive, concrete, and legally binding outcome of the climate change negotiations in cancun.

As this is the last sub-theme that I have the honour to facilitate in this year's Asia-Pacific Human Development Network discussions, I would like to take this opportunity to express my gratitude to all contributors for the very enriching and interesting exchanges from which I have benefited and learned.

With best regards,

Bernarditas Muller
AP-HDNet Facilitator

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Sub-theme 8

Folklore, Traditional Knowledge, Idiomatic Expressions, Proverbs and Quotes

1. Opening Message

Dear Network Members,

We would like to thank you all for the rich interaction we had in the past few months. The discussions were lively, intense and covered a range of issues. They have generated a rich body of material (available online at http://hdru.aprc.undp.org/ext/HDRU/e_discussion_climate_change.php) that can be referred to and used more widely.

For the next three weeks we would like to invite you to share folk tales, examples of traditional knowledge, idiomatic expressions, proverbs and quotes relevant to climate change. Folklore in the form of tales, sayings, songs, music, rhymes and poetry can be highly illuminative of the human-nature relationship. Such material can provide a peek into society, as it is or as it can be imagined. Folk belief systems have also served the purpose of resource conservation in direct or indirect ways.

The concept of sacred resources, for example, is evident among many tribes. In Aka of West Kameng district, in Arunachal Pradesh, India, it is believed that the interference to sacred resources will result in loss of life as it is the abode of a supernatural force called *Ubro or Ubram*. The highest mountain peak in the Aka inhabited area, called *Wojo phu*, is considered as sacred mountain. Extraction of any resources from that mountain, and even hunting, is strictly prohibited. The Akas believe that the breaking of such taboo will lead to nose and mouth bleeding, finally leading to death. So, even today this mountain has a huge dense forest cover (Chaudhuri 2008).

The need to respect the environment, and promote awareness and an environmental-friendly lifestyle has been considered while discussing sub-theme 6. Indeed many cultures have similar sayings that encourage such environmental-friendly behaviour.

The material could be on tapping traditional knowledge, customs, practices and ideas that imply respect for water and land, conservation, sustainability, biological diversity, nature, earth, natural resources etc. It does not have to use terms like 'climate change' as such, as it is quite a new phenomenon.

For material in local languages (e.g., idiomatic expressions), the following information could be indicated: a) Local Term; b) Language; c) Country (origin); d) Translation; e) Comments/short story behind the use of the term (if any).

This discussion will be directly moderated by the HDRU Team. We take this opportunity to thank Dr. Pak Sum Low and Mrs. Bernarditas Muller for having facilitated in a wonderful manner the AP-HDNet discussion of seven sub-themes on "Human development and climate change".

We look forward to reading your contributions!

With kind regards,

Elena Borsatti
(On behalf of the HDRU)
HDRU
UNDP Asia-Pacific Regional Centre

References

Chaudhuri, Sarit K. 2008. "Folk belief and resource conservation: Reflections from Arunachal Pradesh". *Indian Folklife* 28: 4-5.

2. Contributions

The following authors, with their respective contributions, helped to enrich the discussion on the sub-theme *Folklore,*

Traditional Knowledge, Idiomatic Expressions, Proverbs and Quotes:

Jayati Ghosh, *The bell tower in the lake*
Sukthawee Suwannachairop, *Living in sync with nature: Calling back spirits, conserving biodiversity, and combating climate change*
Kishan Khoday and Usha Natarajan, *Dreaming of sustainability: The Jiva, the serpent and climate change in Melanesia*
Try Thuon, *Using indigenous knowledge for predicting floods, droughts and insect infestations: A case study from north-east Cambodia*
Tep Boonny and Kumi Careme, *Wealth and fragility of Cambodian fishermen*
Sumitra Sundram, *Dragons as guardians of the weather in ancient China*

3. Online Discussion

Jayati Ghosh wrote:
Facilitation note (HDRU Team): Jayati Ghosh shares an old Italian folk tale which has a clear "analogy with climate change and the other ecological disasters created by the global pattern of economic growth". Taking the folk tale as a departure point, the contributor highlights that everybody is "adversely affected by the results of (...) ecological imbalances" and there is a need "to shift from an obsession on growth (…) to a more rational organization of society, economy and of the relation between humanity and nature".

Dear Network Members,

The bell tower in the lake

The playwright Dario Fo tells this old Italian folk tale:

"Many years ago, way up on the crest of that steep cliff that rises from the lake, there was a town called Calde. As it happened, this town was sitting on a loose splinter of rock that slowly, day by day, was sliding down towards the precipice. It was a splendid little town, with a campanile, a fortified tower at the very peak and a cluster of houses, one after the other. It's a town that once was and now is gone. It disappeared in the fifteenth century.

'Hey', shouted the peasants and fishermen down in the valley below. 'You're sliding, you'll fall down from there'. But the cliff dwellers wouldn't listen to them, they even laughed and made fun of them: 'You think you're pretty smart, trying to scare us into running away from our houses and our land so you can grab them instead. But we're not that stupid.'

So they continued to prune their vines, sow their fields, marry and make love. They went to mass. They felt the rock slide under their houses but they didn't think much about it. 'Just the rock settling. Quite normal', they said, reassuring each other.

The great splinter of rock was about to sink into the lake. 'Watch out, you've got water up to your ankles', shouted the people along the shore. 'Nonsense, that's just drainage water from the fountains, it's just a bit humid', said the people of the town. And so, slowly but surely, the whole town was swallowed by the lake.

