Proceedings of the Workshop

SETTLEMENTS AND DISASTERS

Amsterdam, June 27 – July 1, 1988

D E R C

Disaster &
Emergency Reference Center

Editors:
Jan van Landewijk
Kathleen Shordt
Proceedings of the Workshop

SETTLEMENTS AND DISASTERS

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Kathleen Shordt
FOREWORD

Man is a creature that strives to shape its own future and take control over its own life. Collectively planning and developing the environment and investing today to shape the conditions of tomorrow are therefore essential activities of modern man. Development planning has now indeed in most countries become an integrated national effort of setting priorities and allocating resources to control the future.

However, in many developing countries disasters and emergencies are regarded as unpredictable and uncontrollable events that cannot be accommodated in the development planning process. This is a profound misunderstanding, because many of these events are either predictable, preventable or at least containable and manageable.

In June 1988 the Disaster and Emergency Reference Center (DERC) of Delft organised a workshop in Amsterdam for disaster workers based in The Netherlands to compare notes and to discuss ways of assembling and disseminating collective experiences. The group set as an objective the improvement of relief and rehabilitation work and the dissemination of prevention and mitigation knowledge. This publication contains the papers presented at the Amsterdam workshop, which had as theme: 'Settlements and Disasters'.

One of the conclusions of the workshop was that there is a considerable information gap concerning disasters and interventions in developing countries. Documents are difficult to find, experiences are not recorded and are lost, and research results do not reach those dealing with the greatest need for practical solutions. DERC has therefore as its aim to develop a collective memory, to collect, process and disseminate information, and to bring people together who share the goal of combating disasters. This publication is a first step towards that aim.

Krisno Nimpuno

March 1989
Delft
ACKNOWLEDGEMENTS

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During preparation for the workshop, the manuscripts were converted into a standard word processing language by Rob Feuth, Jacob Groenendyk, and Sarinti Nimpuno, who deserve our thanks. After the workshop, the edited manuscripts were prepared for printing by Ellen Colthoff, Rob Feuth, and Nancy Sulfridge.

Finally, we are especially grateful for the continued support and cooperation of the Centre for International Cooperation and Appropriate Technology (CICAT) at the Delft University of Technology. They have offered us, in addition to intellectual challenge and support, shelter and infrastructure.

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INTRODUCTION

In most developing countries disasters are frequent uninvited guests, extracting a gruesome toll and instilling fear in all. These events can be seen in quite different ways by professionals of various disciplines. The physician, the architect, the agronomist and the politician all tend to concentrate on limited aspects of disasters. Some see it as a rescue and health care matter, others concentrate on construction solutions; some see such events as logistic crises, while others believe the social disruption is the heart of the matter. But when they all meet and review disasters with a long-term view they agree that disasters all involve a complicated cycle of repetitive events, many of which can be prevented, reduced or predicted.

The costs of disasters are high. In the years 1970-1985, cyclones, hurricanes, and similar storms, numbering 291 in all, killed 412,417 people and caused damage of US $33,975,000; 244 floods caused 49,013 deaths and US $26,245,000 in damages; and 109 earthquakes took a total of 859,393 lives and caused an economic loss of US $46,450,000.

The list is formidable, yet it tells only part of the story. It is not only the threat to life and the immediate material damage that causes distress, but also the negative impact that such disasters have on economic and social development. In the years 1980-1985 alone, over thirty million people became homeless because of the effects of natural disasters. The impact on human settlement development is severe: the massive destruction of shelter is bound to have a long-term impact on development, unless prevention and preparedness reduces the effects.

Natural disasters can and do occur anywhere around the globe, but their effects are less severe in some places than in others. For example, earthquakes and cyclones do not seem to kill many people in Japan, and at present few people drown due to floods in Holland. The reasons are not hard to find. The Japanese know how to build safely in their earthquake-prone country, and the Dutch have, over the centuries, learned to protect themselves and their land from the sea.

Not all disasters can be prevented, but they can be predicted, their effects managed and controlled, if preparedness and prevention can become a part of the general development efforts.

Unfortunately, the need for preparedness and prevention activities is not as visible as the need for relief after a disaster. Since the impacts of disasters are so frightening and the suffering is so visible, now most attention is given to fight the effects after a disaster, while few resources are available for reducing the root causes. Relief is easily funded, but rehabilitation much less so, while prevention almost is unfundable.

There are relevant technologies that can change conditions. Information about the experiences of others is therefore of impor-
tance. But apart from individual technical solutions it is above all important to recognise the repetitive sequence of events that contributes to disasters and the need to allocate resources and efforts to prevent future disasters and control emergencies that threaten us and our children. Management, coordination and fore-
sight are essential elements in disaster control. Thus preven-
tion, preparedness and disaster mitigation are the long term, multi-disciplinary tools that can bring disasters under control.

It was with this purpose that in June 1988 The Disaster and Emergency Reference Center, DERC, brought a score of planners together in a workshop in Amsterdam to share experiences from disaster work in developing countries in a workshop on the theme: 'Settlements and Disasters'. This publication contains the papers prepared for that event. The themes range from engineering solu-
tions to the conditions of children. But in spite of the wide variety of subjects and the different professional perspectives that these papers represent, one theme emerges from all contribu-
tions: the conviction that disasters are controllable. A multi-
disciplinary approach to disasters will reduce the effects and an exchange of experiences combined with co-ordinated efforts should be achieved.

The Amsterdam workshop was the start of the development of a col-
lective disaster memory and of further studies towards the pre-
vention and reduction of disasters in developing countries by professionals based in the Netherlands, in preparation for the International Decade for Natural Disaster Reduction.

The publication of this book coincides with the first national Study Day on disasters organised by DERC and NODRO and held at The Delft University of Technology in April 1989. The theme of the Study Day is "Disasters: Roles and Results."

Jan van Landewijk
Krisno Nimpuno
INTEGRATED SETTLEMENT PLANNING

J.A.P.M. Knikkink

1. SETTLEMENT DYNAMICS

The needs and demands of those dwelling in a settlement are dynamic. Their changing way of living will change the nature and quality of the settlement.

This is clearly the case with permanent settlements that have to accommodate many generations of users; but it is also the case with semi-permanent settlements for people in a disaster situation. These people are sometimes deprived of all their belongings and have to build their new future from scratch with most often only limited resources. Moreover semi-permanent settlements often become as enduring as the permanent ones.

In orthodox planning ('BLUEPRINT-PLANNING') there is too often a neglect of the dynamics of a situation. Such traditional planning tends to be dominated by rigid technical and aesthetic assumptions and consequently is not adaptable to change, growth and new trends in development.

In contrast to blueprint planning, 'PROCESS-PLANNING' is principally open and dynamic (Faludi, 1984). The problem, however, with this approach is that it lacks a simplistic, physical 'blueprint' on which planning and implementation activities can be focussed and on the basis of which integration can be achieved.

The solution to this dilemma lies in the integration of the best elements of the two planning approaches. This should focus on more than just the design of a spatial product alone (blueprint). It should bridge the space-time relationship with rules and procedures that can guide the decision-making process, both in the design phase and in the implementation of the plan. This is not a simple undertaking, and practical solutions are still in an experimental stage.

The following will describe some recent experiments to overcome the gap between blue-print and process by developing practical solutions for integrated and dynamic settlement planning. It will conclude with a note on the role the planner could play in that continuous endeavor.

2. DECIDING ON CONSENSUS

Close examination of the issues indicates that it is exceptionally important to have CONSENSUS between the actors and participants in the settlement scheme on goals, means and ends. But goals and means are not static issues, and even the perception of ends may change over time. This means that the PROCEDURES to readjust the consensus are part of the game as well. So it is the consensus as such and the procedure to achieve and maintain
the consensus that is the heart of our subject. In short: the crux of integrated planning is in deciding on consensus.

3. CONSENSUS ON PROCEDURES

Practical experience has indicated that in the organisation of an integrated planning process the two most critical issues are: consensus on planning procedures and consensus on design concepts.

Usually three stages are distinguished in planning: preparation, design and implementation.

At the start of an integrated settlement planning scheme the following checklist may help to achieve a comprehensive overview on goals, means and ends.

** Topographical and geomorphological data, to assess opportunities and risks for development;
** Socio-economic profile of the regional context, to assess the relative strengths and weaknesses;
** Official policy and investment programmes in the region, pertinent to the settlement scheme;
** Inventory of the formal public and private sector institutions directly or indirectly involved in the scheme;
** Inventory of informal but powerful institutions such as kinship or social clubs that are involved 'behind the scenes' in the actual decision-making process;
** Identification of the beneficiaries of the settlement scheme, their stratification and their expectations;
** Evaluation of current procedures in consultations and decision making during planning and implementation;
** Evaluation of the desired added-value-input from external parties, for instance consultants.

In disaster situations, there initially exists confusion and chaos which inhibit a systematic start as outlined above. However it is the responsibility of the planner to keep these issues in mind and pursue the checklist as soon as possible in the course of action.

With the information from the questionnaire it is possible to organise the planning process in a systematic way. In the traditional mode of settlement design the responsibility for the design is restricted to the planning experts, excluding two parties: the beneficiaries or end-users and those responsible for operations and maintenance (O & M). In an integrated settlement scheme these parties should be involved from the very beginning.

Involvement of beneficiaries and O & M people in the design phase of the settlement has tremendous advantages in the implementation stage; it guarantees a much smoother implementation of the project and is usually more economical. Furthermore, it will be better tailored to the needs and means of the end-users, and this may be considered to be one of the major objectives of integrated settlement planning.
Involving all these parties in the early phases of the project design, in which the situation is already confused enough, seems to be an odd thing. But this is not necessarily so, since there are techniques and approaches to deal with complicated group processes and management of uncertainties that have proven their worth in practice (Friend and Hickling, 1988).

A consequence of integrating blue-print planning with process planning is that the actual design process is no longer to be seen as a linear one, from analysis via synthesis to implementation. Planning in the new concept is to be seen much more as a cyclical procedure with shortcuts in analytical and creative activities.

The organisation of such a complicated but also much more effective design process requires special skills in management and facilitation of inter-active group processes. And it is not anymore evident that the traditionally educated planner avails of these techniques. So it is time now that a new breed of planner-facilitator takes over that responsibility.

4. CONSENSUS ON CONCEPTUAL DESIGNS

Conceptual designs are the substance that emerges from the design process as described before. Ideally it is the result of an inter-active group process in which all relevant parties are involved—planning experts, end-users and O & M people. A conceptual design is a concrete result of the cyclic process of problem analysis and generation of solutions which is typical for the integrated design procedure, in which the broad-brush and general ideas are to be revised and refined in a progressive sequence.

A conceptual design is usually represented in diagrammatic or schematic form and summarizes principles resulting from the problem analysis and indicates in the same time generative ideas for detailed design and implementation activities. In the first phases of the design process the conceptual designs themselves will be rather sketchy but eventually they should become more firm and robust.

In the practice of dynamic settlement planning, conceptual designs are usually focussed on the integration of basic infrastructure and utilities in a generative pattern, a pattern that has the capability to expand and adapt to changing circumstances. The 'final' configuration of these patterns is principally open-ended and will only be decided in the course of future development if appropriate and the need arises. This flexibility for prolonged decision-making makes it distinctive from the traditional blue-print designs that are rigid and fixed for a long term future.

The built-in flexibility of the conceptual designs as mentioned before is based on two distinct qualities, incremental growth and progressive development. Incremental growth implies that the growth be planned in discrete stages, phases or increments in such a way that at the end of any discrete part, development can be halted without difficulty, leaving a satisfactory entity. Thus
the viability of any discrete part is not dependent on the completion of subsequent elements in the plan. Progressive development implies that the uses of land or buildings be allowed to change over time as circumstances change. This means that the infrastructure and utilities need to have either multi-functional redundant capacity or the possibility for incremental increase of capacity. In this way the physical environment will be flexible and readily adaptable to changing socio-economic circumstances.

The following case histories may illustrate these principles. The diagrams in these figures are taken from internal project documents. The flows in the chart represent one full loop in the cyclical design process as indicated in Figure 1 and are partly the result of an organised trial and error process in the early phases of the design procedure.

Case I. A Rural Development Scheme (Figure 1)

The main focus of this integrated rural (re-)settlement scheme in south-east Asia was on employment and job creation; the approach aimed at enabling the settlers to produce sufficient food for themselves one year after arrival and to be self-sustaining from the second year. The project is now in its first year of implementation.

The flow chart indicates how analysis and conceptual design were related to each other in a cyclic process. The chart represents the findings of that cyclic process somewhere at the end of the inception phase.

The basic ideas of progressive development and incremental growth are summarised in the diagram on the second line of the chart. Development will start alongside a main village road branching off from the regional trunkroad. Alongside the main village roads are situated the central facilities that will be provided for in several stages, for instance secondary school and banking facilities the moment such a need arises, but primary schools and village offices already in the beginning.

The houselots are situated in units of 20–50 houses, depending on the topography, alongside a farm track. This farm track gives access to the nearby arable plots (first holdings) of approximately 1 ha to be developed instantaneously, whereas it can be extended in due time to another area of suitable farm land to be developed when considered to be appropriate (second holdings).

The houselots themselves are 25 x 100 m with the narrow frontage ensuring that individual houses are set close together, thus providing a reasonable social setting. Initially two houselots will share latrine facilities, but it is envisaged that in due time individual sanitation facilities may be provided, depending on the progression of socio-economic development standards.

The diagram at the bottom represents the Integrated Settlement Scheme with the general layout of the villages moulded in the topographical configuration of suitable farming land, as derived from the land suitability map. The structure plan as it is presented here is the result of a few rounds of analysis and
design. These rounds had to be repeated a few times more before the implementation plan could be settled.

As a matter of fact, for practical and cultural reasons, two important parties were not represented in that cyclical design process, the eventual settlers and the institutions responsible for operations and maintenance. This absence was however compensated by advocates in the client system and by the advocacy of social and physical planners.

Case II. A Rural-Urban Housing Scheme (Figure 2)

This case describes a process-oriented approach to a low-cost housing scheme in the Middle East which was designed to resettle rural migrants in urban areas. The solution to the housing problem for these low to very low income earners could not be found in the supply of a product (such as a completed house) since this went far beyond the resources of the public sector and the affordability level of the target groups.

So it was decided to experiment with the generation of a process in which public and private initiative and effort are combined. In this process the public institutions can provide the infrastructure, land, basic shelter and 'seed' capital while the owners can gradually take the initiative by providing labour and their savings, motivated by their desire to own a home.

The flow chart in Figure 2 represents the result of the design process during the feasibility phase of the project. It indicates how progressive development and incremental growth is designed both in the house and the community layout.

The design of the house consists of two load-bearing walls made out of bricks from local limestone and a roof of cement slabs. The owner is expected to provide the front wall, doors and windows and the partitions inside the structure. The design allows the owner to expand the house at his own pace and at his own taste. Because the settlers will be mostly rural, the housing is designed to allow a gradual transition to a more urban way of life. For example the house includes a courtyard which can be used in the beginning for keeping livestock, but can eventually be built on to provide extra room to rent. The houses are designed on modular dimensions in order to allow for maximum flexibility in arrangement of partition walls, doors, sink-basins, and other standard elements. The standardized parts can be mass-produced which contributes greatly to the reduction of costs and the improvement of quality.

The design of the urban environment must be flexible enough to adapt as the city grows, and if it proves necessary for more low-income housing to be built than was planned then the city will have to accommodate it without creating havoc with the city plan. The modular design allows this. The right-hand diagram in the centre shows the modularity of the design and the interchangeability within the layout of three types of housing: low, middle and high income. This modular approach facilitates the use of cross-subsidy in financing the infrastructure costs.
The conceptual design was well received by the local client several years ago, but implementation has still to come. The main reason for this is the lack of continuity and feedback from the design phase to the implementation phase and vice versa.

Case III. A Sub-urban Scheme (Figure 3)

One of the major delta cities in south-east Asia is increasingly suffering from flooding and drainage problems, which result from: failure of the flat country to drain quickly or adequately during rainy season; river overflow during periods of high discharge; and river back up during periods of high tides in the sea.

This case will describe a flood protection and drainage programme in the urban fringe on the west bank of that river delta. The study focussed on the provision of a low-cost solution for the drainage and flood control problems creating minimum disturbance for the navigation in the present canal system. Furthermore it had to facilitate the gradual transition of agriculture to (sub)urban land use without untimely disturbance of the agriculture by pollution or urban storm drainage.

The flooding component of the study demanded a global, basin-wide analysis whereas the drainage component demanded for a most accurate and detailed study of the existing pattern of canals and drains and related infrastructure works. This is summarised in the two diagrams at the top of the flow chart.

The main theme of the conceptual design was on the integration of the hydraulic infrastructure with the hierarchical road-system and utility network. It appeared that the core of the design concept was in the proper articulation of the hierarchy in the systems, both in the sense of functional level (that is, regional trunkroads versus local access roads) and on the administrative level of decision-making (that is, local authorities responsible for local roads, state authorities for national highways and metropolitan authorities for the in-between level).

The central diagram in Figure 3 represents the functional hierarchy in the proposed integrated system. The qualities of incremental growth and progressive development were tested in the topographical setting in a more detailed study. This is summarised in the two related diagrams at the bottom line of the chart. The three small graphs in the central diagram at the left-hand side represent from top to bottom the current process of suburbanisation and densification in the project area. This process results in over-congested arterial roads on the watershed in between the canal system. The three graphs at the right-hand side in the same diagram indicate how the present development pattern could be restructured into a more open-ended pattern by introducing a multi-directional hierarchy in the road system.

The local authorities involved in the design phase of this project were at the same time discussing the implementation of a similar programme on the east bank of the river and were therefore in the rather unique position to give valuable feedback from the implementation to the design phase.
5. CONCLUSIONS: THE ROLE OF THE PLANNER

The crux of integrated planning is in deciding on consensus, consensus on procedures and consensus on concepts. Procedures and concepts are interrelated and do require a careful organisation of the design process.

Such a design process for a human settlement is not an exclusive affair for the technical experts but should involve two frequently neglected parties: the actual users of the settlement scheme and those responsible for operation and maintenance. A full integration of these parties in the design process is, however, still an innovative and experimental endeavor. This is not due to a lack of practical tools and approaches; rather, the local culture or political context usually inhibits such an integrated approach.

In that situation the planner should assume two major responsibilities, that of moderator/facilitator of the design process and that of advocate for those parties that for some reason or another are not represented in the design process.

This requires from the planner skills in mastering interactive group processes and identification with cultural entities, which is not what he or she is traditionally trained for. So it is time now for a new school of planning to assume that responsibility.

For the materialisation of the consensus it is important to avail of design concepts in the form of diagrams, models or patterns that can be understood by all parties in the planning and implementation process. Ideally these concepts emerge from an interactive group process, but it is the ultimate responsibility of the planner that they do emerge. In practice these central design concepts are usually focussed on the integration of infrastructure and utility systems in a flexible and adaptable pattern that can act as the backbone for physical development. For that reason it may be useful if the planner has a disciplinary background in the design of such infrastructure and utility systems. However, the major added value to a democratic organisation of the design process is in the facilitation of interactive group processes.

REFERENCES


Figure 1. A Rural Development Scheme
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<td>Social Status</td>
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**Figure 2. A Rural-Urban Housing Scheme**
Figure 3. A Sub-urban Scheme
URBAN RISK ASSESSMENTS FOR DISASTER MITIGATION PLANNING

E. Lohman

1. INTRODUCTION

Disasters and Settlements

Since ancient times man has learned to live with nature. He was aware of being part of it, and therefore knew how to live with natural disasters. He settled in environs with fertile soils, which were easy to cultivate, or at the waterside, and preferably on strategic points (trade, defense). These environs often were disaster-prone areas such as flood plains, slopes of volcanoes, or the edge of the desert.

As man was aware of the risks, he settled with the knowledge that the effects of disasters had to be limited. In mountainous areas, for example, slopes were terraced for protection from run-off water and landslides; in flood plains, settlements were protected by building them on natural or man-made heights, or by constructing dikes.

- Disturbed eco-balance:
The balance between man and nature, however, is increasingly being disturbed by high population growth and environmental mismanagement. The environmental limits to growth determine the carrying capacity for any species, including man. The limits of support for human populations are shifting from an optimum level (which is the normal objective for humans), through a security level (implying reasonable freedom from natural disasters), to only a subsistence level.

Utilization of less suitable land, over-exploitation of farm land and depletion of natural resources, exceeding the carrying capacity of the environment, have occurred increasingly, facilitated by the introduction of modern production factors, such as mechanism.

Ecological interference on a large scale, however, can lead to more disaster-prone areas and increasing risks. For example, global climate change due to air pollution, and the resultant global temperature increase (the so-called green-house effect), can result in a rising sea level, affecting most coastal lowlands where the greater part of the world's population is concentrated, and also may change storm climates. Together with the deforestation of tropical rain forests, this will change the precipitation patterns on a world wide scale as well, which may result in desertification and flooding.

On the regional scale, distortion of the ecological balance may cause a variety of disasters. The consequence of deforestation of watersheds will be flooding in downstream areas, eventually affected by sedimentation of eroded soils. Soils of overexploited farm lands may be blown away (dust-storms), eroded by water, or move downhill (land-slides).
Also changing occupation patterns, resulting from development projects may cause, or affect, disasters. The construction of reservoirs in river basin development projects for instance, has often a resettlement component which will, if not carefully planned, cause environmental damage in adjacent areas.

Environmental changes can affect traditional man-ecosystems, which are of great importance in the greater part of the developing world. As both man and nature are not adapted to altering situations, or to establishing a new ecological balance, man has to cope with new forms of natural disasters.

UNDRO-Disaster Mitigation Manual

A body of knowledge on the nature of disasters, and on ways to minimise their impact, has been accumulated by international organisations, research institutes, consultants, universities and government institutes. Yet, we have not been able to make full use of this body of knowledge to reduce the impact of disasters, since the communication between the relevant sectors has been inadequate.

Therefore the United Nations Disaster Relief Organisation (UNDRO) has, together with the Netherlands government, taken the initiative to develop a manual on disaster mitigation, for planners, decision makers, and others involved in risk reduction, including risk assessment and plan formulation.

- Scope of the manual:
The manual, due for publication this year, intends to make the existing body of knowledge accessible for professionals involved in pre-disaster risk assessment, mitigation planning and implementation. The mitigation planning concept intends to make a disaster less severe. To achieve this, the manual contains information on four different scientific fields: geology & engineering geology, civil engineering, physical & environmental planning, and socio-economic planning.

- Limitations:
It is not the intention of the manual to provide all scientific information required for disaster mitigation. That information is very extensive and often site-specific. Instead, the manual focuses on methods for risk assessment and plan formulation and on parameters that influence the risk in a specific situation.

2. PROCESS OF RISK ASSESSMENT

Risk assessment provides a basis for all types of interventions to reduce the risks from natural (or man-made) hazards on settlements. The aim of risk assessment is to draw a risk profile of a settlement or region.

Risk assessment basically consists of the following steps: hazard assessment, vulnerability analysis, risk assessment and risk appraisal (see fig. 1).
1. Hazard Assessment
For each hazard type, or combination of hazards, the parameters needed for the assessment of the hazard-proneness of a site need to be identified. Hazard assessment is entirely focused on environmental conditions that cause, or aggravate, natural hazards. The consequences of these conditions on man-made elements are included in the next steps.

2. Vulnerability Analysis
The vulnerability analysis describes the relation between intensity and magnitude of the hazard and the damage to buildings and infrastructure. The analysis focuses on the physical strength of buildings and infrastructure elements. The aim of the vulnerability analysis is to indicate the extent of damage that can be expected in a specified hazard. This only depends on the strength of the structure and not on its location, or function. Vulnerability can therefore not be mapped.

3. Risk Assessment
The risk assessment includes all elements that are relevant in drawing the 'risk profile' of a settlement. It includes not only hazard and vulnerability, but also functional, social, and economic aspects. To make the risk assessment applicable in planning, information will have to be 'translated' to plan elements. A fairly complete picture can thus be made of the risk, imposed on settlements.

4. Risk Appraisal
The aim of the risk appraisal is to give planners and decision-makers, in socio-economic terms, an indication of the impact of a potential disaster, for the formulation of scenarios. For each type of risk, methods need to be indicated about how to assign a value to each type of risk, in both quantitative and qualitative terms. The risk valuation includes both social and economic aspects.

In the following pages, the above elements of risk assessment are described in more detail.

Hazard Assessment

As far as natural hazards have their effects on environmental management, it is necessary to make the knowledge of the geoscientist accessible to the planner. Since spatial aspects are common to planners, as well as to geoscientists, a hazard map may be regarded as a suitable tool for communication. The map can be made from field investigations or from careful interpretations of topographic and thematic information such as geological, hydrological, geomorphological and soil maps.

- Use of remote sensing:
Information about the landscape can also be obtained, or updated by studying aerial photographs or satellite images. Satellite remote sensing provides a synoptic view of the land and monitoring capabilities which were so far not possible with conventional aerial photos. The use of remote sensing can also save a considerable amount of field time, not only by directly providing
information, but also by identifying those sites where a more detailed examination in the field is needed.

- Use of checklists:
While interpreting maps or airphotos, it is common to use checklists. Each category of indicators that influences or controls the landscape can thus be examined systematically. The likelihood, for example, of a landslide can be assessed by careful estimation of the state of relief, the drainage, the bedrock, the soil, the incidence of earthquakes, the legacies of past processes and the man-made features. Absolute values are never supplied in a checklist, while each category value depends on its local context. These checklists can be used by planners to put relevant questions to the geologist, geomorphologist, or hydrologist on the environment intended for urban planning. When the geological processes that take place in the area under investigation are not too complex, the planner can also produce his own hazard map.

Summarizing, information for each hazard type should comprise a description of the hazard itself, the method of hazard assessment and mapping, the possible risks from the hazard, and possibilities of forecasting.

Vulnerability Analysis

When hazard assessment has been completed, a clear view is needed of how man-made constructions react on forces induced by the natural hazards (related to the magnitude of the hazard). This analysis is carried out in the vulnerability analysis.

The analysis of vulnerability is an indispensable step between the hazard and risk assessment. The vulnerability of elements does not depend on standards or political decisions. It only refers to the strength of a structure, and does not depend on its location in space. Vulnerability should be seen as the ability of the different types of man-made constructions, including buildings, bridges and other infrastructural elements, to withstand natural forces such as ground shaking, water force or wind. Vulnerability can not be mapped since it only depends on structure-specific, and not on site-specific aspects. The vulnerability of a building in an earthquake, for example, is an intrinsic quality of that particular building, inclusive of its foundation. The vulnerability analysis examines the strength of buildings and infrastructures referring to a number of hazard specific forces.

Analysis of a structure, independent from its location, makes it possible to separate site-influences and structural quality. This enables planners and decision makers to take balanced measures, in the form of land use limitations, and site or structural improvements. The aim of the vulnerability analysis is to determine the level to which elements at risk can be exposed in a particular natural hazard without damage, and to analyse the damage that will occur in a more severe hazard. Vulnerability is therefore defined as "the degree of loss to a given element at risk or a set of such elements resulting from the occurrence of a
natural phenomenon of a given magnitude and expressed on a scale from 0 (no damage) to 1 (total loss)." Elements at risk comprise all man-made structures, such as buildings, constructions and lifelines.

Risk Assessment

Risk assessment should provide a basis for the formulation of mitigation plans. It will provide information on the extent to which plan elements are exposed to risks. This requires adequate understanding of the natural hazard process, the site conditions and the constructional and functional aspects of plan elements. It forms the starting point for the formulation of scenario's and plans. Although the assessment of risk in itself is not a political decision or activity, it will influence political decisions on measures to be taken to reduce risks.

Risk assessment is also a source of information for plan formulation. Detailed data can be drawn from the assessment in order to improve the quality of plans and to facilitate the formulation of standards and scenarios. Analysis of the 'risk-profile' of settlements is not only important for the formulation of long term development scenarios: risk assessment also contributes to the formulation of preparedness or relief activities.

The risk assessment intends to include all aspects that are relevant in the actual risk. It involves the combination of information on hazard and vulnerability. To make the risk assessment applicable for planning, this information should be 'translated' to the risk of plan elements. Furthermore, the risk assessment includes other aspects, such as densities, the layout of infrastructure systems. Thus, a fairly complete picture should arise of the risk, as it is actually imposed on settlements.

Risk Appraisal

Risk appraisal deals with questions like: What are the socio-economic costs of damage sustained if no preventive measures are taken; and which of these costs can be quantified or qualified? The reason that both quantification and qualification techniques are used is that it is not always possible to translate the effects of a (potential) disaster in quantifiable economic terms. But economic costs are not the only costs if an area is affected by a disaster. Social costs also play a major role in a disaster. Social costs are in most cases expressed in qualitative terms. The results of these socio-economic cost estimates can be used as a tool for decision-making and to give priorities to planners while formulating a mitigation policy.

- Types of costs:
Three types of costs of damages, caused by natural disasters, can be distinguished: direct, indirect and secondary costs. Direct costs are effects which occur when the disaster strikes. Indirect costs are effects which result from the damages. These costs can be a multiple of direct costs. Secondary costs are effects which appear some time after the disaster has occurred.
3. FORMULATION OF MITIGATION PLANS

In practice there will not always be a distinction, in terms of time, between pre- and post-disaster planning. Often, the political commitment needed for pre-disaster planning is given after a natural disaster has occurred. Yet, post-disaster planning looks backward, to damages caused by a disaster, and tries to rehabilitate the society. Pre-disaster planning looks into the future, anticipating a forecasted event, and intends to mitigate the consequences of that event in advance.

- Scenarios for long-term development (prevention-oriented): structural risk reduction, by means of development planning, consists of integrated development options that together should be able to reduce the potential damage. The development options, in the form of scenarios, pre-suppose a gradual development, spread over a long time-span. This is an on-going process.

- Scenarios for short-term development (mitigation-oriented): part of the planning process should also be the reduction of risk on a short term. Urgent measures have to be implemented to prepare society for a natural disaster.

For the gradual improvement of the vulnerability of settlements, risk reduction strategies will have to be incorporated in the 'normal' physical planning procedures. The existing institutional framework is the basis for planning, but adaptations may be needed for implementation of risk reduction strategies.

SOURCES OF INFORMATION

Various sources (full list included in the manual) have been used in the following sequence of priority:

* UNDRO-publications
* Information by members of the UNDRO International Expert Panel
* UN-publications (mainly UNESCO, UNEP, UNCHS, ESCAP)
* WB and ADB publications
* International Research Institutes/ Universities
* Case Studies
* Experiences manual team members

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Figure 1.
PHASED INFRASTRUCTURE DEVELOPMENT

K. Nimpuno

Infrastructure is the physical system of provisions, connecting all the different elements of a settlement and constituting its communication lifeline. This network handles the transport of people, goods, water, waste and power. A minimum infrastructure, – access, water supply and waste handling – is necessary at the start of any intervention. Without these facilities life in any settlement is very difficult and most unsafe.

Disasters, both natural and manmade, leave people particularly vulnerable for diseases; and therefore, adequate food and water supply and waste management are very important health protection factors. It is usually not the disaster itself that creates most victims, but the chaotic shelter conditions thereafter, because of poor environmental health. Implementation of a minimum infrastructure service is therefore a priority in emergency settlements as well as in damaged existing housing areas.

Full-scale infrastructure however should be planned for from the outset, as a critical part of development planning, because it is costly and very difficult to develop infrastructure systems in already-existing, built-up areas. Buildings may block the development of roads, drains and mains and often necessitate extensive demolition work. Building groups of dwellings without space for infrastructure necessitates later costly interventions, that are destructive for the settlement itself. Infrastructure grids also create a grouping of the buildings and give a natural functional division in the settlement; and it is desirable that zones of the settlement be defined as part of the infrastructure planning.

When dealing with infrastructure in emergency settlements one does well to consider the parallels with low income housing in general. Municipalities often fail to provide basic urban facilities and almost without exception lack in infrastructure operation and maintenance services. All such difficulties in low income housing are relevant to emergency settlements. Prominent amongst these are the conditions of limited resources, which necessitates community participation and the related issue of skill development.

The key to dealing with disaster conditions is phased infrastructure; that is, the gradual development from survival provisions to full infrastructure networks. There are two reasons for the choice of phased development: on the one hand there is the need for a speedy development of basic facilities to protect public health; while on the other hand full infrastructure is too costly to be affordable in one go. To achieve phased infrastructure one needs to:

- set hard priorities for each phase
- schedule investments over an extended period of time
- link development stages with developing standards
- maximise community participation.
However, in emergency settlement planning the two phases of emergency provisions and settlement development which should be linked are impeded by factors such as:

- limited resources: human, financial, technical
- timing priorities because it concerns emergencies
- the low initial economic capacity of the community
- limitations related to location and land conditions

Keys to this are:

* choosing limited temporary emergency provisions
* balancing survival needs against standard development
* identifying zoning and accessibility needs
* establishing community based development bodies
* establishing support structures

**PHASED INFRASTRUCTURE DEVELOPMENT ELEMENTS**

**Institutional development**

Reconstruction after disaster is a process that has to get off the ground swiftly, but that should continue for a long period of development. The first period has the character of relief work; and here time is the decisive factor. Speed saves lives; and all resources – even at high costs – should be mobilised to put the minimum emergency facilities into place. This can only be achieved with a careful management of the available resources, which in post disaster conditions often are scattered and uncoordinated. It is often unclear which resources the community itself still has available, while outside relief work may consist of contributions from many independent organisations. Without a co-ordination point, infrastructure planning is likely to be inefficient. There are several institutional steps that facilitate sound development, and the establishment of various planning and management bodies is therefore essential.

1. Engineering committee
   Infrastructure development after disaster requires much of the engineering and construction capacity available in the settlement. An engineering committee in charge of planning and construction is necessary to develop emergency interventions that are smoothly followed by long term development work. It may be so that the relief work principally makes use of contractors or other building resources from outside the community, while for the development stage community participation is a main development strategy.

   The tasks of an engineering committee include planning, design, resource planning and actual construction work. The committee should not consist of outside technicians alone. Local knowledge about planning conditions and existing plans are important and local government officials are therefore needed to participate in the committee. Equally important is the involvement of the community in the committee work. Ultimately it is their future that is at stake and whatever plans are made they are the ultimate client.
2. Supply and logistic unit
Relief and development work after disasters is often hampered by supply and logistical difficulties; and there is need for the creation of a special unit for logistical co-ordination, that has access to means of transport and that is accepted by all agencies as a co-ordination unit.

3. Training programmes for skill development
The execution of a phased infrastructure system implies building activities over a long period of time with a high degree of community participation. This is for many settlements the only hope for development, and offers the advantage of enhancing the capacity of the community to initiate and execute new projects. Self-help construction requires many skills in administration, planning and crafts; and a systematic skill development programme is needed to implement, develop and maintain infrastructure facilities. It is not always necessary to establish one single training programme. As long as there is co-ordination, such programmes can well be developed by the individual implementing agencies active in the emergency.

4. Construction and maintenance teams
A phased infrastructure system for emergency settlement requires considerable permanent construction and maintenance capacity. It makes sense to organise the resources in teams that work as individual units and that can take on specialised tasks. In drainage it is for instance often desirable to set up a production of pre-fabricated drain units. Such repetitive tasks are best done by specialised teams. Similarly many maintenance tasks require specialisation. It also makes sense to decentralise these tasks by a geographic division of the settlement, to let the development and maintenance tasks be controlled within neighbourhood areas.

Phased infrastructure development

The objective of infrastructure development after disasters is, firstly, to give basic environmental protection in the damaged or the emergency settlement and, secondly, to develop the supply and communication system fully. This requires considerable resources and effort, which have to be phased out over a long period of time. The development plan aims at striking a balance between the objectives and the means available by scheduling the work over time.

To achieve this one can design development steps for all the infrastructure elements that gradually improve the quality. Successful phased development planning identifies first the ultimate standard for each of the elements and thereafter the intermediate development phases, so that each improvement also contributes towards the same final goal.

It is also essential in each field to determine the facilities and resources initially available. Surveying is always the first step in planning. Basic questions about the topography and the soil conditions have to be asked. How are the run-off patterns; how much rain is there; and how are the basic construction condi-
tions? Then one has to match the available development resources with the needs.

Water

The supply of safe drinking water is the priority in emergency settlements. First comes the identification of a safe source of potable water. If a safe source is available then protecting it against pollution becomes—together with an emergency distribution system—the next step. Chlorination of water may be necessary; the amount of free active chlorine of 0.2 per million after at least 30 minutes indicates effective elimination of bacteria. Safe storage of water is in itself a form of treatment since many pathogens die off within two days. Quality standards should as soon as possible be brought up to WHO standard, but as an emergency standard one can accept coliform concentrations of less than 10 per 100 ml of water.

Emergency quantities can be set at 15 – 20 litres per person per day. In health centres and feeding centres double quantities should be planned for. Consumption can later go up to ten times the minimum quantities.

A professional assessment of longer-term possibilities is the next step, to answer questions about quantity, quality, source protection and development, distribution systems and technology options.

In the very first phase, water supply can be differentiated between drinking water, which has to be of a high level of hygiene, and water for personal and environmental hygiene, which can be of a lesser quality.

Emergency phase alternatives

During the very first development phases water may have to be brought in by tankers to a few distribution points in the settlement. Temporary sources may include nearby rivers or lakes; but even when the water quality initially is acceptable it is likely that pollution soon will affect it. Riverside or lakeside infiltration wells can rapidly be dug.

Later conventional methods of source development include the drilling of deep wells, and the use of surface water with treatment plants supplying water to protected deposits or to water tower, from where it can flow by gravity through a distribution system. The distribution system can be developed in a sequence that starts with stand pipes in the settlement. These can later develop into ablution blocks, which gradually can offer various services: water supply, laundry facilities, shower stalls and toilets. Later again plot stand pipes offer a higher standard, while ultimately house connection reaches the high standard of stable and developed settlements.

Sanitation & waste management

Safe disposal of human excreta a matter of the greatest urgency when in emergencies, great numbers of people settle in dense and
poorly planned or partly destroyed settlements. The overriding priority is the protection of public health. Thus, the criteria that should apply in emergency settlements are not very different from the basic criteria that are used in low income housing:
1. The surface soil should not be contaminated.
2. There should be no contamination of ground water that may enter springs or wells.
3. There should be no contamination of surface water.
4. Excreta should not be accessible to flies or animals.
5. There should be no handling of fresh excreta, or when this is unavoidable, it should be kept to a strict minimum.
6. There should be freedom from odours or unsightly conditions.
7. The daily operation of the system should only require a simple and safe toilet routine.
8. The construction costs should not exceed 10% of the housing investment.
9. The facilities should be made of local building materials and require little maintenance.
10. The use of water to transport excreta should if possible be avoided.
11. The system should allow a gradual integration into a neighbourhood network.
12. Application in high density conditions should be possible.

Emergency phase alternatives

In emergency situations one is often forced to choose solutions which under normal circumstances are not acceptable. This has for all its weaknesses some advantages that are worthwhile considering. The overriding consideration is public health and not convenience or even acceptability. The construction of communal latrines, which in many countries is unacceptable in the introduction of organised sanitation, is usually a necessity. In emergency conditions this is less traumatic than normal, because it comes as just one of the many changes that engulf the disaster victims. It brings changes in behaviour that can be very positive. Communal latrines can offer safe sanitation at very low costs and once people have developed the habit to use these some initial strong negative feelings are likely to diminish in importance. These changes are significant, because in sanitation programmes it is not the technology, but human behaviour that poses the greatest constraint.

In areas where soil conditions allow effluent to seep into the earth, central lavatory blocks can be provided rapidly as safe sanitation systems. In its simplest form it may consist of deep dry trenches with cubicles on top, or as concrete trenches with intermittent tipping flushers connected with settling tanks (Bangladesh, Thailand, Mozambique). Such facilities are however difficult to keep clean and operate well only when managed by sufficiently trained and supervised maintenance staff. There should be regular inspection of the surrounding areas, because in many soils there may be saturation of the earth with the danger that black septic effluent comes to the surface.

In areas with a high water table these solutions are inadequate. In Mozambique an attempt was made to build trench latrines in partly flooded land for camps of Zimbabwean refugees, by building
hills with latrines on top. The results were discouraging and the capacity very limited. In Bangladesh, where dry pits could not be built, OXFAM constructed intermittently flushed latrine trenches connected with huge rubber tanks where the effluent could settle and be digested. The bags were after a considerable retention time emptied into drying beds, where the effect of solar radiation would eliminate most of the remaining pathogens. In exceptional cases burial and tipping sites at some distance from the settlements have been used, but the transport of the night soil is both disagreeable and hazardous.

Permanent communal installations have been built in refugee settlements such as the large aqua privies built in the late forties for Palestinian refugees and the prefabricated plastic aqua privies in several camps in Thailand. These are examples of systems that functioned satisfactorily over many years in spite of the very high utilisation rate. Although these systems have some drawbacks, such as the dangerous effluent, the performance over the years has been quite good.

Conventional alternatives in phased development

For the long term solutions in sanitation it should firstly be decided which option can be taken as a realistic and suitable goal. The development process to reach that goal is the second consideration to ensure that affordable steps gradually increase the efficiency and the comfort of the sanitation system.

There are not so many low-cost options in sanitation to choose from; but in recent years extensive experience has been gained with some simple systems. The choice of systems is very much related to the soil-ground-water conditions in the area. In very dry areas one may prefer 'burial' solutions such as the improved pit latrines, or in rocky soil areas 'composting' systems. In wet areas it is important to avoid groundwater pollution, so closed or partly closed systems such as shallow sewerage or pour flush latrine should be used.

Pour flush pit latrines

These systems use very small quantities of water to take the excreta from a squatting plate in the toilet stall to a soakpit where dry material accumulates until the pit is full. Then the flow is directed into a second pit while the dry material in the first pit digests and is rendered harmless. When the second pit is filled the first one can be emptied and then the cycle restarts. A retention time of one year ensures the destruction of all pathogenic matter.

Aqua privies with upflow filters

Aqua privies, which are simplified septic tanks, have the advantage of using no or little flushing water. The disadvantage is the septic effluent, that may be accepted under emergency conditions, but that later should be treated further. Upflow filter may improve the safety of the effluent, while it also is possible to link the various installations with a small bore drain that carries the effluent well away from the settlement.
Shallow sewerage

A satisfactory system for pour flush latrines in very high density settlements uses small bore (10 cm) pipes to remove sewerage from the settlement to septic tanks or sedimentation ponds located at some distance.

Recycling

There are several systems that recycle treated human waste and these are promising for settlements because of the production and income generation potential these offer. The following systems show different approaches to the recycling of human waste.

Improved pit latrines

Although basically the same low cost system as conventional pit latrines, some recent improvements have made the system much more reliable. The use of two alternating pits allows for safe, periodic emptying of digested material, while a ventilation pipe and in some cases a water seal eliminates the risk of fly breeding. With these improvements the system serves as a safe and permanent facility.

