International Strategy for Disaster Reduction

European Union

Indigenous Knowledge for Disaster Risk Reduction:

Good Practices and Lessons Learned from Experiences in the Asia-Pacific Region

2008

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The cover photo illustrates a Dhani, a traditional family dwelling in the district of Barmer in Rajasthan, India. The Dhani has been improved using modern technology called Stabilized Compressed Interlocking Block technology (SCEB). For more information, see "Indigenous Knowledge and Modern Science Give Environment Friendly Shelter Solution in Flood Affected Desert Region of India" in this publication.
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Singas Village, Papua New Guinea

Living with Floods in Singas, Papua New Guinea

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Abstract

The experiences of the members of Singas village, situated in Morobe Province, Papua New Guinea (PNG), illustrate how indigenous knowledge can contribute to disaster risk reduction. Singas village is a small community situated along the banks of one of PNG's major rivers, the Markham River. As a consequence, it is affected by yearly flooding following heavy rains experienced during the rainy season. The example holds particular significance as not only does the river represent a potential hazard but it is also the source of the community's livelihood and therefore holds great importance within the community. As a result the community is extremely pro-active in its efforts to mitigate the consequences of flooding. Indigenous knowledge in five specific areas, namely building methods, social linkages, land use planning, food strategies and environmental strategies, has proven to help contribute to the community's ability to mitigate the impact of regular flooding events.

Background

Singas village is situated in an isolated enclave in the Markham District of Morobe Province along the banks of the Markham River in PNG.

The closest town is Mutzing Station, located across the river from Singas, which is the centre of Markham District. Mutzing Station contains the nearest government buildings, secondary school, health clinic and market to Singas. The Markham River varies in width from 3-8 km as it travels through its lower reaches, with the crossing by Singas village being one of its widest points. The walk across the river from Singas to Mutzing Station takes approximately one to two hours depending on the river flow (Figure 1). This route is only passable in the dry season and even then it is often still treacherous. During the rainy season, the villagers have to walk for two days to reach a point at which they can cross via a bridge which is often broken and impassable.

The village population is 296 and divided into five family groups. The community previously depended on betel nut trees (the nut is chewed like tobacco) for their cash income. However, as a result of a recent disease that killed the trees, the community now depends heavily on selling garden produce, coconuts, mangos (when in season) and fish for their livelihood. Education levels within the village are low, as parents are unable to afford school fees, mainly as a result of the betel nut crop loss. Income sources are nevertheless diversifying with new cash crops being introduced to the area such as peanuts and coffee. There are three primary schools nearby which the children attend, though access to these schools is often restricted as a result of flooding and the need to cross the Markham River.

Story/Event

Living alongside the banks of one of PNG's major rivers, the Singas community is constantly under threat from flooding, especially during the rainy season. Usually, the village is flooded to some extent each year, dependent on the amount of rainfall received. The last big floods remembered by the villagers were in 1998 and 2002 when water rose above the stilts and into the houses (Figure 2). It was during these years that their use of indigenous knowledge was especially important in reducing the risk of the disaster to themselves and their livelihood.

Singas villagers have been told to move their settlement away from the river banks to higher ground in the hills, as part of a 'top-down' solution to their problem of flooding. However, they never moved. There were multiple reasons for this including (i) the river was valuable for their livelihood in terms of fishing, agriculture, water supply and clay to make cooking pots, (ii) they were close to amenities (the main provincial buildings and medical facilities were located on the other side of the river) and (iii) they had resided there for years, coping with previous floods. Despite the risks, the community was very much aware of its situation and pro-active in its response to flooding in order to ensure its continued survival along the river bank.

Figure 1. Crossing the Markham River

Figure 2. Mud left behind by flood water

Indigenous Knowledge

The main disaster risk reduction strategies practiced within Singas community to deal with flooding can be grouped into five general categories which include building methods, social linkages, land use planning, food strategies and environmental strategies. In many cases these strategies are embedded in community culture and daily life, unidentifiable by the community as specific strategies for disaster risk reduction. While such a situation is not unique to an indigenous community, in the case of Singas it was especially apparent as the community viewed the river first and foremost as a source of livelihood and only second as a hazard. This resulted in many of their indigenous risk reduction strategies being intertwined within their daily lives as they dealt with the river on a daily basis.