Gurgle… gurgle… splash… they sink… houses, men, women, two horses, three donkeys… heehaw… gurgle. Undaunted, the priest continues to receive the confession of a nun: 'Te absolve… animus… santi…gurgle… Aame… guuurgle…' The tower disappeared, the campanile sank with bells and all: Dong... ding... dop… plock…

Even today, if you look down into the water from that outcrop that still juts out from the lake, and if in that same moment a thunderstorm breaks out, and if the lightning illuminates the bottom of the lake, you can still see – incredible as it may seem! – the submerged town, with its streets still intact and even the inhabitants themselves, walking around and glibly repeating to themselves: 'Nothing has happened.' The fish swim back and forth before their eyes, even into their ears. But they just brush them off: 'Nothing to worry about. It's just some kind of fish that's learned to swim in the air.'

'Atchoo!' 'God bless you!' "Thank you… it's a bit humid today… more than yesterday… but everything's fine.' They've reached rock bottom, but as far as they are concerned, nothing has happened at all."

Today, it is hard for us not to see the analogy with climate change and the other ecological disasters created by the global pattern of economic growth. Unfortunately, the discussion around climate change is increasingly dominated by denial. But even among those who do accept that there could be a problem, the tendency is to see the issue as a fight between countries. This misses the essential point: that the issue is really linked to an economic system-capitalism-that is crucially dependent upon rapid growth as its driving force, even if this "growth" does not deliver better lives for the people.

So there is no questioning of the presumption that rich countries with declining populations must keep on growing in terms of GDP, rather than finding different ways of creating and distributing output to generate better quality of life. There is no debating of the pattern of growth in "successful" developing countries, which has in many cases come at the cost of increased inequality, greater material insecurity for a significant section of the population and massive damage to the environment.

Once such questions are asked, it becomes clear the interests of people in the centre are not inevitably opposed to those of people in the periphery, since both are now adversely affected by the results of such ecological imbalances. Instead, it means that it is now in all of our interests to shift from an obsession on growth that is primarily directed to increasing capitalist profits, to a more rational organization of society, economy and of the relation between humanity and nature.

With best regards,

Jayati Ghosh
Professor
Jawaharlal Nehru University, New Delhi, India

About the contributor

Professor Jayati Ghosh is an economist and Professor of Economics at Jawaharlal Nehru University, New Delhi, India. Her many interests include globalization, international finance, employment patterns in developing countries, macroeconomic policy, and issues related to gender and development. She is also the Executive Secretary of International Development Economics Associates (IDEAS).

Sukthawee Suwannachairop wrote:
Facilitation note (HDRU Team): When natural resources are considered "the most important factor" for survival, people "bind and respect" nature. But their beliefs and system of values play also a very important role. Sukthawee Suwannachairop introduces "the concept of kwan", which is vital for a "healthy life". For the Karen community (indigenous peoples living in Thailand and Myanmar) ***kwan*** are "natural spirits" that people, animals and plants have. Thus, a "healthy life is a reflection of healthy ecosystems" and therefore "one must protect the environment". The contributor concludes by highlighting the need to conserve nature which "can help reduce greenhouse gas emissions (i.e., mitigation) and help us adapt to the impacts of climate change." As ecosystem-based approaches to climate change can "increase the resilience of natural systems and are based on existing practices and local knowledge", the contributor suggests mainstreaming them "into climate change strategies of national frameworks".

Dear Network Members,

Living in sync with nature: Calling back spirits, conserving biodiversity, and combating climate change

Concept of Kwan

For Lao people, *Kwan* are components of the soul. The *kwan* have been variously described by Westerners as: "vital forces, giving harmony and balance to the body, or part of it" (Khampradith *et al.* 2010).
It is an ancient belief in Lao PDR that the human being is a union of 32 organs and that the *kwan* watch over and protect each one of them.

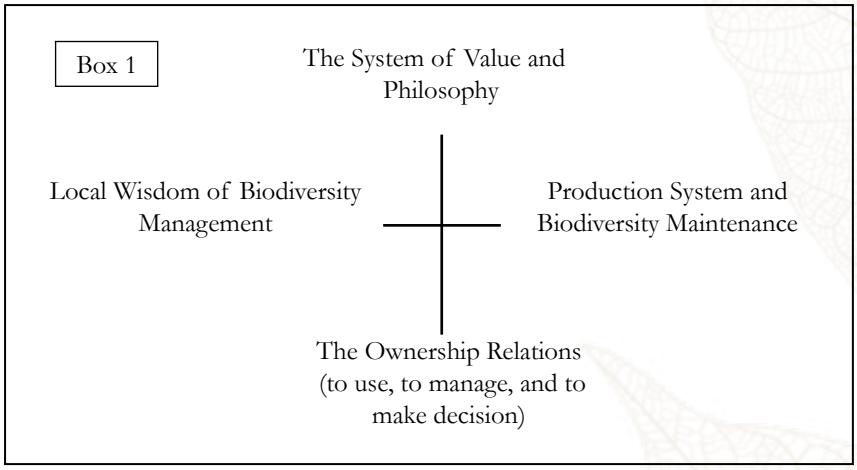
For the Karen, indigenous peoples of the South-East Asian countries of Thailand and Myanmar, the concept of *kwan* is understood and used quite differently, although there are some similarities. The Karen and the Lao people share the same believe that the present of *kwan* is vital to a healthy life and if *kwan* is/are missing they must do something to restore the equilibrium-calling back the *kwan*. The Karen elaborates the concept further by explaining that the *kwan* are natural spirits and every human has 32 *kwan*.