Vietnamese toilets

The Vietnamese toilet is a very successful double vault composting system that is built above ground and functions well in flood prone areas. Through anaerobic composting it destroys pathogens rapidly and mineralises organic matter into a good compost. The units are small and require much users education.

Aerobic composting and fish ponds

The composting of human excreta with refuse is an option that offers an attractive yield of safe manure that can be used for agriculture or fishpond feeding. Insulated and aerated composting boxes have a great capacity, but require well supervised operation. It is an option for locations where unfavourable topographic conditions such as high ground water prevent the choice of conventional solutions. Research in Thailand has shown extraordinary yields of such fish ponds and the production of protein food within the settlement is very attractive. The system however requires the handling and transport of night soil and that is a negative factor.

Domestic waste

Waste management should include safe disposal of refuse. This can in a relatively short time become a considerable task that requires much organisation. It is advisable to allocate disposal areas from the start of the intervention and avoid on-site burial of refuse by individuals. Individual pits are difficult to control and may interfere with future constructions.

Disposal can be by incineration, burial or by composting. Incineration may especially be desirable for contaminated refuse
such as from clinics, but larger quantities of refuse are often difficult to burn. A small incinerator is however simple to build and increases the safety of waste handling. Composting of digestible material has the advantage that the bulk of the settlement waste can be recycled as soil conditioner or manure and thus improve the potential of agricultural production.

Composting has to be organised and needs the separation of mineral and non-digestible materials from organic matter. It also requires a shielded area away from the settlement. Dumping of waste as land fill or by burying needs also supervised and planned routines. In sanitary landfills, layers of refuse are regularly covered with soil, while precautions are taken that fluids draining from the site cannot contaminate water source.

**Drainage**

During the first phase of emergency interventions the priority is flood protection of the settlement area. The run off pattern of the area has to be determined and a system of drains developed to lead rain water out of the settlement area. If it is not possible to drain the entire area instantly, it is wise to have retention areas where the drained water can be kept for short periods without doing too much damage.

In flood-prone areas it may be necessary to give extra protection to key buildings and installations with dikes and even pumps. The main strategy is however the construction of main drains that lead the surface water to lower grounds. In emergency settlements one should try to allocate sufficient land for drainage, because shallow grass-lined drains can rapidly and cheaply be built. Lined drains can be much deeper, however, and handle much larger water quantities.

For a fully developed system in later development stages one always provides retention areas and develops the drainage network with road side drains, first as shallow ditches, later as deep lined ditches. The provision of a good vegetation cover in sloping areas and also terracing reduces demands on the drains. In very steep areas one may have to build stepped drains.

For drainage, community participation is essential, but also relatively easy to achieve. The relation between the effort and the result is clear to everyone. With regular maintenance and close inspection of the system it is possible to handle maximum quantities of water without causing damage. By involving the dwellers in the inspection, cleaning and repairs of drains, a minimum network can keep the area dry. It requires a clear instruction for these tasks, the availability of tools (shovels, hoes or the wire-pulled Ahmed-Davis shovel) and close supervision.

**Roads**

Access is one of the first requirements for development work. Both in emergency settlements and in damaged existing settlements access determines the effectiveness of interventions. During the relief stage one needs first an access spine or loop with load-
ing, storage and parking areas to facilitate the delivery of supplies. This is usually a very busy area and one should discourage the development of dwellings here.

During following phases one can follow conventional development patterns in traffic planning with road classification and traffic separation. The hardening of vehicle access and delivery roads and drained neighbourhood main roads will soon become a necessity. The road network through the area has to be planned carefully, because it constitutes a major investment and it determines the character of the housing areas. By choosing deep and narrow plots the frontage of plots is reduced and this limits the total need for roads dramatically. It also allows for a zoning of the plots with various functions such as gardening, home industries and safe areas for children.

The construction of roads can by and large be on a self help basis with intensive labour technologies, not always requiring costly machinery and materials. Many of these development tasks can be executed as community projects as long as there is professional planning and supervision.

Pedestrian roads usually need little hardening and only basic landscaping work and can also be executed by the dwellers. In all this the psychological effect is often as important as the practical aspects of the improvements.

Power

All settlements need power supplies, and after disasters certain emergency provisions will be needed, which usually are provided by emergency generators. The first provisions are for security lights and radio communications. Then there are the needs of the hospital and the headquarters for electrical power. Fuel is needed for transport and for the generators. An oil depot for transport fuel and household needs is to be set up.

It may not always be possible to supply oil as an energy source to the households, and in that case the settlement will have to secure a timber supply and possibly start charcoal production. The ecological danger of using wood as energy source is evident, and planning for the renewability of the wood production is an essential step. Ecological damage to the region diminishes the long-term prospects of the settlement in the area, and this type of ecological care is thus essential. The introduction of improved stoves also has great importance.

CONCLUSIONS

Phasing the creation of infrastructure gives basic protection in the shortest possible time and initiates a development strategy with resources of the community supported by the external help that may remain after the relief operations end. The gradual improvement of standards and the full mobilisation of the resources of the community are the key elements in a process of sustained development.
It is of importance to notice that development is a process of change and that these changes always bring new behaviour that is often accepted with great difficulty. In emergency situations however many cultural changes that meet great resistance under normal development conditions are accepted as the price one pays for dealing with the disaster. In other words resistance to development progress may often be less after disasters than otherwise is the case.

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MANAGEMENT PROBLEMS IN NEIGHBOURHOOD PLANNING

P.H. Thung

INTRODUCTION: MANAGEMENT PROBLEMS IN NEIGHBOURHOOD PLANNING

This paper will describe an unconventionaly scenario to set up adapted management frameworks that are socio-economically differentiated to target group circuits, each manned predominantly by the target group members themselves in an enabling position.

"The concept of culture is rather complex and there is a large body of literature dealing with it from many points of view. However, the apparent confusion may be simplified by suggesting that all definitions fall into one of three general classes. One defines culture as a way of life typical of a group, a particular way of doing things; the second as a system of symbols, meanings and cognitive schema transmitted through symbolic codes; the third as a set of adaptive strategies for survival related to the ecological setting and its resources. These three views are not in conflict, but are complementary. Thus, built environments of particular groups are settings for the kind of people which that culture sees as normative and the particular life style which is significant and typical, distinguishing the group from others. . . ." (Rapoport, '84.)

The problem of management with and for the poorest is intrinsically different from that described above, and these problems are not sufficiently explored. General "assumptions" should be deculturized, and socio-economic factors scrutinized first. At this point, a segregation of socio-economic circuits may be helpful in addressing management problems.

Management is bringing together relevant resources to make an intentioned product in an efficient and effective way. In this paper such relevant resources are:

- the concept of neighbourhood in planning;
- actors i.e. participants;
- finance;
- land;
- the management framework.

It is obvious that, as listed above, these ingredients are too abstract for any practical manipulation. In fact in day-to-day reality the interpretation of these components is very frequently the main cause of much emotionally-laden discussion and antagonism. Thus it will be worthwhile to analyse apparently familiar concepts. One of those familiar subjects is the concept of the neighbourhood in planning.

1. CONCEPT OF NEIGHBOURHOOD IN PLANNING

In current planning practice the neighbourhood concept has become too obscured to be a recognisable and functional unit. The con-
cept in its original meaning is indivisibly collated with the urban culture. It was first introduced by Perry in 1929 (den Hartog '79) in the context of U.S. middle class society of the 1920s and 1930s. The neighbourhood preferably contains 5000–6000 inhabitants, houses laid out around a community centre, that minimally holds a primary school with recreational facilities. The centre furthermore will have other in- and outdoor sports facilities, including a swimming pool, and is connected with a neighbourhood open green space, that is, a park. The diameter of the unit should not exceed 1.2 miles. The main traffic arteries which link this neighbourhood with other units and the regional environment are found at the perimeter of the unit. Motor vehicle access roads in the residential areas are of nonthoroughfare type. The proposition in a possible situation as envisaged by Perry can be seen in Figure 1.

This pertinent access road requirement was called upon to take into account the growing mobility in the American scene of those days. The motorcar ownership in the USA had grown tremendously from 9 million in 1920 to 26.5 million in 1930 (Johnson '72). Most of the elements mentioned—swimming pool, shopping area and leisure area—fit well with the concept of 20th century industrialized urban life or culture. The separation of classes of traffic, that is, separation of pedestrians from motor cars, served to lessen accidents.

In an in-depth study (den Hartog '79) based on this model, societal aspects in neighbourhood planning were also taken care of. In an Eindhoven neighbourhood (Figure 2) this experiment has resulted in a healthy community, an integrated community with a sense of belonging among inhabitants and with possibilities of democracy to evolve (den Hartog '79).

Indisputably in modern and industrialized countries the concept has improved tools for planning and design. Moreover, the concept, not surprisingly, suits well with the rational, regular patterned perceptions and mode of thinking of our times. But is this culture, although prevailing in industrialized societies, the only existing one? In the squatter settlements and the rural areas of developing countries reality differs, even to the need or demand for fast communications or traffic.

2. CONCEPT OF ACTORS AS PARTICIPANTS

As is well known in developing countries, the leading powerful elite, though a minority, live a lifestyle socio-economically comparable to that of the elite in industrialized nations. Some persons have accumulated and hold an impressive wealth and simultaneously live a modern cosmopolitan life.

A large part, by now more than 30% of the urban population, has already been integrated in the socio-economic and cultural patterns and ways of those more affluent. The education and training efforts in most developing countries have borne significant results. Under- or unemployment is also a frequent phenomenon. Even engineers and medical doctors are among the
underemployed and sometimes happen to live in squatter areas together with people whose education ended at the 6th grade. Strangely, reports regularly describe huge deficiencies in trained manpower for very specific jobs while neglecting already available generally trained and educated resources.

An interesting feature of this educated class is that they, when holding a job and a position in government or private sector, are the people with whom we, as professionals and policy-makers, are accustomed to working: they are the officers with whom we enter into negotiations and plan together for a modern participatory society. Undoubtedly the accumulated global housing and planning experience of the last 3 decades can contribute effectively to this group of people. Ideals and standards are shared; education and training in Rotterdam, the U.K., Berlin, Sweden or the USA warrant this. Use of modern communication and information facilities are becoming a matter of course. The neighbourhood concept as it has developed today can be transferred unconditionally (except financially) to this group. If given adequate financial and human resources, a substantial part of their housing problems can be solved (Thung '85).

Confronted with the poorest part of society in industrial society, a sheer 0.5 – 1.5% of total households, professionals feel quite at ease. These households are housed, albeit through heavily subsidized governments programs. In the Netherlands, 80 years of the Housing Act (1901) and collective efforts and mobilization of sophisticated resources have solved to a large extent the housing problems of the country, but these efforts have not yet succeeded in meeting the housing needs of the poorest of the poor in other countries.

The bulk of research for more and cheaper housing is turned toward refinements and adaptations of proven technology in a homogeneous socio-economic and cultural context. This know-how is contributing significantly to the alleviation of the housing burden of an important part of the more affluent in society. However, for the rapidly increasing urban population in developing countries, this experience is largely irrelevant.

There are many planning and development strategies developed in the course of the last decades: amongst these the participation strategy is most in vogue. Its basic principle is that human needs to be fulfilled are legitimate only when formulated by the target group itself. This is a reversal of the way things used to be done before. In jargon, the reversal may be described as from "top-down to bottom-up, all else being equal". However, the reversal seems to benefit the same participants as the previous strategy, so presumably something has gone wrong. These two interrelated but different sub-systems (elite and non-elite) need different treatment, separate from each other, to rectify the process.

3. FINANCE

A huge amount of knowledge has been accumulated in the area of finance; many practitioners have ventured into unconventional
forms of financing (Jørgensen '75, UN '78, v. Pelt '85). However, the usual approach is monetarian, formal, integrating and expansionistic. It is associated with the service sector: banking, employment, the industrialization of the economy, which usually is not homogeneous. The dominant economic system may overshadow all other forms of economic transactions, but obviously other forms also exist in the informal sector (v. Dijk '80, Burns '75).

On the macro economic level there has been a revival in barter transactions. Why should micro economists not look into this age-old, seasoned and proven mechanism (and its institutions) to rediscover relevant components of barter and promote them.

Abundantly available human resources, especially those unmarketable in the formal sector, should have appropriate uses in the weak monetarian, informal sector. Labour exchange, labour accounting and sharing are worthy of being integrated in this micro-level informal economy. Converting these resources into the city's formal economy should be the responsibility of an intermediate institution.

4. LAND

Similar dualism operates in neighbourhood and land-use planning—as can be demonstrated by examining some standards or accepted conventions.

Although most such conventions are generally accepted, much of their validity depends on locality and time. For example, the well-known rule to save on road/utility costs in site and services settlement design by laying out narrow frontages but deep plots is not related in any way to the intrinsic opinions and values of the target occupants. This rule though has not been questioned in any way since the Bertaud model (Padco 1981). Should all S & S settlement plots have the same degree of accessibility, all plots adjoining a motorable road (tarmac)? Must a site necessarily be subdivided into individual plots preferably of small size to cater for the notion of "more with less"?

S & S and upgraded projects catering for the lower middle income groups and beyond apparently fulfill most of the target group's requirements and fit the culture. These settlements appear to be managed well (Pasteur '79 '84, Keare & Parris '82). However, some who have been originally allocated to these sites have been pushed out or pulled into squatting again. What might be their dissatisfaction? It hardly can be only financial. It is their way of life and survival strategy (and hence their cultural environment) that conflicts, as it appears no allowance is provided for socio-economic interdependency with others, kin, friends, subordinates in the expected socio-economic functioning of the project.

The morphology of spontaneous settlements may indicate the direction to look for a remedy. Why are illegal and informal settlements necessarily patterned irregularly albeit having a
structure? Is it because those kinds of dependencies, for example, extended family, ethnic linkage, and so on, are incorporated in the layout? These aspects have not been investigated; surveys are not set to focus on these phenomena, and when the pattern has been documented, no interpretation has been provided.

Proposed and implemented plans turned are tuned and adapted by the middle class ethics and esthetics of modern technology. Design data and conclusions show how evidence of reality is distorted or adjusted to suit ideals and purposes of the "participants". This very sensitive issue is an almost intractable problem to handle. For example, in current practice only individual household plots are welcomed, and disintegration of socio-cultural cohesiveness follows subsequently.

Surveys have arbitrarily defined the household as the smallest unit of integration, consistent with modern perceptions. The existence of extended family institutions and other forms of associations is noted, but surprisingly has no influence on thinking in planning, nor in design. Plot size and use are always based on the nuclear family household ideology. In low-income housing terminology households can be formed by a group of people sharing one roof and one cooking place.

This interpretation is capable of a wider application. Household can mean in this sense a miniature state or a group of people who are related to one another by blood and/or origin, living together in a village. A group of houses, managed collectively by occupants, should thus be accepted as a household.

In illegal occupations in urban areas, usually no visible boundaries between households can be seen nor traced. The relationship of topography to relatedness, kin, or associations could be determined by asking questions, such as: Who shares what? What do people do together or in turns? How do they divide tasks? Where do they perform their trade? But these questions are usually not asked.

A public green area or park in neighbourhood practice is commonly accepted as a necessity and standard. There are ample recommendation lists and rules of thumb for the facilities of neighbourhood design:

<table>
<thead>
<tr>
<th>Square meter requirements/inhabitant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block- and neighbourhood shops</td>
</tr>
<tr>
<td>Hotel-, bar-, restaurant facilities</td>
</tr>
<tr>
<td>Parking facilities</td>
</tr>
<tr>
<td>Soc.-cult-, religious &amp; recreation facilities</td>
</tr>
<tr>
<td>Pre-primary school</td>
</tr>
<tr>
<td>Primary school</td>
</tr>
<tr>
<td>Secondary school</td>
</tr>
<tr>
<td>School gardens</td>
</tr>
<tr>
<td>Instruction pool</td>
</tr>
<tr>
<td>Block &amp; neighbourhood park</td>
</tr>
<tr>
<td>Sports grounds</td>
</tr>
</tbody>
</table>

Source: Zundert '73: 146. Shortened by author.
When this list is related to the poorer target groups in urban areas, planners and policy makers may restrain themselves to fulfill only demands for religious-, school- and play areas and by narrowing access roads and so on to alleviate the financial burdens of the target people. Putting these necessary items in historical perspective may help to illustrate their relative importance under different cultures.

Ancient agriculturally-based societies in Greece, Italy, the Middle East, India and China had public open spaces of moderate sizes in compact towns; in wealthier cities this open space was paved and tiled to resemble a living room (plaza). Poor people working in the greens, the rich having their private patios and the purists having their woman's courts can relinquish the need for public open space.

Some will argue that in developing societies of the late 20th century an important number of the inhabitants of those cities are becoming more modern every day, thus more motor traffic dominated. They earn their income the way all other middle and upper class people do in industrialized countries, as a result of expansionist cultural integration into the modern sector. It can be agreed that at least for that sector occurrence of socio-economic and cultural problems in design and planning are exaggerated.

The standard facilities of the modern city are a necessity for the upper class inhabitants of developing countries; they must keep up with the Jones' of the industrialized world, because they already form part of the global modern culture.

On the other hand we must admit that in squatter settlements the dominant impression is chaos, untidiness. But a second look may reveal order, resemblance with other spontaneous settlements all over the world. Undoubtedly these settlements are founded and formed with locally affordable materials and available resources of that socio-economic and cultural context. In fact, these settlements prove to be self-reliant and dynamic communities that look for integration or at least for a linkage with the modern sector.

Are there no ways to cater to both modernization and self-reliance? Why should modernization imply retaining nuclear family institutions on small, minimal plots? Why should legal settlements not be modelled after spontaneous developments, unrestrained by prejudicial codes and norms of "foreign" or external cultural origin?

Socio-economic groups of kin or associations should be provided with land of 4,000 - 10,000 m², depending on size of association, for settlement. These lands should be linked to existing formal urban infra-structure for its services and administration. Inside the allocated plot the mini-community containing up to 1500 inhabitants or more in self-management starts developments including housing, sanitation and maintenance to take place, unhindered as in spontaneous settlements. The efficient use of land for housing may leave sufficient areas for urban commercial
and/or subsistence gardening, income generating arts & crafts activities and small industries. See Figure 3 for a possible configuration.

Future changes in land use, densification or even change of land classification status is provided for by internal reorganization; even land sharing is viable. The Bangkok landsharing strategy has been preceded by historical examples from the 17th century: Sri Lanka, Colombo's slumgardens, Negombo Islands and from Surinam in Paramaribo's erfwoningen.

Recognizability is fundamental in a living society. Basic factors determining the appearance of a community in any stage are:
- topography
- climate
- available materials
- financial resources
- human resources, skills etc.

The community, association of households and so on, reacting upon needs will determine what, where and how to realize the demands and add them into the physical environment. As with house building different clients (corporations) and different sites result in different houses. In a dual subaggregated society clearly two different client groups exist. These societies, left on their own to decide on their environment, will meet their perceived needs differently, due principally to the deviating socio-economic balance.

We have come to realize by now that building cheaper houses does not mean smaller dimensions of the rooms or smaller total area covered. As is well known, it should not be a miniature of a middle class house or villa. So the solution for financial constraints and scarce resources will not be an exercise in shrinking the dimensions of access roads or areas of plots, omission of circulation areas or diminishing loan amounts.

The problem is more one of fundamentals than of technology; it is more a problem of compatibility, of interfacing and matching needs. The manager's task in this sector is to make it possible to join two lifestyles, technology cultures and make use of the advantages of the two systems and achievements. Some modern achievements are indispensable, even for the poorest of the poor. For example: clean water and sanitation know-how. By contrast: a tarmac road is not as relevant for both groups, nor is a single family house.

As built-up environment is the crystallization of culture over time, a neighbourhood may reflect sentiments, ideas and above all possibilities that exist at the time. It is not by chance that squatter/spontaneous settlements look the way they do. African or Asian squatter settlements look alike not only in structure, but also in architecture, use of materials, and the apparently irregular or random patterns of housing arrangements.

This is not to idealize maldistribution of wealth and spontaneous settlements, it is only to question whether this "chaos" may serve as a key to create a perspective for an indigenous develop-
ment strategy. In a settlement, as in a core-house, the possibility to adapt a basic structure to their own liking and needs should remain unhampered. The neighbourhood should cater to change of use, to "progress in culture" and lifestyle too.

There are many options to provide for that kind of development in neighbourhoods:

1. Settlement model.
   Allowing change of use on the same land, specifically on those parts of the plots that allow densification, direct access to service infra-structure and the formal sector, along the tarmac inter-neighbourhood access roads. (Landsharing Bangkok, slumgardens Colombo.)

2. Transitorium model.
   Virgin land divided in super plots of 4,000 - 10,000 sq m and link to all service infra-structure. Socio-economic upward mobility is to be recognized by allowing residents to move to neighbourhoods or plots of higher standards. (J.F. Turner development cycle theory realized.)

3. Swapping model.
   The modern fortunate entrepreneurs from formal sector industries who can bear more burdens, can with some encouragement from government/sponsors invest more for poor land. The abandoned dry and loadbearing land would be transformed into Model 2, transitorium plots. This can be done partially following model 1. landsharing to preserve existing employment opportunity.

4. Superimposition model or upgrading strategy.
   The modern sector on an intra-neighbourhood level is superimposed on the micro-tissue of residents' associations, precincts, extended family networks and informal enclaves of traditional communities within a modern city structure. (Japan.)

In disaster planning it is expected that the transitorium model will meet best to the time pressure of events.

The confrontation of the modern with the "informal" sector may justify the call for separated urban sub-local management institutions that are coordinated and integrated on city-level.
City Government level

Modern city management and administration

Ease of setting out of super-plots.

Simpler administration of developments.

Reduction of costs of infrastructure.

Idem for construction and maintenance.

Incremental growth in practice modern infrastructure.

Managed progressive development.

Simple management of expenses and income.

Each group of inhabitants on a superplot is provided with a sufficient capacity standpipe and connection possibility for self-help reticulation. Water supply metered and charged collectively through chief; idem for electricity.

Collection of waste in bulk through a wide city network system

Modern standards and codes prevail.

Residents' self-government committee

Traditionally managed, consensus-based decision-making. Division of tasks within groups. Charismatic leadership; clear interests to be shared.

Division into individual plots when required delegated to chief or head of extended family.

Reticulations of service infrastructure under groups' responsibility.

Incremental growth within block and self-financed.

Progressive development, landsharing make these plots suitable for - mitigation-relief-rehabilitation-cycle of emergency provisions.

Collection of fees, charges etc. under social control conditions.

Internal reticulation paid for individually, mode of payment can be monetary or otherwise: by labour, service, administrative work, material delivery and combinations.

Groups internally organize delivery of waste etc. to city collection point.

Principles of standards and codes are indemnity to others; all acts and constructs not endangering third party are allowed.
Modern financing mechanism. Variability of restrictions related to effects of possible damages.

Infra-structure capacity dimensioned to max. expected density Plot size varies with size of cooperations, groups of kin etc.

Keeping to normal writing-off periods, with no surprises during development. Provisions for change of landuse, potential for commercial activities along link roads. Organized and localized distribution of emergency and relief supplies.

5. THE MANAGEMENT FRAMEWORK

It is noted that in neighbourhood planning no agreement on concepts is reached as yet. Reviewing this concept one may discover that societal culture can be split into two categories of sub-cultures. Obviously there is one global culture of the 20th century that dominates the modern sector economy. In this sector people compete with each other under equal conditions, resources and tools. These people can afford habitat services delivered by professionals. In this sector the accumulated experiences of management success and failure are interchangeable and transferable. The other, less dominant sub-culture that also exists in modern industrialized societies has distinct features of a socio-economic nature. That culture is usually associated with the informal, traditional sector and with the teeming masses of the lowest-income earners and the (at least officially) unemployed, who cannot afford official habitat provisions.

The distinction between these socio-economic circuits is of great importance in disaster situations. Decisions under those circumstances have to be taken in haste and under great pressure. Programs have to be implemented in a swift, smooth and efficient way. Indecisive discussions and muddling about are unproductive.

Centrally coordinated but locally directed actions are required. An organizational structure vested with substantial delegated and specific power/authority is most appropriate. This means on city council level that local authorities have two distinct tasks that have to be administered in two separate institutional infrastructures. The informal sector institutions should be manned by people represented by the micro-level of informal communities.

The system of remuneration in these institutions should be directed towards the informal, traditional economy, labour exchange for materials and/or food, barter system. Funds from higher authorities to micro-level community should follow proportional distribution according to number of residents.

It is in the sponsor's own interest to accept this dual society concept, as this can simplify the identification of appropriate institutions to cooperate with.
APPENDIX I. MANAGEMENT SCENARIO IN NEIGHBOURHOOD PLANNING

0. Mitigation
1. Relief
2. Rehabilitation
3. Reconstruction

0. Mitigation

Local authority and administration should be restructured on the basis of 2 distinct socio-economic target groups. The authority dealing largely with lower-income sectors should be located in their neighbourhoods. To set up this infra-structure, awareness training and practical institutionalization on this micro-level is recommended. This awareness training can be realized within the existing organizations dealing with S&S, slums- and squatter upgrading and health care. The training should result in a restructuring operation to create increased semi-formal/informal employment opportunities at practically no cost for the usually already strained budget of City Council.

1. Relief

Victims should be organized to allow kinship, friendship and ethnicity groups to keep themselves together. Assess disaster-stricken areas; decisions should be made on future re-establishment of the area. Will there be rehabilitation/reconstruction on the previous pre-disaster sites or new settlements on virgin land? What measures are needed to improve, up-grade original area?

Identify and nominate heads of groups; they should commit themselves to govern their kin on superplots and they should accept an awareness-training, so as to support traditional values and way of life and in order to interact with the formal local authority. These local heads should act as administrative interface between conventional institutional infra-structure and the informal traditional kinship or cooperatively operated organizations within the superplots. The sub-committees should be organized to erect and maintain the service infra-structure up to an appropriate functional standard.

Identified groups of victims would be translocated to pre-planned superplots in groups, as appropriate, to erect communal emergency shelters.

2. Rehabilitation

Major preoccupations should be directed to restructuring the affected area. Implementation of this strategy may require:

- expropriation of site;
- reconstruction of infra-structure up to trunk mains.

Individual connections to be arranged locally by residents' or kinship associations, assisted by a technical advisor.
3. Reconstruction

Options:
- land sharing and swaps;
- expropriations and restructuring;
- rebuilding ex-ante;
- new developments (see Appx. II. Check-list for Neighbourhood Plan).
APPENDIX II. CHECK-LIST FOR NEIGHBOURHOOD PLAN

Public greens, open spaces and parks are not necessary for inhabitants from superplots, but may be required at a higher level integration. A collection of different classes of superplots and conventional individual plots may be integrated where common public facilities (shops, markets) should be provided catering for ca 15,000 - 20,000 inhabitants. This is 3 to 4 times the standard size for population groups, thus reducing expenses for city authorities and making public facilities economically viable. On superplot level no expenses for public space, maintenance, repair and reconstructions. All these activities will be taken care of by supporting associations under the authority of the chief/head, creating employment opportunities within their own community. This saves costs on road construction and service infra-structure. Only essential tarmac service and access roads over a wide area need to be constructed; large plots mean less roads. Larger plots harbour more utilisable "rest" space, more possibilities for urban gardening, workshops etc.

Codes and standards should refer to the liability of individuals and/or groups. Any individual is entitled to build his own construction as far as it will not incur damages to third parties. The more harm one person or community can cause to third parties the more strictly regulations must be formulated and enforced.

In the transitorium type of developments no individual plots will be allowed; right of tenure is allowed to the head of the plot association. In permanent site developments land-sharing possibilities, ownerships, and lease arrangements should be looked into. Individual plots are allowed. Land adjoining service roads should have the possibility to develop into modern commercial zones with mixed use. Population densities in these superplots can be very high, as can be seen in spontaneous settlements.

Internal management and administration should be set up from inside. The tenure of the chief/head should be paid by the City Council. Most of the internal activities should be based on economic basis using available human resources.

Each superplot has access to survival essentials like water, electricity, sewerage and sanitation against payment. Payment of deliveries and land rents should be collected, managed and processed by superplot administration. Internal reticulation of services and waste collection is managed by the elected traditional chief of the plot association, assisted by a technical advisor.
REFERENCES


Jørgensen, N.O. (1975), Housing finance for low income groups with special reference to developing countries. HRDU, Nairobi.


Figure 1. Perry's neighbourhood unit
Source: Den Hartog (1979) p.48

Figure 2. Built neighbourhood in Eindhoven
Source: Den Hartog (1979:138)
Figure 3. Extended family house + garden
Source: Liu Dunzhen (1980:126)
SETTLEMENT AND ESTATE MANAGEMENT

M.S.S. El Namaki and Ir. H.H. Werthauer

1. INTRODUCTION

The management of disaster settlements requires special care and consideration, different from those traditionally found in a normal setting, due to their unforeseen emergence as well as to their "temporary" character. Above all, the initial lack of economic ties within the community as well as its non-existent linkages to the surrounding structures have to be dealt with in a way that guarantees longer-term viability for all concerned.

This paper deals with three critical aspects, essential for the functioning of a disaster settlement, namely:

Managerial aspects

Objective
Structure
Decision making

Income generation

Self-employment
Employment

Infrastructure

Supply of goods and services
Service level criteria

2. MANAGERIAL ASPECTS

Broad Objectives

A disaster settlement should function as an "open system" in the supra-system of the host-environment. This implies:

- internally, the settlement will require a management system for directing and controlling its functional activities. An element of activity planning, logistic infrastructure and operational control is needed.

- externally, the settlement has to be linked up to all public and private organizations that influence or support its existence. These linkages should be established within a network and an operational flow pattern.

Considering the state of disaster victims, an immediate attempt is usually or should be made to cover their basic needs; this provides the prime objective of the first phase of disaster management. This implies the following derivative objectives:
- identifying the most effective approach to an adequate and efficient supply of food, shelter, and clothing;

- development of an insight into the future chances of support;

- creation of individual and collective possibilities of employment;

- stimulation of interaction between the settlement and the surrounding community.

Operational Activities by Settlement's Management

Operational activities to be performed by the settlement's management can be summarized as follows:

- contacts with outside agencies, law and order, basic infra-structural requirements;

- housing and accommodations;

- supply and distribution of food, clothing and other goods;

- finance, once the settlement becomes self-governing, since up to that point government and aid organizations will handle this aspect;

- training of adults in preparation for employment;

- hygiene, child and medical care.

Once the settlement becomes permanent, three more areas will be included, representing the functional areas concerned with self-sufficiency and local integration of the settlement. These are:

- employment and job creation for the sake of economic development and integration;

- transportation, energy supply and communication for creating linkages to the existing structures as well as for creating infra-structure for economic activities;

- culture and recreation as communal base and for human linkage to the environment.

All of these functional areas are linked to a needs hierarchy of the population as well as to the interest areas of its surrounding communities. The settlement will require a management structure that channels its normal functions and provides linkages of an open system with the supra-system of the host area for integration into cultural and socio-economic life. Integration is the means to prevent the settlement's containment and isolation with its implicit popular degeneration to out-cast status. It opens the way to satisfactory development for cultural and socio-economic relations; it stimulates self-reliance of the disaster victims.
Representation of "Actors" and Interest Groups

Next to the managerial structure that handles the tasks mentioned above, another structure is required to represent the interests of all individuals and groups involved. This second structure is concerned with decision-making and control, setting the framework for the directives of the functional structure.

Structure for Decision-making

Disaster settlements go through a number of sequential phases:

- the task-force phase: In the initial disaster stage the assistance teams will take any action that mitigates the victims' distress. Their actions are situationally motivated, cross-functional and triggered by the events.

- the semi-permanent phase: Autocratic decision-making takes over as soon as the emergency subsides and aid teams hand over to settlements' representatives. Those leaders have personalities and capabilities that warrant their trustworthiness and are expected to "do the right things" without being questioned. The emergence of doubts or opposition, however, motivates the autocratic leaders to seek popular support through consultation. So the way is open to permanent structures.

- democratic decision making: Here chosen representatives deliberate on outlines of policy and directives for actions. Their decisions are taken by majority vote and entrusted to the executives, who, in turn, are responsible to the assembly for the effective implementation of their policy decisions. Democratic systems however have three marked drawbacks: In the first place, majority rule smothers the interests of minority groups, leading to dissatisfaction and "extra-parliamentary" action; majority representatives become a corrupting power in themselves, tempted to further their own interests rather than those of their constituents; last but not least the self-perpetuating interests of democracy will deny all popular wishes of participation until next election day comes up, thus alienating their "less educated" voters from the dynamic process of decision making.

- sociocratic decision making: Sociocracy requires for its functioning an open network structure and a specific way of personal interaction. The benefits derived from its application are that it encompasses the whole community in the decision making process, it teaches all participants their responsible role of participation, and it stimulates fast implementation of decisions since the principle of "consent" or no objections makes the structure ripe for motivated acceptance.

A Few Details on Sociocracy (1)

It bases its success on the principle that all integrants of a community are to be considered as responsible agents with full knowledge of community processes to which they have to contribute with their knowledge, skill, personality, and inventiveness.

The organizational structure imparted by sociocracy is based on dynamic circles, linked vertically by the appointed head and the
chosen circle-representative. This pair is instrumental in the policy-making and decision-taking process, empowered by their home-circle to act in the next higher circle, on all initiatives to which all home-members gave their consent (or no-object).

Sociocracy's basic philosophy is that all processes are governed by rules, which have to be learned and acted upon accordingly. For effective interaction all integrants therefore have to learn the (jointly convened) rules and apply them accordingly.

Introduction of the sociocratic system of effectiveness implies training in four areas:

- fulfilling the assigned tasks within the immediate network;
- absolving completely the assigned responsibilities;
- reference to the circle-structure for decision-making;
- adaptation to changing circumstances.

Sociocratic training comprises three areas:

- improving professional capabilities;
- contributing to communal performance through integrated process thinking;
- participating in joint decision-making, applying jointly the accepted rules.

In a first step of implementation, sociocratic trainers impart to all participants of the circles a basic knowledge on sociocratic structuring; in a second step these trainers assist in formulating the specific rules and implement the structure accordingly. Once the system works, the internal integration of the settlement has a solid base that allows for effective external linkages with the environment.

3. INCOME GENERATION

Although the settlement will be dependent on government and international aid at its inception, an all-out effort has to be made to reach a degree of economic self-sufficiency, a measure of support and a move towards "independence."

In this respect two different actions have to be initiated:

- Identification of opportunities for self-employment and/or creation of co-operative work within the settlement or surrounding communities.
- Identification of opportunities and openings within the surrounding business structures, matching them with the individual professional capabilities of the settlement's population.
With regard to integration of settlement members into the existing business structure, the existence of labour-exchanges at the surrounding municipal levels can be helpful to locate vacancies.

If professional qualifications of settlement inhabitants do not match requirements, training is needed. International experts will have to be provided to take care of this aspect.

On a long-term basis a study will have to be made of regional self-employment opportunities. This regional development plan will show where employment opportunities arise and which resources are required for their creation. Such a plan needs specialist involvement; it shows the amounts of funds, skills, technology and energy to be invested. Since capabilities to perform such efforts hardly can be expected to be available in the settlement, government and aid organizations will have to be involved in the planning as well as in the implementation stage. Extensive training facilities in managerial and professional qualities make expert involvement indispensable.

Counselling the Underprivileged Groups

Any group of refugees consists to a substantial part of children, women, and elderly people. At an early stage in the rehabilitation process children should be brought back to a normal school routine.

Assistance with external funds for the subsistence of the elderly and invalids hardly has to be mentioned: Their lack of economic potential makes them the ultimate victims of disaster. Their internal function in the settlement for freeing potential wage earners from household chores, child care and schooling, is a matter that comes up naturally. Special attention is required for the future of women due to their usually low professional preparation and personal vulnerability.

LOGISTIC FLOW OF GOODS WITHIN THE SETTLEMENT

Although government and aid organizations will take care of the logistic flow in the early stages of disaster mitigation, the settlement's need for self-respect requires it soon to take these matters into their own hands. Evidently the population will depend largely on aid during the post-disaster period. All the same, it is essential to simulate quickly an economic process in which families can purchase for their own needs from a settlement store with camp money distributed to them. The simulated purchasing power stimulates familiar decision making and implants the mechanisms that later can be linked to normal exchange in local currency.

Creation of a Supply and Physical Distribution System

As mentioned above, the settlement will have to start circulating its own currency at a very early stage in order to avoid the threat of making their population permanently dependent on "handouts." Some thoughts have to be devoted to an equitable way
of distributing the purchasing power and to balancing the money flow with the goods available as well as with the price levels imposed. As a matter of policy, currency and price levels should mirror the local environments' conditions in order to facilitate the later transition once the community's integrants start earning local currency in outside jobs or by trading their products with outsiders.

From the onset of the settlement a store is needed for trading as well as a warehouse for keeping the stocks required for bridging the supply delays. Imposing shop and warehousing routines, a first step of employment generation is taken. Determining the dimensions for trading and storage areas a flexible system of growth will have to be chosen in order to prepare for future increase of variety of goods once purchasing power and economic life becomes more realistic. Similarly the workforce for this enterprise will have to be chosen and trained in order to foresee future extensions.

When aid organizations stop supplying contributions in kind and substitute funds, the supply service will have to be ready with its purchasing plan, needing to have its suppliers available and ready to convey the goods by own or hired transport to its premises. In all these aspects an intimate co-operation is needed between the settlement's finance office and its logistic management. Basic issues like budgeting, expenditure control, accounting of goods and money, stock maintenance and handling losses will have to be dealt with.

Establishment of Logistic System and its Regulatory Mechanisms

The two basic parameters that determine the flow of goods for the settlement are the aggregate of individual needs and the availability of funds for purchasing them.

In the early post-disaster stage, government and aid organizations will provide contributions of goods in kind for immediate needs. An early assessment of requirements of goods can be based on those flows and their shortcomings. Quantity estimates of demands detected should be prepared in relation to the growth of the population.

Simultaneously to the determination of supply requirements a study should be made of their availability in the local market and the probable price consequences of this extra and growing demand. It is quite conceivable that the local market has insufficient flexibility to provide for the necessary extra volume; then a search has to be made in a wider circle or across the borders. These supply sources will have consequences in price due to longer supply routes and possible foreign currency implications.

The volumes and prices of goods should be compiled into a purchase budget which guides the settlement's management in their aid negotiations. Simultaneously an investigation will have to be conducted into the feasibility of initiating local productive activities for meeting the popular needs with local manpower. Investment and training projects for this purpose have to be
submitted to government and sponsors since these attempts at self-reliance have priority in all disaster mitigation policies.

In order to come from supply budget to supply planning, supply delays and seasonal supply influences have to be estimated. These are indicators for stock levels to be maintained and determine the required warehouse capacity. On the other hand, the volume of goods for daily consumption and the price of these goods at local level are a basis for the daily money flow and thus for the amount of camp currency that will have to be brought into circulation. Evidently in this forecast of the money flow a surcharge has to be included for costs of handling and storage, with provisions for loss percentages.

The above procedures evidently require some special knowledge and practice, but so do most of the managerial tasks.

**Organization of Management Structure for Logistics**

The subfunctions of this area dictate the departmental structure:

- purchasing and ordering form the feeder link of the system;
- transport and storage is the bulk handling side;
- vending deals with the retailing to the population;
- cash and administration takes care of the money flow.

Special care is needed for the registration at check-points in the process where records have to be produced for the settlements' financial control. It might be advisable to install at these points physical checks by the finance department so that inspectors can confirm the correct flow of goods and money.

5. CONCLUSIONS

Summing up, it should be stressed that with the first-aid assistance, or immediately thereafter, a substantial effort has to be made for socio-economic rehabilitation. Without this, survival conditions are endangered. This effort should consist of professional assistance in:

- structuring and implementing settlement administration;
- setting up of schools and medical care stations;
- organizing the supply and currency assistance;
- training for enhancing employment possibilities;
- planning and implementing a business deployment scheme;
- training and counselling of future entrepreneurs;
- establishing schemes for deployment of women.
NOTE

1. Cited from an unpublished manuscript by Ing. G. Endenburg, Sociocratic Centre in Rotterdam.
HUMAN SETTLEMENTS AND DISASTER:
STRATEGIES FOR THE DESIGN OF HOUSING UNITS

M. Carmona

INTRODUCTION

This paper aims to establish general guidelines for the design of housing units in relation to disaster situations. Disaster is defined as a situation caused by a natural or political event— that produces radical and sudden change in a given human built environment.

The structure and quality of the built environment varies in the different regions of the world according to broad historical economic and cultural determinants. The most important of these factors are the sort of linkages of the given society to the world economy and the level, form and rhythm of its socio-economic development. Thus, all methodological approaches that attempt to plan and design the built environment of a post-disaster region should be broad enough to embrace a variety of situations.

A post-disaster core-house solution applied in Central Mexico City in 1985 could be inappropriate to the context of the reconstruction of Saighanchi (a small village in Afghanistan). In spite of the fact that both involve a poor population, there exist huge differences in cultural, religious and climatic variables. Differences also exist in their location in the national territory, the scale of the disaster, the local structure of the housing market, the sort of emergency resources and post-disaster organizations, the level of organization of the affected population, the response of the national and local authorities, and so on.

Not only should the design of the future shelter answer the general issues described above, but also the specific issues that determine: the acceptance of the target population to its new environment; needs of the target groups; the range and flexibility of the options; the quality of the future space and the modalities in its construction.

This paper attempts to grasp different post-disaster situations in order to try to build a general model embracing a wider range of variables. With this model we draw broad generalisations about common issues concerning future structures and some specific guidelines for the design of core-houses. In order to achieve these goals, it is necessary to review some past experiences: particularly the 1971 and 1985 earthquakes in the central zones of Chile, the 1972 earthquake in the Managua central area, the 1985 Mexico City earthquake, the reconstruction of Saighanchi and the construction of the new environment for the survivors in the disaster area of volcano Armero in Colombia.
SOME EXPERIENCE ON POST DISASTER PLANNING AND DESIGN

Chile 1971 (Figure 1)

Experiences after the 1971 earthquake in the Chilean center provinces (which made 20,000 new homeless in the city of Valparaiso) show us that core-house solutions in the urban context, although not applicable to the whole of the disaster population of a big city, are applicable to a large extent. In small villages and rural areas, core-housing is perfectly adequate to people's demands (1).

The 1971 earthquake also showed that self-help construction of core-houses was not applicable in many cases in a city like Valparaiso under post-disaster conditions. A new settlement on the outskirts of the city to a large extent answered the housing aspirations of the low income population. Such a settlement was of low density (25 dw/ha) comprising a small (9 or 18 m2), light, pre-fabricated initial unit, with the delivery of communal services and infrastructure constructed by the organized building sector in a very short time. This building modality also meets the aims of local authorities seeking to quickly normalize city activities. Amongst other things it can revitalize the use of schools, churches and similar buildings, that were used in the emergency situation. It can also dynamize interrupted economic activities by giving impulse to the building sector, and in this way increase employment opportunities and broaden income distribution.

