Shelter after Disaster: Guidelines for Assistance

by: Office of the United Nations Disaster Relief Co-ordinator

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Shelter after Disaster

Guidelines for Assistance
Foreword

Since its creation in 1972, the Office of the United Nations Disaster Relief Co-ordinator (UNDRO) has stroven to assist nations of the world in their struggle against natural disasters, and other disaster situations, through a two-pronged strategy: firstly through international disaster relief co-ordination, and secondly through pre-disaster planning in order to mitigate the risks and adverse consequences of disasters. In the field of pre-disaster planning UNDRO has organized training seminars and work-shops, provided technical assistance to disaster-prone countries, and has published studies on the many aspects of disaster preparedness, prevention and mitigation.

The origins of the present study go back to 1975 when the Co-ordinator decided that a major review of emergency shelter provision was needed, particularly with a view to giving the United Nations family and Member States guidance on this extremely difficult subject. The Government of the Kingdom of the Netherlands, expressing its concern for the subject, funded the UNDRO study. The study was carried out in two phases: the first from July 1975 to September 1977, and the second from November 1979 to May 1982. During the first phase the bulk of the evidence was assembled and analysed. The second phase of the study saw the development of planning and policy guidelines for emergency shelter provision, and post-disaster housing more generally.

This has been both a difficult and challenging study, for the evidence gathered has clearly pointed out the need for some important attitudinal shifts among the majority of groups providing assistance following disasters. Many conventional and preconceived notions have been questioned and new ideas proposed.

The publications can be characterized as follows:

It is probably the first comprehensive study to be published on disasters and shelter (many books and articles having been published on limited or special aspects of the problem, usually in relation to specific events).

It encompasses the entire disaster spectrum: disaster preparedness; disaster relief; post-disaster reconstruction, and prevention.

It addresses one of the most complex, controversial and least understood aspects of disaster management and planning.

It analyses the problem of shelter after disaster from the point of view of the survivor, rather than through the traditional perspective of the donors and other assisting groups.

It is evident that in the past decade the understanding of disasters and their consequences has improved. In the face of the mounting social and economic costs of natural disasters in the third world, the international community (donors and recipients of aid alike) have made considerable efforts to improve the quality of disaster relief, preparedness and prevention: to improve our understanding of natural hazards; to estimate the risks resulting therefrom more accurately; and to take adequate precautionary or preventive measures ahead of disasters. Progress has, nevertheless, been slow; population growth, rapid and uncontrolled urbanization, degradation of the environment, economic recession, and poorly co-ordinated development planning have, together, conspired to outstrip progress in the control of disasters. It is certain that disasters are not merely "acts of God" but are aggravated by human error and lack of foresight; that disaster relief can be made more effective through systematized planning and management; and that pre-disaster planning does help, at least, to reduce some of the harshest effects of disasters. Therefore, whatever the difficulties, efforts to improve disaster relief and pre-disaster planning must continue unabated.

It can be said with some assurance that relief management in the fields of medicine, health, and nutrition has, nevertheless, significantly improved over the last decade. The benefits of the lessons learned from major disasters during the 1970s and early 1980s are beginning to show. However, there remains one particular sector in which too little progress has been made, and in which many conservative and obsolescent attitudes survive, that is: emergency shelter, and shelter after disaster in a more general sense. Perhaps the core of the problem lies in the fact that, although housing is one of the most complex and intractable problems of development, it is also one upon which everyone has his or her personal opinion, thus creating much confusion between objective and subjective evaluations. The least understood of all issues is that a house is merely the end-product of a long chain of social, economic, technological, environmental, political and other interactions. In some countries the housing issue is not "the house", but land and utilities (water, electricity, roads, transport, etc.). In others, the poorest housing has a lower priority than employment and nutrition. In no more than a handful of countries can the house, as a product, be said to be of primary concern. Until it is fully and widely understood that shelter is a "process" rather than a "product", many housing programmes, however well-meaning, will fall short of expectations—especially in the developing countries. The foregoing reasoning is as true for the shelter aspects of disasters as for the "normal" housing process.

This study is designed to provide policy and programme guidelines on emergency shelter and post-disaster housing for disaster management personnel within the governments of disaster-prone countries; the non-governmental, voluntary and relief organizations; donor governments; the United Nations system, and other international organizations. It should be emphasized that while considered to be a technical study, it is not a document on engineering or building construc-
tion—for reasons well explained in the text—notably because precise specifications for shelter can only be given in a precise, local context. This study, nevertheless, provides the foundation for such action.

The study was prepared by the Office of the United Nations Disaster Relief Co-ordinator (UNDRO), under the responsibility of Mr. Ludovic van Essche, Senior Co-ordination Officer. The consultants to the study were Mr. Ian Davis, Principal Lecturer, Oxford Polytechnic, United Kingdom, and Mr. Frederick Cuny, Intertect, Dallas, Texas, USA. Contributions were also received from Mr. Paul Thompson (Intertect), Mr. Frederick Krigold, National Science Foundation, Washington, D.C., USA; and Mr. Aloysius Fernandez, New Delhi, India.

In its closing stages, the draft study was reviewed by an International Expert Group who met in UNDRO, Palais des Nations, Geneva, in December 1981. Members of the Group were: Dr. Otto Koenigsberger (Chairman), Emeritus Professor of Development Planning, University College, London, United Kingdom; Mr. Jürg Vittani, a senior relief official of the League of Red Cross Societies, Geneva; Dr. Julius Holt, International Disaster Institute, London, United Kingdom; Dr. Caroline Moser, Development Planning Unit, University College, London, United Kingdom; Professor Aydin Gernen, King Faisal University, Damman, Saudi Arabia; Mr. Jai Sen, UNNAYAN, Calcutta, India.

The representatives of the Netherlands attending the meeting were Ms. Valery Sluyter, Ministry of Foreign Affairs, The Hague, and Mr. L. J. Van den Dool, First Secretary of Embassy, Permanent Mission of the Kingdom of the Netherlands to the Office of the United Nations and other International Organizations at Geneva.

Observers attended from the United Nations High Commissioner for Refugees (UNHCR); the United Nations Centre for Human Settlements (Habitat); and the World Health Organization (WHO).

The Office of the United Nations Disaster Relief Co-ordinator (UNDRO) wishes to express its deep appreciation to the Government of the Kingdom of the Netherlands for its unfailing commitment to, and support for, this important and complex study.

It is hoped that this publication will be of assistance to those it addresses, and a source of inspiration for all those concerned with the problems of shelter in the developing countries. Readers' comments and suggestions are invited, and should be addressed to UNDRO, United Nations, Palais des Nations, Geneva, Switzerland.

UNDRO
Geneva, May 1982
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...Much more was alleviated by the good conduct and extreme hospitality of the inhabitants of Concepcion. Mutual assistance was everywhere rendered and they were almost unknown. The higher characters of the people were very agreeable, and they carried the inhabitants of a similar description about them as they could assist, and as very pivotal all had temporary shelters under which they were reduced...
Chapter I

CONTEXT AND OBJECTIVES

"A Committee of voluntary agencies writing to the President of Guatemala two years after the earthquake of 4 February 1976 admitted that many mistakes had been made and listed the following five as the most important: too much aid was given away; too many of the houses constructed were merely of an emergency type; some organizations used large numbers of foreign volunteers; too much was done under pressure and without proper consultation, so that the victims became mere spectators of the work carried out rather than participants; a lot of reconstruction work was undertaken without first consulting the Government's Reconstruction Committee."

Of these five "mistakes", it will be noted that two are specifically concerned with shelter and housing provision and that the others have a clear bearing on the subject, highlighting yet again the importance of this area of disaster relief and raising a number of important questions:

How should disaster assistance be dispensed? Should it be simply given away, subsidized or marketed in the affected area?

How can outside aid be balanced with local self-help?

What type of housing or shelter should be provided—permanent or emergency?

How can the active participation of the affected community be mobilized during the post-disaster pressure for swift action?

How can the government retain control of housing reconstruction?

Although the literature on these and other topics concerned with shelter after disaster is extensive, it is scattered and, therefore, often inaccessible, especially to assisting groups seeking guidelines and advice.

OBJECTIVES

The present study aims to remedy these problems, its most distinguishing feature being the emphasis on shelter needs from the standpoint of the survivor receiving aid. It also seeks to assist disaster-prone countries (especially the developing countries), and all assisting groups, in solving as effectively as possible the problems of emergency shelter and post-disaster housing through the emergency and reconstruction periods. By the same token, therefore, this study is also a guide to pre-disaster planning, in anticipating future disasters.

Scope

In so far as this study is comprehensive, it has to maintain a certain level of generality. It does not, therefore, address problems of building construction and engineering which, in the view of UNDRO, can only be identified and solved within a specific locality and context. As already emphasized in the foreword, this is a policy and planning document, not a building manual.

Some of the findings of this study are relevant to man-made disasters (for example, refuge situations) and to long onset disasters (such as droughts), but its main concern is with fast-impact disasters (such as earthquakes, floods, cyclones). Although it has been found essential to view emergency shelter provision in the wider context of "normal" housing, it must be emphasized that the primary concern of the study is with the immediate shelter needs of survivors following disaster.

Audience

This publication is intended for all officials and technicians (professional staff) who are responsible for planning and executing post-disaster shelter programmes: government planners, administrators and programme managers at the national and regional levels in disaster-prone developing countries; the experts and technical advisers of the international agencies (and the United Nations system in particular); officials and field staff of non-governmental, voluntary organizations; relief agencies; and donor governments. Clearly, these groups will be concerned with technical matters as well as with policy development and programme management. Since these aspects are closely interwoven, no attempt has been made to separate them in this study, although it is recognized that in practice they may be the concern of different people and agencies, at different levels of responsibility. It is important to emphasize that the recommendations are deliberately not intended for use at the local (or primary) level of field implementation, since detailed guidelines (which are essential for all disaster-prone areas) can only be formulated by local personnel in the light of local conditions. However, the structure of the guidelines as a whole will provide an appropriate model for local adaptation.

Focus

Although many of the guidelines may be appropriate to some industrialized societies, the main concern of the study is with developing countries. The emphasis is placed on the needs of the poorer communities, both urban and rural, for they are in the majority today. These communities, for the most part, preserve many links with tradition, particularly when it comes to housing. Therefore, self-help and popular participation con-
stitute one of the strongest threads running through the study. In fact, the evidence suggests that the modern industrialized sector (large firms of building contractors, prefabrication, etc.) has a relatively minor role to play in the total reconstruction of housing after disaster in developing countries. The very general character of the guidelines must be emphasized in view of the variety of political systems reflected in the evidence collected. Therefore, some of the advice (for example, on the role of private sector or problems of land acquisition and reform) will be of limited application, again pointing to the need for specific guidelines to be developed at the local level. It is further recognized that in urban areas, in particular, the affected community may be highly heterogenous in terms of religious beliefs, social status, ethnic background and income level. Again these differences can only be accommodated in locally developed guidelines. It is hoped that the formulation of local guidelines will be an important and active follow-up aspect of the present study.

Structure of the Guidelines

The analysis of the evidence gathered points to fourteen basic principles. These are listed in chapter II, forming the foundation of the study, and serving as a brief summary of its recommendations. Chapter III presents the findings and guidelines for emergency shelter, and chapter IV does so for post-disaster housing (reconstruction). Chapter V summarizes the most important conclusions to be drawn from the study. It calls special attention to the rising expectations of the developing countries, the accountability of assisting groups toward them, and the need to develop local guidelines.