To the Karen, these natural spirits exist also in physical bodies of animals and plants. The 32 *kwan* reside in various livings i.e. rat, pig, snake, tree, plant, bird, etc. For one to have a healthy life, these animals and plants must be present in their surrounding environment. Healthy life is a reflection of healthy ecosystems; therefore, one must protect the environment. This is a traditional scheme aiming to inspire one to conserve biodiversity. What genius!

Healthy ecosystems provide a range of natural services that people rely on. These include the provision of food, clean water, shelter, firewood, fibre and medicine.

Relationship: Community and biodiversity management

Varaluk Chaitap, of the Northern Farmer Network, who studies the Karen and their biodiversity conservation ethics, explains that "natural resource is the most important factor for the survival of local community, especially communities in the forested areas. Each locality has a unique culture and lifestyle to manage natural resource relations. As the result, the relationship between the community and natural resource is related to their beliefs, thought, and local wisdom of natural resource uses … (See Box 1)." (Chaitap n.d.).



Chaitap concludes that "the ethnic groups and local residents who had lived and depended on natural resource for a long time must bind and respect nature that has given them lives to survive for many generations".

Inspired by Christianity's notion of stewardship, a certain group of Karen (like the habitants of the Karen village Ban Mae Lankhum at Chiangmai, Thailand) believes that *"Nature and all things on the earth do not belong to humans but to God. Humans just ask for its use and to take care of them."*

A legend often told to the children is that *"Ghokho is the god-like who came and created the earth. Before he went back he assigned 'Meukhaklor' to protect and keep eyes on everything on the earth. Meukhaklor was the ancestor of all humans. Later, the ancestor spirit became the guardian spirit of the forests (Seghorjar), the guardian spirit of the mountains (Khorjorghorjar), the guardian spirit of the water (Teeghorjar) and the guardian spirit of the earth (Horkhoghorjar)."* (Chaitap n.d.).

Because of these beliefs, villagers perform natural resource use-related ceremonies to ask permission through the spiritual leader.

Conserving biodiversity = Combating climate change

Conserving nature can help reduce greenhouse gas emissions (i.e., mitigation) and help us adapt to the impacts of climate change. Ecosystem resilience is the key to adaptation of species and habitat to climate change, which, in turn, will maintain and conserve biodiversity.

Conserving and managing nature can help people adapt to climatic changes. Climate change adaptation approaches should focus on maintaining or restoring ecosystems. Ecosystem-based approach that conserves biodiversity and sequesters carbon is an innovative and effective way for mitigating emission and adapting to climate change.

Such ecosystem-based adaptations should be mainstreamed into climate change strategies of national frameworks such as National Climate Change Strategies and the National Adaptation Programmes of Action (NAPAs). **Ecosystem-based approaches to climate change will increase the resilience of natural systems and are based on existing practices and local knowledge.** These offer the most effective and least costly adaptation solutions that are more feasible than engineering options that rely heavily on technical capacity, routine maintenance and large-scale infrastructure.

With best regards,

Sukthawee Suwannachairop
Climate Change and Adaptation Initiative Communication Officer
Mekong River Commission
Vientiane, Lao PDR

About the contributor

Sukthawee Suwannachairop was a visiting scholar at the University of North Carolina at Chapel Hill's Department of Anthropology and holds an Advanced Master Degree in International Studies from the University of Queensland. He has been working with the Mekong River Commission (MRC) as Climate Change and Adaptation Initiative Communication Officer since October 2009. Before joining the MRC, he worked with Sathirakoses-Nagapradipa Foundation as Coordinator of Community Development and Capacity-Building Project in Laos (2007-2009), La Universidad Americana (Nicaragua) as Lecturer in Peace and Conflict Resolution (2006-2007), NHK as Researcher and Correspondent (2003-2004), Consortium (USAID, World Education) as Trainer at the Thai-Burma border refugee camps (2002-2003), and served as a consultant, freelance, and contributor for various organizations (i.e., WWF, Wall Street Journal, Pacarayasara magazine, Krungthep Thurakit, ITV, etc.).

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Kishan Khoday and Usha Natarajan wrote:

Facilitation note (HDRU Team): Kishan Khoday and Usha Natarajan highlight that traditional knowledge is "vital to preservation of a plural and diverse world from both ecological and cultural perspectives". They focus on the Melanesian culture in South-east Asia and the Pacific as "climate change has shaped basic elements of human existence, culture and traditional knowledge in Melanesia for tens of thousands of years and continues to resonate in current discourse on livelihoods and environmental impacts in the area". Indigenous communities have in fact a close relationship with nature, and from one generation to the next a vision of "the individual's role as a custodian of the environment" has been conveyed. As an example of "the infusion of environmental knowledge and climate change into local traditions", the contributors consider "the Dreamtime tradition of Australian Aborigines", and share some information on the "seminal role of the Serpent", which is "associated with fertility and abundance of the environment".

Dear Network Members,

Dreaming of sustainability: The Jiva, the serpent and climate change in Melanesia

"Indigenous peoples are custodians of some of the most biologically diverse territories in the world. They are also responsible for a great deal of the world's linguistic and cultural diversity, and their traditional knowledge has been and continues to be an invaluable resource that benefits all of mankind. Meanwhile, their belief systems, cultures, languages and ways of life continue to be threatened, sometimes even by extinction" (UN 2009). So reads the first UN Report on the *State of the World's Indigenous Peoples.* There are an estimated 370 million indigenous peoples in the world, located across more than 90 countries. Indigenous issues have received increasing attention since the adoption of the *UN Declaration on the Rights of Indigenous Peoples* in 2007 (UN 2009). The regular meetings of the Permanent Forum on Indigenous Issues at UN Headquarters have also contributed to raising awareness on indigenous matters.