In fact the earthquake of 1971 brought great solidarity in which voluntary forms of mutual help were developed, such as the massive construction of pre-fab units (emergency wooden units) in public places (stadiums and open spaces) through voluntary labour. Also in prisons voluntary work was developed.

The construction of definitive core-houses in areas already provided with basic infrastructure, took various forms, according to the particular dynamics of each group, the geography of the place, the quality of the ground, the amount of dwellings, the type of dwelling and the relationship with trade unions (building workers). Among the most remarkable forms that took place, one can point out the ones constructed by building workers cooperatives, small size building enterprises, and the building enterprise of the Ministry of Housing. All modalities permitted the use of the labour force of the settlement under loan agreements with the trade unions. Also mutual self-help was complemented with INACAP's (2) technical assistance of pre-fab panels houses with concrete floors. These were 18 m2 units built on a rhythm of 30 units per day.

Nevertheless, the reconstruction of the central locations of the city, because of its high land rents, the building norms, the level of occupation and particularly the highly overcrowded squatter situation, require new sorts of planning, design and building strategies generally based on traditional building techniques (reinforced cement-block masonry or similar). The organized building sector as well as the affected population should participate in the construction. But of particular
importance is the sort of public participation in the definition of the future strategy of allocation of area per family unit or commercial estate, costs, and forms of repayment.

A second earthquake in 1985 (7.8 on the Richter Scale) struck Chilean territory in the same zone. It was particularly destructive in secondary cities. In accordance with changing economic conditions, support was given to the organized building sector. Small pre-fab housing units were purchased and soft loans were made available for the middle income population. Low income programmes, based on assisted self-help and available local materials, were set up by private non-profit organizations with the support of the international community.

**Mexico 1985**

Similarities to the Chilean experience of combining building modalities and design programmes in the immediate post-disaster period, can be found in Mexico City after 1985, in some programmes in Lerida Tolima for the reconstruction of Almero (Colombia) 1986, and in the construction of the large programme Las Americas of Managua after the 1972 earthquake.

In the case of Mexico City, the earthquake damage was enormous, (8.1 on the Richter Scale) (3). The location of the epicenter was the city center in an area containing about 6 million inhabitants. The earthquake caused 20,000 deaths and the destruction of 700 schools, 40 hospitals, 350 public buildings, 840 commercial buildings as well as hotels, industries and other buildings. Official estimates were 9,000 million dollars worth of damage. The most affected inhabitants were from the middle and low income sectors of the center neighbourhoods (colonias) of Guerrero, Morelos, Doctores, Roma, Centro, Juarez, Narvarte, Cuahtemoc, and Tlatelolco. The population of Colonia Morelos (a typical colonia affected by the earthquake) is composed of 33% of loan workers, 27% artisans, 25% small business people and 15% unemployed. 47% of the population had a family income below the minimum salary and 90% receive a weekly family income below the US $25.00.

The overall housing reconstruction programme is for about 150,000 dwellings, 45,000 in expropriated estates and 105,000 in not-expropriated. The programme also contemplates the reconstruction of artisan and commercial units and an income generation programme. Together this was estimated to cost US $800 million.

Reconstruction has to be carried out in an area of middle density old houses from the beginning of the century. These were wooden structures filled in with earth and wires. Most of them consisted of overcrowded rented rooms in some cases with individual toilets in others with common services. Reconstruction also has to be carried out in an historical part of the city center. In the expropriated estates the reconstruction consists in repairing minor damage (8,587 dwellings), repairing major damage (14,940 units) and complete reconstruction (building of new houses) (21,261 units). The architectural programme must be approved by the RHP (local authorities for reconstruction for low income people) and consists of a maximum of 40 m2 per housing unit.
According to the norms established about 6 months after the earthquake, the beneficiaries (supposedly the old tenants) must pay monthly not more that 20% of the minimum salary and the annual payment must not exceed 10% of the tenant's income including the cost of the land. This applies to finished housing as well as core-houses.

The main problem was the non-expropriated estates, where improvements done by the tenants belong to the owner. In some cases the formation of tenant cooperatives and the prospects of self-help housing reconstruction received legal help and made possible the incorporation of programmes demanding the broadening of expropriation decree and loans. Tenants of these houses can demand to be incorporated into the FONHAPO credits, which are normal programmes of social housing (4).

The government housing reconstruction strategy was designed to confront the enormous ongoing economic crisis. Its main characteristics can be summarized in the following points:
1. To formalize a system of soft credit and enter into individual contracts with the affected families.
2. Mass and immediate reconstruction, which constrained the possibilities for self-help housing.
3. To promote the massive incorporation of the private building sector with a goal of reactivating the sector overwhelmingly affected by the economic crisis.
4. To consolidate popular control through a rapid reconstruction programme in a sector where the so-called "independent organizations" started to emerge.
5. To improve the housing conditions of the sector affected by the earthquake and to accelerate the urban revitalization of the Federal District.

The construction on the expropriated properties shows the possibility of interaction of the different building modalities according to different interests. Large building entrepreneurs are not concerned directly with the reconstruction of isolated buildings but rather with the reconstruction of large public works and large housing projects. Medium-sized entrepreneurs participate in the new construction of a large number of central properties as well as in the programme of reconstruction of badly damaged structures. The newly created cooperative organizations of affected people are concerned with the reconstruction of properties and with the building of new core-house schemes. An initial core of 20 m² was built by these organizations for enlargement up to 40 m² by self-help initiative.

The information to date of the comparison of costs shows that the cost per m² of the cooperatives compares favorably to self-help housing—30,000 pesos against 90,000 pesos. Nevertheless it must be noted that the existing examples differentiate the locations of the properties and the quality of the finished product. The private projects are located in very central streets and are finished to a high standard including commercial units, whereas the core-houses built by cooperatives are on secondary streets and small passages in interior of blocks, with very low quality finish. In all cases the housing density is high, about 300 units per ha. (That is to say, 1,500 inhab/ha netto and 750 inh/ha
brutto). Under these conditions, architectural solutions call for attached units, the construction of a family space, private kitchens and toilets and maintenance of the main characteristics of the "vecindades" with typical common patios. Core houses are built on the first floor for expansion to the second, whereas finished housing is up to three floors. Where there are more than three floors, the social integration and communication is lost, and extra costs arise related to ground resistance due to the seismic requirements and type of ground.

The density requirements and historical values make many building materials unsuitable, while, on the other hand, demolition materials are plentiful for recycling.

Colombia 1985

In Colombia the catastrophe of November 1985 injured directly or indirectly a population of 200,000 persons in 10 municipalities of Tolima and 2 of Caldas (5). There were an estimated 28,400 survivors at Armero and Chinchiná.

The disaster, like those mentioned above, caused not only injuries to human life but also the loss of the economic and social nucleus. The survivors, who completely lost their habitat, were dispersed amongst a dozen villages and cities: 87.3% were received by relatives or friends or went to rented houses; the other 12.7% were sheltered in refugee units in Caldas, Tolima and Cundinamarca. The institution responsible for the rehabilitation of the new environment is RESURGIR, and their programme was to built 5,000 units. In the first year 2,766 new housing units and programmes of loans and technical assistance were provided. Modalities concerning micro-enterprises were conceived for the income generation programmes.

RESURGIR was able to organize construction works and there were also 14 "promotoras", amongst others Minuto de Dios, United Nations programmes in joint venture with the Instituto de Credito Territorial (ICT) and Resurgir, Odra-Ofasa, Supervivienda, Pastoral Social, etc. Modalities for the reconstruction have been various, especially with respect to the type of technology and the linkage of the target population to the construction process. Some projects include local suppliers of building materials and involvement of the target population, which results in benefits to the injured population and the economic resources of the zone. In other cases foreign building materials and building components have been used, mainly from Bogota, as well as foreign labour. Community participation, traditional needs and cultural aspects have been considered in some projects as well. Programmes have taken into account a progressive reconstruction of the habitat linking community labour to the process, providing in this way major popular commitment to the future work and optimal contact amongst future neighbours.

Other programmes have been limited to providing a roof or a finished housing unit as quickly as possible, using local materials or foreign technologies, without involving the future user in the process.
Judging from the projects that have been built, the ones that have proved to be the most acceptable to the population have been those that have implemented a broader and integral philosophy. This means a philosophy that has conceived of habitat as being linked to a programme of employment and income generation, education and health and has generated organizational programmes that succeed in supporting the individual, the family and the social group (6).

The main problems in the different zones are the lack of coordination in the building programmes and the difficulties concerning the micro-enterprises (CORFAS programmes) in effectively meeting demands due to the low rotation of capital and in some cases inadequate location. The lack of interaction between the construction of the housing unit and the delivery of the infrastructure is a real bottleneck.

The CEHAP (7) proposal presented to the Dutch Government one year after the disaster took into consideration the former experience, particularly all the elements that correspond to the physical and socio-economic rehabilitation of the individual in society. The proposal attempts to implement a project of Habitat Development able to stimulate an upgrading process based on the goals and possibilities of the target population.

The plan of the CEHAP Project Proposal comprises programmes for: a) community organization, b) housing, c) economic development and employment generation d) socio-cultural development. The programme of housing reconstruction takes into consideration the need to use cultural elements of the zone, such as arcades, zocalos, colours and textures; attached construction of one and two floors; the identification of geographical and climatic characteristics; the provision of space for housing and working needs; the use of materials and building elements from the zone; and the use of local human resources for the construction process. It is necessary to rationalize the design according to the available building materials and proposed technology and to use earthquake zone building standards. The solutions varies between patio dwelling, dwelling in "L", dwelling plus commercial unit, commercial unit only, and minimum dwelling plus commercial unit. Construction is according to Colombian building norms for seismic resistance; that is, in cement block masonry with roof plates of asbestos cement. Cement floors and color in the facades are used. Walls of prefabricated panels made in situ are also used.

Participants in the construction work are: a) existing cooperatives, b) local building contractors, c) the users-group with a limited supply (maximum 500 hours) of self-help labour.

Nicaragua 1972

A brief analysis of the pattern of buildings in the Managua area before the 1972 earthquake (8) reveals a strong contrast between the old central area and the newer residential areas within a radius of 8 to 10 km. The old central part was predominantly built with continuous "taquesal" wall construction, roofed with timber frames covered by heavy Spanish colonial tiles. Taquesal construction is similar to those systems which combine wood and
inorganic materials in a more-or-less primitive fashion existing in most underdeveloped areas of the world. It is made of vertical timber frames resting on cut stone bases, with wood columns 8" to 12" square and completely covered by horizontal slats of wood filled with a core of stones, clay bricks, or whatever hard material is available. The entire surface is plastered with a mortar made of mud with some lime, then finely stuccoed and painted.

In Nicaragua, modern building technology was introduced very late in relation to other Latin American countries (late 1940s). Initially a "taquesal" building would have the mud and lime plaster completely peeled off. It would then be covered with newly introduced metal lath and replastered with cement mortar. Occasionally a rotten timber column would be replaced with rudimentary concrete using volcanic cinders as aggregate and reinforced with twisted or straight steel bars. Slowly, concrete in all forms (solid concrete, concrete blocks, etc) became the most important structural material. In Nicaragua, as in all Latin American countries, the substitution of traditional materials for industrialized materials occurred in an indiscriminate way; for example, cement blocks were used instead of bricks for walls and floors, and asbestos cement instead of clay tiles for the roofs. This process occurred as a result of market forces in combination with the interlocking interests of public administration, the private sector and the cultural penetration of foreign consumption patterns encouraged by mass advertising.

The collapse of taquesal buildings was responsible for almost all the victims of the December earthquake. However, many modern structures also collapsed for several reasons, including the nature of the seismic movements, bad structural calculations and in many cases a sub-standard building performance.

The most outstanding post-disaster programmes for the injured population are those financed by foreign donors and loans. These are conceived as very simple, continuous, symmetrical, straightforward and repetitive building solutions, which are thought to have a greater degree of reliability when subjected to seismic motions. Most of the programmes (65% of the loans) were directed to middle income strata of the population. The post-disaster housing programme was as follows: 17,638 new houses, 11,133 provisional roofs and 13,806 rehabilitations. This total programme represented a cost of 98 million dollars.

The best known BAVINIC (Banco de la Vivienda Nicaragüense) Programme for low-income sectors is the one called Las Americas, financed by US Government and built by the private sector. The programme has three types of inputs: a) site and services (empty lot plus individual house water, sewerage and electricity connection); b) the same plus a sanitary bloc of 4.92 m2; and c) the same plus a core-house (roof) plus a loan for building materials, for self-help building. The lots vary between 100 and 125 m2 and have densities between 300 and 380 inhab/ha.
Afghanistan 1976 (Figure 2)

The scale of the Saighanghi project (Afghanistan) (10) cannot be compared with the disasters already mentioned; nevertheless, its achievements in the field of research and implementation in creating reliable post-disaster environments make it necessary to examine this experience as fundamental to the search for further solutions. In March 1976 an earthquake measuring 6.8 on the Richter scale struck the Khulm region of northern Afghanistan. Some 50 people died, many thousands were injured, and thousands of homes were destroyed.

The Australian architect Syed N. Sibtain, realising the need to provide appropriate seismic-resistant housing for the rural poor in the region, carried out exhaustive research into the traditional craft and skills of the area, with the object of devising a building system which would be within the economic reach of the population. The aim was to produce a system which would combine modern technology with traditional crafts and skills, using locally and/or readily available materials. Apart from being safe, the building system would fulfill the population's need for housing adapted to the environment and to the social and cultural requirements of the people. Closely connected with the principles of the design was the idea of achieving self-reliance in housing for the rural population by introducing the building system through a self-help scheme. In this way, earthquake-resistant housing would come within the reach of the rural population, who would not need to be dependent on imported materials and technology. The idea was to motivate and train people locally to use the new and safe building system, rather than to introduce it "from the top". It was hoped that the system would be spread in the earthquake-prone area through local peasants and craftsmen.

The building system is quite simple. The walls can be of kiln-burnt bricks, sun-baked bricks or concrete blocks. The roof is made in various ways using reeds found along river banks, straw mats, mats made from any durable material, willow-tree branches or fibre, particle boards, asbestos cement sheets or wood planks. The structural members for the roof are made up using structural timber, mild-steel angles or T-sections, or pre-cast reinforced concrete.

The intention was that, on the self-help principle, people without building skills would construct their own houses; and if those houses were destroyed by an earthquake, build them again, reusing the same materials. In this way the population could become self-reliant in housing, instead of waiting to be rescued and helped by government or international aid agencies.

Architect Syed Sibtain makes a point of stressing that he is not aiming at 'intermediate' solutions. His aim is, rather, to bring the rural population of the developing countries into line with modern times and technologies, while developing local skills and resources in order to decrease dependency upon the industrialised countries. If socially and economically feasible, this might include complex as well as capital-intensive technologies.
The plans became a reality. The success of the plan to build, not just a village but a community, depended on the desire and ability of the villagers to work together. People who worked on the project were not paid, but they and their families received communal cooking and eating services. This helped to build a sense of community, but it would have been essential anyway to provide some material support for the people while they worked on the project because they would not have had the resources to feed themselves and work without payment. This reconstruction was an integral process combining community feeding and rural development with the self-help housing reconstruction. This permitted the peasant to be dedicated full-time to the reconstruction work. The achievement is complete in terms of future self-reliance. It is not the building of a village but the creation of a community. The people basically remain farmers yet they feel at home with technology. Their basic needs are being fulfilled, and their children's health and education are assured.

SETTING DESIGN GUIDELINES FOR HOUSING UNITS

These examples demonstrate that the design of the future environment and housing units in post-disaster circumstances is determined by the interrelationship of the social structure and the built environment in the given situation.

In general, the formulation of dwelling guidelines or typologies can be understood as a method of creating prototypes for households and for the environment which incorporate spatial norms and modes of transformation related to given housing conditions and social structure. The scope of dwelling typologies is particularly broad if we consider that it embraces:

1) An urban typology concerned with the formulation of prototypes for urban development and urban reconstruction.
2) A social typology concerned with the organization of the family and community;
3) A typology of dwelling production concerned with the formulation of building prototypes.

In this analysis we shall attempt to give some guidelines for design considering these three dimensions.

The Dwelling as a Focus of Research Interest

It is difficult and inappropriate to set housing guidelines appropriate for other countries. Compare, for example, the designs for Chile (Figure 1) and Afghanistan (Figure 2). Reliable studies of the built environment must be based on a complex progress of scientific analysis, verifiable in practice through experience gained in the planning and building process, as well as in the use and transformation of the dwelling and its habitat. However three basic sets of variables must be considered: the human group to be housed; the regional characteristics; and the economic and technical realities of the situation.

The Human Group. Demographic, socio-economic, employment and housing-culture of the human group must be considered. These also
include the subcultural forms that preceded the existing reality; tendencies to change, pathologies, types of communal and social organizations, social struggles, etc.

From this three main standpoints can be deduced:

- The relations between human beings and space, family and dwelling community and neighborhood, cannot be understood in terms of a mechanistic subordination to functions, but rather in terms of their dialectical interaction and reciprocity.
- Consequently the built environment can become either a powerful instrument to accelerate and facilitate the development of human and communal values, or it can become a source of social pathology that obstructs all possibilities of further development.
- There cannot be socially-adapted typologies without user participation. Ultimately, user participation constitutes the only acceptable procedure that validates the work of the specialist.

Regional Characteristics. The principal variables involved here are climate, microclimate, land, regional and local subcultures, and cultural interactions. The question that can be posed is: in which way can we define housing forms that respond to ecological imperatives? Most countries have profound variations in the regional characteristics, population, climate, resources and general potentialities. This results in significant differences in relation to spatial forms, use of space, ventilation, use of certain materials, building systems, local traditional techniques, culturally authentic forms, etc. The possibility of setting housing guidelines based on historical and ecological imperatives is only possible in so far as political and administrative decentralization exists that permits the participation of the target population in decision-making concerning the typologies that affect them. This does not invalidate the need for regional planning of resources in relation to materials, energy components, and production processes defined through National Plans.

Economic and Technical Reality. Design of housing units must take into account:

- The type and quantity of financial, technical and human resources that can be allocated to the building of the new environment and to production, housing and social infrastructure.
- The extent to which it is possible to quantify and qualify the damages, shortages and future housing needs.
- The time span and the priorities.

General Target Areas

In general we can assume that a post-disaster plan can identify possible target groups living in three target areas: marginal and semi-marginal areas; rehabilitation and renewal areas; and development areas.

Marginal and Semi-marginal Areas. These include areas of illegal and unauthorized subdivisions and those sites and service areas that contain precarious living conditions (shacks without minimum infrastructure).
Rehabilitation and Renewal Areas. Older neighborhoods requiring legalization, repairs, maintenance, reduction in densities. Villages and secondary cities can be included in this category.

Development Areas. These include new development areas, large unconsolidated or under-consolidated areas in both big and small cities and in rural districts.

Tentative Approach for Designing Popular Housing Units

Flexible and general guidelines can be established which embrace all types of popular residential needs of a given society. However there are particular forms of spatial solution and aggregations of dwellings more suitable to each form; insofar as spatial forms and modes of transformations are dependent on the accessibility of the different groups to the markets of employment, goods and services in a given society.

Versatility criteria in the design of popular housing units can help to embrace a large number of conditions. Versatility can be guaranteed through some modalities:

- Convertibility: the same unit allows variations in the internal division of space. This relates to structural and detachable building elements.
- Adaptable: habitable space should allow for multiple uses of space (e.g. daytime and nighttime use), and/or different levels of privacy.
- Expansive: an initial nucleus which could be transformed or expanded according to the requirements of the occupants.

Tentative Approach to the Aggregation of Dwellings

The considerations outlined apply not only to housing unit, but also to the neighbourhood and community space and services. This departs from the traditional practice of human settlement development which surrounds housing lots with free space for community services to be developed at a future date, together with the infrastructure networks.

The aggregation of dwellings must be an integrated whole, bringing together individual private needs with communal needs. In the same way that a dwelling is considered to be inseparable from the non-detachable equipment within its physical limits, so too it is impossible to consider the settlement without its neighbourhood and communal equipment. Their development must therefore be simultaneous.

Different forms of aggregation can be recognized according to their density:

- Low density: up to 50 dwellings per hectare.
- Medium density: 50 to 90 dwellings per hectare.
- High density: more than 90 dwellings per hectare.

In the three cases versatility can be achieved; extensions can be developed in the high density types too. In the three density cases buildings can be constructed by a variety of groups: small
building cooperatives, private building entrepreneurs, self-help teams, individual self-help, state building enterprises, large private entrepreneurs, etc. Each can build with conventional techniques, pre-fab systems or traditional forms. Nevertheless in low density development, because of the size of the lots, greater individual control can be achieved at the unit level, allowing individual preference, the use of a greater variety of building materials, the better use of low-energy materials (including recycled and throw-away materials) as well as the rationalization of local technology. If the building work is rationally organized there can be a reduction in unit costs.

The advantages of low density developments are virtually annulled when we examine low density extension from the standpoint of community development. Very low density can result in huge infrastructure costs (linear meters per dwelling unit), and bad communication systems. Furthermore, urban development also involves the use of agricultural land, the under-utilization of transport facilities and never-ending social problems resulting from the segregation of low-income neighbourhoods from the city center, from social, cultural and administrative facilities and from centers of employment.

On the other hand, the middle/high density dwelling prototypes (above 50 dwellings per hectare) enjoy more even growth, better use of the urban land and basic infrastructure, and a more harmonious development in relation to surrounding agricultural land.

In comparison to traditional low density environment patterns, growth in middle and high density must be provided for in the design pattern, usually by extension to second floors. Infrastructure costs must be considered when deciding on the sort of aggregations of lower cost housing units. The costs of the infrastructure can easily represent 60% of the total costs when considering core-units of between 30 and 40 m².

There are two main variables which are determinants of infrastructure network costs (11):

- The type of existing or adopted road network.
- The housing density.

The cost of infrastructure networks per hectare varies relatively little with the population density. The costs of the great majority of networks are more related to their extension (number of meters per hectare, for example) than to their capacity (number of liters or cubic meters per hectare). In this case, infrastructure for one hectare for 500 inhabitants will cost little more than the infrastructure for the same area for only 50 inhabitants. Most of the pipelines have, for technical reasons, standard minimum diameters, thereby having sufficient capacity for high average densities. For this reason reducing densities does not result in any decrease in the costs per hectare.

These general criteria for the design of low income housing units are only effective when combined with an integrated analysis of the low income typology of the given place. This analysis must be based on recognizing those positive qualities of the different
types of low-income areas: "cites", "cuarterias", "conventillos", spontaneous illegal settlements, low-cost development areas, sites and services areas, etc. The analysis must be integrated, and the possibilities of expressing the people's demands, the organization of urban services (e.g., transport) and infrastructure, must be analyzed together with individual space of the family unit.

Tentative Levels of Consolidation

According to the former criteria we can roughly define three levels in the process of building an environment.

- The Urgency Level. The provision of the minimum of habitability for a complete family where incomes are below the poverty line defined according the criteria of each country.
- The Level of Basic Unit (Core-Unit). This refers to population strata that are not able to purchase a complete housing unit. Dimensions of the units correspond to studies on the critical limits of habitability expressed for each country.
- Level of Definitive Housing. This level is oriented to those social groups who are able to purchase a finished (social) unit.

The Urgency Level. For the Urgency Level it is evident that given the characteristics of the social groups aggregation of units of the low density type can be considered, because of the severe conditions which exist there (low cost materials, fire prevention, lack of sewerage facilities etc.). Within the typology an initial differentiation can be made between transitory and definitive solutions.

Transitory solutions. The principal characteristic of these is that they are a step towards a future permanent solution. It is necessary to differentiate the sanitary aspects from the living unit. No recommendation can be made about the aggregation of sanitary units. Hygiene is a private issue and therefore the aggregation of sanitary activities (wc, showers, etc.) for social groups living in urgency situations must be in accordance with their own decisions concerning the possibilities of community life. Technical recommendations are dependent upon external factors (i.e. the quality of the land) and this must be clearly communicated to the different target groups to allow them to make the selection. There must also be a clear definition concerning the type of transitory unit, the materials and components used, their ownership and the design of possible variations and transformations of it. If the urgency unit is considered to be a step towards a definitive solution in the same location, it will be necessary to present a design that accommodates the future use of the transitory unit and the modalities of transformation in a new environment.

Permanent units. These are considered to be a step towards a permanent dwelling in an urgency situation. This modality can be regarded as a minimum habitable space. Production of these units must respond to the condition of urgency which involves low building costs and a rapid construction. In particular this would seem to imply a high level of building productivity, which requires a different technology to that used in self-help construc-
tion and in individual extension. A sanitary unit plus a roofed area can be one of the solutions that could permit a step towards the consolidation of the future environment also permitting the use of old building materials and adaption to different conditions.

Level of Basic Unit. This can be differentiated into Low Density, Middle Density and High Density. Solutions can be a one floor house as well as two and three levels. Multifunctional use of the dwelling (small commerce, workshop, etc.) can also be considered. A varied combination of building modalities can be planned according to the conditions.

Definitive Housing Unit. This also includes Low, Middle and High Density and a great variety of building modalities can be planned according to the circumstances. In addition to the organized building sector, forms of mutual help can be considered, if rationalization of design and construction are clearly stated and accepted. In some Latin American countries high densities are achieved in the construction of social housing. Nevertheless the decision of which building modality to use in developing countries implies a set of variables which are made very evident after a disaster occurs. The need for sustained economic growth, widening employment opportunities, the overwhelming impact of the building sector in the formation of internal product, etc., necessitates the combining of all forms of building production. There is sometimes a misconception in respect to the role of the organized sector in the building of housing in developing countries, mostly due to the high benefits that this sector derives from raising building costs and limiting dwellings to medium and higher income groups of the society. It is obvious that in reconstruction of a country all forces must participate; the organized population and the organized building sector are crucial.

The question is to what degree democratic participation can influence public control in the appropriation of benefits, resulting in more egalitarian built environment. This question should be crucial for the implementation of the plans resulting from this analysis.

NOTES


2. INACAP. Instituto Nacional de Capacitacion. A public organization dealing with workers training. Also non-skilled labour for self-help housing programmes was trained.


4. FONAHPQ, a public organization, can finance urbanization, construction, or housing renewal for the low income sector defined as families receiving a family income of not less than
2.5 times the minimum income. The credits are for 20 years, with
rents between the 9 and 23% nominal, i.e. the payment of only 50% of
the capital invested. FONAHOPO has a limited programme, the
same as FOVI, FIVIDESU, INFONAVIT, FOVISSTE. They did not
participate strongly in the reconstruction plans.

5. CEHAP. Centro de Estudios del Habitat Popular, Universidad
de Medellín. Propuesta para la Reconstrucción de Lerida y Tolima
presentada a la Embajada de Los Países Bajos, Colombia 1986.

7. CEHAP. op. cit.

8. See, Aspectos para la Caracterización de la Realidad Urbana
de Managua, Inventarización de las Políticas de Mejoramiento
Urbano dirigidas a los sectores de Bajos Recursos en Managua.
Marisa Carmona, PSIB, 1985. Also, Situación Habitacional, 1972;
INCAE- AID, 1974. Also was revised Alternativas para la Expansion
de la Industria de la Construcción FINAPRI 1984, and the Techni-
cal Reports of Managua earthquake. University of California,
1972, Volumes I and II.

9. Alternativas para la Expansion de la Industria de la Con-

10. Reconstruction of Saighanchi. All Progress Reports of the
Australian Mission to Afghanistan during March and September

11. Cost of Urban Infrastructure Networks, A starting point for
THE THREE LEVELS OF INITIAL SUPPORT in low rise single storey dwellings

minimum support

intermediate support

basic support

THE THREE LEVELS OF INITIAL SUPPORT in low rise two storey dwellings

minimum support

intermediate support

basic support

POSSIBLE COMBINATION OF INITIAL SUPPORTS IN MEDIUM RISE STRUCTURES

basic
intermediate
minimum

minimum
intermediate
basic
intermediate
minimum

Figure 1.

EXAMPLES OF CORE-HOUSING ALTERNATIVES, CHILE
SAIGHANCHI HOUSING PLAN

Figure 2.

AFGHANISTAN
HAZARD PROTECTION OF LOW-INCOME HOUSING

Th. Schilderman

1. INTRODUCTION

Disasters cause terrible suffering, casualties, and damage, both material and personal. In the 20th century alone, earthquakes caused around 1.5 million casualties; 90% of these occurred in low-income housing (1). Economic losses were enormous as well: they may have exceeded a trillion US dollars (2).

Any effort that helps to reduce such staggering losses in the future is worthwhile. As in medicine, money spent on the prevention of a disease, reduces the amount required for its cure (3). Therefore, local governments as well as aid agencies should pay more attention to hazard protection, and reserve part of their disaster budgets to it. This does not necessarily require enormous sums. Often, the message to be transferred is rather simple, can be developed with a moderate effort, and transmitted to potential users by already existing channels of communication. The improvements suggested should not require large investments by the dwellers or a supporting agency.

2. THE APPROACH

The development and implementation of hazard-protective measures pass through a number of well-determined steps, that apply equally to all types of natural disasters, such as earthquakes, hurricanes or floods. These are:

To learn from past disasters

The disaster behavior of different types of structures points out their strength and weaknesses. Disasters are often well-documented; these publications provide essential reading (4).

To analyze local low-income housing

Low-income housing is extremely vulnerable to disasters. This vulnerability is influenced by local factors, such as: site quality, material quality, workmanship, climate.

To set priorities for improvement

Affordability, to the dwellers as well as supporting agencies, always is a major constraint that calls for a strict selection of elements to be tackled (5).

To develop general guidelines

Besides paying attention to specific structural weaknesses, a lot can be gained already by stimulating some general rules with respect to design, site selection, construction and maintenance.
To develop specific structural improvements

These should help to overcome the most important weaknesses by simple and inexpensive measures.

To disseminate these guidelines and improvements

Rather than to enforce them, people could be stimulated to apply guidelines voluntarily via appropriate communication methods and the right type of support.

3. A RESTRICTION

Within the context of this paper, it is impossible to apply the above approach to various types of disasters: one would either be too brief, or end up writing a book. Therefore, this approach is explained by providing a detailed example of a certain type of disaster. The discussion will be limited to earthquake protection of low-income housing, and within that narrowed down to the protection of heavy weight structures, which are by far the most vulnerable (6).

4. THE EARTHQUAKE BEHAVIOR OF HEAVYWEIGHT STRUCTURES

A Definition

Earthquakes make buildings shake; the resulting lateral forces are determined by the mass of the building. Thus, heavyweight structures run the greatest risks (7). Those structures have walls of thick masonry (stone, adobe, brick) or of rammed earth, and roofs of a thick package of soil or a heavy vault or dome (out of brick, adobe or stone). Some of the traditional tile and thatch roofs are quite heavy as well.

The performance of various types of heavy walls

Heavy walls may be damaged due to:
  a) shear, caused by forces parallel to the plane of the wall, and resulting in diagonal cracks starting in high stress areas, such as corners, intersections or openings;
  b) bending out of plane, by forces perpendicular to the wall;
  c) a combination of these two.

A very dangerous type of wall is that of random stone masonry, which occurs very much in the Near East. These walls have very little internal cohesion and disintegrate during even moderate earthquakes. Their poor performance could be noticed for example in Lice, Turkey (1975), where 60% of stone masonry dwellings collapsed (versus 48% of the adobe types). Wooden tie-beams or the use of a better (lime) mortar helped to restrict the damage. Other earthquakes in the same region (Gisk, Ghir, Tabas-e-Golshan in Iran, Zanghezour in Russia) confirm the poor behavior of random rubble masonry compared to other types of structures. In Kinnaur, Pakistan, it was remarked that a masonry out of dressed stone is more earthquake-resistant; the same applies to flat slates, according to an experience from Iraq.
Adobe masonry is even more common in low-income housing. Adobes are soil blocks, of sizes that vary according to location; the same soil is used for their masonry. The cohesion and the tensile strength of an adobe wall are often insufficient to resist even a moderate earthquake: walls shear apart in high stress areas, incline, and are pushed outward by the roof. The performance record of adobe structures is rather poor, and they have contributed most to the casualty list, particularly during earthquakes in Latin America, the Near East and China. Factors that affect the performance of such walls quite commonly are: lack of quality of the adobe, lack of bond, and poor workmanship; they appear in most of the Iran earthquakes, in the Guatemala quake (1976), and in the one that hit Lima, Peru in 1974. The Guatemala earthquake struck during the rainy season, and adobe walls insufficiently protected from rain proved to be weaker. Also, the older dwellings performed less well than the newer ones, because they had developed cracks over time, and were not well maintained. This was confirmed again in Buyin, Iran (1974) and in Lima (1974). In the latter case, adobes containing straw proved to be more resistant. Other noticeable improvements are the use of wooden bracing (Chile, 1971 and Guatemala, 1976) or of tie-beams (Dash-e-Bayaz, Iran, 1968 and Gisk, Iran, 1977).

Rammed earth walls, if properly built, are more resistant to earthquakes than stone or adobe masonry (Pariahuanca, Peru, 1969 and Buyin, Iran, 1962).

Masonry out of full fired-clay bricks performs better than adobe masonry, due to the higher quality of materials. But it remains vulnerable to strong earthquakes, particularly if the masonry is not reinforced. Such was the case with the most devastating earthquake of the century, that struck Tangshan, China in 1976, causing a quarter of a million casualties. In lesser quakes, workmanship often becomes a determining factor in the degree of damage.

The performance of various types of heavy roofs

Heavy roofs (and also floors) often collapse due to:
  a) insufficient strength of the roof;
  b) failure of roof-to-wall connections;
  c) rupture of the supporting structure.

Heavy roofs cause big lateral forces to the walls, that were often not designed to resist those, as is the case with most of the heavy walls discussed above.

Flat earth roofs are already heavy when built, but during repairs more soil is added, and they may get as thick as 40-50 cm. Their supporting beams are often insufficiently connected to the walls: they are not embedded properly or not anchored. This type of roof is very common in the Near East, where it becomes a death trap during earthquakes.

Vaults may behave better, especially when they can be made lighter (Ghir, Iran, 1972 and Tabas-e-Golshan, Iran, 1976). But vaults do cause a lateral thrust of their own, and need trans-
verse walls or ties to resist that. These may loosen or move during earthquakes, thus causing the vault to collapse.

Domes perform even better (Dash-e-Bayaz, Iran, 1968, Ghir, 1972 and Tabas-e Golshan, 1976). But domes are also known to collapse occasionally, mainly due to the absence of tie-beams or their heavy weight (Buyin, 1962).

Heavy tile or thatch roofs show problems similar to the vaults: they thrust the walls outside by themselves, and this action is increased during earthquakes. It is often insufficiently resisted due to poor connections of the roof to the wall. Also, the timber connections in the roof may be weak spots during earthquakes (Guatemala, 1976)

5. REASONS FOR THE VULNERABILITY OF LOW-INCOME HOUSING

"Some 1,200 people died and 90,000 were made homeless in Guatemala City, almost exclusively in the slum areas of the city. In this well-known fault zone the houses of the rich have been built to costly anti-earthquake specifications. Most of the poorest housing, on the other hand, is in the ravines or gorges which are highly susceptible to landslides whenever earth movements occur".

This fragment from the journal Latin America of 9 April 1976 (8) is typical: it is always low-income housing that is most affected during disasters such as earthquakes. Its performance is severely hampered by a number of factors, some of which apply almost generally to all low-income housing, whereas others are more specifically linked to certain locations. Some important factors are, for instance:

Lack of funds

Low-income housing throughout the world is characterized by its low capital-intensity. It is logical, therefore, for its builders to select cheap, mostly local materials, and work with their own or cheap labour.

Evolutionary development

The same financial constraints lead to a very gradual development of housing, whereby quality and size only increase over time. Unfortunately, it may sometimes be very hard to improve the earthquake resistance, once a building has a bad start. (9)

Availability and quality of sites

Low-income earners possess neither the funds nor the power to acquire satisfactory plots. Thus, we often find them on steep slopes, that may slide down, on landfills or alluvial soils that multiply the impact of earthquakes, on low lands that get flooded, and so on.
Availability and quality of materials

The range of local materials that are appropriate to low-income housing is sometimes very limited; furthermore, these materials are often improperly manufactured.

Lack of skills

People that build houses on their own have to rely on their own, usually very limited, skills. Even if paid craftsmen are used, errors may still occur. Some of the problems of workmanship, are traditional errors that have been passed from generation to generation. Such traditions may also limit the possibility to introduce innovative techniques.

Lack of disaster consciousness

Low-income families struggle daily for survival, and questions of nutrition, employment, and education are continuously on their minds. This reduces their consciousness of disasters, even more so if these do not occur very regularly, as is the case with earthquakes.

6. PRIORITIES IN EARTHQUAKE PROTECTION

Hazard reduction is very much conditioned by local factors. One should look in the first place at the resources that are available within local communities, given the circumstances outlined above. A second question is then what resources an agency might add to these. In most cases, affordability will be the major limiting factor, which calls for the establishment of rather strict priorities.

Because earthquakes are unpredictable, one should probably give priority to saving the lives of inhabitants rather than to saving investments, which might be expensive to achieve anyhow. Thus, it may become important to prevent roof-collapse, which in certain cases could be achieved by creating a separate roof-supporting structure. At the same time, one might accept walls or infills to fall down as long as they don't fall on people (10).

7. GENERAL GUIDELINES For EARTHQUAKE PROTECTION

When studying earthquake behavior, we notice in the first place the weaknesses of particular structures. When entering into details, however, we may remark variations: a similar type of structure may fall down in some cases, but resist in others. These variations are caused by secondary factors, such as design, quality of construction and maintenance. Improvements may sometimes be simple, not too costly, and easy to achieve. For instance: it does not cost anything to move the position of a window (in a design) from close to a corner or intersection to a more central section of the wall, yet it considerably improves the resistance of this wall as a whole. The following simple guidelines are deduced from the experiences of many earthquakes.
Pay attention to site and foundation

During the earthquakes, similar dwellings have been found to behave quite differently according to site and soil conditions. Loose or alluvial soils present a great danger of liquefaction and of multiplying the impact of earthquakes, whereas slopes may slide down. Therefore:

a) select a solid site that is as flat as possible;
b) check that soil conditions are similar under the whole structure;
c) avoid landfill;
d) give preference to uniform foundations, such as continuous strips arriving everywhere at the same depth, over piers or stepped foundations;
e) design foundations in such a way that neither termites nor humidity can easily rise in the structure.

Reduce the mass of buildings

It is evident from the foregoing explanations that it is very important to reduce lateral forces, and therefore mass, as much as possible. This applies particularly to roofs, since they may cause enormous thrust on walls, leading often to overall collapse.

Design a strong and regular building

The layout and design of a building influence its performance during earthquakes. Dangers are caused by irregular designs, large openings, wrongly placed openings, long unsupported walls, and so on. Therefore:

a) keep the shape of a structure as regular as possible: A round house performs better than a square one, and that again better than a rectangular one; avoid too elongated plans;
b) balance the mass of a structure, to obtain similar overall lateral forces as well as similar overall strength: If an irregular plan is required, it may be wise to divide it into structurally separate units (sufficiently far apart so as not to knock each other during earthquakes);
c) avoid long unsupported walls: They provoke high stresses at corners and intersections, which traditional structures cannot resist; crosswalls or buttresses should be designed at regular distances, not exceeding 3 to 4 m;
d) tie walls together at their top (and preferably as well above openings), to make a structure act as a unit;
e) keep walls height down and avoid heavy gables;
f) in order to reduce stresses, keep openings small, equally distributed and as centrally placed as possible; thus:
   - the width of an opening should not exceed one third of the width of the wall segment it is placed in,
   - distances from openings to corners or intersections should exceed 60 cm, or twice the wall thickness, whatever is more,
   - openings should be distributed equally around a structure, not to weaken some segments more than others,
   - the wall around openings should be reinforced if possible.
Make strong connections

Some elements of structure are strong enough by themselves, yet
the structure fails because they are improperly connected. Frames
may fail due to bad nailing or insufficient bracing of the vari-
ous elements. Masonry may fail due to bad bond and joints, par-
ticularly at corners and intersections. A roof may become detached
from a wall and the latter from a foundation, if they are
insufficiently connected.

a) Most dangerous are the laid-up (or gravity) connections, such
as roofbeams lying on top of walls. Due to lateral forces, the
laid-up element may slip, and this may provoke the collapse of
the whole structure.

b) Tied (or hinged) connections, such as occur in frames or when
beams are anchored to walls, are already much better, because
they keep these elements in place and prevent slip. They also
allow some elasticity in the joints, which helps to absorb
earthquake forces.

c) Of course rigid connections, such as occur in concrete frames
or may be achieved by a wood frame with sheeting, are moment-
resisting and therefore the best. They are also unaffordable in
most cases.

Select good materials

Badly produced or selected materials can lead to serious damage
during earthquakes. This relates to almost all materials, since
poor quality has reportedly influenced the behavior of:

a) mud and adobe (due to poor soil, improper mixing and curing);
b) stone (for example, too round shape);
c) bricks (not well fired, irregular shape, cracks);
d) timber (unseasoned, untreated, already infested, not
  straight);
e) concrete (bad or unwashed aggregates, poor reinforcements,
too little cement).

Besides, several materials deteriorate with age, particularly
adobe and timber. One should therefore pay a lot of attention to
the manufacture, selection, storage, use and maintenance of these
materials.

Improve workmanship

Many are the examples of poor workmanship and knowledge leading
to serious damage during earthquakes, for instance due to:

a) improper filling of masonry joints;
b) poor mortar or concrete production;
c) lack of curing or too much exposure to the sun;
d) use of too fresh adobes;
e) irregular or hasty construction;
f) improper connections or bond;
g) insufficient embedding of lintels and beams;
h) shallow or no foundations.

Selfbuilders and even quite a few craftsmen often lack the skills
required for hazard-proof construction. The above and other
errors may be diminished by simple guidelines, training, super-
vision and technical assistance.
Maintain a house well

Old and poorly maintained structures are weak during earthquakes. Inhabitants should be stimulated to maintain their houses in good shape, for instance by:
   a) regularly repairing cracks;
   b) regularly checking timber for insect and termite attack and rot;
   c) applying preservative or curative treatments to timber and other vegetable materials;
   d) keeping the close environment of a house free of dirt and plants, thus reducing humidity and termite attack.

8. SPECIFIC STRUCTURAL IMPROVEMENTS

Introduction: the need for more research

Unfortunately, only a minor part of all research done in the field of aseismic construction is spent on structures that regularly occur in low-income housing. That is partly due to the fact that such research can be quite expensive, and therefore most of it is done in advanced economies. These could, however, greatly assist poor economies by extending their research to low-cost structures that are predominant in the third world.

Even in the third world itself, a lot of research attention goes to the more modern types of materials, such as concrete, rather than to the traditional ones. But some work is done at least, particularly on adobe and masonry, out of which improvements are being suggested. Others may be deduced from the detailed analysis of earthquake behaviour of various structures. In this section, a number of improvements are suggested for heavy-weight structures. These have been implemented in various countries or have been proposed as a result of research.