Building Methods

Many village cultures have their own traditional type of house appropriate to local environmental conditions. Singas community is no exception. They use in-depth environmental knowledge to search for dry, strong places to build their houses. Aware of the possibility of flooding, the people build their houses on stilts, which have been gradually lengthened over the years to accommodate the rising flood water and increased incidence of flooding. They also build large mounds under the houses to stem the rising flood water. Land is cleared for houses in the area and then used as a rubbish burial pit where rubbish gradually builds up until it is a significant mound. This is then covered with soil and stabilised with plants before the building of the house begins (Figure 3). Houses are made of traditional bush materials which not only make them transportable and fixable but also cheap and accessible. Houses are built during the dry season to allow the posts time to settle into the ground, thus slowing the rotting process. Houses that are built on the ground contain kitchens which are made out of light and easy-to-dismantle bush materials to limit loss during floods.

Social Linkages

Rarely in the past were communities under stress from flooding or other environmental hazards, as they were often not totally dependent on their own resources.[1] Despite the consequences of incorporation of rural communities into the global economy—including the impacts of increased population, poverty levels, out-migration and new forms of trade rather than traditional forms such as inter-village bartering—Singas is very much reliant on its own resources. Whilst in the past importance was placed on land and land use planning by the community, today this is gradually declining with villagers growing gardens wherever they please rather than following traditional planning. Nevertheless, when gardens are destroyed during floods, the entire community participates, working together to dig and plant new plants for the community.

Singas is very much a cohesive community, assisting each other in times of need as with the disruption caused by a flooding event. Resources and experiences are shared at the community level, so in times of disaster all in the community are aware of the best action plans or where to re-group if necessary. The cohesiveness of the community is possible because of a strong and active community leader who ensures regular community meetings are held to discuss relevant issues and ways forward (Figure 4). There is also a strong positive attitude of wanting to ensure the community's own survival, since while assistance would be gratefully received, it may not be available.

Land Use Planning

Location of villages and housing has often been influenced by hazard vulnerability. Communities, where possible, would locate their settlements on high ground to avoid storm surges and floods, in areas not prone to landslides, and on volcanic islands in areas where lava flow was less likely and prevailing winds did not deposit ash or acid rain on crops.[2] Singas community, in recognition of the threat of flooding, has a comprehensive drainage system dug out by hand surrounding their gardens and land so that flood water is directed away from critical areas. Land use and planting times are planned to avoid the rainy season in order to minimise disruption and damage as gardens are planted alongside river banks to avail of the most fertile soil. There are also safe areas marked out to which the community can move in times of serious flood.

Trees, flowers and plants are regularly planted to protect and stabilise the soil, especially around houses. Careful planning and monitoring of surroundings

[1] Campbell (1990).

[2] South Pacific Applied Geo-Science Commission (2004).

Figure 3. Traditional housing in Singas village – photo depicts housing on stilts, with taller stilts used more regularly today seen on the newer house in the background and the beginnings of a mound surrounded by a drainage ditch in the foreground prior to house building.

Figure 4. Community meeting discussing flood risk reduction

for bush materials that can be used is also done. For example, only certain tress are cut, namely the strongest ones suitable for building and those which do not impact on soil stabilisation. This strategy gives the younger trees time to mature while ensuring that when materials are needed in times of flooding, they will be available.

Food Strategies

Many rural indigenous societies have developed hazard resistant varieties of crops, contributing to community resilience in times of hardship or disaster. Among Singas village's disaster crop is the banana, a hardy crop which survives in flood water. Singas villagers wrap the bananas in leaves to protect them and keep birds away. For taro growth, drains are made to dry the soil out. Bamboo is used to store water and for cooking. A special plant is also used to collect rain water in the rainy season to avoid drinking flood water and becoming sick. Prior to the rainy season and potential flooding, food is preserved in traditional clay pots to ensure food availability when people cannot leave their houses. This food can last up to a few months in pots and still be edible. Food and seeds are also dried and preserved in the sun's heat until enough is saved for next year's crop. Traditional food in the area are also used in times of shortage, e.g. yam and taro are grown on the mountainside as disaster crops in case the villagers have to temporarily seek shelter in the hills.