The connection between climate change and traditional knowledge has received increased attention in recent years (Macchi 2008). Earlier this year, from 19 to 22 April, the *World People´s Conference on Climate Change and the Rights of Mother Earth* convened in Bolivia in the wake of the Copenhagen climate conference. This global gathering of indigenous peoples, UN representatives and government leaders highlighted the need for new visions of the balance between human development and nature, and the central role of traditional knowledge in providing alternative paradigms of progress. As noted at the conference, "the only way we can contribute to the future of humanity and our planet is through recuperating our origins, strengthening our cultural practices and our forms of collective organization for the sustainable use and management of natural resources, guaranteeing the rights of indigenous peoples, and promoting traditional knowledge and notions about living in harmony with Mother Earth" (World People´s Conference on Climate Change and the Rights of Mother Earth 2010). Traditional knowledge is central to preservation of cultural diversity and the wealth of wisdom that has accumulated in indigenous societies over millennia. It is vital to preservation of a plural and diverse world from both ecological and cultural perspectives.

A region of special importance in this regard is the Melanesian culture in South-East Asia and the Pacific, covering the province of Papua in Eastern Indonesia, Papua New Guinea and Australia. The first human presence in this region is estimated at 40 to 60,000 years ago, during an Ice Age when sea levels were low and land masses connected (Neidjie 2002). Original human populations migrated out of the Horn of Africa around 50 to 70,000 years ago, crossing the Arabian Peninsula, the southern coastlines of India, and South-East Asia. Indeed, studies show genetic markers between Australian Aborigines and tribal communities in southern India dating back to this time (Wells 2002). The Melanesian region is the world's most culturally diverse area, hosting only eight million people, but a remarkable 25 per cent of the world's remaining 4,000 indigenous languages (Knauft 1999). Climate change has shaped basic elements of human existence, culture and traditional knowledge in Melanesia for tens of thousands of years and continues to resonate in current discourse on livelihoods and environmental impacts in the area (Gerritsen 2008).

An example of the infusion of environmental knowledge and climate change into local traditions is the Dreamtime tradition of Australian Aborigines, considered to be the longest continuous human culture in the world (Wolf 1994). In Aboriginal mythology, Dreamtime is the sacred creation moment out of which original ancestral beings formed the earth, with the climate, land, plants and animals of today made in their image. While the Dreamtime refers to the original creation act, the Dreaming is a living and continuous process that sustains all life, a connection of individuals and communities to the living spirit of Creation in nature. Every activity or event in life leaves a metaphysical residue

in space and time, a seed of potency within the earth referred to as the 'jiva'. The ecosystem carries jiva within it, a symbolic manifestation of the original creators and a metaphysical constant running throughout space and time, constituting the sacredness of the earth.

While specifics of the Dreamtime mythology vary by tribe, a common element particularly in Northern Australia is the seminal role of the Serpent, associated with fertility and abundance of the environment. Just as the snake sheds and re-grows its skin on a cyclical basis, the Rainbow Serpent symbolizes the regenerative power in nature and serves as a main character in Dreamtime mythology and a central character involved in climate mediation and climate change. "The belief in the Rainbow Snake, a personification of fertility, increase (richness in propagation of plants and animals) and rain, is common throughout Australia. It is a creator of human beings, having life-giving powers that send conception spirits to all the waterholes. It is responsible for regenerating rains and also for storms and floods when it acts as an agent of punishment against those who transgress the law or upset it in any way. It swallows people in great floods and regurgitates their bones, which turn into stone, thus documenting such events" (Chaloupka 1993).

The Rainbow Serpent, seen in rock art from around 6,000 years ago, is regarded by experts to be the world's oldest continuous religious symbol (Dean 1996). It is suggested that the local symbolism of the serpent could be modelled on the pipefish, found on the coastlines of the Arafura Sea in northern Australia and Indonesian Papua. It became a common element of the local environment and a symbol of destruction and recreation following the destructive changes brought on by rising sea levels at the end of the last Ice Age and the formation of rich coastal estuaries which became a source of life for communities (Chippindale *et al.* 1996). Sea level rises and climatic shift created great social stress as sustainability of food and water was affected. These problems led to the emergence of the Rainbow Serpent as a symbol of creation and destruction, and of unity among Aboriginal societies facing a common challenge of environmental change.

Over the generations, these stories have been passed down through a strong oral and pictorial tradition, conveying a vision of the individual's role as a custodian of the environment and sacred sites that are understood to resonate with jiva. This is a worldview where the ecosystem is seen as critical to sustaining the physical, mental and spiritual elements of human development and well-being (Horton 1996). Traditional knowledge not only dealt with the metaphysical but also had practical relations as a science, governing daily relations with the environment. Seasonality governed traditional life, which operated on the basis of a traditional calendar based on six seasons and a complex understanding of ecological processes. To some extent, personification of the environment has helped give expression to these societies' deep understanding and relationship with nature. A sense of nature and its wonder is entrenched in cosmology and social affairs, resulting in a very personalized response to ecological change and sustainability. In the Gagugju area of Australia's Northern Territory (Kakadu National Park), a group of elders has kept the jiva story alive. "I feel it with my body, with my blood. Feeling all these trees, all this country. When this wind blow you can feel it. Same for country, You can feel it. You can look. But feeling … that make you. Feeling make you. Out there in open space, he coming through your body, because tree just about your brother or father and tree is watching you … While you sleeping you dream something. Tree and grass same thing. They grow with your body, with your feeling … This ground never move. I'm hanging on to this ground. I'll become earth again. I belong to this earth. And earth should stay with us" (Neidjie 2002).