The improvement of stone masonry

In various countries, reinforcement of this masonry has given good results. There are various examples of horizontal reinforce-
ment from Turkey:
   a) with timber tie-beams, at several heights of the structure, as is shown for the adobe walls in fig. 1;
   b) the same can be achieved in concrete;
   c) wood or steel dowels at intersections and corners, and even through the wall in several places;

In other countries, such as Iran, vertical reinforcement has been very successful as well. This could be in the form of:
   a) a timber frame (N.B.: if such a frame is used vertically and horizontally, it is worthwhile to include diagonal bracing);
   b) vertical steel bars incorporated in the masonry in high stress areas;
   c) concrete columns at corners or intersections.

As to material quality, one should try to avoid round stones and select the angular ones, preferably dressed, which much increase the internal bond in a wall; something similar may be achieved by
using flat slates. The improvement of mortar quality will also considerably increase the bond, which is very important for corners and intersections. Wherever available and affordable, the use of cement, limepozzolana, lime or gypsum mortar — in that order of preference — should be stimulated.

The achievement of a good bond is also important with respect to construction quality. The practice of building double-faced walls, with some rubble infill, should be strictly avoided. Stones should always be placed as flat as possible, and dressed whenever needed to fit certain gaps, rather than using large quantities of mortar and small stones to fill up voids. Masonry walls should occasionally have stones that reach through the whole thickness of a wall ("through-stones"), and help to make it an entity, as do the dowels. Walls should neither be too thin, which makes good masonry patterns very hard to realize, nor too thick, since that would unnecessarily increase mass. A reasonable wall thickness for irregularly shaped stone masonry is in the order of 40 to 50 cm.

The improvement of adobe masonry

In this case also, reinforcement of the masonry often is the biggest improvement. A continuous horizontal reinforcement is very desirable, particularly at roof level, in order to tie the tops of the walls together, and to create a fixed base for the roof. If openings are many, it would be useful to repeat this continuous reinforcement at lintel level. But with only horizontal reinforcement, walls, unable to resist much lateral force themselves, may still move sideways during earthquakes, unless vertical reinforcement is added to provide a connection with the foundation and to increase bending resistance. Vertical reinforcement is particularly useful in high stress areas: at corners or intersections, and along openings. A picture of the ideal combination of reinforcement is shown in fig. 1.

Reinforcement may take many shapes:

a) concrete columns and beams, the most expensive solution;

b) timber beams, on top of and in the walls. The Turkish code suggests the use of horizontal timber bondbeams at 4 levels: at the basement, under and above windows, and at the roof level. These bondbeams can be double, with a 10 x 10 cm timber profile at each side of the wall, connected by 5 x 10 cm ties at 50 cm intervals. They can also be single, but should then be braced in corners;

c) timber frames were also suggested after the 1976 earthquake in Guatemala, but there the adobe wall becomes more of an infill, and is much thinner. The frame consists of horizontal beams at roof and basement levels, with vertical posts at corners and intersections, and braces to make the frame more rigid. Such wooden frames require good connections with the masonry, through anchor bolts, nails or wire mesh;

d) in Mexico, it has been suggested to use U-shaped or hollow adobes, in order to incorporate timber or concrete reinforcement;

e) steel bars can be used, horizontally and/or vertically, in joints or hollow masonry, to tie walls together and fix them to the foundation;
f) for those who cannot afford those bars, it has been suggested in Ecuador and Honduras to use barbed wire (or other steel wire), in combination with a wooden frame (fig. 2);
g) in the southwest of the USA, it is quite common to use layers of welded mesh in the joints of adobe masonry;
h) wire mesh could also be used to reinforce a plaster in high stress areas, which thus become a kind of ferrocement;
i) a similar effect may be reached with some strong natural fibres, such as sisal. These may be laid in the horizontal joints, with their ends hanging on both sides of the wall, being incorporated as reinforcement into the plaster. According to tests done in Kenya, this considerably increases the earthquake resistance of adobe walls (fig. 3). But the durability of sisal in such structures is yet unknown;
j) instead of timber, various vegetal materials may be used as reinforcement, particularly bamboo and reeds. The Turkish code allows to replace the wooden bondbeams by canes at 5 cm distances, tied every 50 cm. In Peru, tests are being done on both vertical and horizontal reinforcement with reeds and bamboo. One proposal there is to use bitumen-stabilized adobes, that have a single small hole in the vertical joint to allow for a halved bamboo, painted also with bitumen, to pass. Horizontal reinforcement then consists of quartered bamboo laths;
k) in India, a split bamboo mesh, dipped in bitumen, is used as a reinforcement of the plaster on adobe walls.

Apart from continuous reinforcement, which may be expensive and not necessary in all cases, one could place local reinforcements in high stress areas. These could take the form of wood or steel dowels, eventually braced, and of wire mesh, sisal or bamboo strips laid over some distance in horizontal joints.

A next point of importance is that of the material quality, both of the mortar and of the blocks. Since the mortar takes care of the bond, it should have at least the same, and preferably a better quality than the blocks. An enormous amount of literature is available about adobes, and the topic is further enlarged elsewhere in this book. We therefore only list some major points:
a) select the soil carefully; it should have enough clay particles to bind it but not too much, to avoid shrinkage, and enough sand to provide strength;
b) during manufacture, achieve a proper braking and mixing of soil, avoid too much water, and dry blocks gradually, under cover;
c) the inclusion of some grasses, straw or bagasse may help to prevent drying cracks and actually increase the strength of adobes;
d) a better compression also improves strength: hand moulding should then be replaced by a steel press, such as a Cinvaram or Terstaram;
e) stabilization may increase strength enormously, as well as resistance against humidity. Possible stabilizers are cement, lime, bitumen, and gypsum;
f) adobes should preferably be rather flat (less than 10 cm) and large, to achieve good bond in walls.
When paying attention to **construction quality**, one should always protect adobes from humidity, which greatly affects their resistance. It may help to plaster walls or to stabilize the adobes. A very crucial area is the basement of walls, which is usually less protected by a roof overhand, and is hit by rain and splashing water. It is always better to design a basement in a more water-resistant material, such as stone or brick masonry, and to provide a damp-proof course, such as asphalt-paper, between that and the adobe masonry on top. During construction, no fresh adobes should be used, because these would still shrink. Also, masonry should not go up too fast, certainly not more than 1 m per day, to give it time to settle and harden. It is crucial to achieve a good masonry pattern, with sufficient overlaps and no continuous vertical joints, especially at corners and intersections. Walls should have a sufficient thickness, at least 30 cm, and not be too high, certainly not more than 8 times this thickness. Loose gables in adobe should be avoided. The length between intersections or buttresses should be less than ten times the wall thickness. Lintels should have sufficient bearing length in the walls, at least 1.5 times the wall thickness. Finally, roof beams should preferably rest on a wall plate to disperse their weight; this wall plate needs good anchoring.

**The improvement of rammed earth walls**

These walls can also be reinforced between rammed layers, in much the same way as adobe masonry. A vertical reinforcement could come in handy as well during construction, to fix and guide the shuttering. A recent development is that of poured, and not rammed, earth; to gain sufficient strength, it is usually stabilized, for instance with bitumen. It has been used with a wire mesh cage as reinforcement, but tests are being done with bamboo as well. In the field of **material quality**, many of the rules for adobe apply to rammed earth as well. The same is true for **construction quality**, with the difference that wall thickness may have to be increased to 40 cm at least and that construction speed is to be limited to one layer per day.

**The improvement of brick masonry**

**Reinforcement**, both horizontal and vertical, provides a useful improvement. Since bricks bind well with mortar, the ideal reinforcement is in the form of concrete or mortar reinforced by mesh or steel rods. Timber makes a good alternative, as long as it is well anchored, with bolts, long nails, wires, steel strips or wire mesh, in the horizontal joints. The **material quality** of fired clay bricks may be improved by:

a) proper soil selection;
b) proper mixing, moulding, curing;
c) better kilns than the traditional clamps;
d) limiting size, to 30 cm at the very most;
e) adding studs, to make bricks interlock and thus create a better bond, while facilitating masonry simultaneously (fig. 4).

The mortar quality is even more important. If possible, mud mortars should be replaced by stronger ones, on the basis of cement, limepozzolana, lime or even gypsum, whereby priority should go to foundations and basements. If an overall use of
such a mortar is not feasible, joints should at least be pointed with it.

With respect to construction quality, one should not make walls too slender: loadbearing walls with a heavy roof should measure at least 30 cm; for lesser loads, 20 cm may be allowed. With a strong mortar, these thicknesses may be diminished. Wall construction should not go too fast, to allow for hardening. Also, it is wrong practice to build up corners first, and then follow with the middle sections. The masonry pattern should include sufficient overlaps and avoid continuous vertical joints. Care should be taken to fill the joints well with mortar. Bricks should be wetted before laying.

The improvement of heavy flat roofs

As we have noticed in many earthquakes, a heavy roof is a potential risk. If possible, it should therefore be avoided, but if that cannot be achieved, the following measures may help to improve its performance:
a) execute the roof as a strong and rigid unit, a kind of diaphragm that keeps the walls together. The various roof beams may thus be tied together in a vertical sense to their direction, by tie-beams or a wall plate. Their connections should be strong, preferably with metal connectors such as angle irons, steel rods, bolts or steel strips. Nails are less ideal, as they may be pulled out. The roof structure can be braced in the plane of the roof, to achieve rigidity;
b) distribute the weight of the roof equally over the walls, if not via a wall plate, then preferably using many small roof beams instead of few bigger ones that lead to heavy load concentrations. Avoid also placing such concentrations over openings;
c) increase timber durability by treatment against insects and rot;
d) don't add new layers of earth during maintenance. Instead, remove the old and cracked earth, and replace it with new;
e) eventually waterproof the roof by adding lime or another stabilizer to the earth or by coating, to avoid continuous maintenance.

The improvement of vaults and domes

The following suggestions may help:
a) make them as thin, and therefore as lightweight as possible;
b) improve material quality, by selecting good bricks or adobes, and by replacing mud mortar by better mortars on the basis of cement, limepozzolana, lime or gypsum, in that order of preference; the same mortar may be used to plaster the roof;
c) resist lateral thrust by neighbouring vaults or domes or by buttresses; if not, use tie-beams, anchored by bolts or wire mesh in the wall or plaster.

The improvement of framed sloping roofs

This refers to roofs covered with heavy tiles or thatch. Try to:
a) make the roof act as a unit, by properly connecting beams to each other and to the walls. The best connections of sawn timber are steel strips, angle irons or grip anchors. Strong connections
of round wood are more difficult to realize, since nails can easily be pulled out or tend to split the wood. It is preferable to use steep strips wound around the wood, and nailed by small nails; an alternative is to tie it together with steel wire, using a wire lacing tool (ll);

b) select rather flat, machine-moulded tiles, that are lighter than the traditional rounded ones;

c) do not thicken grass or thatch roofs too much during maintenance; rather, remove the old material and replace it.

The improvement of wall-to-roof connections

It has been pointed out already that the improvement of walls and roofs on their own does not help very much if these elements are not well tied together. Traditionally, these connections are of the laid-up type, and one of their most common faults is the insufficient bearing length of roof beams in or on the walls. Therefore:

a) roof beams should bear on the whole width of the wall, or even protrude through them;

b) preferably, a wall place in timber (or concrete) should be placed between wall and beams, to help spread the weight of the latter. Roof beams are best connected to wall plates by bolts, angle-irons or steel strips, and not by nails;

c) the wall plate should be well anchored to the wall, at least over several layers of masonry or one layer of rammed earth, by steel strips or anchor bolts, or by folding wire mesh over the wall plate and several layers of masonry, and nailing it to both.

Several engineers, including Razani, have suggested that it would be preferable to avoid altogether loading heavy roofs of the traditional heavy wall types, that can hardly be made strong enough to carry these during heavy earthquakes, and therefore to add a separate roof-bearing structure (fig. 5).

9. THE DISSEMINATION OF IMPROVEMENTS

Policy options

Authorities may choose between two basically different policies to pursue improvements, each with its own advantages and disadvantages:

a) to impose, via standards, codes or regulations, the building of secure structures. This approach intends to limit casualties and damage, and therefore the costs of repairs, but it requires a high initial investment. It also requires lots of industrial materials, that a country may be unable to manufacture, buy or transport, and a lot of capable manpower for implementation and control;

b) to stimulate affordable improvements of the seismic resistance of existing as well as newly built dwellings. This requires an information campaign and perhaps measures of support. It will only lead to gradual improvements, that may still be insufficient during the next heavy earthquake.

In other words, the options are: security or affordability.
Earthquake codes and standards

This option fits well into the housing policy that was common some years ago: to build or impose by codes the building of good quality dwellings. Authorities are now aware that this policy was expensive for them, and far beyond the spending capacity of low-income dwellers. Widespread spontaneous housing not in accordance with the codes was the result.

Unfortunately, earthquake codes and standards of most third world countries still follow this thinking, and are largely based on the codes of advanced economies. Countries like Ecuador or Tanzania, for instance, largely follow the Californian codes, whereas Indonesia follows the New Zealand example (12). But there are a few exceptions, countries that have tried to adapt such codes to local conditions. The most advanced in that direction are probably Turkey and Peru.

Building codes and standards can at the moment only be a limited instrument for the improvement of low-income housing, because of the affordability constraint. If used, they should take more the form of guidelines incorporating traditional construction, along the lines developed in Peru and Turkey.

Gradual improvement

Actually, many third world countries have changed or are adjusting their housing policy to include acceptance of spontaneous housing, and to support its upgrading. Within such a policy, a gradual improvement of the seismic resistance of dwellings also finds a proper place. One still may need guidelines, but these would no longer be high-quality oriented and imposed by regulations. Instead, they should be based on acceptable and affordable improvements of local structures, ideally even developed with the residents, though this is seldom achieved. In such a policy, communication becomes crucial for success. This requires both good communication methods and material and good agents to communicate with residents. Although authorities may provide important support to such programmes, there may be a big role for NGOs in working with the population.

Communication methods used in transferring protective measures

The selection of the right method depends, in a given situation, largely on the message to be transferred and on the users capacity to understand certain types of communication. Some examples follow below. They have mostly been developed after certain earthquakes struck and have thus been used in reconstruction. Some of these may be used as well in earthquake prevention programmes, but a lot still have to be developed in that field, particularly to fit the message into already existing systems of communication, such as training, radio, and extension.

a) Publications can be used for almost any message. Compared to other methods, they are usually easy and cheap to produce. But some publications do not go much beyond creating interest and awareness, and should be complemented with other methods. Posters have been produced, both in Guatemala and in Turkey, to
show the proper location of buildings and the proper construction of houses in adobe, with timber reinforcement. After the 1976 Guatemala earthquake, several NGOs also have produced manuals for better construction with adobe.

b) **Audiovisual methods** can highlight many elements of construction, with different degrees of success. Their development is more expensive than that of publications, and they are more sensitive to technical problems as well. Mass media within this category have the advantage of reaching very large groups. But their impact can often be only superficial, since the message is usually only given once and rather quickly; and the method may need another type of backup. The CAA and the CFTC in the UK have produced several series of slides and cassette tapes to show various elements of disaster prevention in housing. One of these is specifically on the improvement of the earthquake resistance of adobe houses in Guatemala.

c) **Demonstration methods** may range from real constructions to models on a reduced scale. The first are expensive methods, the latter less, but the difference in scale is hard to understand for many people. This also is a very labour-intensive method, hence not easily widely applied. On the other hand, demonstration may be very effective. Pilot houses have been built in a few countries, such as Guatemala after the 1976 earthquake, showing the improvement of adobe masonry by timber and barbed wire reinforcement. In Peru, projects have been constructed showing the use of stabilized adobe, reinforced with bamboo.

d) **Personal assistance** uses mainly oral communication, but the method may be combined with audiovisual or demonstration methods. The personal approach is always the most flexible and adjustable to local conditions, and comes closest to involving the target population in developing their own improvements. Especially where poor material quality and workmanship contribute much to earthquake damage, personal assistance or training seems the ideal method towards improvement. But its disadvantage is its labour-intensity, and therefore usual high cost. And its success always depends very much on the capacity and motivation of the staff involved. Many reconstruction programmes after earthquakes include a training element, for example Saighanchi (Afghanistan), Bandar Abbas and Tabas-e-Golshan (Iran) and Guatemala. In other cases, technical assistance is provided next to other communication methods.

**NOTES AND REFERENCES**

1. This paper is restricted to low-income housing, which is where disasters do most damage. Of course, most of the text applies equally to other types of low-cost structures that use a similar technology.


4. See for instance *Disasters: The International Journal of Disaster Studies and Practice*, issued by the Relief and Development Institute, London.

5. One may even have to choose between reducing loss of life and reducing economic losses. If priority is given to the first, a line of action may follow that differs between earthquake protection on the one hand, and wind and flood protection on the other. Since the last can be predicted and people warned, authorities might opt for the construction of some safe shelters and the installation of a warning system, instead of reinforcing a lot of dwellings. So far, earthquakes are the most unpredictable disasters, and in their case, measures should be stimulated that prevent inhabitants from dying in their dwellings, for example by roof collapse.


7. At this point, it is interesting to note the importance of mass as a physical factor. Generally, structures in hot arid climate zones have a heavy mass, those in hot humid zones a light mass, and those in temperate zones an intermediate mass. Thus, a classification according to mass (heavyweight, mediumweight, and lightweight), useful in the case of earthquakes, can be made to fit climate or geographical zones, hence the most prominent danger areas indicated.


9. This applies particularly to foundations, which may be irregular, not solid or deep enough, and to some extent to walls as well, for instance in the case of bad masonry.

10. This became a major staring point in rebuilding Saighanchi, Afghanistan, after it was destroyed by an earthquake. Prefabricated, separate steel frames were designed to carry a traditional roof, and slightly curved independent walls built in an "earthquake bond" meant to fall outside during a quake. Ref. Syed Sybtain, personal communications and *To build a village*, Australian Council of Churches, Sydney.

11. As proposed by CICAT, see P. Huybers, "Building methods components for self-help housing," in this book.

12. The Building Research Establishment's "Model Regulations for Small Buildings in Earthquake and Hurricane Areas", that serve as an example to many third world countries, forbid the use of unburnt earth, rammed earth, wattle and daub, unsquared (round) timber, arches, and several other items, therewith condemning over 90% of the dwellings in those countries.
BUILDING METHODS AND COMPONENTS FOR SELF-HELP HOUSING

P. Huybers

INTRODUCTION

It has been estimated that before the year 2000 an annual average of 35 million dwellings has to be built, which is about 4 times the present world production. More than 80 developing countries suffer from an acute housing shortage, principally because of the ever-increasing need for new housing created not only by expanding populations, but also by the periodic large-scale loss of housing from natural and man-made disasters (ref. 1).

A committee, founded at the occasion of the International Conference on Disaster Area Housing of September 1977 at Istanbul, formulated a number of recommendations and comments concerning the policy to be followed in emergency situations (ref. 2). Three equally important subsequent phases were discerned, implying the following activities for housing and shelter relief:

1. Long-term planning in disaster prone areas to secure preventative measures.
2. Immediate provisions during disasters.
3. The provision of temporary shelter in the post-disaster period.

They recommended that international working groups be formed under the auspices of UNDRO and of other organizations, particularly of UNIDO. They also pleaded that research in building institutes oriented towards disaster area housing should be promoted, that the transfer of appropriate technologies and the use of indigenous building materials be encouraged and appropriate structural and construction systems be developed. Industrialization of building component production should be considered. Structures using new technologies could be planned and built whenever necessary and appropriate.

The government of the Netherlands financed a study by UNDRO, which led in 1982 to the publication of the report Shelter after Disaster (ref. 4), comprising a great amount of data and valuable speculations.

The main conclusion arising from this report is that the emergency shelter problem in developing countries is fundamentally different from that in industrialized societies, as it cannot be dissociated from the existing housing problem as a whole. Therefore one of the following shelter strategies after disasters should be considered (ref. 3):

1. The so-called "Extended family system" which means that victims are absorbed in the households of unafflicted families or friends.
2. tents
3. re-use of debris
4. distribution of materials and tools
5. standard designs incorporating indigenous materials
6. prefabricated temporary housing
7. accelerated reconstruction of collapsed houses
8. planning of hazard resistant housing.

This paper intends to offer a contribution in this field by suggesting a few solutions and techniques in some of these categories.

A PANEL BUILDING SYSTEM

In 1979 a coherent modular system was proposed by the author, in which use is made of a number of load-bearing panels of few different kinds (ref. 5). The panels do not require an additional framing, if they are combined in the form of a self-contained system. This often leads to polyhedron-related overall shapes. Therefore triangular, trapezoidal and rhomboid panel shapes were envisaged, as well as common square and rectangular variants. All these facilitate a great variety of forms (fig. 1).

Design criteria

The starting point for its design was based on the following requirements, namely, that it should:
- be prefabricable
- be transportable by plane
- be of versatile character, so that the recipient has the greatest possible freedom in design
- be composed of parts suited to handling
- admit fast assembling and foundation techniques, not dependent on weather and quality of subsoil
- have a good thermal insulation
- be weather-resistant for a least 10 years (some authors suggest as long as 25–30 years)
- preferably be re-usable after the service period for alternative purposes
- be relatively inexpensive.

Panel construction

The panels are of sandwich construction, composed of outer faces of oil-treated hardboard and of a resin-impregnated paper honeycomb core. They are provided at their edges with glued-in timber lattices with a specific profile allowing a structurally sound interconnection with adjacent panels. For this purpose metal hinges were slotted in the timber edges, being adaptable to various dihedral angles. Accelerated weathering tests were done on the materials and the joints (photo 1B); loading tests and thermal insulation tests according to the so-called guarded hot-box method were done on the panels.

Transportation

The size of the basic panel (no. 10 in fig. 1.1) is 1.25 by 2.5 m, so that it is suitable for the composition of air cargo containers (fig. 1.2.K) according to the international standard of 2.5 x 2.5 x 6.25 m. It is very well thinkable that a number of
these panels may initially be used as an air cargo container - if necessary with some additional structural adaptations - and that they then be disassembled at the airport of destination.

The panels have a weight of approximately 14 kg/m², or 230 kg/m³, which is an acceptable gross weight for air transport.

Outdoor weathering tests

A prototype unit representing part of the house in fig. 1.3 and photo 3A was built on full scale. It was composed of 20 panels, two of which are provided with windows and one with a door opening (photo 1A). Most findings of the previous tests were used for its construction. It was erected on an outdoor site and disassembled again after 4.5 years of service life. After that period the edge details had been reshaped according to new ideas, and most of the original panels have been rebuilt again together with a few new panels, to form the test structure of photo 2A and fig. 2. The details are shown in fig. 3 and they are necessary for the construction of the house in fig. 4.1. This prototype is still existing at the time of this writing.

Foundation

The wall-elements are attached at bottom level to a timber ring-beam. A plywood flooring is carried by evenly spaced transverse beams. Pyramid-shaped footings were developed for the foundations, consisting of a square plywood base and inclined members of galvanized steel. In all cases the condition of rapid positioning and assembly was one of the main design criteria. In the later version short pieces of waste rail sleepers were used for this purpose (photo 2D).

Model materials

Much attention was paid to the preparation of instruction material in the form of models in scale 1 to 1 or 1 to 50. The full scale models, usually made of triple wall corrugated cardboard, must be seen as a cheap substitute, giving a true impression of the final proposal (photo 3). Plywood templates of the panels were used to mark the panels. The cutting was done with wood saws. Flanges of 10 cm width were formed along the edges. A specially designed machine, reminiscent of the principle of the well-known CINVA-RAM block pressing machine, was used to make sharp bending lines.

Thus a number of models were built on full scale. It is imaginable that a weather resistant cardboard type can be applied for this purpose so that a more permanent solution results. Cardboard can be provided with liners of plastic sheeting, eventually painted with a suitable coating.

A structure of that composition at Lelystad built by P.B. Hangelbroek of the Institute IMAG, spanning 13 m, withstood an outdoor exposure of several years. It was composed of 60 cm wide triangular boxbeams from triple-wall cardboard with a polyethylene exterior liner and an additional coating of oil modified acrylic
resin. The cardboard can also be coated with glass-fibre reinforced polyester resin. Critchlow did so with the Octagon House. The latter procedure requires favourable weather conditions during the complete erection phase and is therefore not applicable in all circumstances. It also is expensive and does not always provide satisfactory qualitative results.

FERRO CEMENT HOUSING

The building panels might also be used as a mould, either permanent or removable and hence re-usable, for ferrocement core housing. The materials used should in that case have a sufficient rigidity to bear the weight of the ferrocement mixture in the curing phase and be water resistant. Even triple-wall cardboard comes into consideration for that purpose. The designs do not differ substantially from the previous examples. Minke shows a few of these ideas (ref. 7). A suggestion for a building system using prefabricated ferrocement elements and based on a similar geometric arrangement as the panel system, mentioned before, is elucidated in fig. 4.2.

LIGHT-WEIGHT STRUCTURES

In most tropical countries light-weight structures are usually executed in timber or bamboo as the main structural material with grass, leaves, tiles and flat or corrugated sheets for the roof covering. The inherent problems of natural materials for main structures are:
- their vulnerability for fungus or vermin attack
- the prevailing connection of the part in the whole.
Their advantages are:
- much knowledge and experience is already available
- usually easy to understand in their static behaviour
- easy to handle
- because of their light weight and of their often abundant character, relatively safe in cases of collapse or of disaster.

By way of experiment a small office building at Bamako had been designed, consisting of three octagonal units of which the load-bearing structure has been made mainly of the termite-resistant wood of the Borassus or Rhonier palm. The walls are of hollow concrete bricks and the roofing of corrugated galvanized steel sheets (photo 4). Beams are obtained by splitting the trunk of the tree axially. The material thus has a very rough surface and an uneven thickness. The fibres are very hard so that the wood cannot be nailed without pre-drilling of the holes, and it has a certain tendency to split.

For this particular building the struts were connected with metal threaded ends and nuts. The central part of the roof has been raised in order to provide a natural draft of air between the roof covering and the ceiling. The construction took place in 1977 (ref. 14). Plans and models have been made of houses and of two alternatives for a laboratory building at Missira in the rural area of the country (photo 4c). Combinations of a somewhat modified shape for the octagonal units were proposed. This proj-
ect meant the start of a study after alternative building methods for light-weight structures.

**Bamboo and timber pole construction**

Bamboo and unsawed round timber poles are widely used as building construction materials all over the world and they are common in many places. Both have their specific advantages and drawbacks.

Bamboo is not popular in industrialized countries as a structural material because of:
- its sensitivity to environmental influences
- its relatively short service life
- the problems related to the compressibility of the hollow culms, so that special connection methods have to be developed.

In tropical countries, however, it is widely used, especially in India, the Philippines, South America, Puerto Rico and China. Botanically spoken it is subdivided into four families and over 700 species. It has a rapid growth between 7 to 40 centimetres a day, and can reach a length of 30 to 40 metres and a diameter of 30 cm. The culm is cylindrical and hollow and it is divided by impermeable transverse walls, showing at the outside by raised nodes. The outer fibres can have a tensile strength of as much as 80 to 200 N/mm² and a modulus of elasticity of 1,5 to 2,5 x 10⁴ N/mm². It is used in full cross-section or split in halves or less. Various lashing techniques are used.

All lumber is divided into two great groups: softwoods and hardwoods. The softwoods in general are the coniferous or cone-bearing trees, such as the various pines, spruces, hemlocks, firs and cedar. The hardwoods are the non-conebearing trees, such as the maple, oak, and poplar. As lumber becomes more scarce and high-priced, an increasing interest is paid to fast growing species. One of these is the blue gum of Eucalyptus globulus. It grows 7 times as fast as the best quality of mixed hardwoods - to a diameter of 30 cm in 10 years. Although it causes problems by its tendency of splitting and twisting, it is often recommended for building. It can be used as poles in frames or spatial structures. The wood is found in Australia, Northern Africa and the Americas.

**Wire lacings for strong connections**

At Delft University of Technology, a manually operated wire lacing tool has been developed with which strong and uniform bindings can be made with the help of galvanized steel wire of 2 to 5 mm diameter (photo 5 and fig. 5). The usefulness of the tool was investigated for timber connections in building structures, particularly in developing countries, viz. Zaire, Guinea-Bissau, Mexico and Colombia, but also in some industrialized countries like the Netherlands, Australia, Scotland and England.

In most developing countries, bolts are both very expensive and scarce. Wire bindings can serve as a substitute for bolts and often show an even better behaviour, especially if they are used for the interconnection of timber poles. Heart-containing roundwood is cheap, is readily available as thinnings from the normal
maintenance of forests, and does not require much machining prior to use. On the other hand it shows a great tendency to split radially and if — in the case of bolted connections — these radial tears happen to coincide with the bolt holes, this can cause a great reduction in strength. With the help of the tool, connections can be realized that show a relatively great strength and reliability.

A prototype of an air-driven tool was tried out and showed a good behaviour in that less muscular effort is required by the operator and that thicker threads can be used. A more definite concept is being worked out and will be tested in the near future. It is expected that this will enable a greater working speed.

In its most basic form the tool may be used for simply tying timber poles or bamboo culms together without additional metal fasteners or other means of connection. This is done in a few cases in the Netherlands. In the Museum Prinsessehof at Leeuwarden an art object, called "Cone Arbour", designed by an English artist (photo 6) has been built with the help of the tool. It has a conical overall shape with a diameter of 11.00 m and a height of 5.50 m, and it is internally subdivided by a system of intersecting cones. These are formed by peeled larch poles of 10 cm diameter and approximately 3.00 m length, that run according to the generatrices. The poles are provided at both ends with V-shaped grooves perpendicular to the pole axis and fixed with wire bindings against circumferential rings of galvanized steel pipes (photo 6B and C). It was built in May 1987. The system used for the project seems also useful for the construction of trusses. A proposition of this kind was made for larger rooms such as school classes in developing countries (photo 5 and fig. 6). The round members fit together by proper shaping of the contact zones and are joined by wire bindings. Trusses with spans of 6.00 m and more seem quite feasible.

A similar concept is used for a so-called "Pole-House" which is being erected at Almere by a team of prize-winners in the design contest "The Fantasie" of February 1987. The house is being built on top of 6 m high columns and its framework is completely constructed of — in this case relatively heavy — larch poles, that were only debarked and that received consecutively a copper chrome arsenic treatment. All connections had the form of lap joints with steel wire bindings, at some places with additional threaded ends. The method followed in these cases to interconnect roundwood structural members by wire bindings may replace common practice of lashing with natural materials such as rope or rattan.

Special attention has to be paid to a proper shaping of the contact zones, so that they fit well together and have a good shear resistance. This counts even more for bamboo structures where the compressibility of the hollow culms forms a particular problem. Internal support by wooden blocks of the required shape may in many cases be necessary in order to prevent cracking of the bamboo by the rather large pretensioning forces of the bindings. On the other hand, connections formed in this way may be of greater strength and reliability than is provided by the usual lashing technique.
Roundwood for building structures

Round timber is in fact a strong and cheap building material, and it has been used for that purpose since old times. Nowadays however, it is not very common in the industrial countries for structural applications. This is partly due to the higher demands that are being made upon materials to be used for load-bearing structures and furthermore to a lack of awareness of its potential, particularly as no safe and up-to-date methods of construction are available.

A new connection technique, mainly intended for use in industrial countries, has been developed using steel wire bindings that are made also with the help of the previously mentioned tool. In this case a metal plate is inserted in both ends of the poles. This plate is fixed by pieces of pipe going right through pole and plate and by a set of wires through this pipe and around the wood (fig. 7.4). With this joint great forces can be transferred and hence large spans are realizable.

In January 1986 an agricultural equipment shed has been built at Lelystad in the Experimental Station for Cattle Breeding, in collaboration with the Institute IMAG and the firm FORECO (photo 7). It has a floor plan of 10.80 x 16.20 m (fig. 7.1). The roof is executed as a space-deck from peeled larch poles with a minimum diameter of 10 cm and a length of 2.70 m. It is supported on 16 columns of 15 cm thick and approx. 4.00 m long poles. The rods in the roof structure are interconnected with welded steel nodes. All iron work has hot-dip galvanized in advance and all woodwork was first machined as far as necessary and then impregnated. After all that, the wiring was done for the fixation of the plates in the pole ends.

In May 1986 at Winchester, England, a similar building was erected in collaboration with H.J. Darby of the Institute A.D.A.S. of the English Ministry of Agriculture, Fisheries and Food. The building has a plan of 8.10 by 18.90 m and has 6.00 m high and 20 cm thick columns. The roof again has the form of a space structure, this time composed of parallelly machined 10 cm thick poles of the Corsican pine.

In October 1986 at Dronten a timber shed was built by Staatsbosbeheer. Its floor plan is 8.10 x 16.20 m, 10 cm thick. Debarked pine poles 2.70 m long were used for the roof structure, and poles 3.50 m long and 15 cm thick were used for the columns. In this case and also in the two former cases the roof covering was formed by galvanized and plastic coated, profiled steel sheeting and the walls by a timber facing.

A contribution was given to the design of a dome structure for an ecological building project, to be built at Delft from roundwood components and which had an elliptical floor plan of 40 x 50 m and a height of 10 m.

A few space-deck buildings with a comparable character to those at Lelystad, Dronten and Winchester are in the planning stage. Research is being done on buildings with larger span roof struc-
tures. This would make this principle usable for buildings like hippodromes or other sports and public buildings. A proposal has been worked out for a high rise belvedere tower of 27 m height, that will be built according to the same principles from poles of relatively short length and small diameter (photo 7D).

These larger structural applications make it necessary to use heavier poles and hence to devise stronger connections. For poles with a diameter of 10-12 cm, maximum tensile strengths were determined of approximately 140 kN. The admissible load is of course much below this value and follows to a great extent from the load spreading in the results. Under certain circumstances this variation appears to be low, but in some cases it is influenced to its disadvantage by the greatly differing qualities of the obtained material with respect to age, rate of greenness, number of growth rings, density, and so on. A good selection and grading procedure can offer here an important reduction in quality variation. Apart from the connection, described here, a few other solutions were studied and in some cases also applied.

The experiences with the large span space frames built so far offer many data about the reliability of timber pole structures and may as such have an influence on an increased interest in these materials. This may lead to a better understanding of their potential.

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REFERENCES


Photo page 3. Mock-ups in full scale of emergency housing forms, made of triple-wall cardboard.
Photo page 5. Wire lacing tool and construction with simple lap joints.
Photo page 6. Conical structure at Leeuwarden, designed by David Watkins.
Photo page 7. Space structures of roundwood.
Figure 1. Panel shapes and house forms of prefabricated building system.
Figure 2. Elevations, plans and sections of second prototype of panel building system.
Figure 3. Details of panel building system.
Figure 4. Modular hardboard house and ferrocement building system.
Figure 5. Working of the wire lacing tool.
Figure 6. Details of roundwood school building construction.
POTENTIALS OF EARTH FOR RECONSTRUCTION

C.J.W.P. Groot

INTRODUCTION

Economic, social, cultural and physical conditions determine largely the applied building technology for housing. For low-income housing a global distinction can be made between constructions principally built from local materials like stone, soil, wood, reed, grass and constructions composed of "modern" building materials (concrete blocks, corrugated sheets, etc.). The first type is closely related to locally known traditional technology; the second type stems mostly from imported building techniques. Both types may be adapted to the local conditions.

Differences in building technology, construction process and economic value of both types of construction lead to very specific problems with respect to reconstruction after disasters. This paper will mainly focus on a reconstruction approach starting from locally applied earth construction technology.

CONSTRUCTION CONDITIONS

Normally the low-income house of local building materials is constructed by its owner with the help of family and friends. The applied technology is relatively simple, the construction period short. The result usually shows low durability performance, in many cases due to poor professional skill but also as a consequence of the materials. See Figure 1.

This type of dwelling is typically constructed in rural areas as well as in low-income quarters in semi-urban and urban housing areas. The lack of durability is, under rural conditions, not a major problem: maintenance is part of the annual cycle of life; it is simple and can be executed without cost. See Figure 2. Moreover the demands with respect to a certain standard of housing are modest. In urban conditions construction, even with local materials, costs money. Materials such as blocks, wood, etc., have to be bought, and transport costs are also inevitable. See Figure 3.

Maintenance also has its financial consequences. It is more important for the urban dweller to solve his housing problems in a durable, final way than for the rural dweller. This end can only be achieved with modern, expensive building materials, at least in the opinion of the majority of the urban inhabitants. However it is necessary to consider carefully the use of modern building materials, given their high prices. Different options are then possible:

- the use of durable, expensive materials to construct a core unit, to be followed over the years by durable extensions (temporary housing in shacks will be necessary).
- the use of local non-durable materials to construct a relatively cheap house with the prospect to apply over the years durable materials to replace vulnerable parts of the construction or to add durable elements to improve the overall durability of the house.

The possibilities of the second option are often underestimated. Local building materials are considered second-rate materials with which no sound solutions can be realised. Some of the potentials of the second option will be elaborated.

EARTH CONSTRUCTION

Building with earth is common practice all over the world. Availability, cheapness, local skill and climatic properties determine in particular the appropriateness of earth as a building material. The use of earth in hot arid zones, in several tropical composite and upland climates is a cheap solution to meet the high-thermal-capacity demands of walls and roofs. See Figures 4, 5, and 6.

To replace the thick earth construction elements with modern materials after a disaster is not only very expensive but also often unadapted to the climatic conditions. For reconstruction under low-income conditions, it can be attractive to start cheap, using available technologies, and to introduce where necessary techniques with which maintenance costs can be reduced. However, before commencing this process it will be necessary to analyze the commonly constructed dwellings in the context of disaster sensibility and desired housing standards for the future.

The results of the analysis must play a role right from the start of reconstruction to avoid in the future extra costs or even the impossibility of the introduction of improvements in a later stage of construction.

RECONSTRUCTION WITH EARTH

One of the major problems of earth construction is the lack of durability. Depending on the demand for durability, measures can be taken ranging from the use of simple protecting elements to a total change of construction concept.

DURABILITY AND EROSION

The most important forms of erosion are:
- rain erosion
- wind erosion
- domestic erosion

The first two mainly affect the exterior, the latter the interior of the construction. The rain erosion damages in particular the roofs, the top part (direct) and lower part (up-splashing water) of walls. Sand charged winds do have abrading effects on the walls.
Domestic erosion occurs mainly on spots where water is used: cooking area, toilet/bathing area and places of foot traffic.

Local durabilization is a means to protect the most threatened parts of the earth constructions, in an inexpensive way. Examples of this approach are:
- the application of durable gutter pipes (fired clay, galvanized iron etc). Around the inlet of the gutter pipe sand-cement protection may be applied to avoid erosion by fast streaming water,
- durable drains for waste water disposal (concrete lining),
- the use of durable flooring (fired bricks, concrete) in cooking, toilet/bathing areas.
See Figures 7, 8, and 9.

A further step in the process, often applied if the financial conditions are more favorable, is the protection or replacement of the roof by means of durable materials. Protection of flat roofs can, for example, be realised by means of locally fired bricks, masoned with water-resistant mortar joints. See Figure 10.

This solution, maintaining the high thermal capacity of the roof, is normally climatically most adapted in hot arid zones. Moreover outdoor sleeping on this type of roof is possible.

The replacement of the flat earth roof by corrugated iron sheets is a more drastic contribution to durability improvement. Applied in combination with ceiling elements and air-ventilation between sheets and ceiling, this solution can be, also in a climatic sense, reasonably appropriate.

Complete durabilization is attained if also the walls are protected by a type of durable rendering. It can be noticed that the rendering of adobe/earth walls is not without problems. Much money is wasted on sand-cement plastering which, due to differential swell-shrinkage behaviour of earth and rendering layer, often peels off after some years. Table 1 provides information on more successful techniques.
### TABLE 1. Some fixation systems for rendering on earth walls.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Construction</th>
<th>Observations</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>scratching</td>
<td>rammed earth</td>
<td>apply systematically</td>
<td>mediocre</td>
</tr>
<tr>
<td>holes in wall (7-cm grid)</td>
<td>rammed earth</td>
<td>especially for stabilized rendering on mud walls</td>
<td>very good</td>
</tr>
<tr>
<td>nails in wall (12-cm grid)</td>
<td>rammed earth &amp; adobe</td>
<td>labor intensive</td>
<td>average</td>
</tr>
<tr>
<td>wire on nails (20-cm grid)</td>
<td>all</td>
<td>expensive</td>
<td>very good</td>
</tr>
<tr>
<td>chicken wire on nails</td>
<td>all</td>
<td>very expensive</td>
<td>excellent</td>
</tr>
<tr>
<td>pottery fragments</td>
<td>rammed earth</td>
<td>fragments must be well fixed in the wall</td>
<td>good</td>
</tr>
<tr>
<td>scratched joints</td>
<td>compacted adobe blocks</td>
<td>more effective with small blocks</td>
<td>very good</td>
</tr>
<tr>
<td>hollow blocks</td>
<td>compacted blocks</td>
<td>special blocks</td>
<td>good</td>
</tr>
</tbody>
</table>

CRA terre (5)

Another interesting method to protect walls is the application of fired tiles. The technique is as follows: the tiles (+/- 4 cm thick), locally clamp fired, are pressed in a rendering layer of mud newly placed on the exterior of the earth wall. Joints of 2 cm are respected. The mud, filling the joints due to the pressing of the tiles is removed after some time of drying. Here upon the joints are filled with a sand-cement mortar. The bond between tiles and mud is a function of the porosity of the tiles: high porous tiles (often poorly fired) will do better than a high density product. See Figures 11 and 12.

To guarantee long life performance with a minimum of maintenance (normally demanded for amenity constructions like hospitals, schools, etc.) solutions are possible which have to be considered as composite constructions: a high thermal-capacity core of earth surrounded by a variety of protective structural and covering elements made of durable materials. If for reconstruction this extent of durability is desired, the consequences for, among
others, foundation and structural elements of the construction have to be determined during the design phase. Examples of almost maintenance free composite constructions are shown in the figures 13, 14 and 15.

OBSERVATION

Improvement of the structural durability (in particular earthquake resistance) is treated in the paper Hazard Protection of low-income Housing by Theo Schilderman.

REFERENCES


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Figure 1. Poor quality mud building in Bamako, the capital of Mali (West Africa).

Figure 2. Hand manufacture of adobe blocks in Africa.
Figure 3. Machine-made adobe blocks in Arizona (USA).

Figures 4 and 5. Adobe construction in an urban context (Djenne, Mali).
Figure 6. Rural adobe constructions (Mali).

Figure 7. Rendering with sandy-clay soil mixed with rice - or millet - hull.
Figures 8 and 9. Examples of local durabilization.
Figure 10. Protection for roof and upper wall.

Figures 11 and 12. Tile finish on mud walls.
Figure 13. 40-cm thick earth walls for hospital construction at Djenne, Mali.