The following time phases are used, although it is recognized that they will vary according to the conditions and type of disaster:

- **Phase 0**—Pre-disaster phase
- **Phase 1**—Immediate relief period (impact to day 5)
- **Phase 2**—Rehabilitation period (day 5 to 3 months)
- **Phase 3**—Reconstruction period (3 months onward)

It is realized that these phases are somewhat arbitrary, but in the case of disasters of sudden onset they are adequate for descriptive purposes.

Lastly, it is important to mention that the evidence upon which all the findings of the study are based can be found in appendix A containing 11 case study summary sheets.

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<td>Policy-making administrators</td>
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<td>Directors of government building research bodies.</td>
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<tr>
<td>Directors of government housing, reconstruction and emergency planning agencies.</td>
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<tr>
<td>Directors of international voluntary relief development agencies.</td>
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<td>Directors of housing finance institutions.</td>
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| **SECONDARY LEVEL (REGIONAL/PROVINCIAL)** |
| Project managers of shelter or housing programmes |
| Field staff of governments (donor and recipient); international organizations; voluntary organizations; relief agencies. |
| Professional groups; architects, engineers, planners. |
| Private sector: building contractors, suppliers of materials, equipment, etc. |

| **PRIMARY LEVEL (LOCAL)** |
| Local groups (surviving community) |
| Local community leaders. |
| Local teachers/trainers. |
| Local builders/craftsmen. |

The guidelines in *Shelter after Disaster* are focused on tertiary and secondary levels of audience. The production of guidelines for the local (primary) level must be undertaken locally by personnel from the regional/provincial (secondary) level, working in close collaboration with local groups. *Shelter after Disaster* may serve as a model for the preparation of local guidelines. Section 3 A—Advice for the local level—has been written to assist in this task. The guidelines in *Shelter after Disaster* are focused on tertiary and secondary levels of audience.
Chapter II

PRINCIPLES

1. Resources of survivors

The primary resource in the provision of post-disaster shelter is the grass-roots motivation of survivors, their friends and families. Assisting groups can help, but they must avoid duplicating anything best undertaken by survivors themselves.

2. Allocation of roles for assisting groups

The success of a relief and rehabilitation operation depends on the correct and logical distribution of roles. Ideally, this allocation should be undertaken by the local authorities who are best qualified to decide who should do what, when and where. However, if the local administration is too weak to assume this responsibility, the priority must be to strengthen it.

3. The assessment of needs

The accurate assessment of survivors' needs is of the short term more important than a detailed assessment of damage to houses and property. Partial or inaccurate assessments of human needs by assisting groups have been a frequent cause of past failure of relief efforts.

4. Evacuation of survivors

The compulsory evacuation of disaster survivors can retard the recovery process and cause resentment. The voluntary movement of survivors, where their choice of venue and return is timed by their own needs, on the other hand, can be a positive asset. (In the normal course of events, some surviving families may seek shelter for the emergency period with friends and relatives living outside the affected area.)

5. The role of emergency shelter

Assisting groups tend to attribute too high a priority to the need for imported shelter as a result of mistaken assumptions regarding the nature, and, in some cases, relevance of emergency shelter.

6. Shelter strategies

Between emergency shelter provision and permanent reconstruction lies a range of intermediate options. However, the earlier the reconstruction process begins, the lower the ultimate social, economic and capital costs of the disaster.

7. Contingency planning (preparedness)

Post-disaster needs, including shelter requirements, can be anticipated with some accuracy. Effective contingency planning can help to reduce distress and homelessness.

8. Reconstruction: the opportunity for risk reduction and reform

A disaster offers opportunities to reduce the risk of future disasters by introducing improved land-use planning, building methods, and building regulations. These preventive measures should be based on hazard, vulnerability and risk analyses, and should be extensively applied to all hazardous areas across the national territory.

9. Relocation of settlements

Despite frequent intentions to move entire villages, towns and cities at risk to safe locations, such plans are rarely feasible. However, at the local level a disaster will reveal the most hazardous sites (i.e., earthquakes, faults, areas subject to repeated flooding, etc.). Partial relocation within the town or city may therefore be both possible and essential.

10. Land use and land tenure

Success in reconstruction is closely linked to the question of land tenure, government land policy, and all aspects of land-use and infrastructure planning.

11. Financing shelter

One of the most important components of a post-disaster shelter programme is its financing system. Outright cash grants are effective in the short term only, and can create a dependency relationship between survivor and assisting groups. It is far more advantageous for both the individual and the community to participate in the financing of their own shelter programmes, especially permanent reconstruction.

12. Rising expectations

Apart from the tendency of prefabricated, temporary housing to become permanent because of its high initial cost, and in spite of its frequent rejection on sociocultural grounds, temporary shelter, nevertheless, fre-
quently accelerates the desire for permanent modern housing, well beyond reasonable expectation. It is important for assisting groups not to exacerbate social and economic tensions by such provision where there are widespread and chronic housing shortages among low-income and marginal populations.

13. Accountability of donors to recipients of aid

Since the most effective relief and reconstruction policies result from the participation of survivors in determining and planning their own needs, the successful performance of assisting groups is dependent on their accountability to the recipients of their aid.

14. Guidelines for the local level

Guidelines on emergency shelter and post-disaster housing for individual communities can only be formulated by qualified local personnel, in the light of the prevailing local conditions (types of hazard, building traditions, economic base, social system, etc.). Such guidelines can, however, be modelled on the structure of this study.
The needs and resources of shelters

Chapter III

Emergency Shelter

The disasters studied the primary response to

Recovery

Phase 3—Reconstruction period (6 months onwards) o
Phase 2—Rehabilitation period (5 to 6 months) o
Phase 1—Immediate relief period (up to 2 years) o
Pre-disaster phase—Preparation, mitigation risk reduction

Preparedness

Preparedness: Preparedness measures of post-disaster shelter housing projects: Regional protocol

Professionals: Professionals, partners, co-operators

Interagency

Interagency coordination can help the mutual and multidisciplinary efforts promote interventions towards the mitigation of disaster, their resilience and mitigation, assisting people and the affected areas. The primary reason for the provision of post-disaster shelter is the


The planning framework for shelter and housing reconstruction programs (PDF) includes the planning framework for shelter and housing reconstruction programs (PDF) and a framework for the provision of shelter and housing reconstruction programs (PDF). Eleven shelters were built in the area, and the surveys indicated that the

AVAILABILITY OF HOUSING MATERIALS

Although many people rebuild their homes quickly, they can't in the disaster to buy them quickly.

The surveys found that in the immediate post-disaster period, shelter was the

2. Read disaster preparedness, the mitigation of many disasters, distribution in the single area from the possibility of

3. Consequences—Consequences period (3 months onwards)

Secondary (local) level

1. Profile: Detailed profile of post-disaster shelter housing projects: Regional protocol

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Improvised shelter following the 1906 San Francisco earthquake.

Following every type of disaster, one or more of the following sources can be used to obtain substantial amounts of the materials needed for construction:

1. Inventories of unused materials that existed before the disaster.
2. Indigenous materials (both commercially and non-commercially available).
3. Materials salvaged from the rubble.

Of the above, the latter two are the most important for widespread housing programmes. The vast majority of the urban poor usually rebuild from materials obtained from non-commercial sources. Housing in rural areas is most likely to be based on indigenous materials. Industrially manufactured building materials are those which normally survive a disaster in the best condition and are, therefore, the best to salvage from the rubble.

In studying the major disasters which have occurred during the past ten years, causing extensive housing losses, it has been found that there have been enough resources from indigenous and salvaged materials to rebuild nearly three-quarters of the housing to pre-disaster standards. Indeed, for houses rebuilt to a structurally safer standard, the same materials can be used in over ninety per cent of cases, thereby substantially reducing the costs of reconstruction. Yet, authorities and agencies responsible for handling relief and reconstruction efforts have repeatedly overlooked these resources, and have often, and inadvertently, taken steps to destroy them.

The reasons are:

1. That few assisting groups have prior housing or building experience and, therefore, are not familiar with the types of materials required or available.
2. That indigenous and salvageable materials are often overlooked when the authorities or assisting groups reject pre-existing building standards.
3. That housing is often over-emphasized by assisting groups, though, as will be seen throughout this study, it is not always the highest priority item for low-income families in a developing country. They may not, therefore, be willing to invest substantial amounts of money, time or effort into building formal structures.

These problems indicate the need:

1. To understand the local building process which exists before a disaster. The most effective assisting group will be one which is conversant with the pre-existing norm and draws upon this understanding in the development of the post-disaster programme.
2. To survey resources available after the disaster. This will probably require the employment by assisting groups of personnel with experience of local building traditions.

Survivors Priorities

(See table 1)

Survivors show certain distinct preferences for their shelter in the aftermath of disaster. The evidence suggests that their priorities are:

1. To remain as close as possible to their damaged or ruined homes and their means of livelihood.
2. To move temporarily into the homes of families or friends.
3. To improvise temporary shelters as close as possible to the site of their ruined homes. (These shelters frequency evolve into rebuilt houses.)
4. To occupy buildings which have been temporarily requisitioned.
5. To occupy tents erected in, or next to, their ruined homes.
6. To occupy emergency shelters provided by external agencies.
7. To occupy tents on campsites.
8. To be evacuated to distant locations (compulsory evacuation).

*In India in 1971, at the beginning of relief operations for the Bengali refugees, none of the major agencies involved had any prior housing experience in India. At the peak of the influx of refugees in August 1971, only three of the ten largest agencies employed housing or emergency shelter specialists. Over the years, the situation has not significantly improved: in reconstruction operations in Guatemala, 1976, out of the forty agencies involved in reconstruction, only 5 had prior housing experience in Guatemala; and of the remainder, only 7 had staff with prior low-cost housing experience. Reconstruction Housing in Guatemala: A Survey of Programs Proposed after the Earthquake of February 1976. Charlotte and Paul Thompson, UNDRO/Intersect, 1976.*
| Shelter priorities of disaster survivors relative to roles of assisting groups |
|---|---|---|---|---|---|---|---|
| Roles of assisting groups |  |
| International agencies | External donor governments | External emergency services | Foreign experts | Local military | National government | Local administration | Local voluntary groups | Survivors |  |
| Preference of disaster survivors in order of priority |  |
| 1. Remain as close as possible to damaged or ruined home |  |
| 2. Move into the home of families or friends | Skopje, Yugoslavia 1963 | Managua, Nicaragua 1972 |  |
| 3. Improvise temporary shelters close to ruined homes | Guatemala 1976 |  |
FUNCTIONS OF SHELTER

Emergency shelter serves several vital functions (not listed in order of priorities):
Protection against cold, heat, wind and rain.5
Storage of belongings and protection of property.
The establishment of territorial claims (ownership and occupancy rights).
The establishment of a staging point for future action (including salvage and reconstruction, as well as social reorganization.)