Regards,

Kishan Khoday, Deputy Resident Representative, UNDP Saudi Arabia
Usha Natarajan, Legal Research Fellow, Centre for International Sustainable Development Law, Canada

About the contributors

Kishan Khoday served as UNDP Sustainable Development Adviser and Deputy Coordinator for Environment in Indonesia (1997-2005), where among other things, he led programming on indigenous rights in Indonesia's Papua Province, as well as regional programming for sustainable use of the Arafura Sea inclusive of the Aborigines of northern Australia and indigenous peoples of Indonesia's Papua Province. He served as UNDP Assistant Resident Representative and Team Leader for Energy & Environment in China (2005-2009), and currently as UNDP Deputy Resident Representative in Saudi Arabia. Before joining UNDP in 1997, Kishan supported research with indigenous communities in Nunavut, northern Canada and tribal communities in the foothills of the Indian Himalayas. He may be contacted at kishan.khoday@undp.org.

Usha Natarajan holds a PhD in Third World approaches to international law from the Australian National University. She served as Assistant to the UN Special Ambassador for the MDGs in Asia and the Pacific (2003-2004) and worked on peace and development programming with UNESCO in Timor Leste (2002-2003). She is currently based in Riyadh and serves as a Visiting Assistant Professor of International Law at the American University in Cairo and Legal Research Fellow with the Centre for International Sustainable Development Law, Canada. She may be contacted at unatarajan@cisdl.org.

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Try Thuon wrote:
Facilitation note (HDRU Team): Climate has contributed to shaping people's lives in Cambodia, where people "have been dependent on natural resources for their livelihoods". Try Thuon focuses on Mondulkiri, "one of the four northeast provinces of Cambodia" which is known for its "rich natural resources with large forest areas". He considers people's beliefs and practices to predict the "natural phenomena, borrowing wisdoms of the fellow wildlife which habituate the (…) forest". People have learnt to predict, and prepare for seasonal events such as "floods, droughts and insect infestations". However, "since the 1990s (…) the Phnong people have come to observe more frequent occurrences and increased intensity of these events" and they feel that "things are increasingly becoming unpredictable". This has a negative effect not only on "their traditional farming" but also on their "cultural practices".

Dear Network Members,

Using indigenous knowledge for predicting floods, droughts and insect infestations: A case study from north-east Cambodia

Even before the age of science, climate has always been a major determinant in shaping people's lives, and cultural imaginations across the world. It is no less the case in Cambodia, where people have been dependent on natural resources for their livelihoods. Even now, the majority of the population lives in rural areas, practicing farming-most of which is rain-fed, and counting on seasonal flow changes of the Mighty Mekong and Tonle Sap Lake.

For centuries, people in Cambodia have devised a variety of ways to adapt to the natural conditions and engage in productive activities, making most of what is granted by nature. Predicting seasonal floods, droughts and insect infestations etc., has also been of major interest and importance for those who have been living side by side with these phenomena for ages. People in Cambodia have devised various ways to do so. And with probably no less certainty than science?

Examples from Mondulkiri

Mondulkiri is one of the four north-east provinces of Cambodia. It is one of the largest provinces in Cambodia (14,682 km^2), but with the least population (some 56,000 people). The ethnic Phnong consists of the majority (52.24 per cent), while the rest being lowland and other ethnic groups (Try *et al.* 2009).

The province is known for its rich natural resources, with large areas of forests and conservation areas. However, recent years have witnessed rapid changes in the province's landscape as a major part of the land has been converted into economic land concessions, mining and large scale agroforestry plantations. The Phnong people who live in the province for centuries are often blamed for causing forest fires and forest degradation.

The Phnong have long practiced traditional farming and used forest to support their livelihood and cultural system. They are mostly animist, believing in powerful spirits that inhabit a wide range of natural objects or sites. Many ceremonies are observed to ensure good relationships with these spirits, including sacrifices and libations.

Their main farming activity is non-irrigated shifting cultivation (*Miir*) of upland rice and other crops. Forest is burned before cultivation and ceremonies are performed before and after the farm is cleared. This type of slash and burn, when it allows sufficient time in-between for the forest and ecosystem to regenerate, is not considered destructive to the natural environment (Maclnnes 2007).

As their agricultural practices depend largely on natural environment, the Phnong people have developed their own ways of predicting natural phenomena, borrowing wisdoms of the fellow wildlife which habituate the same forest - such as the Bengal Monitor, King Cobra, Long Ant, and Wild Rooster (see Bourdier 2009).

The Phnong believe that there will be drought when a King Cobra lays eggs close to a stream. If the tails of young Bengal Monitors are whiter around April before the onset of the wet season, then that means there will drought during the upcoming supposedly wet season.