Figure 14. Cross-section of hospitalization with courtyard: Durable foundation, corrugated iron roof, tile finish on walls.
Figure 15. Typical cross-sections over wall, roof and floor for durable adobe construction in the south of the USA (1).
TRANSPORT IN EMERGENCY SETTLEMENTS

B. H. Immers and E. J. Malipaaard

1. INTRODUCTION

This paper deals with the local transport situation in disaster areas or emergency settlements. The international transport of relief goods and large-scale inland distribution are not dealt with in this paper. See, for example, Van den Dool (1).

The local transport situation in a disaster area is influenced by several factors, including the displacement from original habitat, the typology of the disaster, and the various stages of the disaster. Moreover, the local situation is a major factor which has to be taken into account. Above all, the availability of water and to a lesser extent fire-wood determine the magnitude of the demand for transport.

In general, the wish and necessity of a quick return to the original habitat results in a low-level activity pattern and thus a relatively small transport demand (this does not apply to new permanent habitats). Relief programmes should be geared towards continuation of life in the original habitat, unless this habitat has been devastated. These above-mentioned factors determine for the greater part the outline of the emergency settlement.

Although the transport burden of people in these settlements is rather small, still the poor physical condition and the shortage of utensils may cause insurmountable problems. A moderate relief programme, taking into account the local situation as much as possible, is the most appropriate approach. This policy is further elaborated in the following sections. In section 2 a typology of emergency areas will be given, with special reference to transport. For each situation, an inventory of the transport situation is made with regard to the various stages of the disaster. In section 3 an outline of a settlement scheme is given. In section 4 the availability of transport means and road infrastructure will be discussed.

2. TYPOLOGY OF DISASTER AREAS WITH SPECIAL REFERENCE TO (INTERNAL) TRANSPORT

As already stated, several factors influence the internal transport situation in a disaster area. First of all, a distinction should be made between short-onset and long-onset disasters. Generally, short-onset disasters involve major destruction (in the original habitat), including road infrastructure and transport means. The faulty transport situation, among other things, results in a malfunctioning of the community.

In case of long-onset disasters, the damage to road infrastructure and transport is less extensive. The consequences for community life in the original habitat are therefore less harmful.
If people are forced to search for a new habitat, this situation might change drastically, as in most cases people are able to take along only the most essential goods.

The permanency of the original habitat is a second factor which has to be taken into account. Some disasters do not induce the search for a new habitat. If possible, people should stay in the original habitat. However, in some cases resettlement is inevitable. This resettlement may have a temporary or permanent nature.

Figure 1 classifies the various disasters according to above-mentioned factors.

<table>
<thead>
<tr>
<th>type of habitat</th>
<th>short-onset</th>
<th>long-onset</th>
</tr>
</thead>
<tbody>
<tr>
<td>original habitat</td>
<td>hurricane, earthquake,</td>
<td>drought</td>
</tr>
<tr>
<td></td>
<td>environmental accidents*</td>
<td></td>
</tr>
<tr>
<td>temporary habitat</td>
<td>flood, mud</td>
<td>war, drought</td>
</tr>
</tbody>
</table>
| new habitat     | x                            | major civil works (e.g. dams),
                         |                               | desertification,
                         |                               | war (boat refugees)         |

* Bhopal, Mexico City, Harrisburg

Figure 1: Classification of disasters according to type of habitat and onset.

As has been stressed before, short-onset disasters cause much damage to road infrastructure. Long-onset disasters induce less damage; however, if resettlement is required, people are forced to move to a place where transport facilities might be inadequate. The distinction with regard to type of habitat is made to indicate the feasibility of new investments. In case of a temporary habitat, large investments, for example in road infrastructure, are not justified. Road infrastructure investments in a permanent (new) habitat should be incorporated in current development aid programmes.

Stages of the disaster

In addition, a distinction can be made with respect to the various stages of the disaster. The following three stages are distinguished:
stage duration
1. relief and salvage 0 - 5 days
2. rehabilitation of provisional settlements 3 months
3. full development and reconstruction 5 - 8 years

Stage 1: relief and salvage

In case of short-onset disasters this stage can easily be determined. After announcements by the mass media, large relief aid organizations will take care of a fast supply of basic goods and logistic assistance. With respect to long-onset disasters, information flowing to the outer world is often rather slow or virtually absent. This results frequently in a late recognition of the disaster. The consequence of a long-onset disaster will therefore extend over a long period, and thus the relief and salvage aid will take place over a longer period.

During stage 1 the massive aid supplied by professional relief organizations is geared towards food, shelter and medical care. The availability of water is an important criterion for the refugee with regard to the choice of the habitat. A lack of (clean) water has immense consequences for the livability of the settlement.

Stage 2: rehabilitation of provisional settlements

In contrast to stage 1, in stage 2 there will be a more extensive call upon the initiatives of the refugees themselves. First of all, the daily tasks will be related to the fulfillment of basic needs. These basic needs include:
- the fetching of water
- the preparation of food
- the collection of firewood
- the provision of shelter.

Surveys by (local) experts, taking into account several factors such as the scale of disaster and local conditions, physical condition of refugees and the availability of relief goods, can result in a task assignment to both refugees and others. Fulfillment of basic needs requires transport of goods. In general, the absence of water locally, requiring transport from other areas, results in the largest transport flow. For example, a settlement of 10,000 persons requires 50,000L per day, assuming a daily usage of 5L per person. This (long distance) transport is only possible by motorized vehicles. It should be assured that the required transport capacity (being of extreme importance) is reliable on a permanent base.

Self-reliance of refugees with respect to the supply of water is considered a starting point if water is locally available. However, relief programmes should incorporate a supply of basic expedients (e.g. for water transport). For example, the supply of food and other consumer goods (such as milk powder) in tins could be considered.
Stage 3: full development and reconstruction

Though undesirable, a long-term stay in a temporary settlement is a frequently occurring phenomenon. By nature people want to return quickly to their original habitat. However, this is not always possible. In that case a new location for a permanent settlement has to be found, enabling people to build up a new existence.

In general, at this stage the relief aid should be in line with ongoing aid programmes. These programmes should be geared towards self-reliance.

With respect to transport, a self-reliance policy could be implemented for:
- the maintenance and upgrading of local level road infrastructure (labour intensive road maintenance and construction).
- the establishment of workshops for production of transport means. For the setting up of these workshops a "basic vehicle kit" can be used. The basic vehicle kit consists of a set of standardized parts and tools out of which different types of vehicles (e.g. wheelbarrows, handcarts, backpacks and bicycles) can be produced/assembled (see section 4).

The present variety of transport means largely determines the dimensions of the road infrastructure. Often simple tracks already meet the requirements. Special attention should be paid to bottle-necks like bridges, culverts and embankments. The damage to road infrastructure will vary significantly according to the type of disaster. With respect to short-onset disasters, the local situation will often show extreme damage to road infrastructure. In other cases, more attention has to be paid to availability of transport means. Improving the availability of transport aims at a reduction of human effort, as during long-onset disaster situations the physical condition of people is rather poor.

3. OUTLINE OF A SETTLEMENT SCHEME

Often the location and lay-out of a settlement is already determined before relief aid from the outer world has arrived. Again, the outline of the settlement will develop according to the location of water sources. Apart from water, the following facilities should be available:
- storage (for food and utensils)
- a health centre
- administration
- school
- centralized cooking.

Some services should be located close to a water source (such as centralized cooking). Clustering of services facilitates guarding them. Storage and administration facilities should be located at the edge of the settlement, thus not requiring heavy (motorized) through traffic, which would disturb people and result in unsafe situations.
The settlement should preferably be linked to the main road (if there) by a short track. In figure 2 an outline of a settlement is given with special reference to the transport situation.

![Diagram of settlement outline]

1. administration
2. storage
3. medical care (health centre)
4. water
5. school
6. centralized cooking
7. workshops

**Figure 2:** Outline of a settlement scheme.

**Inputs/outputs**

As already stated, the flow of goods in an emergency settlement derives for the greater part from efforts to fulfill the basic needs of the population. In general, the starting point is that people themselves take care of the supply of water and firewood, which present the largest transport flows. A lack of firewood might induce centralized cooking, thus requiring an external supply of fuel (charcoal, firewood). This supply could preferably be realized by local entrepreneurs (local authorities). Apart from the transshipment of food, other transport within the settlement does not present significant flows.

4. ROAD INFRASTRUCTURE AND TRANSPORT MEANS

During stage 1 (relief and salvage) the attention should primarily focus on the transport of water. The provision of tins (cans, buckets) might ease this transport significantly. During this stage, less attention should be paid to other aspects of both transport means and road infrastructure. During stage 2 and 3 the general transport demand with respect to basic needs fulfillment has to be taken into account. The upgrading of local road infrastructure based on labour intensive techniques is extensively dealt with in De Veen (2) and Beenhakker et al. (3).

Transport needs should be met, where possible, through income-generating activities. Preferably this should be in line with the local situation. A wider ownership of local transport means should first of all be emphasized, as people are familiar with these vehicles. This should be coupled with the establishment of local training and repair facilities. Taking into account the often deplorable situation in emergency settlements, incentives
should be given to increase vehicle ownership. Therefore it is suggested that a basic vehicle kit be incorporated in current relief salvage programmes.

The basic vehicle kit

Wear and tear as well as a lack of spare parts are the major factors causing a decrease of vehicle ownership. This often results in cannibalisation of vehicles. The large variety of parts severely limits the exchangeability. The basic vehicle kit enables production/assembling of several (non-motorized) vehicles, using a limited variety of parts. The following transport means may be included in the kit:
- the wheelbarrow
- (hand)cart
- (bicycle and trailer).

The standardization of parts facilitates exchangeability and reduces the required number of tools. In Appendix 1 a preliminary parts and tools list of a basic vehicle kit is given. Production and repair should be undertaken in workshops, with assistance of a temporarily affiliated expert.

These transport vehicles should first of all be used for the general functioning of the settlement. However, in the end private ownership should be aimed at. This can be achieved by retailing; a discount should be made possible in exchange for work performed for the public benefit.

Tasks qualifying for a vehicle discount could include:
- distribution of food
- cooking
- transport of patients
- building
- assembly/repair of the vehicles.

REFERENCES


APPENDIX 1

Basic vehicle kit

+ Problem assessment
  - Lack of basic transport means in emergency situations.
+ Objective
  - Provision of simple transport vehicles to alleviate the transport burden.
+ Basic concepts of the kit
  - Standardization/exchangeability
  - Simplicity
  - Assembly with few hand tools
  - Low-cost
  - Durable.
+ Components of the kit

Parts (spare parts)
  - Standard wheel 26"
  - Rim 26" * 1 3/4"
  - All terrain tyres (balloon type)
  - All terrain/heavy duty hubs
  - Sealed bearings
  - Heavy duty spokes and nipples
  - Wooden planks (if not locally available)
  - Angulars and strips (no tubes)
  - Bolts and nuts (2 diameters)
  - Washers and locknuts
  - Grease/oil
  - Patch kit.
+ Tools
  - Iron and wood saw
  - (Adjustable) spanners
  - Hammer
  - Brace and auger
  - File
  - Workbench
  - Handpump.
+ Spare parts and tools of basic vehicle kit should be transported in a reusable container (preferably cylinder shape; e.g. 27" barrel).
LEGAL ASPECTS OF DISASTER PREVENTION AND MITIGATION

E.J.E. Schoustra

INTRODUCTION

So far, there is little research about the legal aspects of disaster prevention and mitigation. The legislation about these matters differs greatly from country to country. Enforcement of the rules often is inadequate, or difficult at least, while the international aspects have hardly attracted broad interest. Nevertheless, adequate legislation about prevention and mitigation of disasters, and the rehabilitation process thereafter, deserves more attention and preparedness. Disasters tend to occur unexpectedly, and almost always cross international borders.

In the past, when disasters only were "acts of God", man could do little else than pray for prevention. Preparedness planning meant clearing away the rubble afterwards.

But the still common view that natural disasters are acts of God is not valid any more. Although the hazards posed by floods, earthquakes, volcanic activities, and the like, still can be considered "God-given", the disasters which arise from them are increasingly man-made. Two trends can be distinguished. Although there is sufficient knowledge, as provided by early warning systems, to avoid the worst effects, the dissemination and application of that knowledge in due time cannot be realized. On the other hand, environmental and resource mismanagement causes hunger and drought, magnifying the impact of the "classical" natural disasters. Much suffering, relief and rehabilitation could be avoided by prior application of known environmental facts. Besides environmental degradation, poverty and the rapid population growth are equally responsible for turning natural hazards into major disasters. (See W.G.V. Balchin, Book Review "Natural Disasters - Acts of God or Acts of Man?" in Disasters.)

In "Earthquake Mexico '85" (Munich Reinsurance Company, Munich 1986), this issue is elaborated on. The Mexico earthquake was the largest earthquake loss experienced by the insurance industry in a number of decades. It had become evident that the Mexico City's vulnerability to earthquakes was increasing drastically. Due to the expansion of the urban area, the area of the former lake Texcoco, which still was a lake in the time the Aztecs lived there in the city of Tenochtitlan, had become fully built up. During an earthquake, the thick sediment strata underlying the entire area of the former lake started to vibrate. Even if an earthquake occurred at a great distance, these vibrations spread to almost all high-rise building with similar resonance periods. The earthquake of 19 September 1985 reached an extremely high degree of intensity, because of the double resonance coupled between the earthquake waves, the sediment vibrations and building oscillations, and the long duration of ground motions. The forces thus caused exceeded by far the limits set forth in the pertinent building regulations.
City centres with numerous high rise buildings are growing in many other earthquake regions. In many cases, the possible resonance coupling between the subsoil and such high-rise buildings has not even been examined. A staggering catastrophe potential is therefore developing all over the world, requiring far-reaching countermeasures on a political, technical and economic level.

During the past decade we have been confronted with more industrial disasters. Due to the concentration of heavy industries near densely populated areas, the impact of mishaps is of the same order, and should be fought accordingly.

As natural and industrial disasters are in large part man-made, they also could be "man-cured" by proper analysis with an international and multidisciplinary approach. Highly important is international legislation concerning land use, environmental improvement, insurance and compensation. But the enforcement of laws, rules and regulations, especially in Third World countries poses special financial and organizational problems. So, special attention has to be given to the feasibility of all proposals regarding financial, organizational and psychological aspects. It may be better to have no laws than to have completely non-functioning ones.

In Bhopal, anatomy of a crisis, the author Paul Shrivastava describes how lack of legislation and safety measures contributed to the Bhopal tragedy in 1984 and insists that a new approach is necessary. A corporation, like Union Carbide, has a moral responsibility to operate safely. The more so in a developing country, as such corporations often have more power than the government of the country they work in. Their responsibility is almost government-like. His second argument is an economic one: the costs of a crisis are very high. Almost all industrial disasters have international political implications, as more countries are affected, and consequently criticism and sanctions from abroad are elicited. This was also clear in the Chernobyl disaster in 1986, when nuclear radiation was spread far beyond the borders of the Soviet Union.

Broadly speaking, there are three phases to be distinguished in disaster prevention and mitigation. The first is prevention, the second is the period of relief just after the disaster, and the third is reconstruction and rehabilitation. Legislation should also clearly distinguish between these different phases, with appropriate laws and measures for each of them. For successful implementation, effective legislation plays a decisive role.

LEGAL ASPECTS OF DISASTER PREVENTION

The UNDRRO publication Disaster Prevention and Mitigation, a Compendium of Current Knowledge (vol. 9, "Legal Aspects") highlights the present situation of legal aspects of disaster prevention and mitigation, in particular in developing countries. The publication only deals with natural disasters which appear suddenly, mainly floods, earthquakes and tropical storms. Long-term effects of a famine, a war or other man-made disasters, like industrial accidents, are not treated in this volume.
Legal strategies which can be used in fighting disasters are analyzed. At the same time it is pointed out how these strategies might cause tensions between the interests of an individual and the community. Another problem is to get international recognition and cooperation in establishing legal strategies.

The legal measures which a government can use include rules and restrictions on land use, such as:

Zoning regulations. The land is divided into broad land-use districts, so development is guided away from likely disaster-prone areas. These should be based on a proper risk analysis, otherwise the regulation might be deemed arbitrary or unreasonable, and invalid. Enforcement of these regulations often turns out to be a practical problem. Municipal control is limited, while the uncontrolled settlements — slum areas — develop themselves outside the municipal borderlines and, consequently, outside municipal jurisdiction. So far, results of zoning regulations are modest at best.

Sub-division regulations. These refer to the division of land into two or more parcels for the purpose of sale or building development, a process of converting fallow land into building sites. The regulations include as well construction of roads, sewage systems, etc. A prospective developer has to seek approval for well-made plans. To have proper plans is important for city planners, as this facilitates the maintenance of accurate records of land titles, which enables the authorities to follow a coherent and consistent policy. However, proper enforcement often is lacking due to inadequate administration.

Building regulations. The building code in disaster-prone areas is more performance- than design-oriented. Rules are concerned with physical aspects and maintenance of new constructions. Housing codes should contain follow-up measures, like compulsory facilities for firefighting. But when this leads to considerable costs for the owner, enforcement problems arise.

Zoning plays an important role in regard to flood control. But special questions have to be considered. Is the taking of property constitutionally valid? Are there provisions for equal protection; are all owners treated alike? People living on small plots with little protection may get less compensation than people on larger plots with fewer risks.

Another difficulty is posed when a river basin falls under the jurisdiction of more than one country. When no international law exists, each country follows its own rules. Customary law about international flood control hardly exists; if so it does not go beyond the maintenance of existing flood discharge conditions. Thus, research is required into the international legal aspects of floodplain management.

Problem of enforcement

The three above-mentioned points are only workable tools in disaster mitigation when enforced properly. To do so, a country
needs a strong administrative infrastructure. Unfortunately, administration is weak in many developing countries.

An alternative strategy could be found in public acquisition of land to prevent development in areas which are particularly hazardous. This would not raise constitutional objections, as almost everywhere there exists the possibility to claim land for public welfare. Seen from this point of view, it is worthwhile to go into deeper research to work out this strategy as a potential solution for the problems of land use. However, when the costs for buying all disaster-prone land poses a problem, it may be better to acquire the development rights of the land instead of the land itself.

The article of R. Spence, "A note on earthquake vulnerability in Quetta, Baluchistan" (Disasters), illustrates how building regulations may work out. An earthquake in 1935 destroyed the town of Quetta, in British India, completely. The town had to be rebuilt on the same spot for military strategic reasons, but this time according to earthquake resisting principles. A building code was drawn up, containing general regulations governing shape, height and spacing of buildings, and a number of different methods of construction, to "suit the purse of anyone intending to build."

For a time the code was rigidly enforced, even though this resulted in a very slow rate of rebuilding. Every building of any age whether in the city or in the military area, the cantonment, bears the marks of the code and the rather odd-looking techniques it specifies. In the cantonment area, where all construction is done under the direct control of the army engineers, both the code building techniques and the quality of supervision and workmanship needed to create earthquake resistant buildings are still to be found.

But outside the cantonment area lies the danger. Due to rapid population increase, uncontrolled building can hardly be stopped. There is no staff or authority to do so. Even if materials for quake resistant building become too expensive, shortage of space leads to multiple-story building, and quality of construction suffers as skilled workmen leave for work in the oil-rich countries of the Middle East. A building code cannot be effective unless there exists both the will and the economic means to adhere to it.

There are a lot of questions to be answered about compensation. Who has a compensable interest when property has been acquired by the government? Which procedure to follow? Who can claim? Is it private or shared property? What is adequate compensation? Based on market value, tax value, or a "reasonable" price? How to calculate a loss?

As public approval is crucial for success, public participation in the planning process is essential. But often public participation starts only after the draft plan has been finalised, which gives the public just the opportunity to object, not to plan. Moreover, the rate and nature of public participation depends on a country's political system. In "The politics of
disaster — Nicaragua" (Disasters), Julian Bommer describes how the earthquake in Managua in 1972, and the floods which struck the country in 1982, occurred under different administrations. Although Managua had been destroyed by a previous earthquake in 1931, the city was totally unprepared, and the only emergency plan that existed lay hidden in the rubble. There was a complete lack of social organization to cope with emergency procedures. This must have been at least in part due to the fact that the Nicaraguan people had lived for more than thirty years under an autocratic regime which viewed most forms of social organization or collective action as subversive. Martial law and subsequent government actions further inhibited the people's efforts to help themselves.

The political situation in Nicaragua changed after the fall of the government in 1979, after which date popular organizations including civil defence, came into being. When the flooding disaster took place in 1982, people immediately responded. Rescue operations were organized, as well as the coordination of food and water provisions and emergency health care. Efficient cooperation between the civil defence and the armed forces was significant.

Another aspect of community participation, mentioned by Shrivastava is that people in a democratic society have the right to choose the risks they live with. But as risk management is a political process currently dominated by corporations and government agencies, people often are not aware of potential hazards, even not in highly developed countries. In order to increase the awareness and community empowerment, legislation has to be extended with "right to know" and "right to act" laws. However, legislation regarding hazard management policies, including hazard location, is fully a government responsibility.

Other strategic tools are taxation and insurance policies. Not much is known about tax strategy in the prevention of disasters. But where municipal administration is weak, registration and collection of taxes is inadequate. So far, there is no study about disaster coverage in the private market. Often, insurance is at best fragmented; owners often neglect to insure themselves. In developing countries there are many practical problems which prevent insurance schemes from operating smoothly. The insurance sector is weak, and there are not enough incentives to participate in the schemes. An insurance system is often considered a luxury.

In his article "Thresholds of security in different societies," F. Battisti points out that different societies not only are exposed to different types of dangers, but also cope with them in different ways, and are able to adapt their development to the presence of hazards. "Hazards alone are not a cause for a disaster unless there are social conditions predisposing it. Different societies have more or less officially established thresholds at which a hazard may be considered dangerous enough to raise social concern. In fact, societies which have better rationalized their productive and everyday life tend to be less tolerant of uncertainties, more likely to better guarantee individual security, and better organized for emergencies. The existence of a col-
lective security against disasters and other accidental events may also be interpreted as the outcome of a possible surplus investment upon those areas of social control which are not usually taken care of in more traditional contexts. The remarkable expenses of a disaster relief program, or even of a nationwide disaster insurance scheme, can only be met when other basic economic prerequisites are already satisfied."

Shrivastava adds that in developing countries the existing medical and public health facilities are inadequate even for daily life. Therefore, the development of emergency capacity must begin by strengthening the everyday medical infrastructure. This holds true for the relief situation in other sectors as well.

In the U.S.A. insurance policy is well developed. The municipalities who take affirmative steps in minimizing losses can be subsidized to take part in insurance schemes. Non-participation means not being eligible for compensation.

Insurers should learn from each disaster and adapt their policies accordingly. Insurers can motivate their clients to take loss prevention measures and refrain from particularly risky investments, set appropriate tariffs and impose sensible deductibles and co-insurance (Munich-Re, 1986).

Disaster preparedness

"Legal Aspects" also outlines the problems involved in the establishment and execution of disaster preparedness plans.

It is not easy to make preparedness plans, due to the episodic character of disasters. But certain natural phenomena require proper planning for the execution of emergency procedures. Plans often are inadequate, incomplete or out-of-date, while for the execution they rely upon ad hoc committees. Proper plans contain the responsibilities of governments, non-governmental agencies, and individuals.

Disaster preparedness legislation facilitates the declaration of a state of disaster emergency. Another procedure goes into operation, execution of power changes. A time limit should be included. The legislation should cover how to suspend normal routine, activate emergency, and ensure law and order. A disaster preparedness unit is useful when disasters occur with some frequency. Crucial for such a unit is to know where in the national bureaucracy the decision making structure is situated. The best place is the office of the chief executive of the country or region. When the decision making falls under the jurisdiction of another minister, like social affairs or interior, the approach is often curative instead of preventive. The central tasks for the disaster preparedness unit are the planning, preparation and maintenance of the plan, with an outline of powers and duties.

As disasters occur locally, local units have to be established as well. National planning often does not look into local details.
Another important point is the reinforcement of existing government services, like the fire brigade, the army and the police forces. These should not be replaced, but reinforced. The French plan ORSEC, which also applies in French Polynesia (Disasters, vol. 8 no 1 1984), operates like a chart in this respect.

Including special financing to maintain the readiness of these services often is neglected, but proves to be crucial.

A practical illustration of these guidelines can be found in the Jamaican experience (Franklin McDonald, "Establishing a national program of disaster preparedness, mitigation and prevention: The Jamaican experience," Disasters).

In 1980, the government of Jamaica formally established a national focal point with a full time staff, to promote action to reduce the effects of future disasters or emergencies on the Jamaican population and economy. In 1979 the country had been hit by a flood. This disaster was coped with by calling in the army and executing a large number of ad hoc measures to provide humanitarian relief. Although these measures were largely effective, it was recognized that a prepared response would have led to more timely relief and more orderly post disaster operation. So in the aftermath of the disaster, the government requested experts to review the country's management system and make recommendations for change.

Jamaica is a plural democracy with two strong political parties. Both parties had been concerned about the effects of the floods and agreed that effective action should be taken. Therefore, the creation of an office concerned with Disaster Preparedness and Emergency Relief Co-ordination, permanently staffed by technical people, was established with broad consent and directly accountable to a very wide constituency. When the government changed within a year after formation of this agency, there was little influence on the continuity of disaster management activities. The Prime Minister decided the agency should be directly responsible to him (but transferred this responsibility later on to another ministry).

The mandate of the agency was twofold: to take action to reduce the impact of disasters and emergencies, and to co-ordinate emergency relief operations in case of major disasters. In order to get the local population involved, the agency assembled local knowledge about disaster fighting, and made this available for general use in comprehensive guides. For example, the knowledge of how to carry injured people out of remote areas when roads are blocked still existed in some rural parts of Jamaica. This approach of looking at all existing information first and reviving old skills and methods, instead of generating new information, proved to be successful.

Moreover, it turned out that laws regarding zoning and building regulations did exist, but that the officials concerned were hardly aware of their meaning for disaster prevention. So it was more important to revive and sensitize the knowledge about appropriate legislation and regulations than to design new legislation or regulations.
In "The development and applications of a Drought Early Warning System in Botswana" (Disasters), Richard Morgan mentions how the organization of drought fighting is integrated in the national machinery, on all levels, while the approach is a multidisciplinary one. After periods of droughts, in 1978 an Interministerial Drought Committee (IMDC) was established under the co-ordination of the Rural Development Unit in the Ministry of Finance and Development Planning. Local government authorities were encouraged to form their own District Drought Committees to plan for and coordinate implementation of relief programmes. At the national level, therefore, the IMDC, which includes in its membership all the main Ministries and Departments involved with the implementation of relief and the monitoring of drought conditions, is responsible for drought assessment, making policy recommendations to the Cabinet on the need for relief measures, securing resources for them from both donor and domestic sources, and the monitoring of relief measures.

When applied properly, this warning system functions as a part of regular national development, but practical problems in implementation still have to be overcome. There is no consensus over what constitutes a "drought", so some borderline cases may fall out of the program. When assessing a situation, the number of indicators often is limited, and transmission of data from the field is slow. However, the planning of this programme from a government point of view, seems to be sound.

Disaster preparedness is incomplete without training programmes to get qualified people who can be assigned for relief operations.

In his article "Training for disaster preparedness in India" (Disasters), Narendra Kumar Jain discusses the necessity of training programmes to get qualified relief workers. There is no need for enthusiastic volunteers, but for trained people, who could train and coordinate volunteers. In India a policy of prevention is only carried out by the Red Cross in areas of health, and in highly specialized fields such as monitoring and forecasting using satellites, radar network and computers. He mentions which existing civil and military services can be involved: the Indian Meteorological Department, Central Water Commission, Civil Defence, Home Guards Directorate, Fire Service, National Buildings Organization, College of Nursing, and Medical College.

But the implementation of adequate training programmes is hampered by organizational, financial and political problems. No one can do this as a full-time job, as disaster preparedness nowhere is considered as a regular occupation. The training is expensive and the practical opportunities to see effectiveness few. It is difficult to mobilize funds for training, while it is comparatively easy to get money for relief. In India, funds for both kinds (training and relief) have to be procured from donor agencies. When training can be organized, it is most likely in an urban area where facilities are within reach; however, this does not prepare workers for situations in rural areas.
Who should be trained? Jain states a preference for members of the "able bodied population", like government employees and students. But they are usually not available. He remarks that special casual leave is allowed to employees for adventure activities such as trekking, rowing, or mountaineering, but no provisions exist when an employee wishes to undergo training for disaster preparedness. The prospects of the enrollment of students are equally gloomy, due to the fear of accidents during training or actual relief operations. There is no insurance scheme to cover such risks. So, teachers are not too keen to take risks and responsibilities. Parents will not let their children take part, while earning members of a family are strongly advised against taking up such assignments.

When disaster relief has international dimensions, for example, when foreign workers and materials have to be received, their work can be facilitated by smooth cooperation between the different ministries who deal with immigration, work and import permits.

The legal position of disaster relief workers still is a neglected issue. As seen in the above mentioned Indian situation, lack of proper regulations regarding risk insurance, or special leave with salary compensation, prevents people from joining. In the "Rode Kruis Koerier", December 1987, a proposal is discussed to legalize the position of voluntary relief workers in the Netherlands. When working with official relief organisations they are insured during training and actual relief operations. Next to that, a provision is made for lack of regular income and working overtime.

The legal position of foreign relief workers regarding their rights and responsibilities is often a matter of special consideration. When in a country a state of emergency is declared, a foreign worker might find himself also in another legal and social position.

Last, but not least, the legal implications of technological developments is commented on in "Legal Aspects". There are two important developments:

Weather modification, the capacity to alter atmospheric processes, is a sensitive issue. The decision to conduct weather modifications is a matter of national discretion, but with international dimensions. WHO/UNEP recommend the use for peaceful purposes, with an obligation for neighbouring states to enter into consultations.

Remote sensing by satellite is important for mapping hazardous areas, and giving information and timely warnings. The advantages for disaster prevention and mitigation are clear, but so are the advantages for economic and military purposes. This poses conflicting principles about application and informing of third parties. Discussions about these matters are going on.

In the earlier mentioned situation in Botswana, an early warning system has been designed to assist the Interministerial Drought Committee. In 1984 a small Early Warning Technical Committee was
established, consisting of a few key members as a subgroup; this group now meets on a monthly basis to review rainfall and agrometeorological data, reports from the Nutritional Surveillance System and the Agricultural Situation Reports issued by the Agricultural Statistics Unit in the Ministry of Agriculture. In this way, regular assessments of the incidence of drought and its effects are produced and policy actions recommended accordingly. The Early Warning Technical Committee also monitors the availability of foodstuffs both for the relief programmes and the grain reserves for the nation's food security.

The article states that the future developments of Botswana's EWS will be related to the establishment of a Regional Early Warning System for the nine countries of the Southern African Development Co-ordinating Conference, based in Zimbabwe. So, the whole region is to benefit from the experience of each member country. Harmonization of data collection and reporting methods and general exchange of experience will result in improvement of drought monitoring and food security planning on the long term.

To be successful, an early warning system dealing with potential disasters which cross national borders requires international cooperation about dissemination of information and consensus about the measures to be taken.

At present, a plague of locusts threatens the Sahel countries in North Africa. Although this has been forecasted in 1986, thanks to advanced early warning techniques, the preventive measures suggested were not implemented because of the lack of international cooperation between the countries concerned. This is mainly due to the fact that civil war and other military conflicts hamper the governments from paying attention to long-term planning for the sake of preventing and mitigating disasters (Rene van Zanten,"De onnodige plaaq, sprinkhanen eten Noord-Afrika leeg," Haagsche Courant, 9 April 1988).

This situation is very much to be regretted, as early warning systems to locate the breeding places of locusts have been researched extensively with multidisciplinary cooperation for a long time already. Wilfred Thesiger, in Arabian Sands, 1959, mentions he was hired by the FAO to travel in the Empty Quarter to collect information on locust movements in 1945.

In Bhopal, anatomy of a crisis, Shrivastava analyses what has happened in the industrial disaster in the Indian city of Bhopal in December 1984. A severe gas leak in the Union Carbide plant, killed nearly 3000 people and injured another 200,000, many of them for life.

Regarding the legal aspects and consequences of this case, he makes the following remarks and considerations. The state and central government had encouraged Union Carbide to set up an industrial plant. In fact, the city government's objections to locating a plant which handled hazardous materials on that particular site were overruled. After the accident, more than 40 volunteer organizations and hundreds of individuals provided services for weeks. Besides this help, oriented on relief and rehabilitation, action groups raised political questions and
built up networks of concerned citizens, who vented criticism of the government and Union Carbide. Public participation in fighting the effects of the disaster was often of a political nature, stressing the fact that the accident was not handled properly. The actions caused a lot of controversy.

The lawsuits for compensating the victims became so entangled in legal wranglings and diffuse matters of competence between the Indian government, Union Carbide, the Indian legal system, US and Indian private lawyers, that the victims were not getting any compensation for months, even years in some cases. Twenty months after the accident, there was still no consensus about the question of where the case should be tried. By these discrepancies in the compensation issue and the lawsuit itself the victims were even more heavily victimized.

Shrivastava proposes the establishment of standing compensation funds around the world, in order to offer assistance to victims immediately after a triggering crisis event. Such compensation funds could be financed by corporations in much the same way that insurance systems are funded. Alternatively, governments could create such funds. In India, the Prime Minister's Relief Fund, a standing fund designed to assist natural disaster relief efforts, was used to aid Bhopal victims.

A victim's compensation fund has the advantage of separating compensation to the victims, which should occur quickly, from the question of legal liability, which may be resolved later.

In Bhopal, those who reaped the benefits of the plant - workers, rich farmers, stockholders, and government agencies - escaped unharmed, while the slum dwellers who lost their lives benefitted little from the plant's presence. Failure in the area of policy implementation occurred in the Bhopal case. In 1981, the Indian Labor Department investigated an accident in the Union Carbide plant that killed one person. Consequent recommendations to improve safety at the plant were never implemented, while many of these recommendations might have mitigated the 1984 disaster. Except for implementation, a dynamic updating of the risk assessments should be done periodically.

The government made a major effort to help, in mobilizing resources, handling rescue and relief, seeking alternative employment, but also had to prevent political repercussions. It proved to be impossible to stop local moneylenders and middlemen, who offered "services" for procuring relief money, from exploiting victims. The government's concern about the welfare of the victims, and the concern about its own legitimacy were conflicting. Control was sought in two ways: by controlling the dissemination of all information, and by quickly identifying and punishing officials who were thought responsible. But all these actions just delayed the payments of compensation. All these conflicts added to the controversial situation.
FINAL REMARKS

In "Legal Aspects" and the other references, the importance of law as an instrument of disaster prevention and mitigation is shown, and further comparative research is urgently required.

a) Zoning, subdivision and other regulatory measures have been used by many countries as techniques of land development and land-use control. These techniques can be extended for the purpose of disaster prevention or for risk mitigation and management. Non-enforcement due to lack of administrative infrastructure, especially on the municipal level, often plays a role.

b) High courts do not have much experience with constitutional aspects of land, but lower courts do. In developing countries there are legal loopholes and lacunae; for example, a local court has power within municipal limits, but uncontrolled growth goes beyond its borders of jurisdiction.

c) Good solutions are not everywhere applicable in the same way. Citizen participation is crucial, but in developing countries it might be a hindrance or a luxury. Insurance and tax strategies differ as successful tools for disaster prevention. Better research might result in advice about adopting policies appropriate to their distinct requirements and traditions.

d) Degree of preparedness varies greatly. Often there is no plan at all, or an unsatisfactory one. A good plan contains outlines for national and regional situations, declaration of a state of disaster emergency, duration of it, exercise of powers.

e) When disasters occur often, there should be a disaster preparedness unit, and the decision making power should be as high and central in the governmental machinery as possible. Enough attention should be given to regular updating.

f) Local authorities must cooperate in planning, also in inter-jurisdictional matters.

g) Special financing is needed for disaster-related activities, with a special committee to make use of these funds.

h) After each disaster, an evaluating case study should be made, identifying its causes and effects, in order to prevent and mitigate similar catastrophes in future. The HOT framework-Human, Organizational and Technological factors-is useful in this respect.

i) The Bhopal crisis prompted legislative measures around the world; but, besides India, mainly only in Western Europe. In this way, developed nations with a good infrastructure profit from the experiences of a disaster situation in a developing country by adapting their legislation to their own situations. The same effect is unfortunately not visible in other developing countries.
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ECONOMIC RECOVERY

D. Sogge

INTRODUCTION

Displaced persons put high priority on restoring their economic livelihoods. Those who devise plans with them, or on their behalf should do likewise. People caught up in post-disaster situations cannot remain forever on rations, food-for-work projects, or payrolls of a charity. In such positions they are far too vulnerable to outsiders. And their communities will never gain the means to sustain themselves or to develop civic pride.

Even under "normal" conditions in Africa, Asia, and Latin America it is difficult and risky to plan ways to permit households to gain income, or for communities and regions to prosper and reinvest. In settlements of uprooted people the problems are even more formidable.

Yet such situations are not without opportunities. Disasters can create circumstances whereby, once on their feet again, people can not merely regain the status quo, but move ahead economically. Encrusted bureaucratic rules, monolithic business interests and economic inertia can be broken or at least circumvented to the benefit of disaster victims.

This paper considers the question of economic recovery both as a problem and as an opportunity. It addresses means of seizing these opportunities, giving attention to four basic steps in a planning process:

1. Assessing options
2. Making decisions
3. Mobilizing resources and implementing plans
4. Extracting and applying lessons from the experience.

It further treats in sequence major phases in responses to most disasters: relief & rehabilitation, and reconstruction.

ECONOMIC RECOVERY: SOME BASIC CONSIDERATIONS

Immediately after disaster, most of those affected need no prompting to seek means of sustaining themselves. True, people can be too traumatized or exhausted to respond at first; hence the need for immediate relief and aid. But if that relief assistance is unnecessarily prolonged, or implemented with paternalistic or authoritarian methods, problems of motivation can arise. What began as a humanitarian response to acute crisis can rather quickly engender chronic paralysis.

Loss of land and possessions is of course a severe blow, but not necessarily a crippling one. Social relationships, skills, and
informal economic circuits all contribute to the economic survival strategy which every household will automatically adopt. Such strategies serve as a gyroscope, orienting steps toward economic security. For a planner, knowing and respecting such ordinary thinking and behavior is essential.

That is, the responses of those affected are anything but random and thoughtless. Rather, they are valid and often quite shrewd. However, their effectiveness depends on the affected person's maturity and degree of experience, as well as sheer time and energy available. A population composed largely of unaccompanied children, old people, and mothers with several infants will almost certainly need more external assistance over a longer time than would a more balanced population.

Measures to foster economic recovery will usually be less complex where the disaster has hit people suddenly. A flood, earthquake or storm will permanently destroy the economic fabric only rarely. If there is no severe loss of life (including livestock), the problem is the relatively straightforward one of providing residents and local infrastructure authorities with the physical means to reestablish the status quo ante. In the case of slower-onset disasters — internal war, drought, and famine — the economic problems are more complex. People may be more thoroughly uprooted or dispossessed, with fewer immediate prospects of return to native ground. Commercial circuits may be disrupted, and there is often very widespread economic decline. In such cases return to the status quo ante is virtually impossible.

GETTING BACK ON ONE'S FEET: THE RELIEF & REHABILITATION PHASE

Assessing Options

As noted elsewhere in this collection of papers (notably "Social Data Collection and Disasters"), socio-economic information is vital. But the costs of gathering it can far outweigh its usefulness if the framework and aims are vague. In assessing options the following questions could be posed:

1. Which categories of persons or groups should benefit? e.g.:
   - Children, old people, i.e. dependents, unable to contribute direct labor power?
   - Households without no labor time available beyond that needed to meet its own need, and possibly labor-short?
   - Those in settlements? Those autonomously settled?

2. What are the problems as they define them?
   - At the household or micro-level:
     - food for the coming "hunger season"
     - inputs for farming, fishing, etc.
     - access to cash
     - domestic fuels
     - building materials
     - access to training certification
At the settlement or macro level:
• improved, sustained transport and warehousing capacities
• physical security
• water, sanitation, drainage infrastructure
• organization of labor for public works.

3 What resources can be mobilized rapidly? in the longer term?
From affected groups themselves:
• practical skills (Note: some settlers may be reluctant to reveal these in some cases, preferring to give as profession merely "farmer")
• tools, cattle, equipment, vehicles
• managerial experience
• local knowledge
From local persons resident in the settlement zone:
• practical skills, managerial experience, etc.
• under-utilized physical infrastructure such as warehouses, water sources, administrative premises.
From local authorities:
• transport services
• office, warehouse, school infrastructure
• power to intervene to negotiate land, work space, energy, etc.
• knowledge of conditions, natural resources, patterns of economic activity
From regional or national authorities:
• indications of capacities for sustaining projects to furnish needed goods and services on an emergency basis
• power to waive or accelerate bureaucratic procedures for allocation of goods and services
• statistical and scientific information on local rainfall, groundwater, and on agricultural, logistical, commercial and other conditions
From foreign resident and non-resident agencies:
• a range of purchasable goods and services
• models (successful & unsuccessful) from which to learn.

4 What timeframes should govern the options laid out for the relief phase?

Planning of economic rehabilitation must begin here as well. The framing of options should therefore include the setting of thresholds or criteria for ending external support. The consequences of not setting such thresholds can be costly: the creation of dependency relations; discouragement of local initiative; and misapprehensions, distrust and outright conflict among beneficiaries of relief assistance, providers of it, and local residents not eligible for it.

Making Decisions

Processes used to collect basic information from affected persons may help suggest means of involving them in decision-making about economic recovery, even at an early stage. Participation here is often a practical necessity to improve the chances of smooth implementation, mobilizing of local labor—time, assuring fairness
and honesty in allocation of resources, and correction of errors in subsequent phases. The need to act rapidly to reduce immediate suffering and prevent further loss may tempt planners to take shortcuts, and to omit consultation and participation. However, decisions taken at the beginning commonly have more fundamental consequences than those taken later. Also implementation will succeed or fail to the degree that the implementors are involved in decision-making at an early stage. For these reasons planners should hold in check tendencies to let expediency overrule consultation even in the early, urgent stages.

Mobilizing Resources and Implementing Plans

Means of orchestrating relief assistance is covered elsewhere in this collection of papers. Management of such assistance has in recent years become a matter of concerted study, publication, and formal training. The UNHCR, for example, has made important progress here. (See Handbook for Emergencies, UNHCR, 1982 and Planning Rural Settlements for Refugees: Some Considerations and Ideas, UNHCR, 1979.) Rather than rehearse what has already been amply covered elsewhere, the following paragraphs signal tactical choices in implementation which can influence prospects for economic recovery.

Food Supply. Trends in the prices of basic grains normally give good clues not only about the extent of the crisis affecting a given population, but also the extent to which food relief measures themselves are dispelling or exacerbating a crisis in food supply. It has long been observed that food relief through imports can harm rather than improve long-term prospects for food security by depressing prices — and thus incentives for local producers — and affected persons themselves.