Evidence from two severe winter earthquakes (Van, Turkey, 1976 and Southern Italy, 1980) shows how families take the initiative in reducing the risks of exposure, by lighting fires made from earthquake debris, digging in to form semi-underground structures, thus securing ground warmth; or by erecting several tents inside each other to form a cellular insulation skin. This shows that the majority of survivors who are frequently from the poorest sections of the community are the most resourceful. See Reader, Everett. Issues Related to the Provision of Emergency Shelter in Winter Conditions (Report on visit to Calabrian Earthquake, Eastern Turkey). UNDRO/Intersect. 1977.

Emotional security and the need for privacy.
An address for the receipt of services (medical aid, food distribution, etc.)
Shelter within commuting distance of employment.
Accommodation for families who have temporarily evacuated their homes for fear of subsequent damage.6

6 A major earthquake and its aftershocks may result in families needing temporary accommodation for a long period. Normally this form of shelter will be adjacent to their homes, with many activities still taking place inside the house but sleeping occurring in cars, tents or improvised shelters. Following the 1976 Friuli earthquake in Italy, many families with undamaged, or partially damaged homes moved out into temporary accommodation. Whilst this occurred, a second earthquake took place, causing additional damage to the already weakened structures but minimal loss of life due to evacuated houses. A further effect of earthquakes is that, in certain instances, surviving families have shown reluctance to begin salvaging materials from the rubble until the threat of a secondary disaster has passed. In the case of floods, families will be displaced for as long as it takes the flood waters to recede. On their return, the problems of inundated soil, contaminated water supply etc., normally delay the repair or reconstruction of buildings.

A key function of emergency shelter is the storage of salvaged belongings. This photograph was taken after the Guatemalan earthquake of 1976.
Improvised shelters in Guatemala, made from any waste materials: cardboard boxes, earthquake rubble, etc.

Policy Guidelines

Policies to avoid

1. Actions which duplicate the efforts of survivors.
2. Bulldozing rubble and burning timber from damaged houses, which could otherwise be recycled into new homes.
3. Importing labour for reconstruction when there is ample labour to be found locally.
4. Importing building materials which can be obtained locally.
5. Compulsory evacuation, especially of women and children: although this can temporarily reduce the pressure on local resources, it can cause social misery and apathy.
6. Relocation of survivors on land which is remote from work, markets, schools and other social and economic needs.
7. Creating large emergency campsites with risks of adverse social and environmental effects.
8. Building imported or prefabricated temporary shelters unnecessarily.

Policies to adopt

1. Encouragement of people to participate in the assessment of their own needs and resources

The objective is to minimize dependency on outside support, and concentrate official effort on identifying gaps and unmet needs with survivor participation. Advice on local housing needs is best obtained from local builders, architects or engineers. In some situations there may be local housing institutions with knowledge of building traditions and resources. Official groups, such as local government housing officers and public works departments, will have knowledge of the local housing process. Advice on how to make low-cost housing safe against future hazards may need to be introduced, but there is normally a shortage of local expertise on this subject.

2. Provision of materials and tools

Establish programmes which make shelter materials available, such as blankets, plastic sheeting, roofing sheets, and locally available or traditional building materials. In addition, tools for building and clearing rubble are always needed.

3. In cold climates or seasons, keeping stocks of robust “winterized” tents

This policy should be balanced against others advocated in this study: in many instances where the climate is mild or warm, alternative strategies can be adopted to mobilize local resources for rapid reconstruction.

4. Provision of transport for voluntary evacuation

Families wishing to leave the affected area to stay with friends or relatives who can receive them temporarily, should receive transport.

5. Requisition of public or community buildings

Public buildings such as schools, churches, community halls, etc. can fulfill an important function in providing emergency accommodation for homeless families. Such buildings should be earmarked and checked by qualified civil engineers for their structural resistance to the prevailing natural hazards. The maximum magnitude of hazard against which to check these buildings should correspond to the expected magnitude of hazard for a return period equivalent at least to the economic life of the building in question.

6. Cash grants and sale of building materials

Where stockists are still functioning, the provision of cash grants, or low-interest loans to enable survivors to buy building materials and tools, can be a highly effective policy. However, prior to embarking on such programmes, assisting groups must ascertain the scale of needs in relation to local resources: a small community may be able to obtain adequate supplies from normal stockists, but in a major disaster shortages may rapidly occur with consequent price rises.

Where the supply of materials or tools is limited, assisting groups, including the local government, should negotiate the block purchase of supplies and organize their transport and distribution to the affected area. Various approaches have been adopted to control the prices of essential materials (such as governmental price controls), but these interventions in a market economy may result in further shortages unless it is financially advantageous to the private sector to increase supplies or production substantially.
It should be noted that the distribution of essential shelter supplies is more effective if they are sold rather than given away, though subsidies may be necessary in cases of severe hardship. Although assisting groups may find selling more complicated than free disposal, it is better for the following reasons:

It retains the dignity of the survivor, who will be a participant rather than a victim, if he purchases goods himself.

Free distribution creates problems of dependency.

Free distribution can have serious adverse effects on local stockists trying to sell their goods in a normal manner (they themselves may also be victims of the disaster).

The money from the sale of shelter goods is needed by agencies for other vital purchases.

Although it is better to offer loans than to make outright cash grants, there are nevertheless certain instances when cash grants may be an important and effective form of aid:

To near destitute people, where they form so small a percentage of the population that they will not significantly drive up prices of commodities.

To labourers, in lieu of wages lost following disaster, in order to enable them to salvage belongings and materials, and build shelters, or begin to reconstruct their homes.

To poor artisans, to replace destroyed equipment essential to their livelihood, also possibly in lieu of income lost as a result of goods destroyed or damaged in the disaster.

To low income groups across a wider spectrum, when essential commodities are available in abundance in nearby, unaffected regions, and where the cash grant is in effect a subsidy for the part of the price which traders add for increased transport costs.

7. Access to land for housing and resettlement

Authorities frequently hold the key to rapid recovery, and must recognise the need to make land available. Ideally such land should be as close as possible to original homes and means of livelihood, but in a less hazardous area. Inevitably this will require loans or subsidies since the new land will require purchase and development (see chapter IV).

Key References


HOWARD, J., and SPICE, R., Plastic Sheetling—Its Use for Emergency Housing and Other Purposes, OXFAM, United Kingdom, 1981.

3.2 ALLOCATION OF ROLES TO ASSISTING GROUPS

PRINCIPLE: The success of a relief and rehabilitation operation depends on the correct and logical distribution of roles. Ideally this allocation should be undertaken by the local authorities who are best qualified to decide who should do what, when and where. However if the local administration is too weak to assume this responsibility, the priority must be to strengthen it.

Audience

- Private sector: Manufacturers/contractors
- Professionals: Architects/planners/engineers
- Policy-making administrators: National (tertiary) level
- Project managers of post-disaster shelter/housing projects: Regional/provincial (secondary level).

Time phases

- Pre-disaster phase—Preparedness/mitigation/risk reduction.
- Phase 1—Immediate relief period (impact to day 5)
- Phase 2—Rehabilitation period (day 5 to 3 months inclusive)
- Phase 3—Reconstruction period (3 months onward)
The role of national and local governments

Second in importance after the surviving community's own role, is that of the national and local government. The local government has the key task of allocating roles for all assisting groups. In undertaking this, it is likely to need assistance from the national government. In spite of the obvious risk of delegation of authority, this pattern of management has been found to be much more effective than centralised control. Local direction is frequently difficult for outside groups to accept, but it is vital to successful co-operation between survivors and assisting groups. The following list identifies the main components of the local government's responsibility in the recovery of shelter:

Safeguard employment:
Repair damaged infrastructure:
Provide safe land for rebuilding:
Restore social services:
Provide safe land for rebuilding:
Provide expertise to introduce safe construction and siting:
Draft up contingency and preparedness plans for any future disaster.

One of the key responsibilities of local government, clearing rubble, must be considered where large numbers of houses have been destroyed, authorities may want to move into the area rapidly and bulldoze the rubble out of the disaster zone. Mechanized rubble-clearance usually takes place after earthquake and cyclonic storms. As heavy machinery (such as bulldozers, scrapers and tractors) becomes more readily available in developing countries, this kind of clearance is likely to increase. Evidence from countries where massive bulldozing has occurred, shows that it plays a negative role for the following reasons:

1. It destroys salvable materials. Millions of dollars worth of both manufactured and indigenous materials, which could be re-used, are often destroyed by bulldozing. Those responsible for carrying out bulldozing often do not realize the value of the materials being removed. These same materials can actually be re-used to build safer houses, if the appropriate building methods are adopted.

2. The removal or destruction of salvable materials will delay reconstruction. It may take months, or even years, for a low-income family to raise the money to acquire new materials. Even if a low-interest loan programme is started, it is rare for such a programme to be working within the first three months after a disaster. Survivors, especially those in towns, rely on access to salvable materials for their initial building needs.

3. It destroys landmarks. The psychological need to be able to identify with pre-disaster sites and landmarks must not be underestimated. After a disaster, people want to re-establish the pre-disaster norm as soon as possible. The greater their sense of identity, and the less they have to replace or rebuild, the faster the overall recovery from disaster.

4. The very presence of bulldozers inhibits reconstruction. Mechanized clearance is dusty, noisy and frenzied. In areas where people have had little exposure to heavy, mechanized equipment, bulldozers are often terrifying. In some cases, bulldozing can be dangerous: when knocking down damaged buildings, the debris can spill over into adjoining public spaces. Reconstruction rarely begins until all bulldozing has ceased.

The mechanized clearance of rubble (seen here after the Guatemalan earthquake of 1976) can remove vital building materials which are capable of being recycled for new construction, such as the beam projecting from the front of the bulldozer. (Photo: UNDRR)
After the Corinth earthquake in Greece in March 1981, this man is salvaging roofing tiles from his damaged house.

However, there are some instances where bulldozing is required. Following natural disasters in large, urbanized areas, damaged high-rise and other structures may need to be demolished for safety reasons. Finally, it is recognized that some clearance will be necessary to re-establish communications after a disaster. Employed as an automatically implemented policy, rather than as a particular emergency measure, rapid mechanized clearance inevitably retards reconstruction.

The army

The army is often called upon to set up emergency tent camps for disaster victims. Because these camps are too rigid in layout, too uniform, too large, too dense, and often too far from original homes and work, they are the source of unforeseen problems: either they remain half-empty, or they breed environmental and social ills because of induced promiscuity. In the administration of emergency shelter programmes, military organizations seek uniformity and conformity. This concern for order is simply too much to expect from a civilian population stricken by disaster. The period immediately after a disaster is a time when people need to get together and develop a collective response. A military hierarchy of decision-making inhibits this organic social process.

The military nevertheless can play an important, positive role in the emergency phase. It has great potential for rescue and relief since it possesses certain unique advantages over all other agencies, such as the capacity for rapid action, pre-established emergency stock-piling facilities, and considerable logistical resources. The military's most effective roles in relief operations include:

- Opening up roads and re-establishing telecommunication links;
- Providing emergency water supplies and sanitation;
- Transporting and distributing emergency relief supplies and personnel;
- Assisting survivors in search and rescue operations;
- Demolishing structures which threaten to collapse;
- Stockpiling essential demolition equipment, building tools and vital building materials;
- Undertaking aerial surveys of damage.

The role of local professionals

Local professionals have the potential to fulfill important technical assistance roles in the post-disaster phases. However, their involvement is often limited because of professional and social barriers between the liberal professions and the low-income groups who form the majority of those affected by disasters, and who live, mostly illegally, in unsafe buildings on hazardous land.