When more black colour is observed in Bengal Monitors' tails in the months of April and May, then the Phnong people would predict more rain, which may possibly lead to flooding. In some parts of Mondulkiri, locations of the nests of Long Ants are also believed to indicate possibility of floods: the higher on a tree and the further away from water they build their nests, the more likely that there will be flood. Similarly, when Wild Roosters lay their eggs on tree stumps or other higher ground and not directly on the ground, then you can expect a flood will come (*).

People also learned to observe behaviours of rains, dry spells and air flows. When a long (2-3 weeks) drought in otherwise normally wet season, followed by continuous rains with wind for 4-10 days, then they would expect a lot of insects would come to annoy them, taking their crops away.

Recent changes

Floods, droughts and insect infestations have been annual seasonal events which people have learned to predict, expect and prepare for. But since the 1990s onwards, the Phnong people have come to observe more frequent occurrences and increased intensity of these events, negatively affecting their upland crops. Sometimes insects destroy the entire harvest of one village, which was a hardly seen phenomenon earlier. Some people attribute this to longer spells of drought and changes in weather (more heat and rain), while others blame increased commercial activities in the province, that have led to land clearing/deforestation, changes in water regime, loss of habitat, increased use of pesticides in certain areas. Changes in the patterns of rains and droughts lead to not just crop failure but also competition for water uses for household and agriculture during droughts. Livestock and humans, especially children, fall ill during extreme temperature changes.

If these changes continue, the century-old traditional knowledge of the Phnong and other forest dwellers may someday become invalid. The Phnong are already feeling that things are increasingly becoming unpredictable for them. This in turn will disrupt their traditional farming and cultural practices, which for a long time has been dependent upon predictable rainfall patterns and amount.

Such increasing unpredictability is also reported from other provinces in the lowland. A villager who research changes in their own environment over time in Stung Treng (through Sala Phoum project (**)), recently reported: *'Last year during the drought we experienced flash floods, this year the rains came early.....before the (monsoon) rains and the farming season were regular, now you cannot trust them, people are changing their habits as a result. Migration from our homelands has increased sharply and cultural ceremonies such as those for calling the rains are being abandoned'*. (Mr. Ton: Sala Phoum village researcher, Wetlands Alliance Project Area, NE Cambodia)

These are just small examples from limited parts of Cambodia, but where and before we do not notice, there are more cultural and intellectual heritages possibly being at risk across the country.

With best regards,

Try Thuon
Resource Tenure and Livelihood Specialist
Independent researcher and co-author of the Cambodia HDR 2010/2011 on climate change
Phnom Penh, Cambodia

Notes

(*) In some parts of North-east Cambodia and Southern Lao PDR, people are also known to predict floods by observing the height at which insects lay eggs in the grass near streams.
(**) See Suwannachairop 2010.

About the contributor

Try Thuon is part of the authoring team of the next Cambodia Human Development Report on climate change. The contribution above is based on his earlier research work in Mondulkiri, and by courtesy of Mr. Mark Dubois of the World Fish Centre based in Phnom Penh, Cambodia for additional information.

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Tep Boonny and Kumi Careme wrote:

Facilitation note (HDRU Team): In Cambodia "the lives of poor fishermen are at the mercy of changing environmental conditions". Tep Boonny and Kumi Careme highlight the "important role that natural capture fisheries plays" in the Cambodian "culture and economy". They indicate that "the range of cultural traditions, together with the different topographic settings in which they have existed, has led to differences in the fishing equipments developed by the various communities/ethnic groups through their interactions". They also share a few proverbs that "make reference to fish, fishing and related activities, or seasonal water level changes of the fishing ground". One of them is "There is water, there is fish." But the contributors rightly question if this would always be the case, and consider the negative impacts that "changes in the environment and ecosystems" have on the livelihoods of the Cambodian fishermen.

Dear Network Members,

Wealth and fragility of Cambodian fishermen

As mentioned in Mr Try Thuon's contribution, in Cambodia, people have lived with and adapted to diverse phases and behaviours of the natural environment.

Fisheries, both inland and coastal, have traditionally been a main productive activity for Cambodians. Fish is no doubt the main staple food along with rice and it provides over 75 per cent of animal protein in the Cambodian diet (SCW 2006). The major part of Cambodian fisheries is capture fisheries, which depend on natural supply of fish from the rivers, lakes and the sea, rather than fish farming (aquaculture). Small-scale family fishing, which the great majority of fishing population is engaged in, is an important source of income in addition to supplementing nutrition.

The important role that natural capture fisheries plays in our culture and economy has not changed much since the time of the Angkor civilization. The impressive stone reliefs of Angkor temples celebrate the wealth and importance of fish and fisheries a millennium back.

The availability, migratory movements and species of fish and other aquatic resources vary quite significantly from place to place, and from season to season. Over centuries, Cambodian people have learned to adapt to such variability by developing appropriate hardware, techniques, and resource management regimes and their own migration patterns.

Exercising ingenuities in pursuit of fish

Cambodian fishermen's ingenuity to take advantage of the natural harvest is demonstrated by the wide variety of fishing techniques and gears they use. The range of cultural traditions, together with the different topographic settings in which they have existed, has led to differences in the fishing equipments developed by the various communities/ethnic groups through their interactions (Try 2004). Names for gear types were passed from community to community, and

different versions of fishing gears appeared and disappeared, to suit the changing social, economic and environmental conditions. According to a study conducted in 12 out of 24 provinces, around 200 different types of fishing gears were identified (Deap *et al.* 2003). These gears are designed for specific fish habitats, water conditions and levels, and often specific species groups. People also adapt how they fish according to seasonal conditions. The traditional gears/fishing methods are also used selectively in order to avoid overfishing (UNDP 2006).