Genuine food relief needs should therefore be distinguished as accurately as possible from needs for structural approaches to providing food security on non-dependent terms. Prospects for foodstuff purchases in a country or in neighboring countries, together with acquisition of seeds, should be investigated as a matter of priority, as well as the costs and risks of internal transportation, warehousing, and local distribution free of predatory commercial practices.

Together with access to tools, seeds, means of on-farm transport and other inputs, those in the affected community (re)entering agriculture should be informed as to when the food relief will end, and as to what type of return they can expect from their own production. A measure worth implementing even during the relief phase is the gradual but systematic substitution of foodstuffs with purchasable consumer and producer goods for which access is controlled (via buying co-ops) and hence limited to local agricultural producers.

Water. The proximity and quantity of water available to a settlement can have immediate economic consequences, chiefly through the effects on the time households have available for other
things. These factors also have obvious consequences for general health and well-being, which in their turn influence the amount of labour-time available.

Even before drilling rigs or water pumps have arrived, residents will have organized a supply of water on a household basis, often absorbing the labour-time of children and women. Water hauled by households for households is usually not a commodity; but it can become one rather rapidly where a local resident owns a pump, or cart and donkey. Control over water sources or water hauling is, together with rights over land, a matter where public need may clash with private possession. As such it must be addressed by political authorities with powers to ensure access to all at low cost. The organization of water transport, or of well cleaning and management merits priority attention in the relief phase. The steps taken here are likely to be the first toward creation of local work units which together form a basis for settlement public utilities' services.

Shelter. Construction and construction materials are treated extensively elsewhere in this collection of papers. Technologies, designs, equipment, expertise and organizational frameworks applied in the relief phase can influence profoundly the prospects for subsequent phases. Where the approach to shelter relies heavily on conceptual and material inputs foreign to the affected community, the chances are poor that sustainable economic activities will emerge following the relief phase. The repair of tents might provide economic livelihood for a few, but not for a very long period.

Where known local materials, skills and designs are incorporated from the beginning, the chances are considerably better that a construction and construction materials sector will emerge in and around the settlement.

Among the most important activities of the relief & rehabilitation phase, with a view to later evolution into sustainable economic units, would be:

* the cutting and hauling of grass, palm leaves, bamboo or wooden poles for use in roofing and temporary wall materials;
* the plaiting of palm leaves or combing of grass for roofing;
* the hauling of stone and gravel;
* the winning of mud and sand for adobe construction;
* the identification of skilled builders in the community for use in construction, or supervision of building by others, coupled with the organization of work crews for public works;
* the provision of basic hand tools and simple means of conveyance (e.g. wheelbarrows, carts) for construction material production and building crews for constructions or infrastructure serving the public.

Transport Infrastructure. During a relief & rehabilitation phase, settlements remain dependent on lifelines to the wider world for food and other supplies. While residents may have
arrived separately on foot carrying meagre belongings with them, they cannot survive long collectively in settlements relying on unassisted human portage. Labour time is desperately needed for other activities. Hence it is usually essential to organize a sustainable system of cargo transport which puts low demands on scarce labour-time.

Planning here should concentrate on:

- identification and mobilization of traditional non-motorized means of cargo transport (carts or sledges drawn by animals; pack animals; bicycles; hand carts);
- identification of bottlenecks in sustaining motor vehicle services, such as fuel and spare shortages, or insufficient maintenance skills among vehicle crews;
- identification and mobilization of available supplementary motorized vehicles, such as tractors with trailers, or motorcycles for communication;
- the organizing of work crews to provide at least minimal maintenance of access roads and bridges, or of docking points for cargo boats.

Warehousing and Distribution. Storage and distribution during a relief & rehabilitation phase may appear to be matters generally left to outsiders to organize over limited periods. They may therefore appear ephemeral, without lasting consequences for economic developments thereafter. Yet opportunities may exist here to control or reduce predatory commercial structures and practices to which displaced households and settlements are so often vulnerable.

Where, as in most emergency operations, central authorities intervene to assure supplies to affected populations, consumer interests can gain a certain temporary ascendency over those of suppliers: ration systems, price ceilings and other forms of market control are often imposed for a settlement. Often these are accompanied by special warehousing systems or distribution points. These may be weak and ephemeral, but need not remain so. Resident participation at an early phase, together with training and some continued protection by external authority, can create openings for co-operative buying arrangements, and co-operative retail trading, warehousing, and distribution. Such posts could eventually hold their own against private merchants. Along with minimal management capacity, assured access to transportation services, or simple ownership of means of transport, are often critical factors.

Extracting and Applying Lessons from the Experience

To begin planning and implementing the more difficult phase of reconstruction, assessment of what was set in motion in the relief and rehabilitation phase can repay the effort.

Such an assessment is perhaps interesting for external relief agencies and central authorities, but it is of greatest practical importance for those burdened with planning and implementing
measures for economic recovery locally — that is, local administrators and representatives of residents themselves.

Because its aims were few in number, limited in time, and relatively undynamic, a relief operation will normally not lend itself to an evaluation yielding profound insights into the prospects of economic recovery. But a thoughtful review of the experience, one focused on a number of critical areas, could yield valuable clues in the matter.

Among these areas are:

- Trends in food supply: what basic items are now being procured locally?
- Bottlenecks in supply lines: what is the mix of material and human shortcomings?
- Satisfaction of needs for shelter: what bottlenecks, normally overcome locally, persist?
- What organizational forms have sprung up among residents as part of the relief effort?
- What are the range and depth of technical, managerial, and entrepreneurial skills among the displaced?

Together with the socio-economic information gathered, such an assessment will help provide a basis for strategic planning of reconstruction. It should help make such planning concrete and realistic by clarifying what is known, and focusing analysis on alternative policies or programmes which differ only incrementally from the current state of affairs. It permits identification of variables in the socio-political environment likely to impinge on reconstruction efforts.

For example, if assessment showed that roadway upkeep was vital for settlement survival, but that roadways deteriorated during the rainy season because road crews failed to show up for work, preferring instead to work on their family plots, then a policy to address the rainy season road crew labor shortage would be indicated.

Of course, strategic planning at the margins may be proven utterly unrealistic if disaster continues to strike. Planning incremental measures to put a sounder economic floor under settlements sustained by relief shipments has little purpose if, as in a number of countries, those shipments are systematically ambushed, or the settlements themselves overrun by armed gangs. In such cases planners and victims alike are forced back almost to square one.

STEPS FORWARD: THE RECONSTRUCTION PHASE

Assessing Options

As external assistance diminishes, self-sustaining economic activity for settlement residents becomes imperative. In general, the earlier this imperative is acknowledged and planned for, the better.
However, the dimensions, dynamics, and inter-relationships of the problems to be addressed have to be ascertained. For example: Is the assured supply of sufficient food, as linked with available cultivable land, the most pressing issue for most households over the years ahead? Or do most households face shortages of producer goods (tools, materials), wage goods (consumer articles) and incentive goods (non-essential consumer articles)? And if so, are these linked with poor supply systems, low income, or household labour shortages?

Analysis of prospects for self-sustaining economic recovery in settlements peopled by disaster victims is thus little different from that required in "normal" poor country planning situations at local and regional levels. The difference is usually that people are now subjected to above-normal levels of vulnerability — especially economic vulnerability.

In such circumstances a planner may have to cope with greater uncertainty. Warfare may make settlements little more than temporary encampments. Moreover options actually available to address the problems may not have crystallized at an early phase. For example, residents may wish to resume livestock-rearing as soon as possible, but the effects of drought on vegetation and animal reproduction, and the political and economic implications of grazing in a given locale may not be known with any accuracy.

Important variables to consider while framing the options for economic recovery along broad lines would be the following:

1. Is it official policy that a planned settlement, or autonomously-settled households, become permanent, and that residents be granted secure rights to land and fixed assets? Given environmental, demographic and military factors, how realistic is such a policy over more than one annual cycle?
2. What trends are observable in new residents' engagement in the wider economy as consumers and producers? For example, are they recruited by locals for cheap labour? Are they active or passive in trade within local and regional commercial circuits? What goods or services are they furnishing beyond their own settlement?
3. What basic needs currently met by external assistance in the case of re-settled persons are met adequately from local sources in the case of long-established residents? What short- and medium-term effects on the supply and demand balance could be anticipated by the withdrawal of external assistance?
4. What policies and practices govern entrepreneurial activity? Infrastructural investment and maintenance? The supply of raw materials, fuels, tools and supporting services?
5. What basic trends are observable in the broader economy: prices, employment, capital in- and out-flows, etc.
6. How, and along what lines (mutual aid, ethnic, religious, gender-based) have residents organized themselves?

In sum, options may be assessed against a background of:

1. lessons extracted from the relief & rehabilitation phase;
2. socio-economic information on residents;
definition of the problems and the hierarchy or sequences into which they can be divided;
broader economic trends, policies, programmes and the institutions through which they operate;
availability of means;
acceptable levels of uncertainty.

Making Decisions

Authoritarian or paternalistic management styles, if present during the relief & rehabilitation phase, now clearly have no further place if reconstruction is to develop a momentum of its own. Consultation and participation in decision-making become essential. Groupings or formal associations of residents or their representatives should now move center-stage.

On the side of national authority, in the state apparatus, the delegation of powers to local or regional staff should have occurred as the relief and rehabilitation phase ran its course. If neither tendency — resident participation, or decentralization of powers — is observable, then a shift of emphasis to reconstruction may be premature.

Commonly, however, supplies allocated by central authorities will begin to dry up. Those same authorities, and their local subalterns, will begin to exhort residents to exercise self-reliance. Thus responsibilities tend to shift in the direction of the settlements, although the means to fulfill them often do not. Hence the need for realistic assessment of locally-available means, and priority from the beginning on reinforcing those means.

Insofar as local state authorities providing routine economic services — public works, agricultural training and extension, orchestration of investment — play a role, means to consult them systematically should be organized. Inter-agency consultative bodies at local or regional level with short-term mandates respecting reconstruction efforts, can help focus attention and mobilize needed resources. They may also mitigate possible bureaucratic snags or intra-governmental conflicts. In countries where the state plays a dominant role in the economy, such inter-ministerial commissions may be central to decision-making for the reconstruction phase.

The time-frame for reconstruction is far more open-ended than for the relief & rehabilitation phase. Hence decision-making has a rolling character, with many feedback loops. National and even international policy and economic trends will become even more influential.

Mobilizing Resources and Implementing Plans

Although public authorities will commonly orchestrate, if not dictate, measures intended to foster economic recovery in the wake of disasters, private and cooperative undertakings will commonly assume major roles over time. In this section the broad
categories of civic and private initiatives are used to draw out distinctions and to emphasize the continuing role of civic investment and management in economic recovery — regardless of whether the government of the affected country is strongly interventionist or not.

**Civic Action/Investment.** To be put on a sounder footing:
- water source services:
  - pump maintenance service
  - well-digging, cleaning
- communal infrastructure construction & maintenance:
  - drainage
  - latrine construction
  - public laundry sites construction
  - solid waste disposal system—road upkeep
- public vehicle maintenance:
  - fuel storage
  - garage service
  - tyre repair
- dock, airstrip, railway upkeep
  - warehousing:
  - post-harvest crop storage
  - goods imported from outside locale
- communication services:
  - radio-telephone
  - postal service
  - radio broadcast

**Civic and Private Initiatives and Investments.** The following will be more or less promising depending on the pre-existing economic environment and the human resources available among new settlers. These settlers will have to find economic niches, depending on demand arising from already established residents and from among fellow newcomers. Special support services may be warranted to reduce entry barriers. Such barriers commonly consist of: lack of access to tools, equipment and materials; improved skills, especially in managing small enterprise; lack of reliable transportation services; and sometimes lack of credit.

Care must be taken to study the prospects for such local initiatives in a wider context of:
- state allocation of resources (materials, machinery, credit);
- private production and investment;
- taxation, price controls, state subsidies to investors;
- labor laws, inspection;
- private credit;
- competition for similar resources by local residents;
- competition for markets;
- attraction of alternative employment by skilled and semi-skilled workers outside the locale.

**Direct Production**

Settlement planners & residents should carefully consider costs and benefits of import-substitution, and trade with the rest of the region.
a) Stabilizing & improving supply of robust seeds & root crop cuttings. National seed farms or institutes could be called upon, but close consultation with local farmers, and direct purchase of seeds destined for seed multiplication may give better results. Premium prices should be paid to those selling seeds or cuttings of acceptable quantity.

b) Land clearance. This may be one task for which the rental of tractors or heavier equipment may be justified. With appropriate hand tools, and special food supplements, local work crews could be mobilized from among settlement dwellers.

c) Stabilizing & improving livestock and fisheries production. Goats and chickens are typical of small livestock which could be promoted immediately. Apart from furnishing means of catching fish, locally-acceptable means of preserving them should be promoted.

d) Stabilizing & improving the supply of woodfuels. In many lands this activity may be readily organized with appropriate means of cargo transport, hand tools and sharpening devices, and food supplements to work crews. This can be combined with ground-wood collecting for construction and fencing.

e) Salt, oil, fruit, beverages. Processing of such products depends, of course, on local endowments and diets.

f) Grain milling or cassava processing. A common hazard here is that relief grain shipments can lead to investment in machinery which later proves far too big, and too centralized to be of much use to settlers finally producing their own grains. Very small, non-motorized milling devices should be investigated first.

g) Materials for foundations and walls. Techniques in adobe and burned brick are discussed elsewhere in this collection of papers. Appropriate tools, cargo devices, and food supplements and appropriate management can provide the conditions for sustainable small enterprises. These in turn may stimulate construction enterprises.

h) Roofing materials. Grass, bamboo, reed, woven or natural palm may be obtainable, but newcomers to already settled areas may find the costs in fetching time too high. External subsidies for purchase of galvanized iron roofing may be the only alternative. Sales of such roofing through civic channels can generate local currency funds for civic investment.

i) Domestic articles (clay, metal, wood). Depending on the material culture and requirements of the displaced, an impressive range of domestic goods, from chairs to pots, (and domestic services, from bucket repair to tool sharpening), may emerge with modest encouragement. The plastic bucket may have driven out the clay pot, but not yet the earthen water cistern or grinding bowl.
j) Clothing & footwear. An obvious set of local industries, they are also ones in which the activities of local craftspeople may preclude entry by the recently-settled. A policy of infant industry protection may be called for.

k) Toolmaking and repair. An adequate supply of appropriate steel may be found in scrap heaps; the problem is sometimes one of overcoming political obstacles to get it. Appropriate fuels may likewise be hard to acquire. Subsidies are often needed.

l) Local vehicle repair (bicycles, carts, wheelbarrows). This is an obvious set of enterprises, yet all too frequently overlooked in the relief phase, when so much attention goes toward motor vehicles. Spare parts imports should be subsidized.

m) Cultural artifacts. For both local consumption and possibly distribution beyond settlements, artifacts from drums to carvings to embroidered garments can merit attention as settlement residents seek money-making opportunities. Often, however, the markets are saturated and prospects less positive than what many foreign promoters first think.

Exchange with the Settlement and Outside of It

a) Buying cooperatives. These may be among the first to spring from the ground if residents believe that such commercial posts will gain them privileged access to goods. But they will wither quickly if no system delivers the goods, or if no mechanism exists to protect members against dishonesty or favoritism.

b) Credit societies. Mutual support at times of crisis, or for funerals and the like, give rise to many indigenous forms of community pooling and lending. These may provide a basis for much more complex forms, such as those needed to get farmers started through an agricultural cycle. But such complex credit mechanisms demand fairly high levels of trust, literacy, book-keeping skills and organizational stability.

c) Private trade. For new settlers to establish niches as private traders in the all-too-frequent situation of well-developed local trading circuits, some forms of initial assistance or protection may be necessary. Such assistance could include privileged access to certain locations, or reduced fees for transport services. The construction of market stalls, butchery facilities, fish drying or smoking structures, etc. may be planned with newcomer traders in mind.

Services

a) Common labour for local employers. In many post-disaster situations, the most common survival strategy in the near and middle term is to sell one's labor power to local employers. This is likely to happen quite spontaneously. Sometimes it even determines the physical contours of settlement, predisposing many to avoid planned settlements and to settle autonomously. An advantage of planned settlements is that residents may benefit from
planned, and controlled, markets for labour. In a number of instances (Sudan, Thailand) labour exchanges have been established on behalf of disaster victims in settlements. If planned with the full participation of prospective workers themselves, such labour exchanges can help minimize exploitation of settlement residents as workers, and can help identify gaps in the labour market and needs for skill improvement.

b) Construction crews. Indigenous systems, such as off-season building services in zones heavily influenced by annual farming cycles, can give clues to what is possible. Management abilities and logistical means are often bottlenecks, and may require special attention and investment.

c) Repair services. Clothing and footwear repair, already alluded to, are among the most obvious. Yet even in remote areas there can be considerable demand for blacksmithing, tinsmithing, bicycle repair, tyre repair, radio repair, watch repair, and of course motor vehicle repair. Commonly, however, the crucial bottlenecks are in the supply of materials, energy, and tools. Therefore the setting-up of workshops and the provision of training will count for nothing if the supply circuits are weak.

d) Child care, creches. Depending on cultural patterns, the proportion of the population no longer intensely active economically, and the demands placed on fully active household members (e.g., considerable wage labour), investment in training of and support to local creches may be highly beneficial, and can provide supplementary employment to many.

e) Security services. Residents of settlements whether in time of war or of economic upheaval will face problems of security of their goods and persons. Guard duty in local militias is a common phenomenon in settlements. In the mid- to longer-term, such services may fall to those permanently employed in them. Residents and settlement planners should address the matter, in consultation with local authorities.

f) Cultural work. Theatrical and musical groups, puppetry and dance are not the superfluous luxuries they might seem, especially when a resident's morale, sense of self-worth and need for relaxation are seen as basic to survival. Education for persons of all ages, and the promotion of certain vital health or environmental campaigns, may also find excellent vehicles through organized units for cultural expression. In the short to middle run, however, subsidies will be necessary.
INTER AGENCY COORDINATION

M. Weeda

INTRODUCTION

This essay is based on my experience working in refugee situations, particularly Somalia, as a Social Services Officer for the United Nations High Commissioner for Refugees. Evaluation brings up questions and observations concerning coordination. Written from a specific refugee context (Somalia) they can be linked to refugee assistance programmes in general. The lessons learned can be applied to a wider context, like other disaster situations.

DESCRIPTION OF THE SOMALI SITUATION; GENERAL BACKGROUND

Somalia, in the north-eastern corner of the African continent, ranks amongst the 25 poorest and least developed countries of the world. The Somali Democratic Republic became independent in 1960. For the Somalis it was an incomplete State as parts of what they considered the original Somali nation, remained outside, as a result of the 'Scramble for Africa'. From the beginning Somali's foreign policy was dominated by the unification issue. This set the scene for continuing border conflicts and led to the Ogaden War in 1977-78. A mass influx of refugees was the outcome. An emergency was declared and international assistance sought. In response to the Government appeals voluntary agencies and international organisations, of all sorts and sizes, started to arrive.

THE HIGH COMMISSIONER FOR REFUGEES IN SOMALIA

Amongst the international agencies responding to the appeals was the Office of the High Commissioner for Refugees, called into existence on 1 January 1951. The main responsibilities of the Office of the UNHCR are the international protection of refugees and the pursuit of durable solutions to their problems. These durable solutions as identified by UNHCR are:

Voluntary Repatriation, return to the country of origin.
Local Settlement within the country of asylum.
Resettlement to a third country when the above are not feasible.

The UNHCR is responsible for ensuring that refugees receive the assistance necessary to meet their basic needs and to attempt to achieve these durable solutions. The UNHCR receives the bulk of its funding from donor countries through a yearly appeal to EXCOM. UNHCR's primary role concerning assistance is to help governments respond to refugee needs and is in most cases 'non-operational'. The direct provision of assistance is made in most cases by UNHCR's 'operational partners', including the government of a country of asylum, international intergovernmental organisa-
tions, non-governmental organisations (NGOs), private firms and technical consultants.

Assistance to refugees has always been categorised under the heading 'emergency assistance' which means short-term relief, bringing massive amounts of aid in the form of food, goods, cash and expatriates. Even in the 'care and maintenance phase' when the first emergency is over, the assistance is still viewed as temporary, awaiting a durable solution.

The UNHCR opened its branch office in Mogadishu in 1979. The immediate programme involved the provision of food, shelter, water, health care and logistic support. The UNHCR worked directly with the government counterpart, the National Refugee Commission (NRC), created by the government to deal with the refugee problem. The branch office was assisted by 4 sub-offices and 2 field offices, the social services office and technical unit, staffed by local and international personnel to assist the branch office in their coordination of the refugee assistance programme. For the implementation of the programme, the UNHCR office in Somalia depended on a variety of operational partners, governmental as well as non-governmental.

After the initial emergency response UNHCR moved into the phase of 'care and maintenance' support. In 1982 an attempt was made to stress the concepts of local integration and self-reliance. The Government of Somalia, however, still viewed the refugee situation as temporary, expecting the causes which led to the flight to be solved within the shortest possible time. In March 1983 the Government issued a new Policy Statement to allow the creation of settlements, still hoping for the conditions to change and people to return home voluntarily.

PLANNING

The assistance to refugees in Somalia was set within the UNHCR context. The Somali branch office followed the guidelines from headquarters, which were influenced by expectations concerning financial resources and donor perceptions regarding assistance to the different countries. This hampered a flexible interpretation of the rules to fit the country's needs.

The planning was done in coordination with the government agencies and NGOs involved in implementation. The way this coordination was interpreted by the UNHCR office gives rise to many problems and friction. The agencies are expected to follow UNHCR's guidelines and formats without taking into account whether these fit their structure. Such a 'top-down' introduction of a formal, bureaucratic method into Somali society, still characterised by oral tradition and informal ways of decision-making created problems (Rodenburg, 1986). For expatriate NGOs these one-way expectations caused other problems as most agencies have their own established methods, sometimes based on a longer-term and more development-oriented planning approach.

The planning within UNHCR was done on sectoral basis, with the only 'coordination' consisting of checking the different propos-
als in accordance with the directives and then compiling them into one 'plan' for headquarters. There seems to be no relation between the refugee planning coordinated by the National Refugee Commission (NRC) and the country's national planning. Not many serious attempts were made to create a policy or coordination platform. Minimal coordination existed between the branch office and the field offices, despite the monthly meetings.

THE PERCEPTION OF EMERGENCY VERSUS DEVELOPMENT

Recently the awareness is growing that disasters and development cannot be separated and that relief and reconstruction programmes cannot be viewed or carried out as separate or distinct operations. An emergency influences the overall development of a country.

The literature shows a long-standing debate regarding how to define emergencies, mirroring the different views of experts, agencies and governments. Such different views and theoretical debates can have negative effects as is shown in the example of the Ethiopian Famine of 1984-85, where this seemed to have played a part in the late response from donors and agencies (Jansson, 1987). Working definitions of organisations, however, can provide an indication of how disasters are perceived. According to Cuny (1983:140) emergencies are often defined as unforeseen, unusual events with widespread loss of life and property, disrupting the existing social order, needing quick and massive assistance from outside. The perceived material losses, rarely backed by surveys, lead agencies into massive material responses.

The assumption that victims cannot take care of themselves and therefore need outside help, combined with the view that disasters wipe out indigenous coping mechanisms, creates a condition where aid organisations ignore any local coping mechanisms. Viewing emergencies as unforeseen, isolated occurrences, aid organisations fail to see them in a broader perspective. They see only the root causes of the natural disaster—an earthquake, flood, or hurricane—but they fail to see the vulnerability derived from poverty. Such perceptions place emergencies in isolation and not in the total political, social and economical context of a specific country.

Perceiving an emergency not in isolation but linked to the overall development of a country, however, means that an emergency operation will have to be conducted in relation to development programmes. Both approaches influence directly the way emergency operations are organised and coordinated as well as the methods used for reconstruction and rehabilitation, staff recruitment, and time planning and the way in which victims will be involved.

WHAT IS COORDINATION?

Emergencies and post-disaster response seem to be characterised by 'multiplicity' in terms of money, food, materials, donors, implementing agencies and 'experts'. The nature of relief assis-
tance itself seems to create problems and hampers finding solutions. In the past, few inquiries are made into the effects of the operations and the multiplicity of donors in a particular emergency. Recently, however, the impressions derived from the stories of relief workers about negative effects of duplication of effort has prompted intensified interest in emergency coordination and in the question how coordination can play a positive role in the emergency response.

What is meant by coordination? The Collins Dictionary describes 'coordination' as "a balanced and effective interaction of movements or actions" and 'to coordinate' as "to integrate diverse elements in a harmonious operation; to work together harmoniously". This is a very useful description of the action needed to integrate a diversity of donors, agencies and views to achieve an effective working relationship with the ultimate goal of relieving the consequences of an emergency situation for its victims.

Most actors involved in emergency relief agree with the need for coordination, but not on the means. Most agree that coordination should be "the mitigation of the negative effects inherent to the aid system and arising from the multiplicity of donors operating in a given disaster situation". Cassen (1987:224) mentions three additional functions of coordination:

1. to assemble resources for particular countries to assess needs and likely flows of aid and to provide mutual encouragement among donors so that collective aid is well-related to the recipients situation;
2. to provide basic economic and technical assistance and information on which the donors can make their judgments on aid levels, project selection, needs for differing types of aid and administration for particular recipients;
3. to provide policy dialogue between donors and recipients and provide macro, sector, project, and technical cooperation.

FACTORS INFLUENCING COORDINATION

The need for coordination of relief efforts is influenced by several factors: a. the kind of emergency, b. the phases of a disaster operation, c. the type of organisation, and d. the level of operation.

The Somali example shows that a refugee situation, like droughts, can develop into long-term emergencies, dragging on for years with no clear solution in sight, as opposed to short-term emergencies, caused by floods, hurricanes or earthquakes, where people can return to their homes and start rebuilding as soon as the floods recede or the tremors have seized. In long-term emergencies the link between emergency assistance and development assistance becomes most apparent.

An emergency operation can be divided into different phases. During the emergency phase, just after a disaster occurs, a high interest in coordination can be noted amongst relief organisations. As soon as most agencies have established their programme in the weeks following, the interest for a broader form of coordination weakens. All attention is directed to the actual field
work. Hence, relevant coordination is related to the sector and limited to the local or at most regional level. Agencies are interested in sharing of information and resources in their own field, like health or housing, with the objective of getting the job done as well and as quickly as possible.

During the rehabilitation phase a different need for coordination comes up, as programming for such a phase can stretch out over several months or even years. Long-term programmes need to be established, linked to the overall economic and social development of a country. Many organisations will branch out into other sectors or will become more dependent on other sectors, including the 'normal' development programmes and governmental programmes. During this phase, more formal coordination is seen as beneficial to enable dealing with the local government.

Another factor influencing coordination is the type of organisation. Many differences exist between the mandates of multi-lateral organisations like the UN-agencies, those of the non-governmental organisations, expatriate as well as indigenous, and those of governmental agencies. Each agency has its own pattern of relationships between their local representation and head office, their own procedural systems, own modality for selecting and contracting experts, procurement of commodities and equipment and of financial accounting. It is self-evident that such a diversity will have its effects on any attempt to coordinate.

Coordination takes place at different levels. High level coordination is achieved through Consortia or Consultative Groups, like the EXCOM-meetings of UNHCR. Within the NGO-system one can see similar levels of coordination. International bodies like the Red Cross, Caritas, and World Council of Churches have been established and provide high level coordination. Such bodies serve their member groups by collecting and disseminating information, funds and relief materials and providing technical assistance. They provide a forum for exchanging information about emergencies and coordinating appeals (Gudy, 1983:120). One of the aims of higher level coordination is to improve the match between types of aid provided by donors and the recipients requirements. In this way coordination is meant to have its effects on the policy side as well as on the monitoring and implementation side at field level.

At regional or country level UN agencies are supposed to play a leading role. In the Somali programme coordinating platforms were constructed at every level of the operation. In Mogadishu the Inter Agency Meeting was meant to give a structure to UNHCR's effort to coordinate its own policies and work with those of the government and the NGOs in planning the overall refugee assistance programmes. The field and sub-offices installed their own meetings, to enable the coordination of the monitoring aspects and the actual work, trying to avoid duplication as well as to discuss the problems arising. Due to the organisational structure of the refugee operation, the same subjects would come up at different levels, involving different problems and decision-making processes.
THE DIFFERENT ACTORS INVOLVED

Multilateral agencies like the UN agencies have coordination as a major assignment in their mandates. They are supposed to coordinate various relief and reconstruction efforts of the UN system and to stimulate prevention and preparedness measures. The United Nations Disaster Relief Organisation (UNDRO), for example, is expected to have information on donations and to coordinate foreign agencies in the field during post-disaster operations. UNHCR has to do the same in relation to the refugee relief operations.

Non-governmental organisations (NGOs) will also respond in an emergency situation. In terms of material resources they don't have as large a contribution as multi- and bilateral organisations. However, they play a key role because they can be more flexible and have the ability to experiment in terms of style and contents of a programme. They have their own structure and rules but are not as tied to politics as governmental aid. They, in turn, are tied by their own objectives and perceptions and, in different degrees, by the expectations of their individual donors, whether churches, labour groups or 'the person in the street'. The scale that NGOs present can overlap, compete for the same donors but also play a complementary role amongst each other as well as in relation to the big multilateral agencies. NGOs have their own networks both on the donor side and the recipient side.

The need for coordination is growing amongst the NGOs. In the case of a diversity of donors channeling funds to one implementing partner in a specific emergency situation, increasing use is made of consortia to coordinate such assistance. The consortia members start to discuss the connections between emergency relief and ongoing development assistance, in particular where the implementing partner is involved in ongoing development projects, often paid by the same donors.

The recipient government is the other actor on the scene. They are initially the first to respond to an emergency. In case of larger-scale emergencies, governments are ultimately forced to call in outside intervenors. Depending on the possibilities of the government itself, additional outside assistance will be used to serve more people and/or to fill the gaps left by local aid. Here we touch upon an area where emergency response cannot be divorced from politics. Emergencies often highlight the social struggles and underscore the inequities within a (political) system. The way in which relief policies are formulated and implemented can alleviate or aggravate existing inequalities. This may be seen as a threat to the existing order.

Some governments are afraid that a disaster will disrupt the overall socio-economic development of the country as it needs disproportionate attention and diverts personnel from other tasks. Others see a disaster as an opportunity to move ahead towards a speedier implementation of their development objectives as the massive amounts of assistance coming in could be used to rebuild infrastructure in a better way.
Emergency situations are very susceptible to political interference partly due to the huge amounts of foreign aid involved. Conflicts of interest seriously influence the emergency response. This kind of 'politics' must be regarded as an integral part and not just an annoying problem to be ignored as long as possible. It should be noted that ultimately it is the government who takes the policy decisions determining the context of the relief assistance and the space organisations will get to provide relief assistance. Unless the government has a firm grasp of the aid process, coordination will not take place or will reflect at only the priorities of the dominant donors.

THE REFUGEE HEALTH UNIT, A COORDINATING BODY

An example of what coordination can achieve can be found in the health sector of the Somali refugee programme. When the emergency was called as refugees died of starvation and related diseases, many donors and agencies rushed in. They had their own projects, priorities, procedures and their own perception about causes, solutions and refugees. Agencies competed with each other in providing assistance to certain groups of refugees. Every organisation had different ideas about the way in which assistance should be provided. Some wanted to assist only during the emergency phase and pull out as soon as the problems were under control; some wanted to work with the local health structure, others were very negative about local conditions; some worked from the principle of "community based health-care" and wanted to involve the refugees as much and as soon as possible, others came in with outside personnel and material looking at the refugees as subjects of care. With all these agencies working in the same area or even within the same camp problems could not be avoided. Services were duplicated in those camps closest to the towns due to easy access, but were insufficient in the more isolated areas. Fierce competition occurred due to the differences in methods used, in payments to local staff or the provision of certain incentives to the refugees. The situation became very confusing for everybody involved. It was clear to almost everybody that this had to end. The health relief had to be coordinated. Certain working methods had to be established, a list of basic medicines had to be worked out, equality in pay settled and certain procedures started. A coordinating body was needed!

Out of all this emerged the Refugee Health Unit, placed under the responsibility of the Ministry of Health. However, the unit was not fully integrated within the health-infrastructure, but functioned as a parallel organisation with its own staffing patterns, own procedures, its own funding and budgeting and own foreign advisors. Due to the funding system it was strongly tied to UNHCR. The choice was made to provide basic, preventive health care. Links were established with the more curative-oriented Somali health infrastructure, as far as existed. The Refugee Health Unit (RHU) took over the responsibility for the provision of health care to the refugees in the camps. They were supposed to allocate agencies to certain camps or areas, to supervise and coordinate the work done by the foreign agencies and experts

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still working in the field. Hence the Refugee Health Unit can be seen as a positive result of a serious attempt to coordinate.

WHAT ARE THE CONSTRAINING FACTORS INVOLVED?

Giving increasing importance to coordination does not mean that it is integrated automatically. Problems arise due to several factors, interconnected with perceptions and attitudes of organisations as well as people, and the technicalities of the assistance process.

Multilateral organisations combine conflicting views, represent different countries with a diversity of objectives. Thus being assigned the role of coordination does not mean that this role can be carried out without problems. The origin of the organisation itself can create fundamental problems. The view of disasters and refugee situations as isolated occurrences has prompted the establishment of offices with an autonomous status within the UN system, such as UNDRO and UNHCR. They move when an emergency is called, with a specific set of objectives to be met. Opportunities are missed to link programmes of different organisations. Hence the assistance can become unrealistic in the country's social, political and economic context. The inability to establish a leadership role accepted by the other organisations and governments makes such mandates ineffective. This creates a negative attitude towards multilateralism which may be damaging in two ways; it can weaken the very multilateral agencies still playing key roles in coordination and may foster a trend back to bilateral, less coordinated aid.

Certain constraining factors are inherent to the nature of relief. Agencies which perceive relief assistance as a question of direct outside action until the emergency is under control, will not see much need for ongoing coordination. At best it will involve coordination of material flows, solving transportation problems, dividing work areas; issues related to the technical side of an emergency response. Ongoing coordination is perceived as a threat, as it would make organisations account for methods used and adjust their input according to needs indicated by the coordination.

Time pressure puts emergency relief in a very specific position. No time can be spent to discuss extensively what should be done and how. Immediate action has to be taken to save lives and to limit the after-effects of an emergency. The process becomes technical and financially related, decisions are made on ad hoc basis, with short-term objectives and without a proper understanding of the political, social and cultural context of the problem. Furthermore donor expectation causes a strong pressure to spend funds as soon as possible. This creates a problem of overloading; there are too many projects with too much diversity, which over-taxes staff and dilutes effectiveness. No energy nor time is left for coordination as the recipient has to show expenditure instead of careful implementation.

Another aspect of relief work that complicates coordination is the personnel factor. According to Cuny (1983;124) fewer than 5%
of staff have ever been involved in emergency relief before, even at managerial level. In the field, staff are mainly volunteers or short-term personnel. There is a high turn-over as many agencies cannot afford to maintain a large staff during non-emergency periods. They often get assignments that bear no relationship to their background or training.

Competition presents another serious constraint. Agencies "go to unseemly lengths to secure projects of reasonable size and manageability for own aid programmes, rather than to let them go to another" (Cassen, 1987: 221). NGOs in particular need to have separate identifiable programmes to show their benefactors. Competition is an inherent feature at all levels of the system. At higher levels for resources and funds as well as for public awareness and recognition. Recently donor agencies are more aware of the need to limit competition, and examples of coordination on a national scale emerge. In the emergency phase the agencies' competition for success can become an all-consuming motivation. As long as the importance of agencies is measured in material inputs of relief, numbers of victims reached or tents pitched, attempts to achieve effective coordination will be hampered.

Considering the many complications, donors and recipients seem to have strong reservations about engaging seriously in coordination. The donor reasons can be summed up in the fear that it will impair the freedom with which they can pursue their own interests through relief programmes. There are many subjects on which they are likely to disagree, particularly in matters of policy.

Recipients, governments as well as NGOs, are concerned that donor coordination will create unbearable pressures especially in the area of policy reform. Without coordination there is the freedom to play donors off against each other, to choose which donors will participate in which programme and to influence the terms of their aid.

Hence, coordination touches everything from ideological concerns to purely technical matters. This should not be underestimated.

CONCLUSION

The debate about coordination shows a vicious circle in the sense that many factors hampering the creation of effective coordination in turn could be affected positively by appropriate forms of coordination.

More interest is shown in achieving coordination. The reason is the realisation that effective coordination can result in well-balanced decisions regarding implementation as well as reductions and redirection of funds. Furthermore there is a growing recognition that through better coordination the assumed losses are modest compared with the potential gains. Growing concern among donors about the policy environment in which emergency relief operates brings up further need. Appropriate coordination at all levels seems the logical consequence of the understanding.
that an emergency response cannot be isolated from the overall
development of a country.

**Coordinating bodies**

Questions concerning the kind of coordination, the contents and
the expectations regarding the outcome of coordination are
directly related to all the forces influencing relief assistance.
Thus a careful definition of what is an emergency is needed as
well as the creation of effective mechanisms through which the
international community can respond rationally. Within this
context coordinating bodies can play a significant role.
Strengthening of already existing coordinating bodies is there-
fore needed. By using them increasingly for the review of
emergency operations, coordination can be strengthened in both
the rehabilitation as well as the prevention phase. Such cannot
be achieved amidst the confusion and pressure of an emergency.
It is impossible to sort through competing and conflicting values
and goals of the different actors involved during the actual
conduct of an emergency operation (Cuny, 1983: 131). Time is
needed to discuss what to do, to consider options carefully.

**Training**

Coordination should work towards the development of uniform
relief construction policies. Basic standards for relief assis-
tance as well as model programme approaches for providing assis-
tance should be developed, including disaster preparedness plan-
ing. Training courses relating to emergency management and
settlement preparation can assist such a process. Handbooks,
like the UNHCR Handbook for Emergencies and the Oxfam Field
Directors' Handbook are also useful tools. Coordination, its
possibilities, use and constraints has to feature more explicit-
ly, not just as a technical matter, related to logistic problems,
but as a means to achieve an appropriate emergency response.
However in the field a limited use of handbooks and little
outcome of training sessions can be observed. The reason may be
the fact that training sessions and handbooks have often little
connection with reality or are difficult to put into practice
while in the field.

**How to increase effectiveness**

One of the complaints is that so little results from coordination
meetings that it is hardly worth the time and effort. A reason
for this could be that when a coordinating body is established no
proper attention is given to clearly establishing a) the contents
of such meetings; b) what will be coordinated and c) what will be
the decision-making process. Such clarification is of the utmost
importance as the agencies involved ultimately are independent
organisations. If no agreement is reached about these subjects
before final decisions are taken, ongoing frustration will be the
consequence as all participants can put conclusions reached
aside. Donor agencies have some power with which they can in-
fluence meetings, enforcing their own decisions and criteria:
funds! The more funding input the more power. However using
this method creates bad feelings amongst donors and recipients.
Coordination can gain effectiveness by integrating the emergency response within existing coordinating bodies. Appropriate relief is more likely achieved through existing networks. Emergency-oriented agencies should give due attention to the question how to link emergency assistance with development assistance. Development-oriented agencies have to become more sensitive towards the specific issues linked with emergency response and study the concept of disaster-preparedness as an integral part of development.

Overall acceptance of coordination and its role in relief and development is a policy issue involving the policy and planning levels of all actors involved. Not only implementing staff, but also planners and policy-makers, must fundamentally rethink the role and structure of coordination in order to solve the fundamental problems and differences which block the way to an effective coordination.

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COMMUNITY PARTICIPATION AND SETTLEMENT DEVELOPMENT

M. S. Muller

INTRODUCTION

It is sometimes said that involving the people in the fullest sense in rehabilitation work is the most important condition for recovery after disaster. Requesting people to carry out their usual social and family obligations—even with more intensity in the crisis situation—would help them, the victims, to overcome their feelings of shock and apathy. And asking them to contribute their knowledge, ideas and skills would ensure that a settlement is developed that suits their needs. In a general sense, it is right to stress the ongoing responsibility of disaster victims for the recovery of their settlement. It is not long ago that relief and rehabilitation workers would gladly decide for the victims "what was good for them."

At the same time, however, the generality of such statements is not correct, as it ignores the different social and management implications of different types of disasters. It also ignores the fact that there are fundamental differences between those settlements which are surviving a disaster and those which are newly established after a disaster. In addition, there is a confusing variety of meanings and assumptions surrounding the concepts "community" and "community participation."

This paper will first identify the type of settlement which is the subject of the paper. Then some basic notions about community and community participation will be introduced, which will, finally, be illustrated by some case examples. The point I want to make is that in some settlements (not all) the scope for community participation is limited because of the prevailing political and management structure. It follows that agencies concerned with rehabilitation and recovery must investigate what type of community participation is feasible in a particular settlement situation before deciding upon a settlement development strategy.

In this paper community participation is taken as a development strategy, to be distinguished from self-help or just any form of local initiative. As a development strategy, community participation is utilized by local authorities or project staff with the aim of informing people, or consulting them, or giving them responsibilities in planning and implementing development. Community participation can in this sense stimulate or incorporate local self-help practices.

SETTLEMENTS AND COMMUNITIES AFTER DISASTER

We distinguish two types of settlement after disaster:

a) A city or village hit by disaster, where people remain as far as possible in their own homes. When the impact is severe,
people may stay for a while in emergency shelters until it is safe to return to their homes, or until their homes are reconstructed.

b) Semi-permanent settlement camps for refugees or displaced persons. They are set up to provide first relief and shelter to disaster victims. Often these settlements are located far away from the disaster area. They are supposed to function for a short time only; until, that is, people can return to their normal life in their original place of residence.

This paper deals with the semi-permanent settlement camps.

The two types of emergency settlement may differ in their physical appearance and in the quality of construction. Most important from the perspective of community participation are the socio-economic and political-administrative differences between them, which are caused by the type of disaster which has hit the ongoing communities.

THE EFFECTS OF DISASTER

Some disasters, such as earthquakes or floods, hit a community suddenly. Even in a disaster-prone area and even with forewarning of the event, the exact moment, the exact location of the impact, and the identity of the future victims are unknown. At the most, local organisations like the fire-fighting brigade, public works department, social and medical service institutions, and private mutual help arrangements are brought in a state of preparedness to provide immediate assistance. The affected population helps with early relief and salvage work—if authorities permit that—or flee the disaster location and settle in temporary emergency shelters. These shelters are established as nearby their original settlements as possible—for example in the outskirts of the same city or village, but at least within the same region. The people in emergency shelters expect to return home soon—as soon as the effects of the disaster have subsided and rehabilitation and reconstruction work has commenced. That reconstruction may be delayed, that large central areas in cities like Managua (Nicaragua) or Popayan (Colombia) are not rebuilt for years, and that temporary settlements may turn into permanent villages is another matter. (1) This is an experience that affects the people at a later stage.