The role of the private sector

The private sector includes enterprises operating on widely differing scales, from the small artisan to the large corporation. Overall reconstruction policy determines who will prosper, and it is therefore important to recognize the encouragement that can be given to small or medium-scale enterprises. Governments have a key social role in the way they administer credit, grants or loans to the business sector. The evidence suggests that a major bottleneck in disaster recovery is the lack of "cash flow" to get goods moving. A constraint on the rapid delivery of key building materials has been the monopolistic practices of a few large stockists and producers of building materials.

The role of experts

In many developing countries there is an acute shortage of local expertise on many aspects of shelter and housing provision following disaster. Expertise is needed for:

- Contingency planning (preparedness);
- Damage survey methods;
- Preparation of building codes for hazard-resistant construction;
- Appropriate modification techniques to rebuild low-income housing, and make it more hazard-resistant (this will include both traditional housing as well as some "modern" housing);
- Education of local architects, engineers, builders, carpenters, in hazard resistant construction.

The role of external voluntary and relief agencies

In addition to the primary, altruistic motivation of emergency relief, there are extraneous pressures on voluntary agencies which may be harmful to their purpose. These include:
The need to impress their contributors with a rapid and visible response:
The need to raise funds:
Competition with rival agencies:
The need to avoid offending the susceptibilities of the local administration:
In some instances, the limitation of their role to a specific "relief role"; thus encouraging them to restrict their shelter perception to an artificially narrow frame of reference:

However, they have certain inherent advantages which are particularly apparent when they operate in close rapport with local counterpart agencies. These include:
The capacity to operate very rapidly:
A grass-roots link to the local social and political structures:
Flexibility of approach:
Prior experience of disaster management (often these groups will have greater experience than all the other assisting groups including, in some instances, the central government).

THE ROLE OF DONOR GOVERNMENTS

Similarly, to the constraints on voluntary agencies, the altruistic motivation of emergency relief provided by donor governments is often tempered by the politics of bilateral aid. However, they have the capacity to fulfills important functions throughout all three post-disaster phases. They are particularly well placed to provide long-term capital and technical assistance for reconstruction and to link such assistance to future disaster preparedness and prevention policies.

THE ROLE OF INTERNATIONAL AGENCIES
(UNITED NATIONS SYSTEM)

The effectiveness of international agencies may be reduced by extraneous pressures, harmful to their central purpose, including:
The need to demonstrate their value to ensure their future growth and funding:
Competition among UN agencies where there are overlapping responsibilities:
Over-sensitivity to the tendencies and preferences of requesting governments:

However, their distinctive contribution lies in:
The ability to mobilize large-scale assistance from a multiplicity of sources:
The reduction of the need for bilateral assistance (where there may be strings attached to assistance):
A unique co-ordinating role that no other agency or government can undertake alone:
Access to international expertise of the highest calibre:

Political disinterestedness.

Project management

Quite apart from the correct allocation of roles, the evidence gathered in this study suggests that many failures in emergency shelter and housing reconstruction programmes stem from bad management. This criticism applies to both governments and assisting groups.

A survey of the background of relief and reconstruction programme managers and field directors over the last decade in relief operations (Nicaragua 1973, Honduras 1975, Guatemala 1976, and Andhra Pradesh 1978) shows that none of the key staff personnel had received prior disaster relief training. It also shows that none of the staff had a background in management, or had a formal education in programme administration. The backgrounds of field directors were in specialized fields such as agriculture, sociology, anthropology, economics, and general development studies. Also represented were members of the legal and medical professions, ministers of religion (missionaries), and persons drawn from the public relations field. Of the field directors of the major voluntary relief organizations, only three reported that they had received training from their own organizations in programme management, and that this was limited to short discussions.

This is not to say that field directors and their staff are not capable of planning excellent programmes. Several projects were well thought-out in terms of philosophy and objectives. The failure was caused by a lack of expertise in several vital functions:

Budgeting, especially estimating real costs:
Properly sequencing activities:
Forecasting problems:
Programme analysis:
Personnel administration

Few, if any, courses currently exist to train field-level staff in programme management. (There are several courses to train executive-level personnel in disaster management: however, most of this training is strictly for governmental personnel.) As pointed out elsewhere in this study, there is a lack of solid information upon which to base project plans. Without management skills, and without the information upon which to base decisions, relief programmes are doomed before they ever get started.

One of the most pressing needs in international disaster relief is for programmes to prepare and train disaster managers at all levels.

THE LACK OF INFORMATION

The present lack of training opportunities reflects the severe shortage of information on the effectiveness of past projects. In the field of emergency shelter and post-disaster housing, there are many descriptions of past projects, but there has been little analysis of the cause-and-effect relationships between the conduct of a programme and its result. In reviewing the information available from studies of disasters, we know where the problems occur, but we have not fully described the problems themselves, nor accurately described their causes:
1. How do relief and reconstruction programmes relate to development?
2. What are the different shelter responses required by different types of disasters?
3. How can technical assistance be best employed to improve emergency shelter management, and accelerate recovery and reconstruction?
4. What are the most effective means for controlling the prices of building materials?
5. How can experience and technical assistance be communicated to all levels of management and execution, and how can technology be best transferred?
6. What types of organization are best suited to respond to shelter/housing needs?
7. What is the true role of emergency shelter in the overall relief and reconstruction scenario?
8. What makes shelter programmes effective?

These gaps in knowledge stem ultimately from a general reluctance to question the fundamental nature of the relationship between donor and recipient. This question is discussed in detail in the concluding chapter.

**Policy guidelines**

**Policies to adopt**

(See table 2)

The local administration should assume responsibility for the allocation of roles and subsequent direction of all assisting groups concerned with housing and shelter provision, whilst making full use of those groups' particular expertise. In the allocation of roles, the following considerations should be borne in mind:

1. Avoid mechanical clearance of rubble (bulldozing) where building materials can be salvaged.
2. The local administration should allocate all roles for shelter and housing assistance.
3. There are important roles for the military, but they do not necessarily include shelter provision.
4. Local professionals can be extremely useful but are often psychologically and socially removed from the shelter and housing needs of low-income families. Their attitudes and commitments need to be changed.
5. The local private sector, particularly small enterprises, can play a major role in building shelter at economic rates, but they must be protected from cartels and monopolistic practices.
6. Local experts should always be used in preference to foreign personnel. However, not all the expertise required can be found locally.
7. Voluntary agencies have a flexible, grass-roots capacity which can be a vital asset in providing assistance at local levels.
8. There is a noticeable lack of effective project management of shelter and housing programmes, with a consequent need for training at all levels.

**Note**

The majority of issues discussed in this chapter are examined in more detail in chapter V, section 5-3, on the accountability of donors to recipients of aid.

**Key references**


Note particularly: Sections 30-39 — Social Development; sections 40-41 — Humanitarian Programmes; section 50 — Disaster Policies and Procedures; section 51 — Emergency Nutrition; section 52 — Disaster Technology: Sanitation, Water and Shelter.
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<td>Assess unmet needs of survivors</td>
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**Phase 1 — Immediate relief period (impact to day 5)**

- Providing essential building materials
- Provide expertise for safe housing construction
- Release safe land for new housing
- Re-establish damaged infrastructure
- Rebuild damaged and destroyed homes
- Assess damage to housing
- Co-ordinate external assistance
- Re-establish local economy
- Provide cash inputs to survivors
- Clearance of rubble (recycle materials)
- Re-establish damaged infrastructure
- Formulate building codes for safe construction
- Provide expertise for safe housing construction
- Devise contingency plans for future earthquakes
- Develop stockpiles of essential building materials
- Rebuild damaged or destroyed homes
- Devise any new plans for destroyed towns
3.3 THE ASSESSMENT OF SURVIVORS' NEEDS

**PRINCIPLE:** The accurate assessment of survivors' needs is in the short term more important than a detailed assessment of damage to houses and property. Partial or inaccurate assessments of the human needs by assisting groups have been a frequent cause of past failure of relief efforts.

**Audience**
- Private sector: manufacturers/contractors
- Professionals: architects/planners/engineers
- Policy-making administrators: national (tertiary) level
- Managers of post-disaster shelter/housing programmes: regional (secondary) level

**Time phases**
- Pre-Disaster Phase—Preparedness/mitigation/risk reduction
- Phase 1—Immediate relief period (impact to day 5)
- Phase 2—Rehabilitation period (day 5 to 3 months)
- Phase 3—Reconstruction period (3 months onward)

**COMMON FAILURES OF ASSESSMENT**

One of the first responses to natural disaster is to estimate the extent of the damage. Assumptions are then made about the kind and scale of the survivors' needs. Specific failures in assessment occur in three categories:

1. **Lack of familiarity of assessors with the local situation.** A lack of knowledge of housing conditions prior to the disaster often makes it difficult, if not impossible, to distinguish between disaster-related needs and pre-existing housing shortages. Consequently, shelter requirements may be overstated, attributing residual housing deficiencies to the disaster. Lack of familiarity with the local situation can also result in overlooking all forms of local resources, which may be extensive: social 'coping mechanisms' which can assist in providing emergency shelter; all forms of material goods, including existing supplies of building products and tools stocked—in the normal course of events—within any large community; local skills and manpower which can be used for both emergency shelter and reconstruction; local agencies or institutions (e.g. co-operatives) able to manage shelter and housing programmes.

2. **Lack of understanding of appropriate techniques for damage and needs assessment.** Conventional methods of data collection do not work in the chaotic conditions of the immediate post-disaster phase, and assessment techniques to measure survivors' needs have to draw the subtle, but vital, distinction between 'needs' and 'wants'. However, information-gathering technology may not be appropriate to the technical level of the country being surveyed (data requiring computer analysis, for instance, is useless if a computer is not readily available either in time or locally).

3. **Weak management of the assessment.** Inappropriate assessments can be characterized by:

A higher priority being placed on damage surveys than surveys of basic human needs.
A lack of active participation by the surviving community (or even the surviving local administration) in the assessment of needs.
Confusion as to who has the responsibility for making the assessment.
Problems of communicating the assessments of assisting groups.
Lack of definition of the objectives of the assessment (for example, is the assessment of needs aimed at regenerating the self-help process in housing reconstruction, or is it aimed at providing emergency shelters before all other considerations?).

**DEFINING WHO SHOULD MAKE THE ASSESSMENT:**

The problem of authority and information needs

It is a characteristic of all major disasters that too many regard it as their role to make an assessment of survivors' shelter needs. There may be confusion within government departments about where this responsibility lies. Health, housing and emergency planning officials have all often regarded it as their particular task. In addition, groups such as the military frequently make their own assessments, as do voluntary organizations, representatives of international agencies, etc. They often do so either to suit their own views and operational policies, or as verification of official assessments which they may be inclined to distrust, or which may not be sufficiently detailed for their purposes.

Given this situation, if the government is to maintain full control it will be necessary for assisting groups to accept ultimate governmental authority in the assessment of needs, as in all other relief matters. On the other hand, the government must recognize the value of assisting groups' advice on assessment, since many of these groups will probably have more experience of dis-
The assessment must be verifiable. Many assisting groups will be well experienced in disaster management, and will be quick to detect over-estimations. Once assisting groups recognise the accuracy of the assessment, they will be less likely to insist on their own independent assessments. It is essential to capitalise on relief assistance for the medium to longer term. There is an urgent need to transcend exclusive preoccupation with immediate relief needs, and to give more thought to reconstruction needs at the outset.