Flooding precludes fishing in the river as a result of the fast flowing water so the village uses two inland lakes for their fish supply. The village women all cooperate, working in a large circle and driving the fish into the centre to catch with their hands. Within individual families, when food is scarce as a result of flooding, adults often limit their food intake to ensure children receive plenty. Village women have gone to the extent of tying belts made of cloth or bark tightly around their waists in order to restrict hunger pains.

Environmental Strategies

Since the Singas community is dependent upon the environment for its livelihood, it has developed a vast amount of knowledge enabling it to identify signs of impending trouble. For example, if members of the community see a lot of rain in the hills they start to prepare for an impending flood by packing belongings and ensuring food supplies are plentiful. 'Spotters' are often sent upstream to determine the river's behaviour and report back through messages passed from person to person reaching the village quickly. Markers are used to determine the changes in height of the river itself and the villagers are constantly on alert with adequate plans in place in case flooding occurs. Within PNG, oral traditions passed down through generations in the form of legends, visions and stories are plentiful and reliance is often placed on these for guidance as to what to do when disaster strikes.

Lessons Learned

The indigenous practices described above and used by the Singas community for disaster risk reduction have proved to successfully minimize the risks its members face whilst enabling them to continue using the river as a valuable source of livelihood. The indigenous knowledge used by Singas community for flood risk reduction is currently contained within the community. The sharing of resources and experiences at a community level ensures that, if a flood were to occur, the whole village will be able to help one another. The cohesiveness of the community and the willingness to help one another are strong underlying factors behind Singas's success in reducing flood risk. Further, this attitude and social coherence has enabled the dissemination of disaster risk reduction knowledge in the community through public meetings and sharing of experiences.

The experience of Singas is contradictory to many other communities in PNG. Typically within PNG, there is a highly defeatist attitude among indigenous communities resulting from lack of governmental support, a 'hand-out' culture and the perception that vulnerability levels are impossible to address. In the case of the Singas village, whilst to some extent there is an element of 'we can't do anything', the village has been proactive in their strategies for dealing with environmental hazards. What is needed now is for the experiences of Singas to be acknowledged by other communities, policy makers, government offices (such as the provincial disaster office) and non-governmental organizations. Acknowledging the success of the Singas community can allow its members to interact with appropriate stakeholders to further build upon these disaster risk reduction capabilities. Further, these interactions would make possible the dissemination of indigenous knowledge and enable other communities to identify with the lessons learnt and build upon their own existing disaster risk reduction knowledge.

The community is keenly aware of its situation, yet it feels that it possesses the knowledge to deal with recurring hazards. A proposed 'top-down' solution considered neither the whole picture nor the needs of the community, so the community rejected it in favour of its own strategies. This reiterates the importance of existing disaster-related knowledge and demonstrates the need for ownership to occur at a local level. Increasingly, it has been advocated that populations directly affected by environmental hazards should be the ones to decide and develop policies to deal with these.[3]

This said, a paternalistic viewpoint is still frequently taken with the voices of the disadvantaged either buried or ignored. As this example shows, ownership needs to be directed from the 'bottom-up' rather than infiltrated from the 'top-down' by those who may not understand the community's situation. There should be a support system existing alongside community strategies in case more support is required. Whilst these are clearly relevant strategies in dealing with disaster risk reduction, anthropogenic and non-anthropogenic processes are increasing the likelihood of adverse effects of environmental hazards on indigenous societies.[4] Indigenous communities such as Singas could further reduce their vulnerability to flooding through integrating indigenous and scientific knowledge. The recognition, recording, and promotion of indigenous coping mechanisms with culturally compatible scientific strategies can only contribute to enhancing the capacity of indigenous communities to mitigate, prepare for and recover from environmental hazards.[5] Only then will disaster risk reduction practices be seen to successfully address the vulnerability of indigenous communities to environmental hazards.

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[3] Wisner et al. (2004).
[4] Hay, 2002; Wilbanks and Kates (1999).
[5] Mercer et al. (2007).

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