The situation is different for a population affected by disasters like drought or civil war. These disasters have a gradual onset, the situation gradually deteriorates, people use up their resources, and the local institutions gradually become ineffective. At a certain moment the limits of endurance are reached, and the population starts its exodus. The decision to leave is taken by families or village groups at different moments, depending on their assessment of danger and on their resources. They flee for hundreds of kilometres, away from their home district, even to foreign countries. They settle in camps, establish new villages, or integrate with the existing population. It is significant that there is no immediate expectation to return home. There is uncertainty as to when the cause for
the flight will be eliminated. When will the civil war end? When will it rain sufficiently?

One can conclude that different disasters have different immediate and long-term effects on communities. Disasters like earthquakes and floods are sudden, and they last for a limited, well-defined period. The population remains under control of their own political administrative structure, as local authority institutions remain functioning. And even if residing in emergency settlements, people expect to resume normal life within a foreseeable future. In contrast, disasters like drought or war have a gradual beginning and an uncertain end. People come under the jurisdiction of new authorities and are considered as strangers or intruders. Even when their own political leaders continue to exercise control, their leadership functions within a new political and material context.

When, after the relief period in the camps, future perspectives remain uncertain, people take different decisions. Some refugees set up new independent villages in the host area, others integrate themselves in existing villages or towns, while others remain in the camps. These three options have important implications for their political and cultural identity as a group, their socio-economic development as individuals, and the development of attitudes of dependence. (2)

CONTINUITY AND CHANGE IN A NEW SETTLEMENT

Before talking about community participation it is necessary to have a realistic idea about the nature of the community with which one is going to deal. One can assume that it is rare to find homogeneous, harmonious communities. Rather, one finds that in any community, apart from values expressing shared community identity, solidarity and cooperation, there are also ideas expressing deep differences between people. These differences are based on, for example, religion, ethnic origin, or control over economic resources. They indicate which social groups are likely to cooperate and which are not.

In a new settlement, often on foreign soil, a community continues daily life to the best of its traditions. Family groups or household groups stay together as long as possible, as they form the basic social unit of mutual assistance and exchange. They try to occupy huts in the same corner of the settlement. The conventional division of labour between men and women, and the same segregated use of space is maintained. People try to reestablish their economic independence, and they practice the same habits regarding food preparation and distribution, water usage, and sanitation as far as possible. Cultural unity is expressed through the same symbols and rituals as before.

Changes in political and economic leadership, based on a new division of control over economic resources, do take place.

A good example of this is the Afghan village leader who has decided to take his people to a refugee camp in Pakistan. There he will find other village leaders, with their people, and he
will decide to settle near them or far away from them, depending on their historical ties and assessment of each other. The traditional leaders continued to exercise authority in the new settlements. It was, however, observed in the Afghan camps that not all traditional leaders maintained their position. Leadership depends, among other things, on control over resources. In the settlements, food, medicine, clothes, and jobs were scarce resources over which community leaders had only limited control. Their degree of control was related to the majority/minority status of their community in the settlement (not to their status in the pre-settlement or outside community), to their socio-political closeness to the administration, and to personal abilities. Those traditional leaders who could not "deliver the goods" to their people were gradually replaced by other leaders. (Weeda, personal communication.)

Although continuation of traditions is necessary for any community, some traditions may be inappropriate, even unfair to a large section of the population settled in a new situation.

An example of an inappropriate continuation of tradition concerns the role of women. If the conventional view is held that women should do only domestic work, then households headed by women in semipermanent settlements are reduced to a destitute condition. If their husbands have been killed or are away fighting, these refugee women (and their children) must rely on food rations, even while other households are earning extra income by work inside or outside the settlement.

Another example of an inappropriate traditional practice is sanitary habits. Habits that are acceptable in a village with much empty space become a danger to public health in a crowded settlement.

COMMUNITY PARTICIPATION

Community participation may be defined as "an active process by which beneficiary groups influence the direction and execution of a development project with a view to enhancing their well-being in terms of income, personal growth, self reliance or other values they cherish." (3) As a working definition, one could say that community participation means that the beneficiary groups in a community have some form of influence on a programme that is going to affect their life as a group or as a community.

Referring to the introductory remarks of this paper, we note that two questions remain: Is community participation in every type of situation attainable? And with which methods can community participation be realized? In fact, community participation may sometimes have limited aims and be encouraged in a variety of ways. An agency selects those aims and methods which seem the best possible in a given situation, given the characteristics of the community and the institutional constraints on the part of government or the agency.

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Four levels of intensity can be distinguished. (4)

1. Programme managers only share information about the programme with the population. The community has no influence on the direction of the programme.

2. Programme managers may consult the community about key issues in the programme, for example about food distribution practices. The community has a slight and indirect influence on a single programme component.

3. Sometimes a community may be allowed to take decisions about certain aspects of the implementation of a programme. For example, the leaders, or residents' committee, may decide how to improve sanitation in a settlement, or they may select beneficiaries or candidates for a training programme.

4. The most intensive form of CP is when the community may choose between alternatives and initiate action to satisfy needs that the programme does not address. For example, the participants of a women's club may decide that activities should focus on adult literacy rather than on income-generating activities.

The community, or rather that section of the community for whom the programme is intended, can be involved by various instruments. (5)

Field workers of the development agency can be trained to mobilize the population. Or community workers (e.g., health workers) selected by the community, and representative committees (e.g., a women's association, a ward committee) can consult the beneficiaries and take part on their behalf in the decision-making process. Finally, the people carry the greatest responsibility when they themselves are organized in user groups in order to participate in consultation with project staff and to take responsibility for certain tasks. An example are public health groups who are responsible for hygiene and health care in their own neighbourhoods.

When an agency wants to promote community participation (CP) in its programmes, it must consider what it wants to achieve with CP. It must consider what level of intensity is justified (information sharing, consultation, decision making or implementation, choosing between alternative goals), and which instruments are suitable (only agency field workers, or trained community workers and committees and even user groups). In practice the distinction between these elements may become blurred.

POSSIBILITIES FOR COMMUNITY PARTICIPATION

What are the possibilities for CP in a semi-permanent settlement? On the one hand the potential for CP is very wide. Agencies are dealing with communities who are in need of everything, from food to jobs, from basic shelter to a centre for religious devotion. Consulting the beneficiaries about their preferences and at-
titudes, and encouraging them to organize collective action seem obvious strategies. On the other hand the potential for CP is rather limited as the authorities in charge of settlements tend to have a bureaucratic and directive style of management. National governments and large, multinational organisations have this style more than smaller, private organisations. For example, the composition of food rations for Somali camps was decided in Rome, at the Headquarters of the World Food Programme area, without consultation with the beneficiaries, even long after the first phase of emergency relief.

As these last comments imply, the potential for CP is influenced by the total setting in which the population is living. This setting determines, for example, whether it is realistic to expect beneficiaries to participate in decision making about a sanitation programme, or whether an information campaign by field workers about how to deal with childrens' diarrhoea is the most that is feasible.

CASE EXAMPLES

Two case examples will illustrate some of the points mentioned above.

A. The Ethiopian Emergency Settlements in Somalia

The Somali government exercises centralized State control in the country through its bureaucracy, the one-Party structure, and the army. Popular participation is only accepted when it follows the Party's guidelines. The camps are staffed by government officials. The structure in the camps is based on a division in sections and sub-sections, headed by refugee leaders chosen by the government and with responsibilities covering control, food distribution and population figures. The assistance programmes, mainly implemented by government agencies, hire Somali nationals and Ethiopian refugees screened by the regional or national government. The selection for jobs within the camps is coordinated by refugee section leaders and camp commanders. Beneficiaries for different projects are selected in the same way. The official structure of government officials and by refugee leaders is perceived by international agencies as well as refugees as a close-knit group, protecting its high interests in the assistance programmes.

Spontaneous initiatives by refugees are allowed within this structure as long as they do not interfere with local or official interests. If played correctly within the local power-structure, objectives can be achieved, like setting up shops, getting land to farm, or conducting other income-generating activities.

Within this institutional set-up, refugees work their way through the hierarchical system, using leaders and officials to achieve a better life. The existing system works, however, to the advantage of the strong, more innovative, powerful and better-off refugees. It is more advantageous for men than for women and depends on tribal links. This means a further stratification of
an already highly stratified refugee population leading towards unequal access to resources. (6)

When it became clear that the so-called emergency situation would extend into a semi-permanent situation as the causes of the war were not eliminated, a programme was set up to stimulate the self-reliance of refugees. (7) The United Nations High Commissioner for Refugees in Somalia, together with the National Refugee Committee, Council Office, initiated a community development programme, in which camp residents were selected to work as community workers. After training in community development, these workers would assist persons or groups who wanted to organize themselves around one or more common problems. Setting up a school, increasing the level of income or improving the health situation, were some such problems. In some camp sections such cooperative groups were already in existence, e.g., a few cooperatives of tailors and of carpenters existed as well as groups of families who helped each other to bury their dead.

Within a social climate that stressed hierarchy and individual endeavour, people did find ways of organising themselves to improve their living conditions. The most obvious basis for organisation was the neighbourhood, as people with common social ties tended to settle together. People from the same village or region in Ethiopia or from the same tribe or clan stayed together for practical reasons (e.g., language) or emotional support. The community development programme would support the self-help efforts. The ultimate success of the programme greatly depended on the cooperation of the camp leadership, which could encourage or thwart collective efforts.

The camp section leaders selected the potential community workers (the UN Social Services Office made the final selection). To do this well the section leaders would have to understand the concept of community development, support the idea of making the settlement's residents less dependent and more self-reliant, and know what personal qualities to look for in the candidates. The UN Social Services Office realized after a while that some camp leaders did not understand or support the requirements of the programme. It was therefore necessary to train the camp leaders too in a community development approach which stresses working with people rather than giving them orders.

Nevertheless, community workers were not easily accepted by the camp population. Some camp leaders thought of them as spies and tried to sideline them into better jobs. And the residents mistrusted their loyalty: were they on the side of the administration—which paid their salaries—or on the side of the common man? An additional problem was that the community workers had more formal education than the majority. This created a confidence gap between them and the population and leaders they were to serve. To deal with this latter issue, the Social Services Office decided to give training in the Somali language, so that a wider group of natural leaders—women included—could be eligible as community workers.
B. Khmer Settlements in Thailand

The exodus of Cambodians gathered momentum after the Vietnamese invasion in 1979. The people flowing into Thailand were received in so-called temporary holding centres and camps from where they would "soon" leave. Thousands of people, however, have stayed in these settlements for years, waiting.

The Khao-I-Dang holding centre, for example, was set up to hold 140,000 people. The centre had to be laid out within four days, consisting of a road system on a grid pattern, a few shallow wells, open trenches for drainage, and communal latrines. To increase the water supply for the present 26,000 people, water is still being trucked in from 100 kilometres away. (8) Later people constructed buildings with bamboo and palm leaves, the traditional materials for temporary buildings. They constructed houses as well as a Buddhist pagoda and a Christian church, a theatre for traditional Khmer presentations, a meeting hall, a medical centre and health centres, a school and pre-schools. These institutional buildings show the people's concern with continuity of their life as a community, not only with sheer survival. Like all settlement camps, Khao-I-Dang is fenced, having one entrance only.

Health care is one of the major concerns in settlement life. An interesting example of how community resources are being tapped to deal with mental disorders is reported from the Khao-I-Dang settlement (and is practiced in other settlements as well). (9) In the aftermath of war experiences and flight, mental disturbances appeared among refugees. The International Red Cross in Thailand took the initiative for an approach whereby herbal medicines and psychotherapeutic treatment by Khmer healers were combined with conventional Western techniques. "The effectiveness of this approach, which relies upon a common language and cultural background among Khmers, has been remarkable. . . Since supernatural spirits do play an important role in traditional Khmer conceptions of the world, both psychosomatic and emotional disturbances have been alleviated in medical centres like the one at Khao-I-Dang." (10)

The refugee camps of Thailand, in which hundreds of thousands lived from 1980 to 1985, witnessed some intense rivalry among voluntary/non-governmental organizations. This, among other things, limited the potential for meaningful participation of the community in its own maintenance and development.

Another set of camps have housed Khmers as "displaced people." These are groups not composed of refugees, (and so not eligible to migrate to other countries) but of people who are identified by allegiance to one of the Cambodian political movements. Internally these camps are self-governing, unlike refugee camps. These camps are divided into sections, each headed by a political-administrative leader.

Among the strongest organisation in these settlements is the Khmer Women's Association (KWA), of which all women are members. Although the KWA was already a feature of socio-political life in the towns and villages of Cambodia, its functioning in the
settlements is not an automatic transfer from the old situation. The relation of the KWA with the civil administration varies, depending on its own strength as a cohesive association, the determination of its leaders, and on the attitude of the civil leaders. The United Nations Border Relief Operation (UNBRO) has a strong voice in KWA operations because it provides support, advice and supplies for its programme. However, the KWA is essentially a Khmer organization, managed and directed from within.

For example, the KWA of Camp Site 8 was started in mid-1985. "Its activities have been focussed on providing material assistance to needy families and arranging for referrals of newborns to the hospital for immunization. Despite the efforts of the leader to request a women's development programme as in other camps, the KWA remained under the control of the civil administration of the camp until early this year (1986). With UNBRO's intervention and technical support, Site 8 KWA recently started its women's development programme with 200 mothers and 220 children." (11) In the succeeding 3 years, the programme has expanded to other camps, involving tens of thousands of women and children.

The KWA's women's programme may include activities like silk worm production and silk weaving, vegetable growing, sewing, mat making, soya bean processing, adult literacy, and child development in preschools. The productive activities are not meant as a source of income. Because the camp residents "are politically considered as in transit by the local authorities, they are not allowed to pursue anything beyond a precarious subsistence economy." (Mimar, p. 50.) The products are primarily used for their own consumption. Even the silk clothes are used for their own theatre performances.

The KWA has its own staff of social workers or facilitators. These women have attended the literacy classes with success and have received a few weeks of extra training. They volunteer for the job or are "encouraged" to do so. The material rewards for leaders and staff vary from one extra ration of food per week to a better house and a place in a children's centre. In addition, having a leading position with the KWA carries respect and authority.

The KWA has also addressed itself to the issue of public hygiene. (12) This is becoming a major hazard in some camps where the emptying of communal latrines is inadequate. Human and household waste lies around the neighbourhoods, posing a public health menace. A continuous public sanitation campaign should be started. The KWA recognizes that this can only be successful if the civil administration down to the section level understands the importance of regular cleaning activities for public hygiene.

Such a campaign to mobilize community participation in keeping the settlement clean may face difficulties as the social and political atmosphere is not very hopeful. After so many years of "temporary" camp life the outlook on a permanent, self-reliant future is not very bright. Moreover, internal cohesion within
the community has been undermined in the past by the frequent movement of camp populations and is still weakened by the present political uncertainties. For strategic and deficiency reasons camps are being consolidated and moved periodically, usually on 48 hours notice. "The last series of dry season attacks (1984–1985) resulted in the consolidation of border camps which were originally scattered along 700 km of the Thai/Kampuchea border. Furthermore all camps were moved to evacuation encampments inside Thailand." (13) Since 1983, the longest period in any one camp has been about 18 months. This means a complete reshuffling of people, whereby neighbours, family groups, networks of social support and of authority are completely shattered. Such experiences weaken the attitudes of mutual trust and of interest in caring for the community and for the environment.

CONCLUDING COMMENTS

These case examples are not complete descriptions of the socio-political life in the Ethiopian and Khmer settlements. They have only been introduced here to illustrate some of the points on community participation made above. What do they tell us?

Both cases refer to initiatives taken during the rehabilitation phase, many years after the beginning of the emergency settlements. In both, the potential for community participation is limited because of the following factors:

1. The official political view is that these camps are temporary, transit centres only. The authorities, therefore, try to prevent the residents from using the camp situation as a base for developing a permanent foothold in the area.

2. The straitjacket of centralized, bureaucratic control is not encouraging local initiatives by individuals or community groups.

3. The camp commanders and carefully selected refugee leaders form a close-knit group. They are able to grant permission for profitable local initiatives to selected individuals.

Both cases show the importance of initiatives from powerful international agencies, such as the UN and the Red Cross, on development policies in the settlements. Through a combination of advice to national or camp authorities and control over supplies, these agencies were allowed to mobilize local knowledge and support the social organisation of residents. Yet, these agencies have the reputation of having an anti-local style of management. The heated internal debates about the appropriateness of the community approach can only be guessed.

The CP strategy in both cases is to start with forms of organisation that people already know and to facilitate existing initiatives through collective action. These are the cooperative efforts of people with social and economic ties in the Ethiopian case, and the KWA in the Cambodian case. Another example of starting with the familiar is the integration of traditional knowledge with modern practices in the treatment of patients.
All three examples of community participation have strengthened the influence of the community on its own life.

Finally, the cases indicate two conditions of CP in emergency settlement. First, there must be physical stability, as a community needs time to develop. Moving settlement populations destroys the social ties between people. Yet these social ties form the basis for CP. Secondly, people seek evidence that community efforts have a lasting effect. They want to see that their efforts are complemented and supported by the necessary action by the authorities, whether it regards public hygiene or the improvement of socio-economic conditions. In this respect settlement authorities should assist community efforts and incorporate them in the development planning for these emergency settlements.

This paper has presented two examples of settlement camps managed in a military context. They offered limited scope for community participation. In some refugee camps under military supervision, however, there is more scope for individual and community initiative, e.g., in the camps in Mozambique. Moreover, many settlements are not under military, but under civilian control. Do they allow more community participation? We cannot even begin to answer the question until we specify what we mean by community participation and what the conditions are in the different types of settlements after disaster.

NOTES


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POTENTIALS FOR SELF-HELP REHABILITATION

E. Bloemkolk and A. van de Klundert (1)

INTRODUCTION

On the evening of the 13th November 1985 a catastrophe struck Colombia. A minor eruption of the volcano "El Nevado del Ruiz" melted 10% of its icecap. Torrents of mud swept down the slopes and buried Armero and devastated other low-lying towns like Chinchina and Honda, which became graves for about 23,000 people. There were more than 4,500 people injured, 230,000 people afflicted and a calculated damage of about U.S. $200,000,000.

We know for sure that such disasters will strike again, so that nations prone to disasters must learn to detect their approach, better prepare for their assaults and implement the planned measures. Together with donor agencies and countries, relief campaigns need to be reviewed to make them more effective for the population affected by the disaster.

After a major disaster, millions of dollars and tons of material pour in through the channels of the various relief agencies, national and international. Besides the good efforts, there have been many mistakes, and it has been reported that some relief campaigns actually have negative effects. Illich stated that after the earthquake on the 19th and 20th October 1985 in Mexico "the effective efforts of the population to run their own relief campaign, became frustrated by the intervention of the authorities and the international organizations." (2)

The fact that the victims need immediate help often leads to an approach which will be in the end counterproductive, as it makes people dependent.

This paper, based on the Armero case, describes three different phases in the process of rehabilitation and two different approaches of relief agencies and their effects in the long run on the rehabilitation of the people:

1. The traditional (top-down) approach; with a hierarchical structured organization, centralized decision making, paternalistic relief services, no participation of the victims, emphasis on medical and technical aid and the use of imported materials, equipment and expertise.

2. An alternative (people-based) approach; as possible participation in the planning, organization and implementation of the programmes and emphasis on reducing the physical and economic vulnerability of the people. It provides an integrated type of rehabilitation of the physical, social and economic situation, making use of local human, physical and economic resources.
I. THE ARMERO CASE

The total destruction of the infrastructure required total rehabilitation of all aspects of the society: social, economic and physical. After the treatment of the injured, the burying of the dead and the clearing of the debris, the rebuilding of a society had to take place. As in other disaster scenarios there were three phases:

a. the emergency phase
b. the transitional phase
c. the structural phase

a. The emergency phase: chaos and the power to survive

The mudflows that destroyed Armero were not unexpected. Despite warnings of various volcano experts, the local authorities did not evacuate the inhabitants of Armero, not even after the first visible signs of an eruption appeared. A contingency plan from UNDRO in English had been left untranslated in the drawer of a civil servant for two months.

The inhabitants were told to stay in their houses and that nothing serious was going to happen. The majority did listen. So the people were trapped in their houses or hit while trying to run away, by streams of mud. In Armero, which had about 30,000 inhabitants, only 8,000 survived.

A few hours after the magnitude of the disaster was known, the army and the Colombian Red Cross started to help. The army usually is the only organization with logistic equipment to operate on a large scale as is necessary in emergency situations, but it doesn't have the experience for this type of emergency. When the news reached other areas of the country the next morning, volunteers from all over the country, including doctors, nurses, firefighters, boy scouts and students, hurried to the site.

Improvised camps were set up with tents and in schools, to provide shelter for the homeless. Schools and hospitals catered for the wounded. The Colombian Government declared a state of emergency, and the army took over all civilian power.

Physically able people in the camps were energetically involved in the erection and organization of the camps and, whenever possible, helped the trapped and the wounded. Others looked for shelter for themselves and what was left of their families. About 50% fled to the big cities of Bogota, Ibagué and Manizales to stay with relatives and friends.

Shortly after the shocking news spread out over the world, the international relief organizations came in. The International Red Cross played a major role in the emergency phase through their regional headquarters in Bogota. Various other organizations sent staff and emergency equipment (rescue dogs, medicine, food, clothes, tents, etc.). The total amount of aid in cash and kind is estimated at about US $70,000,000. To coordinate all relief activities, a local body was founded: RESURGIR. It was set up as
a non-governmental organization, but strongly felt to be a governmental, bureaucratic organization. It was rather more a barrier than a help for an efficient relief campaign. It also absorbed a large part of the aid that was given for the victims.

It was in this stage, after two or three weeks, that the afflicted people became less involved in the rehabilitation programme. The victims became more dependent on the enormous amount of outside aid and personnel. Nine months after the disaster, many victims still lived in camps, totally dependent and passive. Before the disaster very few social organizations had existed in the Armero area. Attempts by some people to organize the victims were turned down by the government officials as being subversive. All camps were under direct control of the army.

b. The transition phase: the institutionalization of relief in perspective of the reconstruction of daily life

After the first shock and the influx of aid were over, there was the need for consideration of the future. However, the unknown amount of aid to be expected, the lack of preparation for an emergency situation and the political impotence made the stay of the victims in the camps far too long. The fragmentation of the families, the lack of social organization or any perspective for the near future, and the total destruction of the economic life in the area made the most active people flee to the cities, leaving the most helpless and deprived people to stay behind.

A large scale general plan was made by order of RESURGIR to build a new and safe Armero, near a dusty village called Lerida. It was designed by Noriega & Restrepo, a Colombian real estate developer specializing in urban housing projects. The design was typical for most aid that was given: top-down, paternalistic, without any involvement of the local population or local professionals, made in Bogota, with very little field research. The only way local people were involved was as unskilled construction labourers. The plan has characteristics of an urban centre, with large four-lane highways, a commercial centre and an industrial zone. None of them are realistic for the rural setting and they are not integrated in the existing environment. It was originally located 4 to 11 kilometers outside Lerida, which imposed a total economic, social and physical separation of the new inhabitants from the original villagers. The question of whether the people could afford to live in the houses did not even arise. After a lot of criticism of the plan toward the end of the design process, some areas close to Lerida and the departmental main road were integrated into the plan. These were the first to be built.

Not less than nineteen national and international organizations were invited to build houses in the plan, but there was no coordination of who was to build the houses, for whom, for what price or at what quality.

Eight months after the disaster, the building of some houses was started. Also the reconstruction of infrastructural facilities started, without taking into consideration the totally changed
geographic and economic situation and the desperate need of the victims to have work.

Nearly all programmes in this phase had the characteristic of "emergency-projects", focused on construction of houses, roads and hospitals and not integrated with a general development plan.

Emergency aid has to be spent within a year after the disaster takes place. This rule of donor organizations is a major obstacle for the transition of emergency to structural aid. The need to spend the money quickly also leads to unnecessary projects, as for example in the Colombian case the extension and construction of hospitals by the Red Cross and the extension of the physical organization of the Red Cross itself.

c. The structural phase: the underestimated need for rehabilitation of the social and economic life of the victims

Few programmes had an integrated plan for the rehabilitation of the lives of the victims. The vast majority only had physical aims - mainly the construction of houses. Very few also integrated activities for the social and economic reconstruction of the daily life of the victims. This lack of socio-economic programmes led to the result that even after one year many victims were not able to lead an independent life.

The description of the three phases shows a lack of participation of the people and a lack of socio-economic programmes to encourage this. The centralized method of operation of organizations like RESURGIR and the Colombian and International Red Cross causes all plans and decisions to be made in Bogota. This lack of close links with the emergency area frustrated activities set up in the disaster area, based on the needs felt by the people and the workers on the spot. So, their abilities and their knowledge were ignored. The experience of housewives - usually running large households - was not used, and the skills of the formal and informal sector workers were neglected. This centralized approach left people with projects not suitable for their specific situation and without any participation in the programmes and influence on the decisions to be made.

EXAMPLES OF AN ALTERNATIVE APPROACH

In Armero, however, a new approach was developed and implemented: a people-based approach to the socio-economic and physical reconstruction of the affected area.

This approach was implemented in two programmes: a small scale business development programme, supported by the Dutch Red Cross, and a construction programme in and around the village of Ambalema, supported by CEBEMO, a Dutch development organization.

The housing construction programme was set up by the Colombian NGO, FREDIVIVIENDA. This organization identified a group of people who lived in a very dangerous zone and were badly in need of improved houses on a safe location.
First a social survey was done to identify the economic and social situation. Several meetings were organized to reinforce the mutual relationship and the awareness of their situation. They discussed which action had to be undertaken and in what way. In small groups the people made their own design of the house they wanted. Each group defended its design in front of the whole meeting (about 60 participants). The two best designs were chosen. These two were put together by two architecture students into a professional design. Noticeable in this design were the small improvements on the traditional house design and the fact that the houses offered space for running small scale businesses. The aim was for people to build the houses themselves, with the use of local materials.

These activities were not done in isolation. The Colombian organization SENA provided technical assistance and schooling programmes. Links were made with CORFAS for credit facilities for small scale economic activities. It was a major effort to get municipal land, permissions and infrastructural facilities, such as roads, electricity, and so on, from RESURGIR, but in the long run they managed.

During the whole process many problems arose, as is likely to happen in any community-based programme. Many people had to work long and hard just to earn their daily living, frequently working six days a week, ten hours a day. For them it was a hard job to be involved in building a house for someone else. Moreover some participants lacked the skills to construct these improved and somewhat more complex houses. So an outside workforce had to be called in to do some of the work. Altogether it was a process of about a year and a half before the first people could move into their new houses, but even so this was no longer than several of the top-down housing programmes.

CONCLUDING REMARKS

Our conclusions are the same as those of Otto Koeningsberger, who stated at the National Workshop on Ecologia de los Desastres Natureales in Ibague, Colombia (April 1986) that:

- emergency aid (in the traditional form) is a natural enemy of structural aid and should be kept to a minimum;

- even the smallest emergency aid campaign reduces the executing capacity of the public sector; a paternalistic approach should therefore be avoided and as much work as possible should be done by the afflicted people.

This leads to the following recommendations:

-a real fruitful, structural relief campaign should be geared towards reducing the vulnerability through planning for the physical, social, economic and environmental elements of society.

-in order to reduce the dependency of the victims, they should be involved in the rehabilitation whenever possible and a sound base
should be made for a sustainable, independent economic living (credit facilities and availability of basic equipment).

-as much as possible the skills, experiences and abilities of the victims should be made use of in the rehabilitation process right from the beginning in order to discourage dependence and the period of stay in the emergency camps.

-relief campaigns after disasters should not be limited to a period of emergency aid only, but should change smoothly into a period of long-lasting structural aid.

-since disasters frequently strike areas known beforehand to be at risk, local rehabilitation teams should be set up and trained to act in disaster-hit areas. Such rehabilitation teams have strong links with local organizations and government officials and have data available to act promptly in case of a catastrophe. Emphasis should be on giving people information on how to act when a disaster is about to happen. Important tasks for these teams are the identification of projects, planning and budgeting and supervision during the execution of projects by the people.

REFERENCES


NOTES

1. E. Bloemkolk did research on the impact of relief programmes a half year after the eruption of the Nevado del Ruiz in Armero as part of his final theses on Human Geography at the Free University, Amsterdam, The Netherlands. Theo Thijssen, a staff member of WASTE Consultants, Gouda, The Netherlands, was involved via the Netherlands Red Cross in the initial relief campaign and afterwards was the initiator of a small-scale industry rehabilitation programme in Armero.

Emergencies, whether due to political or natural causes, have a most disruptive effect on family stability and a very great number of woman headed households can therefore be expected. The 'mother' role of holding the children together, feeding and educating them and giving them security is here stronger than anywhere else. Fathers rarely replace mothers in this role. Although the responsibility for the family and children's nutrition, health and early education, is an accepted woman's role, women are seldom incorporated in the decision making process when these issues are addressed.

Women with families have three responsibilities: production, reproduction and maintenance. This triple burden results in specific requirements for their needs in emergency situations. Their productive tasks are similar to those of men: to be a provider, e.g. to earn an income. Then there is the reproductive task of bearing and rearing children. And thirdly women shoulder a community management and maintenance task, which is the execution of collective responsibilities, including community provisions, such as water supply, self help programs and collective child care. These three functions are particularly pronounced for women with-out a spouse who by themselves have to bear the whole responsibility as women heads of households.

It should be recognized that the emotional stress of disaster situations is severe for displaced persons. Much of one's self esteem is destroyed when the men lose their earning capacity and become dependent on charity. It promptly affects the family, and usually the woman has to try to keep the emotional equilibrium in the household and hold the family together. This burden is then added to all her others. The story of a Sudanese refugee family is typical: the husband fell into apathy and did not even help in the household work. His attitude to the children became nasty, and his days became filled with aimless lingering around.

Woman Headed Households (WHH) are a particularly vulnerable group. It is known that in many developing countries the occurrence of WHH is sharply increasing among low income families. In a number of African, Asian and Latin American countries, it has been observed that as much as 50% of such households belong to this category under "normal" conditions. In emergency settlements this may rise to 90%. Low income households try in spite of great difficulties to remain intact in a generally unstable environment. In disasters and emergencies the social pressure on these groups increases enormously, and it is not uncommon that families break up and that the women stay with the children to face the survival tasks alone.

The social instability in disaster situations disrupts the basic 'protection' that women enjoy in an organised community, and consequently they are then more vulnerable to hardship and additional oppression such as violence and rape.

Neither the potential contribution of women to disaster mitigation and reconstruction nor the special problems of women who are the victims of disasters have been taken into account in regular assis-
tasks well results in a lower standard of living and effects the health of the whole family. For the victims of disasters who lost shelter and for displaced persons the return to basic living conditions is a central issue. Much of the effort will have to come from themselves, and only if their full potential and capabilities are taken into account can the rehabilitation process be successful. The capacity of women is here a core question.

LAND USE

The layout of emergency settlements has great consequences for women that often go unnoticed. The location of water pumps, the distance between production facilities and the dwelling, space for child facilities and the grouping of dwelling clusters not only represent spatial divisions and linkages, but also elementary accessibility of resources for this group. Production facilities which prevent child supervision become thus inaccessible for women. These linkages are often not observed by planners. The greater the distance to the water pump, the lower the actual consumption of water in the household, because of the time its supply requires. The noticeable adverse effects on health are known. Women, different from men, prefer dwellings grouped around the services so that domestic work can be shared.

The linkages between dwellings and green areas are also important for subsistence farming and for offering safe areas for children.

HOUSING

Shelter and housing needs are one of the important considerations for disaster victims. The main function of shelter is protection from the elements as well as protection of property. Privacy as well as emotional security are closely linked with housing.

The special housing needs of women in emergency settlements are very similar to the basic, but not often recognised, special housing requirements of women in low income areas. First needed by women here is shelter, that is not only a basic dwelling to her family, but also access to child care facilities and production facilities.

In some cultures the home as a protected area offering a high degree of privacy is a valued requirement for women. To be seen and to lack a secluded space may be a serious factor adding to instability and emotional insecurity.

One of the first requirements of women in emergency settlement design is the development of small communities or housing units, which offer shelter, space for child care and locations for productive work. These communities should function as safe and friendly areas where a group of people jointly can reconstruct a life.

Temporary shelters are easily built using material at hand, scrap material and soil are often used. If refugees are peasant farmers or shanty town dwellers, they traditionally built their homes. In many cases too, donor agencies provide emergency shelter, like tents,
tance policies of donor countries and development agencies. One reason for this is that the common approach to relief is gender blind. Relief workers and mitigation workers do not see women as an individual entity, but as dependents on men (fathers, sons, husbands). Though in some areas, 50 to 75% of the households are women headed, these households are still considered to be deviant from the norm.

Disaster relief programmes as well as refugee policy ought to be conceptually reformulated in terms of gender differences. There is among the bureaucrats and planners little awareness of the way aid itself operates in a male oriented framework, causing great inequalities between men and women and also leading to disruption in the very development plans they wish to have implemented.

Gender roles vary in every society, and programmes cannot be transplanted from one setting to another. Aid agencies ought to examine their own policies and practices. Each situation requires qualitative as well as quantitative research, based on the reality and reciprocal roles in successive stages of their experiences as refugees or disaster victims: the phase of disaster and mass exodus, the programme or emergency relief, the transition towards self-reliance and achieving rehabilitation.

The analysis of specific situations might then help in the formulation of new policies. Although this may be difficult in the initial stage, women's participation should be encouraged in the design, implementation and evaluation of programmes for the benefit of the community as a whole.

Social networks, friends and neighbours play a very important role for women in their pursuit of their triple tasks. Disasters often break such links and this adds to the problems in restoring their lives. This is especially true for the supervision of children, which is in many societies a collective task.

The responsibility for children, requiring regular supervision, limits the mobility of the mothers. A safe location for the children where they can be left for play and learning allows the mother to pursue her other tasks. Mothers involved in productive work outside the house should therefore be able to supervise their children, and this requires proximity to the children. Even if several women share supervision, the importance of proximity remains. This has obviously implications for the design of the settlement and the location of production sites.

TASKS AND BURDENS

The daily tasks of taking care of the family include a variety of activities beyond the mere preparation of food and cleaning of the house. Rural and low income urban women spend a good deal of time and energy in collecting water and fuel. The supply of clean water and fuel for food preparation are vital factors for the health of the family, and these efforts are thus not a choice but a must. Growing food is a constant task. The construction and the upkeep of the house is as much the task of women as it is for men. All this demands much of the time and energy of women, and their failure to perform these
corrugated iron sheets, plastic sheeting, etc. These are, however, at best temporary solutions, unsuitable to protect permanently against the elements.

In the reconstruction programme, whereby better and permanent shelter is provided, it is important that the selection criteria for access take women's needs into account.

The role of construction training in post disaster work is central to reduce the impact of the next cyclone, flood or earthquake. In such training programmes women should be seen as at least of equal importance to men as participants, given their crucial role in all low income housing. The disabled, the elderly and WHH of very large families are an exception, as they may find it difficult to muster the strength and time to participate in construction work. For these very vulnerable groups special support is required.

FOOD PRODUCTION

Low income groups survive often by growing food. Subsistence food production reduces family dependence on hand-outs. Its considerable positive effects on the nutritional status of low income families has been well documented. It is insufficiently recognised, however, that women play a crucial role in food production. The location and size of agricultural plots for women determines much of the productivity, due to their need of proximity to the dwelling and the children (not in the least because child care facilities are rarely available in emergencies).

The size of the household determines the effectiveness of family based food production programs. Larger families tend to be more successful in cultivation and consequently do indeed show a better nutritional status. The elderly, Women Headed Households and single member households are in particular need of extra supplies, because of lack of manpower for gardening. Food supply and production programs should take these factors into account by giving better supplies to the smaller households and by giving production support to the larger.

The distribution of food well within the family may be decided by status rather than by need, with gender, age and rank as distribution factors. It has been observed that male heads of households receiving rations may hand out better portions to their favoured wife.

Family based food production is not only determined by the availability and the size of garden plots. The knowledge of the duration of the stay in the settlement and active extension programmes are also important factors. Extension programmes concern training, advice, supply of seeds and tools and possibilities of selling surplus production. Uncertainty about such factors decreases agricultural participation, especially if the sexual division of labour in the society in question is taken into account.
HEALTH AND SECURITY

In emergencies and disasters women do not only suffer from the direct impacts of the catastrophe, but also often fall victim to violence and aggression of men who can take advantage of them without punishment. The tragic fate of many Vietnamese 'boat women' even inspired a large UNHCR antipiracy program to reduce the rape, abduction and subsequent murder of female boat refugees. In refugee camps, single women may be protected by locating their dwellings in safe areas.

The high occurrence of psychosomatic problems among women in emergency conditions points to the extreme stress and the need of social support for them. Much of the practical health needs are related to the importance of integrated maternal-child health care. This implies the necessity of special programs for women during pregnancy and early childhood of their children. In emergency settlements most maternal health care is still mainly curative and too little preventive in nature. The educational aspects of preventive care need much more attention. Sanitation facilities and information ranks prominently among those needs.
Skills and capabilities of women must be considered in rehabilitation and training programmes.
CHILDREN IN EMERGENCY SETTLEMENTS: DESIGN AND HOUSING ISSUES

K. Shordt

INTRODUCTION

People do things in space; space does things to people. Ideally, the design of a settlement, town or camp should provide a space that supports what people do in it— all of their day-to-day activities, both formal and informal. At the very least, it should not thwart their activities. This is particularly true for children, whose growth and development are directly affected by the design and maintenance of a settlement that constitutes their early environment.

This paper is concerned with settlements during the so-called "rehabilitation" phase of the resettlement process, during which people live in the "temporary" community for months or even years as refugees or displaced people. After the immediate emergency causing the resettlement has passed and as the interest of relief agencies wanes, such settlements can deteriorate into crowded shanty towns rather like city slums. Children are most vulnerable to the hazards caused by over-crowded, badly planned settlements. In such deprived environments, 50% of the young children may be sick at any time with diarrhoea, respiratory infections, tuberculosis, measles, or malaria. (1)

It may at first seem contradictory that camps for refugees and displaced people have among the highest population growth rates in the world. Completed family will commonly range from 6 to 13 children. (2) Perhaps one in four or one in five people in many camps will be a child six years of age or less. There are vast numbers of these children, many of whom are not in particularly good health. Sick for 100 to 150 days a year, they lose basic opportunities for physical, intellectual and social development. Both family environment and physical surroundings contribute to this deprivation.

Of course, parent and family are of primary importance for the young child. Both common sense and research indicate that a caring and stimulating family enables children to confront the challenges in their young lives more successfully. However, daily life in the refugee camp situation can be debilitating for parents as well as children. They live in camps, often without support from community or the extended family, following an artificial daily routine. Their past is unpleasant or traumatic, their present insecure and unsettled, and their future uncertain. Understandably, where the parents, family or basic environment of the camp should support the child the most, they most frequently fail.

Every environment should make it as easy as possible for young children to crawl, to play, to sit in the shade, to eat, to go to the toilet, to wash their bodies, to drink water, to touch and manipulate things. These are skills which children learn— skills which may be fostered or thwarted by the environment. All
children must have support for health, nutrition, safety, comfort and stimulation. (1) Specifically, this means:

Health: water for drinking and bathing, sanitary toilets, immunization and medical services.

Nutrition: food supply, clean preparation and good food storage.

Safety and comfort: an acceptable shelter, security, freedom from hazards, comfort in terms of temperature.

Developmental experiences: the environment should help stimulate the child's attention and provide opportunities for social, physical, intellectual, emotional and language development.

When any of these elements is deficient or lacking, the development of the child is endangered.

Child development has certain general stages in which the child begins to walk, talk, learn to socialize much like adults, and so on. It may be useful to examine some of these developmental landmarks, to look briefly at what the child does in order to draw out implications about what the child needs from the physical environment.

THE INFANT LESS THAN ONE YEAR

For the young child, sleep, feeding and basic care dominate life. The baby is usually cot-bound, in a cradle or carried around. Vaccination for tuberculosis (BCG) should occur soon after birth followed, preferably at 1 and 2 months of age, by immunisation for diphtheria, pertussis, tetanus (DPT) and polio. The third period for immunization should be around 9 months of age for DPT, polio, and measles. Many children miss this third round. (2)

In the camp situation infants are usually breastfed, although the length of the breastfeeding period may vary from about 4 months to as much as a year and a half. Similarly the time when supplementary or weaning foods are introduced varies. But with weaning many babies become ill; diarrhoea can begin; nutrition falters. High energy foods should be prepared with potable water and under as clean conditions as possible. Good weaning foods might be prepared initially by adding a mashed ripe banana or a spoon of oil to the traditional gruel or rice porridge. Many children in these camps, particularly in Africa and Asia, may not be able to digest cow's milk or milk products easily. Further, on the assumption that eggs, liver, meat and the like are not readily available for children, other good weaning foods and simple meals could include soy meal, legumes and green leaves, mung beans, groundnuts, papaya, and sesame. (2)

Very young children should be as comfortable as possible and have freedom of movement. At 7 to 9 months, they begin to explore their world, crawling, becoming more mobile. Children should have the opportunity to try things, to touch and play with
objects around them, to laugh, hear singing, make noises and be heard and acknowledged.

Comfort for the Infant at Home

The house or hut are very important for the young child. In some refugee situations, the basic accommodation is less comfortable and less healthful for the young child than accommodations in the pre-disaster community. For example, some Afghan refugee groups lived in tents well-adapted to cold regions. However, in Pakistan where temperature can range above 38 degrees in some areas, stifling tents are a health hazard. This is exacerbated by the fact that women and children of rural origin tend to be more confined to the tent in the denser campsites, with adherence to Purdah, than had been the case in the sparsely populated rural areas of Afghanistan.

Another example is provided by the Khmer camps in Thailand. In Kampuchea, as in Thailand and Laos, houses are traditionally built on stilts with wooden frames and floors usually providing a safe, clean area for young children. However, when tens of thousands of people entered camps rapidly, needing inexpensive housing immediately, bamboo huts were constructed using available technology. Unlike the traditional Khmer huts, these sat directly on the earthen ground. The refugees immediately started building platforms about one metre above the ground for beds and sitting space. (2) However, one can wonder if it would have been possible to provide enough materials to make low platforms, perhaps 20 cm in height, covering the whole floor—this would have given a larger, cleaner living space for young children.

Many low-cost or no-cost ideas which increase basic comfort and security can undoubtedly be incorporated even into emergency housing, particularly if the refugee population is consulted. These might include, for example: care in the geographical orientation of the dwelling, additional vents and sensible positioning of doors and window spaces for optimal ventilation, over-hanging roofs for additional shade, verandas which are good spaces for infants to crawl and explore, and flexible shutters against wind and rain. (7) A shutter design was quickly developed by Khmer refugees using bamboo strips and plastic bags to cover window holes against rain.