Policy guidelines

Policies to avoid

1. Policies that encourage a proliferation of independent assessments, without co-ordination or agreement on the sharing of information.
2. Requesting the assessment of needs from those without pre-disaster knowledge of the locality.
3. Awaiting the results of damage surveys and subsequent vulnerability analyses before starting any housing reconstruction. Although damage surveys reveal the need for detailed vulnerability and risk analyses of various building types and sites, the evidence indicates that if such studies do not already exist, it is not advisable to wait for their completion before starting the reconstruction process—both should proceed in parallel, for delays dissipate commitment and resources.
4. Isolating damage or structural surveys from the assessment of social, cultural and economic needs.
5. Assuming that the assessment of needs and damage surveys can be undertaken after a disaster, without having set up a methodology beforehand.
6. Over-reliance on sophisticated technology, such as remote sensing or high altitude photographs, for damage surveys.

Policies to adopt

1. The governmental body in charge of relief must allocate all roles as a matter of priority to those individuals or organizations best equipped to make the assessment. It is advisable for the assessment of shelter needs to be undertaken by a multi-disciplinary governmental/inter-agency team, covering public works, housing, sanitation, community development, relief, etc. The composition of the team will vary according to the type of disaster and local conditions. Although there may be extensive damage to housing, damage to the infrastructure and other sectors of the economy may be of equal, or greater, concern to the survivors.
2. Some members of the team should be familiar with the normal pattern of life in the affected area, so as not to confuse immediate emergency needs with the norm for the area. This is not an easy task in marginal or squatter settlements, where, for the most part, people subsist in a state of chronic housing shortage and need.

Guidelines for the assessment of needs and damage

1. Pre-disaster planning (preparedness)

The establishment of procedures for post-disaster needs assessment and damage surveys are a vital part of the preparedness planning process. The first requirement is for a data base against which the conditions following the disaster can be measured. To this end, certain pre-disaster conditions should be met:

(a) Identification and mapping of hazardous zones.
(b) A description of prevailing building techniques.
(c) Mapping of elements at risk.
(d) Estimation of housing demand. In the event of the need to reconstruct housing, the scale of demand will be a function of:
   - The rate at which the region is being urbanised, and under what conditions;
   - The economic profile of the area (income levels, employment, skills, building industry, etc.);
   - The demographic profile of the area, especially the rate of population growth and the distribution of age groups;
(e) Preparation of a sociological profile of the community. Part of the information produced by the profile should include a description of the "coping mechanisms" by which survivors, institutions and public services respond with assistance and shelter.
(f) Description of the building industry. Such information is vital if an outside agency is to formulate a shelter programme well co-ordinated with local procedures and resources.

The above information provides not only a basis for estimating emergency shelter needs following a disaster rapidly and accurately, but it is also the foundation for long-term risk reduction and prevention.

2. Information needed immediately after the impact of a disaster

(a) The approximate number of housing units that have been destroyed.
(b) The approximate number of housing units that are too severely damaged (and in danger of collapse) to provide safe shelter.
(c) An assessment of exposure to climate and weather.
(d) The capability of the community's social 'coping mechanisms' to provide emergency shelter, i.e., how many survivors can be housed by family or friends, or find refuge in public buildings, etc.
(e) The feasibility and likelihood of survivors fashioning their own emergency shelter from salvaged materials.

(f) The proportion of survivors that have access to emergency shelter provided by the authorities and assisting groups within the first 24 to 48 hours.

(g) The most appropriate and accessible emergency shelter types available (if any) for survivors without shelter.

(h) Accessibility to the disaster sites.

(i) The risks of secondary disasters that may influence shelter needs (e.g. fire, aftershocks, landslides etc.)

(j) The manpower at the disaster site, capable of assisting in erecting emergency shelter.

3. Information needed for reconstruction

The information needed for the subsequent post-emergency phases depends on the objectives of reconstruction, especially in terms of development. This is a major policy issue that will be made at the national level following all major disasters. In contrast to the emergency phase, the assessment of needs and resources for reconstruction requires a thorough and systematic collection of information. The specific tool for information collection will again be a function of the type of disaster, geographical limitations of accessibility to the disaster sites, and social conditions.

4. Damage surveys

Survey methods. The process for collecting the necessary information obviously cannot be a systematic family by family survey. Therefore some type of survey is essential to obtain usable data. However, natural disasters often reduce access to the stricken area by cutting lines of communication (rail, roads, bridges.) The most useful survey method may include low level reconnaissance flights. A trained observer can determine the geographic extent of the disaster area, the relative degree of damage at each location, detect patterns of damage, and perhaps see patterns of the survivors' emergency response. The aerial survey can also be used to identify areas that are accessible by land for limited though more accurate ground assessments, and to identify those areas on which to concentrate relief efforts.10

But it should be noted that although such a survey can help calculate the number of buildings damaged, it cannot, of course, provide information on damage invisible from the air (e.g. cracked adobe walls, weakened foundations, roofs in a near state of collapse, etc.). For this reason, the data assembled must be assessed in conjunction with that collected by sample field surveys, interviews with reliable eye witnesses may also provide additional information of value.

Field surveys. The field survey must be regarded as the most useful method of information collection, as opposed to aerial survey or sample interviews. Field surveys may be limited by the following factors:

- Depending on local conditions and survey objectives, the cost can be high in money, time and expertise:

- The affected areas may be difficult to reach:

- Cultural heterogeneity in the area to be studied may make it difficult to obtain useful data from sampling:

- Interviews may distort the information, depending on the interviewer-interviewee relationship:

- Field surveys require considerable local knowledge to distinguish damage from poor building techniques:

- Cultural differences between the affected population and foreign or national experts may produce differences of understanding and therefore difficulties in designing appropriate reconstruction programmes.

Nevertheless, field surveys have some important advantages:

- They generally cost less than more sophisticated assessment methods, such as remote sensing.

- They use less sophisticated, and therefore more accessible, technologies and equipment than in aerial observation and remote sensing.

- They yield high volumes of information. In sudden disasters, data collection includes estimates of the number of injured people, types of injury, number of deaths, availability of health facilities, medical and paramedical resources, quantity of medical supplies still available, damage to water supply and waste-disposal systems, risk of communicable diseases, damage to lifeline systems, and to physical structures. Field surveys are also particularly valuable for inventorying useful resources, such as building materials for temporary and permanent shelter, reusable debris, labour, building contractors, etc.

- They make it possible to generalize from relatively small samples, if adequate techniques are used.

- They permit the participation of local personnel who, after a short period of training, can conduct interviews and assist in other field survey tasks. Skilled personnel is needed, however, to plan, supervise and analyse the collected data.

5. Checklists for the assessment of needs and damage

(a) Figure 1 contains an outline for a needs assessment in the field. It is intended to demonstrate the scope of information that is useful in planning a shelter programme. It can be modified to reflect the specific conditions of the community and its culture. But it should be recognised that the specific design of the survey and the manner in which it is implemented should be as open to influence by the survivors as it is to that of assisting groups. Both can bring specific skills and expertise to this task.

(b) The survey form (Figure 2) is designed to identify structural problems and so provide information necessary for safe rebuilding or repair. A person trained in structural evaluation should study several damaged houses of each basic type of construction in order to be able to describe the general pattern of structural behaviour in the disaster. Once the structural expert has established the general pattern of damage, he should train local personnel in carrying the survey. They will then be able to complete the survey and to tabulate the number of damaged houses.

The damage assessment form includes a general evaluation of how well different structural elements and materials held up. To be useful, the survey should note
Figure I

Suggested information requirements for a needs assessment

1. Data of head of family at time of interview
   1.1 Name
   1.2 Address
   1.3 City or district
   1.4 State (province)
   1.5 Marital status
   1.6 Age
   1.7 Occupation
   1.8 Identification number
   1.9 Name of spouse (partner)
   1.10 Age
   1.11 Number of minor children
   1.12 Sex

2. Housing data before the disaster
   2.1 Tenency of the house
   2.2 Rent
   2.3 Available resources
   2.4 Time available for work
   2.5 Building materials that can be salvaged
   2.6 Technical information
   2.7 Loan

3. Conclusions
   3.1 Total damaged
   3.2 Safety of House
   3.3 Resolve housing on the same site
   3.4 Move to another site
   3.5 Immediate assistance needed
   3.6 Long-term assistance

4. Information for the family
   4.1 Evaluation of safety of house
   4.2 Your housing plans

5. Assistance requested

6. Role of survivors in the assessment of needs

As has been stated, survivors must have a full and effective role in determining their emergency needs, especially shelter. This principle must be applied to the process of damage and needs assessment. In the event of a slowly developing disaster, such as drought, there is usually ample time to involve the affected population. However, these types of disasters seldom affect shelter, unless the community is relocated. In the immediate aftermath of a sudden disaster, when there is considerable damage and chaos, the immediate involvement of survivors in assessment may be inappropriate, at least until the initial rescue and relief operations have been organized.

Beyond the emergency period, however, survivors should begin to take an active role in the assessment of needs. The interview of key individuals within the community is often considered the appropriate course of action. For this to be successful, the individuals interviewed must be not only well informed about the extent of damage and needs, but willing and capable of providing information, and fully representative of their community. Obviously, the more familiar the authorities and assisting groups are with the community, the more secure they will be in obtaining reliable information.

7. Dissemination and sharing of assessment information

The dissemination of information to all interested parties must be assured. A possible means of information sharing might be the creation of a council of assisting groups working in the disaster area. The council could be structured with one agency responsible for liaison and acting as the information clearing house. Whatever the means, it is essential that the information reaches the head of the housing task force, and is placed in the hands of staff capable of effectively interpreting it.

the quality of the materials, their arrangement in the building and the distribution of cracks, deformations, and so on. Information should also be obtained on the type of soil, peculiarities of the building, or interference from neighbouring structures.

6. Role of survivors in the assessment of needs

As has been stated, survivors must have a full and effective role in determining their emergency needs, especially shelter. This principle must be applied to the process of damage and needs assessment. In the event of a slowly developing disaster, such as drought, there is usually ample time to involve the affected population. However, these types of disasters seldom affect shelter, unless the community is relocated. In the immediate aftermath of a sudden disaster, when there is considerable damage and chaos, the immediate involvement of survivors in assessment may be inappropriate, at least until the initial rescue and relief operations have been organized.

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FIGURE 2

Damage assessment survey form

Description

Size .................................................................
Materials .............................................................
Replacement cost ................................................
Cost of repair ........................................................
Per cent of damage
0-25% .............................................................
26-50% ............................................................
Over 50% ..........................................................

Site

Urban ........ Rural ........ Open ........ Protected ........
If protected, describe: ...........................................

Description of terrain ........................................

Foundations

Anchoring foundation ........................................
Materials used ..................................................
Evidence of failure ............................................
Preservatives ....................................................

Walls

Materials used ..................................................
Height and width ............................................... (Configuration)
Reinforcement system ....................................... (Configuration)

Damage description location ..................................
Evidence of explosion or implosion ..........................

Roof and roof support

Roof configuration
Gable ............................................................
Hip ..............................................................
Shed ............................................................
Other ............................................................