In addition to adjusting their hardware, people also adjust places of living in pursuit of fish. In Tonle Sap, when the water goes up from June to October (no-fishing season), fishermen park their floating huts close to the shore, and spend time preparing and fixing their fishing gears and equipment. In October, when the water starts to recede and flow back from Tonle Sap Lake to the Mekong and further downstream towards the South China Sea, fishermen start preparing to migrate with the flow. Some fishermen even migrate from Phnom Penh up north to Stung Treng along the Mekong close to the Lao border, and stay there for the whole fishing season.

Fish and fishermen in daily dicta

Cambodian's cultural imaginations also flourished around fisheries. We have a number of proverbs that make reference to fish, fishing and related activities, or seasonal water level changes of the fishing ground. For example: *The water rises, fish eat the ants; the water recedes, the ants eat the fish.* (Life is a permanent up and down. Don't be too proud about your power as you will lose it one day. Don't despair, then one day things will change to your benefit.) (KCD 2009).

And another: *The one who climbs in the tree is busy with picking; the one who shells does not eat; the one who stays unoccupied may satisfy his hunger.* (Society is full of inequity and too frequently, some are rewarded for nonproductive behavior while others do not, even by working hard.) (KCD 2009).

As suggested by this proverb, most of ordinary fishermen in Cambodia are poor. Often fisher folks who live on water bodies in floating huts or houses-on-stilts do so as they have no land to farm. Those who are engaged both in fishing and farming prefer to be identified as farmers rather than fishermen, as the latter implies that one is poor.

Where there is water, is there fish?

The lives of poor fishermen are at the mercy of changing environmental conditions. Another Cambodian proverb goes: "There is water, there is fish". But would it always be the case? Here's a story of a young fisherman:

Mr. Trie Tearn, 21 years old and born in Koah Kapi, Koah Kong Province, is a muddy crab fisherman along the mangrove forest and small streams around Koah Kapi's island. He feels that "On our island, there is a crucial change in temperature. Fishery products, mainly muddy crabs in the mangrove forest, are becoming harder to catch. I believe it is because the sea water has also become hotter and the muddy crabs are moving deeper and deeper in the water" (*).

From May to October, the sea water level goes down during the day. If the water gets too warm, muddy crabs move down deeper, out of the reach of Mr. Tearn's otherwise effective traps. Sometimes the tide rises during the day but the water temperature still remains hot. These changes were not felt before, and he feels that they are affecting the behaviours of fish and other marine species. In general, the catches from his community are decreasing.

In recent years, fishing communities both inland and coastal areas are feeling changes in the environment. Some say it is climate change, but others say it is the direct consequence of destruction of coastal mangroves or construction of hydropower dams upstream, if it is inland. Increasing use of modern equipment is blamed also for overfishing. Probably these are all contributing factors to the changes that people are feeling. Whatever the causes, the fact remains that delicate changes in the environment and ecosystems, which lead to decrease or unpredictability of aquatic/marine resource availability, directly affects already fragile livelihoods of our Cambodian fishermen.

With best regards,

Tep Boonny, Executive Director, Save Cambodia's Wildlife
Kumi Careme, Coordinator, National Human Development Report, UNDP Cambodia

Note

(*) Based on information collected during SCW's field work in Koah Kapi, Koah Kong Province in July 2010.

About the contributors

Tep Boonny is Executive Director of Save Cambodia's Wildlife (SCW), and a member of Coordination Team of National Climate Change Network – Cambodia. SCW is an NGO which works extensively on natural resources management and governance, environmental education and conservation, across Cambodia. The contribution above is based on his extensive experience in working with communities along the coastal zone of Cambodia.

Kumi Careme currently coordinates development of the next Cambodia Human Development Report on climate change, focusing on implications for rural livelihoods.

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Sumitra Sundram wrote:

Facilitation note (HDRU Team): Sumitra Sundram shares information on how dragons were perceived in the ancient Chinese society and highlights their importance for the protection of "natural elements", "earth, agricultural crops and mountains", "precious metals and gems" and "all sources of water". She indicates that in the "ancient Chinese legends" four dragons were featured and one of them, the Water Dragon, guarded "rain, waterfalls, wells, seas, and all sources of water". "The worst floodings (…) were usually attributed to a dragon being upset", and "when villages suffered consequences of extreme weather patterns (e.g., droughts or floodings), 'sacrifices and religious ceremonies were conducted in hopes of appeasing the appropriate dragon'". Although the perception of dragons has evolved, they are still an important element in the Chinese culture and "an important part of Chinese New Year celebrations".

Dear Network Members,

Dragons as guardians of the weather in ancient China

For the ancient Chinese, dragons were perceived to be real, of supernatural ability. They were also the embodiment of "yang" energy (representing masculine power and associated with the weather). Based on Chinese beliefs of living in harmony, there must be enough "yang" in nature and in one's life to balance the feminine "yin" energy (associated with the earth). By extension, dragons were also a symbol of the power of emperors. This perception of dragons has evolved to modern times where they are viewed by the Chinese to be "a symbol of power, strength, success, luck and honour" and an important part of Chinese New Year celebrations (Cole n.d.).

Ancient Chinese legends feature 4 distinct dragons as listed below:

- The Fire Dragon (associated with the colour red) guards the natural elements (including the wind, fire, sky, and lightening).
- The Earth Dragon (associated with the colour green) guards the earth, agricultural crops and mountains.
- The Metal Dragon (associated with the colour gold) guards precious metals and gems.
- The Water Dragon (associated with the colour blue) guards "rain, waterfalls, wells, seas, and all sources of water" (Cole n.d.).