Water Supply

Diarrhoea, which may be annoying for an adult, is dangerous for an infant. There is much data linking water supply with diarrhoeal disease. At one camp in Pakistan, when the safe water supply increased from 10% to 30% of the dwellings, the incidence of diarrhoea measured over a one-week period decreased from 51% to 28% of the population. (4)

For some reason relief agencies and the camp populations themselves seem more interested in curative and clinical health services than in essential preventive services such as water supply. (5) It is very discouraging to see relief workers entering camps at the beginning of a work day bringing their own thermoses of water. The UNHCR, following WHO guidelines,
suggests that at least 20 litres of water be available per person per day. (6) Twenty litres is about 1 1/2 buckets of water. David Vickery, in a monograph "A guide to facilities for early childhood care and education," recommends 95 litres of water be available per day for children 0 to 3 years of age and 25 litres for children 3 to 6 years. (1) However, some camps follow the 20 litre guideline. This is very little water for an adult; but it is inadequate for a one-year-old child who is not continent, who often lives in a hot, dusty or muddy environment and requires potable water frequently.

Of course, it is not only the amount and quality of water that are important—accessibility and storage are also significant. Water, if not piped directly, should be easily available without long waiting lines and long walks. Storage facilities are needed, for example, in clean tanks or unglazed pots.

Nutrition and Health

The physical differences among children in emergency settlements can be startling. Healthy eight-month-old children are large, active, bubbling with sounds and responsive to the things and people around them, mobile, with clear skin. Unhealthy children tend to be small, quiet or irritable, not particularly responsive to their environment, and to have flaccid and marked skin. It may appear that these differences are in part related to the educational level and the class stratification within the community. However, looking below the surface, many factors may be involved:

- The food/water distribution systems or policies may be faulty, for example, favouring one group more than another or being of insufficient quality.

- Perhaps there is no land or insufficient land for family or community food production.

- In some situations special food is distributed for vulnerable groups. Care should be taken to be certain that food supplements are familiar and acceptable, not requiring unusual amounts of time or fuel for processing.

- Some mothers are more effective at caring for their children. Some may lack basic skills, including organizational and household management skills needed to prepare healthy food for the children or special food for weaning. Still others may be so depressed or alienated that there is little energy or emotion left for children. In some emergency situations the extended family has been splintered or dissolved. Support, traditionally provided by grandmothers, aunts and others, is missing.

- Traditional weaning gruel made out of rice water or other grain-water, if unsupplemented, is filling but not nutritious for the young child. Supplementation of food may require new knowledge and new ways of behaving on the part of mothers.
At the extreme it may be that some mothers come from a background where malnourishment is the norm. Food meant for infants may be sold or given to older family members.

The point is that nutrition problems among children in emergency settlements do not necessarily derive solely or even largely from the fact of the emergency. Nutrition problems may emerge with the aging and decay of the physical community. Often, considerable effort is given to identifying and distributing appropriate weaning foods. Relatively little emphasis seems to be placed on asking people about their own food systems and beliefs, about distribution of food in the family, or the causes of malnutrition in a particular setting.

Small household vegetable gardens, poultry projects and the like are often advocated for food supplementation. Simple gardens may be effective guards against deficiency diseases and skin diseases in particular. Leafy green vegetables, papayas, bananas, and cassava are plants one frequently sees. Depending on the food distribution habits in the family, children may have greater access to vegetables and fruits than to eggs, meat or other produce from household husbandry. Both gardening and animal husbandry, of course, require sufficient space, usually near the hut or house in dense settlements, and may require fencing materials to keep the chickens or pigs in the household area and protect them from other people and animals.

The kitchen is another area that deserves planning by those constructing or maintaining settlements, including the inhabitants themselves. A kitchen needs a counter that is non-permeable (e.g., bamboo) and a stove, wood or charcoal burner, or fire placed so that it is secure from young children. If separate weaning foods are cooked, an extra pot and storage containers are required.

THE CHILD FROM ONE TO THREE YEARS

At this age, children become mobile, walking, running, and jumping. They play with each other and begin socialization to group life. They begin separating themselves from others, although sometimes with difficulty. This is reflected in their language development—in "I-You" words. Words become sentences and children become more independent, feeding themselves with hand or spoon and exploring their environment more actively. It is at this age that children may begin to show signs of delayed development even if they are physically healthy enough, often due to lack of stimulation from the environment, from the people and children around them, or lack of warm, responsive care. Children, of course, learn by playing and talking. Even in the simple environment of a refugee camp or emergency settlement, there should be many opportunities for play, if only with everyday objects such as coconut shells, tins, sticks, cups and spoons, and different-sized pebbles. Development really takes place when children extend their everyday activities. This means that talk is also important—telling stories to children, encouraging their responses and responding to them, giving simple
explanations. In the depressed conditions of many long-term emergency settlements, children can miss out on much of this.

A Safe Environment for the Child

In hastily constructed or poorly maintained communities, many dangers lurk that threaten the young explorer. Of course, very young children must learn, must be taught social taboos about "clean" and "dirty" things. Young children will play in garbage. Some essential elements for the protection of young children may include: fences to keep animals, garbage, or holes away from children; clean crawling and walking areas around the house (such as verandas); drainage pipes or covered sewage ditches; walking bridges across ditches and hazards, wide enough for children who may not be proficient at walking.

Children must have space to play, move and run safely. In crowded emergency or refugee settlements, space is often in short supply. One of the least satisfying arrangements for children may be the grid system of construction—connected rows of huts with narrow walking space between the rows and roads for vehicles surrounding blocks of the dense huts. The grid system appears to be built for reasons of speed and efficiency, but it leaves children either without space or makes them into little nuisance factors in narrow alleyways and on roads. More satisfactory is a housing plan that gives free space at the end of the housing rows, or between and among houses. One settlement in Thailand has been partially reconstructed by refugees so that in some sections house facades form courtyards. The courtyards provide informal meeting spaces and play areas with a view to and from the houses. Unfortunately it has not been possible to set up playgrounds with climbing frames or slides and swings because of vandalism, presumably by some of the youth who have little or nothing to do throughout the day. The development and maintenance of useful space often requires community organization.

Outdoor space needs sheltered areas protected against sun, rain, and wind. A tree will eliminate up to 40% of the sun's heat on a rooftop. (7) Trees, of course, also cut down glare and provide defence against wind; however, they are rare in emergency settlements. Other low-cost means for protecting against sun and rain would include simple thatched roofing materials on poles and overhanging roof panels on houses. If the roofing material is suitable, the overhanging eaves can of course also be used to catch rain water for drinking and bathing.

THE CHILD FROM 3 TO 6 YEARS (2)

At this age children walk about with purpose, go to other houses, and can dress and bathe themselves. They can control their urination and defecation. These children can act independently and are socialized into group interaction. Children 3 to 6 years of age should learn to ask questions, repeat main points of a story, count on their fingers, draw (on paper or sand, for example). In addition to learning from the care and stimulation of adults, children learn a lot from each other. By 5 or 6 years children will usually be able to dance, catch balls, cut vege-
tables, invent stories, draw, and understand the important relational words (left-right, young-old, sweet-sour). They should be able to build things, name the parts of their bodies, label and classify in simple ways. Unlike most children in industrialized situations, these children will also begin taking on the so-called adult roles. They help prepare meals, carry water and wood, take care of younger brother or sister.

The Size of Children (1)

A child of 4 years is 84 to 109 cm and a child of 6 years is usually 95 to 124 cm in height with matching body dimensions. A very important preventive activity for the young child is washing hands after defecation and before eating. This is impossible if the child cannot reach the water. The size of children can be taken into account in many ways. In this case, the shelf with the water should be not more than 0.6 the child's length—that is, about 50 cm off the ground for the young child.

Toilets (1,5)

Many people in emergency settlements may come from rural areas or a background where pit latrines were sufficient or where defecation was done outdoors. Even in rural areas this is unhygienic, but in a crowded camp it is a recipe for immediate parasite infestation and disease. In addition to the need for changes in personal and group behaviour, this basic sanitation problem is compounded by poor facilities. Where water is in short supply, where housing is crowded and money not available for piped sewerage systems, settlements with 30,000 to 200,000 people often have only pit latrines. If dwellings are crowded and it is not possible to locate the latrine 33 metres from each house, there

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are usually communal latrines. It is not overly dramatic to say that the open communal latrines are usually so filthy, smelly and disgusting that no normal child would use them. In some camps, to keep the communal latrines clean, they are locked, with the individual householder having a key for a latrine. However, most young children are not constantly accompanied to the toilet, cannot find the keys, and could not unlock the doors anyway.

For children, toileting and toilet training varies significantly with cultural practices. However, whether the toilet is of the sit-down type, or a hole with foot-plates near ground level, the size should be such that children are able to use it. The toilet room can also be important. Young children can be frightened in toilets, which is one reason why partitions between toilets in nurseries are usually either partial or are missing completely.

Different societies use a surprisingly wide range of things for cleaning the body after toileting. These may include water, paper, pieces of wood, or even stones. But in many emergency settlements none of these may be available. In these cases, which seem to be frequent, the only time the child is cleaned is during bathing time. This is another reason for reconsideration of the limited WHO guidelines of water supply in emergency settlements. Children, especially, should have more than 20 litres of water available per day.

It seems that relief or development agencies, and leadership groups in the communities themselves, are not very interested in the unattractive problems of toilets and sewers. Perhaps the most effective way of changing this attitude would be to eliminate separate toilet facilities for the relief workers and local leaders, including the teachers and medical staff.

The Child's Home Environment

By the time the child is five or six years of age, there will often be younger children in the family. Dwellings, even if built in haste as "temporary" housing, should be constructed so that they can be extended, cheaply, using skills and materials which are readily available.

It is interesting to note that the concerns which slum dwellers, refugee camp people and poor people in general express about their housing seem to have much in common around the world. The women in a housing study of an unplanned settlement in Maputo, Mozambique listed the following concerns in 1976—a list that applies just as readily to the communities being discussed here:

- no place for children to go or play;
- houses are too small and it is not possible to enlarge them;
- pollution in and from latrines, flooding from the latrines in the rainy season;
- bad and irregular water supply;
-problems of refuse collection;
-children and women carrying heavy loads of water and wood over long distances for use at home. (8)

PROGRAMMES AND FACILITIES SPECIFICALLY FOR CHILDREN

Many emergency settlements and camps have special programmes for children such as nurseries, day care, child-minding services, kindergartens, preschools and so on. These may be provided in purpose-built facilities, in under-utilized buildings, in neighbourhood centres, in homes or huts, or merely outside in some free space.

Early childhood care and education programmes can cater to a surprising range of objectives, including one or more of the following:

- enhancing the cognitive and social development of the child;
- improving child health and nutrition;
- preparing the child for formal schooling;
- providing an entry point for parent education;
- freeing mothers for work, either for collecting food and water or for formal, paid jobs;
- freeing mothers for adult education or training programmes.

Where the programmes for children are linked to adult activities, the facilities are sometimes physically connected. Purpose-built facilities for children may also become bases for more comprehensive work in the community such as home-visiting, parent-run child care and so on.

The Purpose-Built Centre for Children

If any of the basic requirements (food, water, toileting, protected areas for play) are not provided in a purpose-built center, then the programme risks undermining itself. Concretely, a child of 0 to 6 years should not be placed in a building for 4 or 5 hours a day without water, food, toilet facilities and sufficient space indoors and outdoors. An early childhood programme should be an improvement over what exists, not just a change, nor a mini-primary school, nor a repository for children.

Because of the facilities and space needed for young children, these facilities tend to be more expensive than those for older children. David Vickery cites reports on floor space for purpose-built early childhood care and education centres in several countries compared to primary and secondary school facilities. These centres for young children can be among the most costly educational facilities: (1)
Hungary (80 places)  16.3 m²/place
Vietnam (270 places)  10.5 m²/place
UK (60 places)  7.5 m²/place

primary schools  commonly 1.5 to 2.5 m²/place
secondary schools  commonly 3.5 to 4.5 m²/place

Another factor adding to the expense of purpose-built centres is staffing. In order to serve the needs of the young, child/staff ratios must be lower than 20:1 for the older children and lower than 10:1 for the children aged 1 to 3 years. Furthermore, center-based services of this type seldom reach more than a small portion of the children in need. (1,11)

Home-based and Community-based Programmes for Children

It is ironic that studies in several countries indicate that simpler services for children, based in homes rather than in purpose-built centres, tend to be of higher quality and lower cost. (1,9) The mother, or substitute mother in her own home, particularly if given a bit of training and support, may be the most effective provider of services for small groups of children. Support for the home-based childminder will, of course, differ depending on the setting, but might include a sturdy box with a few simple supplies and playthings (for example, soap, balls, dried corn cobs, simple dolls, non-toxic iodine equivalent).

In a few of the government-supported land development schemes in Peninsular Malaysia an informal strategy is used for home-based childcare when mothers work. One woman, herself a mother, becomes a childminder, receiving a small amount of money each month to take care of four to eight children (depending on their ages) from the neighbourhood. She usually receives a short course by staff responsible for social service development in several plantations. The social service unit also occasionally visits the home, and sets basic rules such as the maximum charges for each child. After some time, perhaps six months or a year, the woman may find other work or return to agriculture and another woman in the neighbourhood will take over. These non-formal, periodically shifting centres are in simple but pleasant homes built on stilts with a good piece of land around each. The children have ample space to play near their homes, with their friends; they usually know the childminder already and have food and water during the day.

Another programme with a novel strategy for young children in the community has been developed at a refugee camp on the Laothian border of Thailand by the French-supported non-governmental organization, Ecoles san Frontieres. A team of young men set up short programmes in open courtyards to which surrounding houses have access. Young children from the neighborhood help set mats on the ground and share (on "loan-basis" only) a few toys which the team brings. Then there is usually a story or puppet show about something fun but related to a health/nutrition topic (for example, wash hands before eating). This is followed by singing, or drawing and some organized games where children practice following directions, learn words (such as inside-outside, up-down, left-right). Then the children pack up everything. The
plan is such that after the team has been working in a neighbourhood a short time each day for a couple of months, the youth in the neighbourhood gradually take over responsibility, with occasional visits from the team. In this programme young children bear a high degree of responsibility—for bringing in others, for showing other children how to play with dolls (which many have not seen) or how to draw with pebble or pencil, for sharing simple health messages, and for organizing the mats and playthings in the outdoor center.

These two examples from East Asia are meant to emphasize no-cost or low-cost early childhood programme approaches. There are many other examples; however, the point is that use of homes or existing underutilized spaces and families offers alternatives for the care and education of young children without necessarily meaning lower quality care.

**Curricula for Early Childhood**

In these examples, educators may wonder about the relatively unsophisticated curricula, both for the children and for training the adults who work with children. Indeed, in the past 3 decades, different approaches to early childhood education have been developed and translated into different curricula (that is, sequences of objectives and learning/teaching experiences). Put simply, this means that the child’s experiences in one type of programme should be different from another. However, research has not been able to demonstrate that different curricula have differential impact on children: it is not possible to say that one approach is "better" than another. (10) What does seem important is the overall quality of the programme: attention given to the child, opportunities for play and social interaction, the sensitivity and responsiveness of the child’s caregiver, basic hygiene, nutrition, opportunities for the child to build on his or her daily experiences in new ways. The intricacies of a particular curriculum are less important than the overall quality of the programme. It is unfortunate that education staff of non-governmental or relief organizations often spend too much time and energy on developing new educational contents, training packages and learning sequences, rather than concentrating on the meaningful implementation of practical and simple educational curricula.

**Centres for Children with Adults**

The imperative for purpose-built facilities for children may lie in their link to adult activities. Children come to centres while their mothers take literacy courses, learn new skills, are involved in production for income, or go to MCH clinics.

When these child facilities are close to those for adults, the programme can, if correctly operated, become a community or family center—rather than a set of isolated services—offering meaningful opportunities for adult-child interaction and parent education as well.

A good example are the centres set up by the Japanese-supported voluntary agency, Caring for Young Refugees (CYR) in the refugee
camp Khao-I-Dang on the Kampuchean border of Thailand. Hundreds of thousands of refugees have lived in Khao-I-Dang since 1979. Now it is closed as a bona fide refugee camp but continues to house 15,000 to 20,000 people who have lived there for 3 to 8 years.

The CYR programme works with children and adults in two locations at Khao-I-Dang which have slightly different facilities but operate on the same principles. One site has a center for children aged 2 1/2 to 6 years, 70 of whom attend in each of two daily shifts. During the day the children are usually divided into small groups, each with an adult. The children play freely and are involved in various guided activities such as drawing, making things with geometric figures, playing with dolls, eating snacks and washing. Outside there may be games or dancing to music played on traditional Khmer instruments.

In the preschool, as it is called, because the children are divided into small groups, there is a need for semi-isolated spaces as well as a large hall. Flooring in the smaller spaces is made of bamboo soaked in car oil (as protection against insects) and set about 20 cm off the ground. There are three niches for small groups that have been raised still further. Everything is scaled to the children's size and needs. The niches have low ceilings and windows at the right height for children to look out to the playground.

The entire structure, covering 106 square metres, is made of bamboo fastened with wire. Because of the climate, the south side of the building, facing the playground, can be entirely closed to the southern sun, wind and rains. Eaves on the south and north facades provide outdoor shade during the hot midday. The north side has a low wall (about 70 cm) and the rest is open under the eaves. The walls are only two metres high on the east and west with a place under the eaves left open for light and ventilation. However, in the rainy season, bamboo frames covered with plastic sheets can be raised over the open gables.

To build it required 18 men about 23 days to erect the structure with another 5 days for thatching the roof. The building, which cost about US $1,000, was designed by a Japanese architect in the Unesco regional office of Bangkok, Ms. Hiroko Kishigami, who worked in consultation with the CYR and refugees during the construction. The untreated bamboo lasts 18 to 24 months and thus this school has had major repairs since it was constructed. 

Repair has been done by the refugees without outside assistance because they are thoroughly familiar with the building techniques. The building lasted somewhat longer than had been expected, in part because of the careful design and in part because of a few modifications on traditional technologies such as fastening the bamboo with wire rather than reed. A drawing of the CYR preschool is shown below:
The playground in front of the preschool has bamboo and rope climbing frames and balancing bars, some of which can be moved to give space for other activities.

Children bathe with water from tanks located outside the preschool building. On one side of the tanks are low bamboo benches for wash basins at the child's height. The toilets are at the other side of the compound in a narrow thatched building with open eaves for ventilation and without vertical partitions between the ground-level cement toilet holes, which is more pleasant for the children and makes washing down the toilets twice a day much easier.

The preschool is one element in a large complex in which the whole community, people of all ages, participate. In the preschool hundreds of refugees have received training for working with children in other centres throughout the camp. There is a classroom for these trainees in back of the preschool where theoretical training is provided by more experienced refugees to complement the on-the-job training with children. The trainees sometimes work with the carpenters group. The carpenters, numbering 5 to about 15 at different times, make toys for the children, traditional musical instruments, items for the center and for use at home. The carpenters have also created the looms in the centres for weaving. Children are free to go and sit or play with the carpenters.

Throughout, the simple complex of bamboo structures is designed for easy visual and physical contact so that adults and children have their own activities but are encouraged to interact. On the looms, which follow traditional Khmer designs, cloth is woven for sarongs and beautiful traditional tie-dyed silk is made, for the aim is also to help sustain traditional Khmer culture. Elsewhere in the compound are hand sewing machines where skilled refugees teach others to design and make clothes for themselves and their families. It was in the sewing classes that the dolls and soft toys were made for the children in the preschool. The young children are free to go to their mothers and see what is happening in other parts of the center, giving a sense, although
artificial, of the rhythms of village life. There is a mothers' group meeting in the center and, for slightly older children, there is an after-school programme for making things, working with the carpenters. A drawing of one of the 2 CYR community center complexes is shown below:

In the CYR programme, refugees bear the major responsibility for implementing the activities and for training. According to camp regulations, these refugee workers receive a fixed gratuity of about US $0.30 a day. Therefore motivation for working in this programme is in part voluntary. Overall the CYR programme has been acknowledged for its careful planning and insightful focus on child and adult development. About 700 children and adults are involved at any one time, a small proportion of the total community. Most non-governmental social service and education programmes involve a minority of the people living in each area, a fact which continues to be a challenge in rehabilitation work.

Khmer Women's Associations

One group which has been able to reach out to greater numbers of women and children are the Khmer Women's Associations in camps for displaced people at the Thai border. The distinction between displaced people and refugees is significant. "Refugee" is a legal status with certain rights such as that of immigration to third country. However, the 290,000 displaced people living in these camps do not have this possibility. Each camp has internal self-government related to one of the political factions in the internationally recognized Khmer coalition against the present government in Kampuchea. In these border camps, they have organized their own administration and associations which govern and provide services. By far the best organized are the Khmer Women's Associations. Each Association has a mandate for women and children in one camp. Each has a president with a large staff who work for little remuneration (apparently an extra ration of rice). The Associations have set up networks and programmes in each camp to provide child care, education and skills training for women, cultural events, special services for families headed by women and orphans. They carry out their programme with a very small but dedicated core team from the
United Nations Border Relief Organization. The early childhood programme of the Khmer Women's Associations is supported by the Bernard van Leer Foundation.

The Associations have set up a system of 63 early childhood centres which are attached to mothers' education and skills training programmes. Literacy is a major element within this, since about 65% of the women are illiterate. The literacy courses last for about 6 months and are interspersed with skills training activities such as mat-making (for the home), sewing (including making clothes for the woman's family) and weaving.

The programme takes place in centres with separate bamboo buildings for each activity. Often the buildings face each other, forming a plaza used as a play area for the children. Interaction between mother and child is physically possible but has been slow to develop as it is not fostered by the leaders—it is felt that it can create too much noise and interfere with the mother's work. The centres have slightly different programmes and vary in style and quality. Sizes range from centres that involve 100 women and children to those with almost 1,000. Fire and bad weather are hazards which have claimed many of the bamboo structures from time to time. All construction and reconstruction is done locally with bamboo.

About 27,000 women and children participated in the programme last year generally for periods of 6 months or more. The programme has shown a unique capacity for outreach and growth, reaching in one year 28% of the women and children under difficult conditions. This is probably due to the fact that the Khmer women and camp administrations take a large part in the planning and have entire responsibility for the execution of the programme.

There are two general areas which require further concentration in the future. The first is qualitative; the second implies decentralization. The programmes in the children's centres need to be improved, providing children with a wider range of active experiences and providing each child with sufficient water and food. Training, supervision and links between the activities for the women and the children need to be strengthened.

The programme has not been as successful as had been hoped in reaching into the local neighbourhood and the home. Much time has been devoted to developing basic structures and content. However, it does not appear that the new skills and learning experiences provided to the mothers are being used regularly, or to great effect, in the home and neighbourhood. This is exacerbated by fundamental problems of community sanitation and water supply. With respect to improving sanitation (something which has an immediate impact on the small children), perhaps the only approach will be through neighbourhood mobilization. Thus, it is planned to "decentre" the programme—developing a focus, perhaps through the provision of some simple materials (such as shovels, toys, buckets, seeds) to small groups of 5 to 30 houses who then begin to have responsibility for caring for their immediate environment. It appears that the impact of center-based program—
mes needs to be strengthened by work at the level of the neighbour- 
hood and home.

Therefore, the mothers were invited to bring their infants to the 
classes and some hammocks were suspended from the ceiling of the 
room. The mothers were encouraged to interact in a normal way 
with their children including breast feeding during the class. 
This was reinforced by the literacy programme which included 
contents about the care of young children. In a simple way it 
was possible to enable mothers to attend who would not normally 
have had the freedom.

Unfortunately, however, many classrooms are crowded, so stuffed 
with desks and chairs that such simple alterations of the normal 
programme would not be possible. Classrooms should be con-
structed with some thought to the need for flexibility, including 
leaving some space free, or potentially free.

CONSTRAINTS ON PROGRAMMES AND FACILITIES FOR CHILDREN

Many of these examples have implications which are relatively 
simple and inexpensive to implement. For example, one may ask 
why houses in emergency settlements, specifically refugee 
settlements, are not made with sufficient space for expansion, 
gardening, or fencing. The overall reason is that settlements 
for displaced people and refugees encounter substantial resource 
and political constraints weighing against the basic quality of 
life within the settlements. Some of these constraints seem to 
apply to refugee settlements as well as those constructed after 
natural disasters. For example:

- Development of settlements often involves the use or misuse 
of building contractors, who may follow inappropriate regulations 
and who typically cater only to the governments and are not 
encouraged to communicate with the people who must live in the 
settlements.

- People responsible for designing settlements seem to be 
detached from their creations. One may wonder if results would 
be more appropriate if the people planning a settlement were 
subsequently forced to live in it.

- Time constraints are considerable in a disaster situation 
or during a refugee exodus. There may be only a few days or 
weeks to set up housing and basic services for thousands of 
people.

- The people in the community either are not consulted or 
sometimes cannot be consulted to the benefit of the majority. 
Those designing and maintaining settlements may disregard the 
population, hiring a few workers from among them as needed.

- Relief personnel need cultural sensitivity and respect: 
they should eschew unwanted social engineering. For example, it 
is reported that one camp with a Moslem population went on 
"strike" against a relief organization until appropriate (from 
their point of view) partitions were put into clinics.
There seem to be some issues which do not fire the imaginations of relief workers or of the leaders of these settlements. The scandalous condition of toilet and sewerage facilities in many older "emergency" settlements is a case in point.

There are other constraints to improving the design of emergency settlements for refugees which seem to derive from the special circumstances of the refugees themselves. For example, refugees are domiciled in host countries whose policy is sometimes not to encourage refugees to remain, for fear that they will compete for jobs or for scarce resources with their own citizens. Thus an unwritten policy in some cases may be not to provide too many amenities, to withhold certain opportunities such as the production of food or skills training, in order to encourage or force them to settle elsewhere. Typically, space for refugee camps is limited by local authorities, tending to create overcrowded conditions and discourage flexible approaches to planning the settlements. Some settlements suffer from severe water shortages, particularly when water must be trucked long distances.

Nonetheless, facilities for refugees and displaced people could be improved even given the constraints of space, water and other essentials. However, those charged with the physical design and construction of such camps sometimes lack the time, capacity, resources or experience to develop more appropriate approaches. Recently the author heard a conversation between two senior staff members of an organization charged with the care of a refugee community. The conversation went something like this:

A: I must talk to the builders about the extension of the camp. Tomorrow they will be knocking down the fence on the east side.

B: Do you suppose we could add some space for kids to play and for people to meet?

A: No, it will still be very crowded with the extension. That's probably out of the question.

B: Are they still going to build the huts in tight rows?

A: Yes, that's the only way the builder knows.

It might have been possible, if these two professionals had more time in their over-crowded schedules and a more extensive working mandate, to consult with the refugees themselves. They probably could have suggested some simple and useful ideas for varying the housing pattern and creating public-use areas, particularly since the contractor was using local construction techniques and materials.
NOTES


EVACUATION AND REHABILITATION OF GHANAIANS EXPELLED FROM NIGERIA

J.E.J.M. van Landewijk

INTRODUCTION

West Africa has always known a great, informal labour mobility. In times of national difficulties or political expedience, groups of aliens are easily made scapegoats and driven away. Some festivals commemorate such mass exoduses. To limit us to the recent, post-independence history, the Ghana Government of Dr. K.A. Busia ordered the expulsion of all illegal residents in 1969, the so-called 'compliance order.' Many of the deportees were Nigerians. Many were born and settled in Ghana and had lost their bonds with their tribal homelands. The enforced repatriation brought much hardship.

In January 1983 it was the turn of the Nigerian Government to force its illegal immigrants to repatriate. Nigeria suffered economic difficulties. The oil boom had ended abruptly. There were also plans for elections. The Nigerian Government issued the so-called 'quit order.'

The repatriation of the aliens expelled from Nigeria by the 'quit order' caused the largest peacetime displacement of humans in recent history. The total of displaced persons was around two million persons, of which about one million were evacuated to Ghana, a country of about 13 million inhabitants (Ghanaian and Nigerian Ministries of External Affairs estimates). No disaster ensued in Ghana because of Ghana's disaster avoidance response (although the start was delayed slightly) and the timely requested international assistance. Ghana is justly proud of its demonstrated ability to cope with crises.

This emergency came at a time of an economic crisis in Ghana including food shortage, unemployment and urban concentration of idle youth, partly caused by extensive bush fires and prolonged drought. Ghana was also making a forceful effort towards a national socio-political restructuring. The people were vulnerable during the on-going crisis. The restructuring could have been put in jeopardy.

The mass exodus of the Ghanaian illegal immigrants from Nigeria had its own peculiar characteristics not met in the more usual starvation- or war-induced refugee mass movements. The ratio of young over very young and old and the ratio of healthy over sick and disabled were very high. The proportion of family units was low. Moreover a large proportion of the returning persons had only recently left their home country and had always had the intention to return one day. They could settle in their original place of abode among their family and peers. After the initial man-made social upheaval, caused by the mass accommodation, the main problem was one of resettlement and re-integration as opposed to the usual settlement and assimilation. Of course although the influx of about 7% of the population stretched socio-economic and infrastructural resources, the emergency
operation could fade into the development and restructuring processes. The emergency management operation is worth recording notwithstanding its socio-cultural and technical uniqueness. To record and analyse the specific, least disturbed situation is a prerequisite for any worthwhile generalisation. This mass displacement without the disturbing pressures of war or starvation is a prime study object.

The local social, material and economic resources were inadequate, but the society was not disrupted; the local response capacity as hospital and police services was not diminished but only more overloaded by the extra pressure and emergency-enhanced public scrutiny.

SITUATION

In the last half of the 1970s many young Ghanaian men and women emigrated to Nigeria to escape the economic hardship of Ghana. Many did not bother about work permits or visas, many did not even possess passports. Many were unskilled labourers accepting employment they would not have accepted within view of their family of Ghanaian peers. Also a large number of professionals, such as medical officers, teachers and architects emigrated on a temporary basis, especially after the clash of the professionals with the Ghanaian Government of the late, then General, Acheampong.

The Nigerian Government had in 1981 already ordered all aliens without the necessary papers to leave. The Ghanaian Mission in Lagos advised its illegal immigrants to comply with the order, but this order was never enforced. The Ghanaian High Commission in Lagos started the processing of passports for Ghanaians living in Nigeria in September, 1982. This registration was not completed at the time of the issue of the 'quit order' causing an overload on the Ghanaian Mission during the quit period of 17 to 31 January and afterwards.

Mr. Ali Baba, the Nigerian Minister of Internal Security, announced on 17 January 1983 that all aliens illegally residing in Nigeria should leave Nigeria by the first of February 1983: the 'quit order.' The estimates of the number of illegal residents varied from 1,160,000 to 2 million, of which 700,000 to 1.2 million were Ghanaians. Under pressure from Nigerian employers, the 'quit order' deadline of the first of February was later extended till the first of March for employed and skilled labour. This did not have much effect, as most employed were already dismissed. Moreover, many aliens were afraid and wanted to leave at the earliest opportunity.

The evacuation of the Ghanaians was made more difficult because the Ghanaian Government had closed the land boundaries in October 1982 for economic and security reasons, long before the 'quit order.'
ORGANISATION AND GENERAL EMERGENCY PROCESS

The Government of Ghana established the National Evacuation Task Force under command of Steve Obimpeh, Commodore of the Ghana Navy (ret.). The duty of the Task Force was the evacuation of the deportees from Nigeria to Ghana, the reception and registration in Ghana, the onward transportation, the distribution of food, drugs and other aid material as well as solving problems of re-deployment. This means that the entire emergency operation was in the hands of one high-powered organisation.

On the 8th of February the National Coordinating Committee was established with a chairman who was a member of the Ghana Government (the Provisional People's Defence Council). The Coordinators of the Evacuation Task Force and the newly established Relief Supply Management Committee as well as the coordinator of the pre-existing Mobilisation and Rehabilitation Committee were members. At the end of the evacuation exercise the next phases of the emergency operations were taken over by the National Mobilisation Committee, then under the chairmanship of the same Commodore — Steve Obimpeh. This means that after a short interval during which three sub-organizations coped with the large amount of work and material, later one organization was again responsible for the execution of the emergency operation.

During the exercise, ad hoc transit camps were established on the International Trade Fair Site of Accra and in the eastern border-post Aflao (see Map 1) with smaller reception camps in Tema harbour, along the border at Kpetoe and in the International Kotoka Airport Accra. Later registration centres were set up in the regions and districts. In Nigeria, ad hoc transit facilities were established by the Ghana High Commission.

All returnees were provisionally registered in the main camps, a medical check-up was given and some catering was done. The returnees were as soon as practicable sent through to their regions and districts or transferred to hospitals. The usual refugee camp problems were avoided by the speedy processing. The main bottle-neck was transport.

The following phases of the emergency process can be distinguished:
- phase 1, crisis evacuation, repatriation and reception;
- phase 2, registration, rehabilitation and (re)settlement;
- phase 3, mobilization, deployment and (re)integration.
The phases were of course gradual, and the end of one ran concurrently with the beginning of the next one.

In the first phase, the main task performed by the Task Force was the transportation of the deportees, the first registration, health inspection and onward transportation. The Task Force was also responsible for the first emergency aid distribution and the transport of foodstuffs to the returnees in the regions. Aid material and money from internal sources were also accepted. In the end of this phase, the newly established Coordinating Committee and Relief Supplies Management Committee played an important role.
The more complete registration, rehabilitation, acquisition of land for the agricultural groups and the final distribution of aid and mobilization to useful settlement were to be executed in the second phase.

The third phase was the long-term phase in which non-returnees were also being absorbed for deployment in agricultural and construction projects. This phase was expected gradually to become a normal development process.

THE REPATRIATION-RECEPTION PHASE

At the start of the evacuation to Ghana, all transport had to be by air or sea, because the Togo-Ghana boundary was still closed. Even after the opening of the land boundary crossing points by Ghana on 29th of January 1983 additional sea and air transport was still necessary.

Notwithstanding the closure of the land boundaries, the mass exodus from Nigeria started by road as well, resulting in a hazardous concentration of expulsee on the Benin-Togo boundary and the roads in Nigeria and Benin. Togo was not willing to admit the deportees on transit as long as the Togo-Ghana boundary was closed. At one time an estimated 150,000 persons were waiting without any infrastructural facilities at the Benin-Togo borderpost of Jila Condji, located on a sandbar between the ocean and the lagoon. Another 50,000 were on the road from Nigeria nearby. Voluntary non-governmental organizations of Togo, helped by Benin and Togo officials, saved many lives, although casualties were suffered (see Kelly, 1983).

Thousands of returnees arrived daily in Tema harbour and Kotoko airport. An estimated 5,000 persons stayed at any one time in the Accra Trade Fair Site.

On Friday 29 February the land borderposts between Togo and Ghana were opened for entry to Ghana only. Hundreds of thousands of returnees crossed the boundary that weekend into Ghana. The chiefs and people of Togo and Aflao cared voluntarily for the stranded as far as possible. On the morning of 31 January 32 vehicles and some articulators were sent to Aflao, the southern borderpost, and another 15 to Tema, where 11,000 deportees disembarked from Ghana Black Star vessels were waiting.

The Ghana Government asked for private transports to help. The normal government administration and commercial enterprises ground to a near halt.

To cite another example: on the 9th of February the Black Star vessel Sisili River docked for the fourth time in Tema having transported a total of 25,604 returnees.

On the 18th of February the evacuation phase was officially terminated. After this only skeleton staff manned the entry points and transit centres.
THE REGISTRATION AND RESETTLEMENT TO DEPLOYMENT PHASES

On the 8th of February emphasis was already shifting from the short-term evacuation-repatriation activities to the medium- and long-term rehabilitation and (re)integration. Most returnees had not severed contacts with their homeland and were only marginally worse off than before leaving for Nigeria, if at all. However an appreciable number were almost destitute, having left most of their possessions, if they had in fact had time and opportunity to acquire any, in Nigeria.

The actual task of repatriation was completed speedily and efficiently, but the difficult task of (re)settling and (re)integration was still to be executed. Many returnees had an expectation of abundant government help. They had a feeling that this was their right, despite the fact that they had been expelled from Nigeria for not having legal permits to be there.

Regional and district registration centres were run and repatriates were requested to furnish the regional and district mobilization committees with requisite data such as age, skills, and areas of interest concerning settlement. The centres participated also in the distribution of food and other aid materials.

The returnees were dispersed throughout the country. Some formed their own associations and cooperatives, such as the Kwabenya Deportees Task Force. The Tema District coordinator of the National Youth Organization Council settled some unskilled returnees on its farm, as did the Salvation Army, the Faith Evangelical Church, and other organizations. The relief aid and all other donations were distributed as much as possible under the sole authority of the central, single Relief Supplies Management Committee. The distribution by donors themselves was discouraged.

The government exhorted the Ghanaians to see it as a national obligation to help the returnees and exhorted the custodians of the land to release land to the returnees for farming. This fitted well into the already existing government policy to try to induce people to go back to farming. (The partial success and the propaganda during this period induced later remainees to embrace the National Mobilization Programme.)

In this way the returnees would reintegrate with the local community and not be a burden to society in the near future. The call to go into farming was meant to be based on persuasion, and no returnee was supposed to be coerced. However, in the later phase aid was especially directed to the diligent new farmer, using a kind of food aid and relief aid as inducement. The relief goods were distributed to the returnees in the regions and districts. Every region received goods on the basis of the ratio of returnees registered in that region.

The deployment and integration of 7% of the population of Ghana was obviously an on-going, long-term process more and more blending in the normal development process. The solution for the most immediate benefit within the possibilities for deployment and continuity was medium- and long-term agricultural, construc-
tion and rural health projects. For this the Ghana Government had to ask international aid and the UN sent a multi-agency assessment mission (UNDRO News, May–June 1983).

ORGANIZATIONAL, HEALTH AND SOCIO–CULTURAL ASPECTS

The Ghana Government appreciated the efforts of the international organizations but would not allow the aid to be given haphazardly. Foreign governments and organizations who wished to donate aid material were asked to contact the Ghanaian missions abroad for a list of requirements. In the beginning the recognized needs were mainly food, specified drugs, blankets, agricultural tools and hospital equipment. The newspapers published daily lists of donations of emergency aid, trucks, food and money. The donors ranged from international organizations to local Ghanaian traders.

Most returnees were basically in good shape although traumatized by the emotional experience. Some died on the journey from exhaustion, hunger and disease. The efficiency of the evacuation to the regions prevented the outbreak of cholera and dysentery. The police hospital mounted a clinic at the Accra Trade Fair Site.

Most aid goods were specifically given for the welfare of the returnees. The returnees were not separated from the society at large. Many took up residence in their former abode. They took their food with their family and peers. In April signs of resentment were observable, voiced by some people who never left Ghana for 'the easy life in Nigeria.' Only the returnees were given relief food while 'all suffered together and ate the same food.' The intentions of the donors were not discussed. The donors never tested their limited aims with the actual integrated conditions in the country so different from the usual displaced-refugee situation.

Relief aid was to be denied to returnee-loafers. FAO and other organizations were also giving aid for resettlement, and in the long term this would blend with general development projects.

In the beginning the returnees were received with some degree of enthusiasm and feelings of relief; later this attitude was modified by some resentment. Complaints of doctors, ship staff and other officials and the general public of rude and unruly behaviour added to the complaints that bad customs brought from Nigeria (such as playing your own judge) interfered with the peace-loving and calm life of the average Ghanaian. This affected the general sentiment towards the returnee.

Most returnees expected the Ghanaian Government and society to give them food and other aid and demanded a National Resettlement Plan. They behaved often as a victorious group coming back to their homeland.

In the beginning the most used name was "deportee" or "expelled person," but later "returnee" was the named preferred by the returnees themselves as being socially more acceptable. Un-
avoidably the term "remainee" turned up in the later mobilization phase. Obviously this behaviour was a self-protection mechanism. From this viewpoint many of the attitudes of the returnees are understandable, like returnees telling the people of Ghana not to emigrate to foreign lands and how to rebuild Ghana. They needed a new, socially acceptable goal and a token reason for being back in Ghana. The People's Defence Council and others embarked on educating the returnees on the other hand about the current revolutionary process.

It should be appreciated that the Ghanaian people did not retaliate against aliens living in Ghana.

During May through June some Ghanaians were already returning illegally to Nigeria, notwithstanding all the official warnings. The slogan of some Ghanaians leaving Nigeria was 'we will meet again.'

CONCLUDING REMARKS AND CONSIDERATIONS

Ghana wanted originally to organize the whole evacuation by air and sea but the circumstances, the original delay in government activity and the number of evacuees forced her to use land routes as well. In the beginning of the evacuation operation, around 200,000 Ghanaians were massed at the Togo border and on the roads while another 300,000 waited at Lagos harbour.

Although the government had a clear warning time of two weeks, they started to act after an initial delay to make ships available. Due also to the normal lag of ship movements, transport started not long before the actual deadline. Obviously only the government could activate the evacuation taking into account the number of people involved and the international nature of the exercise.

The usual ad hoc assistance organizations cooperated with the government from the beginning. International assistance was requested and received in an early stage due to good information and media organizations although the emergency was not standard. Successful organizations were established in the form first of the executive Task Force, followed by the control and supply RSMC to supervise and handle supplies with an overview authority: the regulating NCC. In the final stages the duties of the Task Force were taken over by the already existing NMC for resettlement and redeployment.

The ad hoc organizational set up was successful in the framework of the still centrally controlled Ghanaian system. The on-going decentralization, "the grass roots," agreed with the steps taken and collaborated with the authorities. The Task Force and the RSMC could act without undue bureaucratic hindrance. It had sufficient power, source of supplies and access to central government. It could execute its tasks efficiently and had authority to influence other collaborating organizations; and it had the necessary physical resources. No legislative problem could arise in the PNDC-PDC system. The emergency created a high
degree of consensus in the country. A feeling of patriotism blossomed in the emergent groups of returnees.

The social economic cost-benefit analysis can only be made retrospectively. The economic cost has been very high. Not only was the burden to feed and accommodate about one million people in the food scarcity situation tremendous in itself, but the actual costs of transport and reception were high. Moreover the commercial, economic and administrative life of the country was at a near standstill during the early stages. The success of the operation as a whole, however, and the avoidance of a disaster are beyond price. The direction to work on the land and the group cooperation and rehabilitation may be of lasting social benefit. A social loss was the apparently unavoidable priority given to those who had left and returned partially at the cost of the remainees, who felt that they had sacrificed for the country all the time. The system developed during the execution of the emergency tasks has generated the model for the continuing National Mobilization Programme. Participating remainees were induced by the success of the earlier returnees programme.

The analysis of the developing resentment and the defence mechanism of the returnees may be used successfully in other emergencies where groups reunite. The inducement of returnees and remainees can work in other circumstances.

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Map 1. Main locations map of Nigerian-Ghanaian exodus.
(N = Nigeria; B = Benin; T = Togo; G = Ghana.)
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