Roof support system ........................................

Roof/wall attachment ........................................

Estimated Pitch ..............................................

Overhang ......................................................

Description of damage ......................................

Evidence of uplift ...........................................

Damage to utilities ...........................................

Description of sequence of failure ........................

Date ..............................................................

General information

Community ......................................................
Location ........................................................
Use ..............................................................
Age .............................................................
Builder ........................................................
Hazard type ...................................................
Magnitude .....................................................
Frequency/return period ....................................
Owner/occupant plans ......................................
Observations ..................................................
Recommendations ............................................

Observations ..................................................
Recommendations ............................................

Summary of policy recommendations

1. Primary level (local)
   (a) Pre-disaster
      Carry out hazard mapping, and the mapping of elements at risk.
      Prepare assessment and survey methodology accordingly.
      Prepare logistics for duplicating, distributing, and collecting survey forms.
   (b) Post-disaster
      Identify local people who can participate in the execution of field surveys (they need to be literate and capable of learning basic survey and analytical skills).

2. Secondary and tertiary levels (regional and national)
   (a) Pre-disaster
      As part of disaster preparedness, develop the data base of existing housing conditions, housing demand, house types, labour and material resources, the normal building processes and related social conditions again, and a post-disaster needs assessment can be prepared.
      Develop an assessment procedure that co-ordinates the efforts of all the assisting groups in collecting and sharing information.
      Support the establishment of a national team of experts, who will train local government officials and technicians in administering pre- and post-disaster surveys (this team should also be 'on call' to assist in the execution of post-disaster surveys).
      Prepare post-disaster survey models, identifying all essential information, adapted to specific disaster-prone communities.
   (b) Post-disaster
      establish policy and programmes for the reconstruction of housing, in harmony with the prevailing development patterns.
<table>
<thead>
<tr>
<th>Method of assessing damage</th>
<th>Survivors</th>
<th>Local voluntary agencies and private sector</th>
<th>Local government</th>
<th>National government</th>
<th>Local military</th>
<th>Foreign experts</th>
<th>External voluntary agencies</th>
<th>External donor governments</th>
<th>International agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air surveys of roads, bridges, etc. Field sampling techniques for well contamination; village-by-village surveys of damage to water supply, sanitation.</td>
<td>Useful for avoiding blocked roads, contaminated water supplies, etc.</td>
<td>Necessary for private sector in deploying their resources.</td>
<td>Essential in determining whether to request supplies of materials from external sources.</td>
<td>Essential in the event of major disasters to determine the resources needed.</td>
<td>Essential.</td>
<td>Essential for all consultancy work.</td>
<td>Not relevant.</td>
<td>Relevant, if there is bilateral aid.</td>
<td>As above.</td>
</tr>
<tr>
<td>Damage to infrastructure such as roads, etc.</td>
<td>Air surveys when damage is to raw materials, such as trees, coupled with field surveys of warehouse stockpiles, etc.</td>
<td>Essential in determining whether to order supplies from external sources. Also useful in determining stockpiles for future preparedness planning.</td>
<td>Essential in determining whether to order supplies from external sources. Also useful in determining stockpiles for future preparedness planning.</td>
<td>Essential in determining what contributions are needed, particularly from adjoining countries.</td>
<td>Useful, since the army may use their own stockpiles of materials.</td>
<td>Essential for advice on the import of materials.</td>
<td>Useful.</td>
<td>Relevant, if there is bilateral aid.</td>
<td>As above.</td>
</tr>
<tr>
<td>Number and location of houses damaged or destroyed, times of damage, degree of damage.</td>
<td>A mixture of low-level and high-level air surveys coupled with field survey sampling techniques.</td>
<td>Limited use.</td>
<td>Useful for determining: (a) The supply of essential materials for construction; (b) The supply of tools.</td>
<td>Essential to determine the need for: (a) Supplying, in particular circumstances, emergency shelter (e.g., tents); (b) Allocating funds to survivors; (c) Establishing what materials will be needed for reconstruction.</td>
<td>Not needed.</td>
<td>Essential for any advice being offered on safe reconstruction.</td>
<td>Useful in determining which areas to deploy maximum resources.</td>
<td>Relevant of there is bilateral aid.</td>
<td>Relevant for the co-ordination of international assistance.</td>
</tr>
</tbody>
</table>
Table 3 provides synoptic guidance on the relevance of damage survey data to the various assisting groups concerned, including the survivors themselves.

Key references


4.4 EVACUATION OF SURVIVORS

PRINCIPLE: The compulsory evacuation of disaster survivors can retard the recovery process and cause resentment. The voluntary movement of survivors, where their choice of venue and return is timed by their own needs, on the other hand, can be a positive asset (in the normal course of events, some surviving families seek shelter for the emergency period with friends and relatives living outside the affected area).

Audience
- Private sector: Manufacturers/contractors
- Professionals: Architects/planners/engineers/public health officials
- Policy-making administrators: National (tertiary) level
- Project managers of post-disaster shelter/housing projects: Regional/provincial (secondary) level

Time phases
- Pre-disaster phase—Preparedness/mitigation/risk reduction
- Phase 1—Immediate relief period (impact to day 5)
- Phase 2—Rehabilitation period (day 5 to 3 months)
- Phase 3—Reconstruction period (3 months onward)

CONFLICTING PRIORITIES

After disasters there are normally two conflicting sets of priorities:

1. The desire of officials to clear the affected region of everyone, except those involved in relief activities, so as to relive public services which may be only partially operational.

2. The desire of families to remain as near as possible to their damaged homes, in order to protect their title to property, their belongings, animals etc. In addition, there may be an even stronger motivation, probably based on a psychological need for security, to remain close to home (even if it has been largely destroyed).

PROBLEMS OF COMPULSORY EVACUATION

The compulsory evacuation of a disaster zone creates the following problems:

- It may increase the problems of distribution of relief supplies and services.
- It reduces the possibility of families to salvage their belongings and to gather building materials.
- It creates an artificial need for temporary shelter.
- It turns survivors into refugees.
- It reduces the capacity of the surrounding communities to assist the survivors.
- It retards reconstruction.
- It retards the psychological recovery of the survivor by introducing additional stress: family separation and an unfamiliar environment.

In the majority of cases where major evacuations were ordered, it was later established that the decisions were made:

Without waiting for full knowledge of the services that could have been brought into the affected area; and

STEWART, R.S., Understanding Earthquake: Relief Guidelines for Private Agencies and Commercial Organisations, International Disaster Institute, Farnham, United Kingdom, 1982.
Without any awareness of the potentially adverse social and economic costs of a major evacuation.

Cordon surrounding the prohibited zone following the enforced evacuation of Managua, Nicaragua, in December 1972.

RISK AND EVACUATION

Most of the reasons given for evacuation—protection from epidemics caused by contact with the dead, looting, panic, and so on—have proved to be ill-founded. The policy only seems justified in the exceptional circumstances of immediate threat of a secondary disaster (e.g. the risk of fire after an earthquake, as in San Francisco 1906, and Tokyo 1923, or the breakdown of essential services such as water and sewage).

In the case of cyclones or earthquakes there may be doubt about whether or not to order an evacuation. But in the event of a major flood there is usually no such option, and public authorities may need to evacuate the entire population of a region until the water level drops. However, flood hazard mapping allows planners to designate areas for evacuation. If such a provision does not exist, a rapid inventory of unaffected areas must be made after flooding, listing the public buildings (schools, halls, churches etc.) which can be made available for emergency accommodation.

CHART 1
Comparative movement of population following Managua earthquake, 1972

This chart is of the situation in Masaya, a town about 20 miles from Managua, Nicaragua. Thirty-two thousand people were absorbed by friends or their families during the first ten days. In contrast to the numbers with extended families, the low occupancy of the El Covetepe campsite can be seen.
Policy guideline

(See chart 2)

Unless there are exceptional circumstances, compulsory evacuation should be avoided. However, the voluntary movement of families or parts of families (such as women, children and the elderly) from the affected area may be a positive asset to recovery and the problem of emergency shelter.

Key references


3.5 THE ROLE OF EMERGENCY SHELTER

PRINCIPLE: Assisting groups tend to attribute too high a priority on the need for imported shelter units as a result of mistaken assumptions regarding the nature, and, in some cases, relevance of emergency shelter.

Audience
- Private sector: Manufacturers/contractors
- Professionals: Architects/planners/engineers
- Policy-making administrators: National (tertiary) level
- Project managers of post-disaster shelter/housing projects: Regional/provincial (secondary) level

Time phases
- Pre-disaster phase—Preparedness/mitigation/risk reduction
- Phase 1—Immediate relief period (impact to day 5)
- Phase 2—Rehabilitation period (day 5 to 3 months)
- Phase 3—Reconstruction period (3 months onward)

COMMON PROBLEMS OF EVALUATION

1. Criteria. Emergency Shelter has more often than not been regarded as a product with design criteria developed by the donor. This approach has consistently failed to satisfy the needs of surviving families. It stems from a number of mistaken assumptions:

That there automatically exists a need for outside agencies to provide large numbers of imported, prefabricated shelters;

That universal, prefabricated (and preconceived) shelter systems are desirable and feasible;

That “Shelter” implies an industrial product rather than a social and economic process;

That survivors do not possess building skills, or resourcefulness in salvaging materials or obtaining traditional materials to carry out their own building;

That survivors are passive, dazed and willing to accept any form of emergency shelter;

Within 24 hours of the 1976 Guatemala earthquake, families moved into streets, public parks, or open-visited emergency shelters from plastic streets, curbs, etc. The authorities assisted the process with supply tanks, and by digging latrine trenches.
That imported emergency shelter can be provided rapidly and cheaply;
That temporary housing is not a cost factor in the total reconstruction programme and will be demolished after a limited period;
That large sites with concentrations of temporary housing are an acceptable and effective solution for the community.

2. Timing (see table 4). Timing of the delivery of emergency shelter is crucial, for its usefulness is confined to the actual emergency phase, which may last only a few days. Late delivery may actually impede the recovery of housing rehabilitation and reconstruction. Due to the logistical difficulty (if not impossibility) of transporting, distributing and assembling imported emergency shelters within the critical few days of the emergency phase itself, such shelter rarely plays a significant role. Moreover, the evidence suggests that survivors have the resourcefulness to improvise their own emergency shelter needs, at least for a limited period. Lastly, it should not be forgotten that the relief and reconstruction phases often start simultaneously, all of which points to the need for new and less conventional approaches to emergency shelter provision after disaster. To achieve maximum effectiveness, therefore, assisting groups should reserve a proportion of their resources for the phases beyond the immediate emergency period.