Water was of extreme importance to ancient Chinese society for their survival due to the annual flooding of major floodplains to support the cultivation of rice and other important agricultural crops. Rivers also provided a major means of transportation and trade. Any prolonged period of drought was seen as a sign that the heavenly beings had withdrawn their favour from the ruling emperor and thus the emperor would face challenges to remain in power. The worst floodings in ancient China were usually attributed to a dragon being upset (Bast n.d.).

In addition to the dragons listed above, there were also four main Dragon Kings who ruled over particular water bodies and were responsible for water-related weather occurrences (Cole n.d.):

- Dragon King of the East Sea: ruler of the East China Sea.
- Dragon King of South Sea: ruler of the South China Sea.
- Dragon King of the West Sea: ruler of the Indian Ocean and beyond.
- Dragon King of the North Sea: ruler of Lake Baikal.

When villages suffered consequences of extreme weather patterns (e.g., droughts or floodings), "sacrifices and religious ceremonies were conducted in hopes of appeasing the appropriate dragon" (Cole n.d.). Cirlot (2002), as quoted by Bast (n.d.), notes that the Chinese, when they wished for rain, made "a huge dragon out of wood and paper" to be carried in a procession; but if it did not rain, then the dragon was destroyed.

For the Chinese population, though it is still subject to floodings and droughts, appeasing the dragons and linking weather phenomena to the longevity of dynasties have become practices of the past.

Best regards,

Sumitra Sundram
Management Analyst
UNDP Asia-Pacific Regional Centre

About the contributor

Sumitra Sundram is a Management Analyst with UNDP's Asia-Pacific Regional Centre. She is a chemical engineer by training with a Master's in International Affairs, focusing on environmental policy. She decided early in her career to work in the environmental arena. She has previously worked in environmental management in the private sector and with UNDP. With UNDP, she has previously worked for the UNDP-GEF Small Grants Programme in Malaysia and the Africa-Asia Eco-Partnership Programme. She can be contacted at sumitra_sundram@yahoo.com.

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4. Closing Message

Dear Network Members,

We would like to express our sincere thanks to Jayati Ghosh, Sukthawee Suwannachairop, Kishan Khoday and Usha Natarajan (joint contribution), Try Thuon, Tep Boonny and Kumi Careme (joint contribution), and Sumitra Sundram for their interesting and informative contributions to the sub-theme *Folklore, Traditional Knowledge, Idiomatic Expressions, Proverbs and Quotes.*

Jayati Ghosh shared an old Italian folk tale with a clear "analogy with climate change and the other ecological disasters created by the global pattern of economic growth". But this folk tale was only a departure point to highlight the need "to shift from an obsession on growth (…) to a more rational organization of society, economy and of the relation between humanity and nature". "The interests of people in the centre are not inevitably opposed to those of people in the periphery, since both are now adversely affected by the results of such ecological imbalances".

Tep Boonny and Kumi Careme highlighted that "changes in the environment and ecosystems" negatively affect the "already fragile livelihoods" of the Cambodian fishermen. Their contribution, in which a few proverbs from Cambodia were presented, focused on the natural capture fisheries and indicated that "the range of cultural traditions, together with the different topographic settings in which they have existed, has led to differences in the fishing equipments developed by the various communities/ethnic groups through their interactions".

Kishan Khoday and Usha Natarajan highlighted the importance of traditional knowledge as it is "vital to preservation of a plural and diverse world from both ecological and cultural perspectives". They focused on the Melanesian culture in South-East Asia and the Pacific, and as an example of "the infusion of environmental knowledge and climate change into local traditions", "the Dreamtime tradition of Australian Aborigines" was considered. They also considered the belief in the Rainbow Snake which "symbolizes the regenerative power in nature and serves as a main character in Dreamtime mythology".

People's beliefs and practices were considered also in other contributions. **Sukthawee Suwannachairop** shared some of the beliefs of the Karen community (indigenous peoples living in Thailand and Myanmar) for which "healthy life is a reflection of healthy ecosystems" and therefore "one must protect the environment". The contributor concluded that as ecosystem-based approaches to climate change can "increase the resilience of natural systems and are based on existing practices and local knowledge", they could be mainstreamed "into climate change strategies of national frameworks". **Try Thuon** focused on Mondulkiri, "one of the four north-east provinces of Cambodia", and considered people's beliefs and practices to predict the "natural phenomena, borrowing wisdoms of the fellow wildlife which habituate the (…) forest". People have learnt to predict, and prepare for seasonal events such as "floods, droughts and insect infestations". However, since the 1990s the frequency and intensity of these events have changed and people feel that "things are increasingly becoming unpredictable". Thus, this has a negative effect not only on "their traditional farming" but also on their "cultural practices". **Sumitra Sundram** shared information on how dragons were perceived in the ancient Chinese society for the protection of "natural elements", "earth, agricultural crops and mountains", "precious metals and gems" and "all sources of water". In those days "the worst floodings (…) were usually attributed to a dragon being upset".

Folk tales, myths and beliefs have given us a peek into different cultures while considering the collective need for living a more harmonious life with nature, to protect and preserve the local environment.

We would like to thank all Network members for having shared with us their knowledge in the past few months.

We look forward to interacting with you again soon.

With our very best wishes,

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