<table>
<thead>
<tr>
<th>Table 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>The timing of assistance: a summary of the most effective phases for assistance by various groups</td>
</tr>
<tr>
<td>Phase 1: immediate relief; impact of day 2 Phase 2: rehabilitation; 5 to 1 month Phase 3: re-establishment; 3 months onwards</td>
</tr>
<tr>
<td>Survivors</td>
</tr>
<tr>
<td>!</td>
</tr>
</tbody>
</table>

3. Quantities of units produced. Assisting groups have frequently set a higher priority on supplying shelter units than on contributing to the self-help process, although there are signs that this attitude may be changing. They have also been apt to overestimate the simple correlation between a damaged or destroyed house and the need for an emergency shelter;

4. Standardization. Relief agencies normally standardize the size or form of their emergency shelters for ease of production and packing. However, this approach greatly oversimplifies the problem. The concept of a "universal or standard shelter" is not feasible because it ignores:

- The high price and poor cost effectiveness of the products in the disaster affected country;
- Its potentially harmful social consequences;
- The need to involve disaster survivors in satisfying their own shelter needs;
- Climatic variations;
- Variations in cultural values and house forms;
- Variations in family size;
- The need of families to earn their livelihood in their houses;
- Local capacity to improvise shelter;
- The problems of obtaining suitable land at low-cost on which to build such shelters;
- The logistical problem of transporting and distributing such shelters in time for the emergency period;
- Problems of appropriate technology: assembly, skills, materials etc.

5. Cost effectiveness. The unit cost of donor emergency shelters is often much higher than the cost of a new house in the disaster affected community, especially when the latter enjoys the built-in savings of self-help and the use of locally available, traditional materials. If one must then add to the unit cost of emergency shelter the costs of transport, distribution and assembly, the cost-effectiveness is sufficiently poor to justify a re-appraisal of such solutions, and a closer examination of how best to exploit local resources.

6. Performance. Evidence about the performance of emergency shelters has not come from surveys conducted by the assisting groups themselves, but from independent sources. The reluctance of many relief agencies to monitor and formally evaluate their post-disaster shelter programmes can hamper the development of more effective policies for the future.

7. Extra shelter needs following earthquakes. There often has been a failure to grasp that the need for emergency shelter may extend to the entire community, families with undamaged homes leaving them for fear of damage from aftershocks. However, this fear tends to decline as the frequency of aftershocks subsides. It was particularly apparent after the 1976 earthquakes in Guatemala and Friuli (Italy), that temporary shelter for this group of survivors was required almost exclusively for sleeping, other normal living functions (cooking, washing, etc.) continuing within the home. Thus, shelter...
provision for such families must be immediately adjacent to their homes.

8. False correlations. Frequently a direct correlation is made between numbers of damaged or destroyed houses and the number of homeless, neglecting the role of extended families, and other kinship patterns, as the providers of temporary accommodation.

9. Shelter versus land and services. The standard approach to emergency shelter or post disaster housing provision in the past has been to manufacture a standard structure. Most programmes adopting this approach have come under heavy criticism, since many of the shelters or houses provided have had low occupancy rates, or have been unpopular with their occupants. This has prompted much discussion on the cultural acceptability of such designs, but cultural rejection is rarely the most important factor in a family’s refusal of a shelter. Recent research has shown that far more significant to the occupant is its relationship to land tenure, its security, its proximity to employment, and its access to services and utilities.14

10. "Indigenous" emergency shelters. Recently, several assisting groups have attempted to build standard emergency shelters, using indigenous materials designed in such a way that the performance of the structure would be improved. These programmes, too, have shown little success. Their rate of failure seems tied to deficiencies of site and services, the costs and difficulties of long-term maintenance, and the inability to adapt the structure to non-housing needs (such as shelter for animals, storage of food, crops implements etc.).

11. The place of emergency shelter on the survivors’ scale of priorities. The majority of developing countries are situated between the equator and the sub-tropics, i.e. in regions where climate exposure does not systematically pose a threat to survival.15 The result is that emergency shelter is not systematically the first priority of survivors. As this study emphasizes, the priorities are for land, infrastructure, income (employment), and early access to the means of reconstruction.

### 3.6 SHELTER STRATEGIES

**PRINCIPLE:** Between emergency shelter provision and permanent reconstruction there lies a range of intermediate options. However, the earlier the reconstruction process begins, the lower the ultimate social, economic and capital costs of the disaster.

#### Audience

- Private sector: Manufacturers/contractors
- Professionals: Architects/planners/engineers
- Policy-making administrators: National (tertiary) level
- Project managers of post-disaster shelter/housing projects: Regional/provincial (secondary) level.

#### Time Phases

- **Pre-disaster phase—Preparedness/mitigation/risk reduction.**
- **Phase 1—Immediate relief period (impact to day 5).**
- **Phase 2—Rehabilitation period (day 5 to 3 months).**
- **Phase 3—Reconstruction period (3 months onward).**

#### Options

- Temporary housing:
- The distribution of materials:
- Core housing:
- Hazard-resistant housing:
- Accelerating reconstruction of permanent housing.

- **Tents.** The tent is often viewed as the most obvious form of emergency shelter, and remains an effective and flexible relief item, especially when compared to the many alternative forms that have been tested and failed. The tent will therefore continue to survive as a major resource. Tents have certain characteristics which have made them very popular:

---

14 In Managua, Nicaragua, following the 1972 earthquake, there was initially no more than 30% occupancy of the Las Americas wooden shelters provided by the US Government. However, once services were provided, including water, sanitation, surfaced roads, transport, shops and schools, this figure was dramatically increased.

15 There are exceptions to this rule: areas located in the temperate belt, continental climates, or at high altitudes.

---
They are relatively lightweight, compact, and easy to transport:

They can be erected rapidly and easily:

They are the only form of disaster shelter that is stockpiled by donor countries and relief agencies in readiness for the potential demand.

They are similarly popular with the governments of affected countries for certain additional reasons:

They are normally stockpiled by the army and can be quickly released for disaster survivors:

Unlike improvised settlements, they are unlikely to become permanent, since they possess built-in obsolescence:

They are a visible demonstration that authorities are taking action to help the homeless.

However, despite the obvious necessity for, and effectiveness of, tents in certain situations, such as severe winter conditions, they have a number of limitations:

They fail to fulfill some essential shelter functions. They are not suitable for storage of salvaged goods, belongings and animals:

They are frequently too small for a family's needs, and are impossible to extend:

If the transit costs of imported tents are added to the cost of the tents themselves it is likely that, in many countries, the total cost will be substantially greater than that of rebuilding a normal, traditional house. This is particularly true of houses built out of local materials in the warm, humid tropics. But as a result of the divorce that often occurs between officials managing relief operations, and those concerned with longer-term reconstruction, such comparisons are rarely, if ever, made, and local cost-effectiveness is ignored:

Inevitably, the climatic range of disaster-prone environments makes it highly unlikely that one or even several tent designs will be appropriate for all conditions:

They deteriorate very rapidly as a result of exposure to the weather. In addition, they are very vulnerable to wear and tear.

A further difficulty has arisen in numerous disasters: tents have been erected on emergency campsites, but have been under-occupied. This probably results from reticence toward camp life and the desire of families to remain close to their damaged or destroyed homes. In rural areas families are reluctant to leave their damaged property for fear of losing their crops and animals. A final reason (probably the major one) has been the fear of losing possession of land if it is vacated.

1. *Imported designs and units.* As already mentioned, there has been a general quest for a universally applicable emergency shelter to meet the shelter and housing needs of the developing world. Members of the design professions, voluntary agencies, industry and many university graduate programmes have been active in this type of research. Hundreds of designs have been offered; many have gone into limited production, a few have actually been used in disaster areas. Most of these shelters have been designed to take advantage—mostly in vain—of simplified construction processes and prefabrication, or to make use of new materials initially developed for use in industrialised countries. Examples of such units include the Bayer/Red Cross polyurethane igloos used after earthquakes in Gediz (Turkey), Chimbor (Peru), and Managua (Nicaragua), and the OX-FAM polyurethane igloos used in Lice (Turkey).

A survey of the success of these shelters has indicated that their use as emergency shelter or as temporary housing has been extremely limited, their performance and acceptability poor, and their cost high. The reason (as has already been pointed out) is that their design criteria tend to be donor, rather than survivor orientated. The technology is often inappropriate, and assembly may require the skilled know-how of non-local personnel. Costs of transportation and the means of distribution are often ignored, adding substantially to the total costs of such units. While the donor may wish to have a standard unit that can be easily airlifted and rapidly installed, the recipient of aid will want a unit which is socially, culturally and climatically suitable, easy to maintain, and suitable also for other uses linked to this livelihood.

In cases where there is a risk of climatic exposure, the provision of improved shelter often receives a fairly high priority. In these cases the emergency shelter is basically a humanitarian consideration. The long-term impact of the units is not considered, and questions of cost-effectiveness normally do not come into play.

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A 1976 flood in the Panjshir Valley of Afghanistan washed most of this home away. Relief tents were placed within the building ruins, possibly to protect belongings (including animals) and preserve the ownership of the home.

Managua earthquake, Nicaragua, 1972—Coyotepe Camp, Masaya. The tents came from the emergency stockpile of the US Government's Office of Foreign Disaster Assistance (OFDA). Three hundred and sixty tents were provided. Occupancy, at its peak, reached 60 per cent.

The record of the performance of imported emergency shelters and the role they play during the emergency period suggest the following conclusions:

(a) Emergency shelters made of local materials are both helpful and necessary in refugee camps resulting from war and civil strife, but their effectiveness after a natural disaster appears to be limited.

(b) The majority of foreign assisting groups have concentrated on designing emergency shelter units which can be quickly flown in and erected in large volume. The problem, however, lies less in initial transportation, or in speed of erection, but in the distribution of the units within the disaster-affected area.

(c) In practice, few donor-designed emergency shelters serve the purpose for which they were intended, i.e. life support or protection from the elements. The uses to which the survivors have put the units have normally been of a secondary type, i.e. storage, with the families themselves living in adjacent improvised shelters, built at a fraction of the cost of the donor shelter.
Adjacent to the El Coyotepe campsite in Masaya, Nicaragua, following the 1972 earthquake the West German Red Cross donated 500 polyurethane igloos. Although such units only take two hours to fabricate, it took 148 days for the first igloo to be occupied due to logistical problems as well as difficulty in obtaining a site with approval to build. Approximately 30 per cent of the igloos were occupied despite the fact that there were no rent charges.

El Coyotepe, Masaya, Nicaragua. Fifteen months after the igloos had been built, families had already made extensive additions/modifications. Note the rectangular profile of the additions, to suit local building traditions, in lieu of the alien circular form. Since the igloos could easily be cut they proved very easy for such additions to be made.

(d) In the poorer disaster-prone developing countries, donor shelters have consistently cost more (by any standard of comparison) than traditional structures.

(e) The bulk of shelter provision following a disaster is provided and built by the survivors themselves. Even in cases where emergency shelters have been provided by external groups, most have arrived and been erected long after the emergency period.16

(f) In the few cases where the shelters have arrived during the actual emergency, they have usually been set up as camps. As already discussed, the evidence indicates that the creation of such camps following natural disasters has a negative impact, creating long-term problems. Indeed, the introduction of emergency shelter units from the outside often forces relief officials to adopt hastily conceived plans for distribution and erection.

(g) There are cases where imported emergency shelters proved to be of a lower priority than other relief items, especially medical and food items, thus leading to a waste of resources.

To summarize, there may be occasions when emergency shelter units are needed, but in such cases the evidence is overwhelmingly in support of their provision by the government, rather than by external assisting groups.

3. Standard designs incorporating indigenous materials. In recent years there has been much interest in the development of designs for emergency shelters using indigenous materials. Most of the effort has centred on

16 In Nicaragua the Bayer/Red Cross polyurethane igloos were not in use until 138 days after the earthquake of 1972.
Following the liberation of eastern Turkey in 1925, OXFAM, a voluntary agency, used their polytechnics for the first and only time. A team went to a church and an orphanage, setting up a workshop and putting the foam onto the mould. Several hundred and six hundred units were produced.

The units went on to an emergency summing up of an aluminium mould (with its own air supply), and dipping the foam onto the mould. Four hundred and six hundred units were produced.
Quonset huts provided in Skopje by the US Army. These houses are still occupied, nearly 20 years later, by the local population of gypsies.

Designs making better structural use of these materials\textsuperscript{17}. While there is little doubt that the structural performance of traditional buildings can be greatly improved, many programmes of this type have been unacceptable to the local people, and have therefore also been a disappointment to the agencies funding them. The reasons are as follows:

(a) Structural improvements often increase the quantity of materials required, thus making the unit more costly (even though it may be less costly than one made of industrialized materials).

(b) The modified units often result in architectural forms less functional than those traditionally used, representing the failure of designers to define problems from the survivor's point of view.

(c) Very few assisting groups employ qualified housing specialists who understand the building properties of indigenous materials in their local context (for example, if an agency decides to utilize bamboo, it must not only know how best to use the bamboo structurally, but

\textsuperscript{17}In 1974 the Office of Foreign Disaster Assistance of the United States Government financed over 11,000 temporary houses in Managua, Nicaragua, made from locally produced timber and corrugated iron sheeting.
the proper time to cut it; how to recognize whether it has been cured properly; how to treat it for different climatic conditions; and what materials to use with it, etc.

(d) There is the risk of environmental damage, by depleting supplies of indigenous materials. Unfortunately, little information on environmental impacts is available from developing countries.

4. Temporary housing. Temporary housing is usually provided by wealthy governments, and is extremely expensive in relation to its intended life-span. The units provided are expected to last for a period of several months to several years, prior to replacement with permanent housing. Temporary housing programmes are adopted when damage covers very large areas, and when the government feels that it is short of capital and will take years to rebuild normal housing.

The theory of temporary housing is that a low-cost, temporary unit can be provided at little or no cost to the disaster survivor who will be able to live in it long enough to obtain the capital necessary to rebuild a normal, permanent house. However, the main problem is that a "temporary" unit often costs more than a permanent structure (especially where the survivor normally builds his own home from indigenous materials). The evidence suggests that officials advocating temporary housing are frequently unaware of this.

Where temporary houses are provided at a cost attractive to the survivor, they may receive a wider distribution than those sold at an unsubsidized price. However, a review of such cases shows that the houses become permanent, with all the ensuing problems of having created premature slums.

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5. The distribution of materials. Many assisting groups feel that the key to shelter provision is to provide adequate or improved building materials (or machines to produce these materials), thereby omitting the design process altogether. In some instances, this approach is intended only to replace housing destroyed by the disaster; in others, minor improvements, such as the introduction of lightweight roofing materials, have been attempted in the hope that there will reduce vulnerability.

Assisting groups have not only provided building materials, but have also undertaken extensive housing education programmes, concentrating on the improvement of local building construction skills in order to strengthen housing against natural hazards. Use of this educational approach is encouraging, though its impact is not yet clear.

There are three main problems with the materials' distribution approach:

(a) The distinction that is apparent in industrialised countries between "temporary" and "permanent" housing cannot be readily applied to developing countries, where a permanent house may be cheaper and built in less time than an imported "temporary" unit from an industrialised country.

(b) The description "temporary housing" has frequently been used where shelter has been designed for a short life-span, but owing to its cost of replacement, it inevitably becomes permanent.

(c) The term "temporary housing" has been used in some instances by officials to persuade people to accept housing that does not conform with their normal expectation.

(d) In certain developing countries (e.g. in Latin America and the Indian sub-continent) families possess a form of "temporary shelter" in addition to their normal house—most frequently in rural areas where, during the harvest season, families move close to their crops—and which fulfills a very useful emergency role following disasters.

(e) The policy of "two stage" reconstruction—pursued in the Italian earthquakes of 1976 and 1979—where prefabricated temporary housing is subsequently replaced by the full reconstruction of damaged homes, is not viable in developing countries because of the extremely high cost of what amounts to reconstruction twice over.

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Price subsidies. If the scale of the subsidy programme is great, it virtually ensures that retail suppliers at the disaster site cannot ask higher than competitive prices.

Stockpiling. This topic is discussed in section 3.7. It is a mechanism with many limitations, but a stockpiling programme may be necessary to guarantee a material's supply, and mitigate the effects of commercial speculation.
Congregate purchasing. Another measure might be called "congregate purchasing", necessary to control prices of the manufacturer or wholesaler. Assisting groups could pool their resources and seek competitive bidding from suppliers or manufacturers of materials. It is most likely that they would get more favourable prices than if they were in competition with each other for the same materials.

Price controls. Price controls placed on materials by national governments have had mixed success. The policy is not completely effective if the controls do not extend throughout the distribution network. This type of policy has had some success in Peru, where the government not only fixed the price of cement, but also purchased it and resold it directly to the consumer at the fixed price. It should be stressed, however, that controlling costs in post-disaster situations encompasses more than just the cost of building materials. Cost control policies should also take into account the costs of land, building repairs, the installation of new infrastructure, and building labour.

6. Core housing. A simple, low-cost frame or solid core is provided and can be used as an emergency shelter or temporary structure. The core is designed to be permanent and more hazard-resistant. Over a period of years the occupants are expected to fill in the walls with whatever materials are available. This approach has had varying degrees of success, depending on the relative cost of the core, security of land tenure, the extent to which accompanying education programmes were carried out, and other socio-economic factors.

7. Hazard resistant housing. Since the rebuilding by owners of damaged or destroyed houses usually starts very soon after a disaster, there is always an urgent need for technical advice on safer siting, structural improvement, and basic architectural improvements, in order to improve overall resistance to hazard. However, it has been found that there are considerable difficulties in making advice available to house builders. These include:

Providing such advice in time;
Finding an appropriate format for the advice, given that many builders may be illiterate and unable to read working drawings;
Providing technical advice relevant to the skills of local builders on structural improvements, using the available building materials;

Making proposals that are economical and culturally acceptable.

8. Accelerating the reconstruction of permanent housing. Following the 1976 earthquake in Guatemala, a number of assisting groups developed a different strategy: instead of attempting to provide emergency shelter or temporary housing, they concentrated on encouraging rapid reconstruction of normal housing. This approach assumed that people would look after their own emergency shelter or temporary housing needs, enabling assisting groups to put the emphasis on rapid reconstruction. In this approach, houses could be rebuilt to the standard represented by those which did not fail. Reconstruction to an improved standard would occur where the majority of houses failed as a result of inherent weaknesses of design, building methods and use of materials.

Rapid reconstruction requires that the survivors have the means to accede, in one manner or another, to permanent housing. As most building will be carried out with self-help methods, reconstruction to an improved standard necessitates the introduction of more advanced building techniques, but at a technological level which can be assimilated by the community, and at a price it can afford.

The advantages of using this approach are as follows:

It enables limited resources to be concentrated where they will have a permanent effect, and thereby be cost effective;
It reduces the time during which people are without permanent accommodation; the local people can afford, and allows decision-making to be kept at a "grass-roots" level; it uses and builds upon the existing housing process and the skills which exist in the community.

There are few, if any, major disadvantages in opting for rapid reconstruction, but it does require the support of the government, and a long-term commitment on the part of the assisting groups. Assistance can come in the form of price controls, low interest loans, technical assistance, training, self-help and employment schemes linked to housing, etc. It may also require the local government to address some sensitive problems such as land reforms, security of land tenure and alteration of land-use patterns. Such a policy pre-supposes that, for certain hazards, reconstruction will take place in different locations.

Of all the shelter strategies available after a natural disaster of sudden onset, rapid reconstruction appears to be the best; it accelerates full recovery and makes optimal use of local resources, human and material. In the past, some agencies have undertaken a 1-2-3 strategy, i.e. they provide emergency shelter, temporary housing, then permanent housing. Some agencies have taken the shorter but still costly routes of 1-3 or 2-3. These routes can be wasteful unless the materials and skills contributed in the first instance contribute significantly to the final "3" stage of reconstruction.

The emergency shelter needs of survivors may be regarded as a function of the time taken to build a house under normal circumstances.

Policy guidelines

Policies to avoid

1. Determining shelter needs for survivors based on the roles and perceptions of assisting groups alone.
2. Designing, manufacturing and stockpiling prefabricated emergency shelter units (other than tents), as this solution is too costly and a waste of resources for developing countries.
3. Assuming that there will be a direct correlation between numbers of houses damaged or destroyed, and numbers of families needing emergency shelter.
4. In the case of earthquake disasters, neglecting the emergency shelter needs of families who fear to occupy damaged houses, in case of aftershocks and subsequent damage.
5. Considering shelter as a product rather than a process.
6. Erecting large, camp-like concentrations of tents or temporary housing.
7. Building temporary housing as a form of emergency shelter. Since temporary housing is rarely, if ever, replaced by permanent housing, assisting groups should, whenever possible, bypass this option, and move directly towards assistance in providing permanent reconstruction.
8. Spending all resources for shelter in the emergency period while aid is plentiful, rather than earmarking a proportion of these resources for rehabilitation and reconstruction, when the need for cash, materials and expertise is likely to be extensive in scale and prolonged in duration.

Policies to adopt

1. A study of the normal (pre-disaster) housing process.
2. Follow the advice already given in section 3.3 (The assessment of survivors' needs), in order to achieve accuracy in forecasts of shelter needs.
3. Provide appropriately designed tents, but only if they are found to be absolutely necessary (caution is needed to avoid any conditioned reflex that disaster recovery equals the need for tents).
4. Provide building materials and tools for emergency shelter and reconstruction programmes. Plastic sheeting and blankets have been found to be very effective relief items in all types of natural disaster."
5. Accelerate the housing reconstruction process to hazard resistant standards, consistent with the resources and capabilities of the community.
6. Include land and infrastructure as integral components of housing reconstruction.
7. The evaluation and continual monitoring of shelter provision is a vital requirement for the development of more effective policies by assisting groups. It is proposed that a proportion of all disaster assistance, perhaps 10 percent be designated for this purpose.

Key References

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""OXFAM, a British voluntary agency, has found that in nearly 40 years' experience of disaster assistance, the most common request relative to shelter has been for blankets."
3.7 CONTINGENCY PLANNING (PREPAREDNESS)

**PRINCIPLE:** Post-disaster needs, including shelter requirements, can be anticipated with some accuracy. Effective contingency planning can help to reduce damage and distress.

**Audience**
- Private sector: Manufacturers-contractors
- Professionals: Architects planners engineers
- Policy-making administrators: National (tertiary) level
- Project managers of post-disaster shelter housing projects: Regional provincial (secondary) level

**Time phases**
- Pre-disaster phase—Preparedness: mitigation risk reduction
- Phase 1—Immediate relief period (impact to day 5)
- Phase 2—Rehabilitation period (day 5 to 3 months)
- Phase 3—Reconstruction period (3 months onward)

**PREPAREDNESS AND DEVELOPMENT**

Many of the problems which must be confronted in pre-disaster planning are problems of development with which countries do not always cope quickly or easily. Thus, in the short-term, disaster prevention policies can have only limited results. Although disaster preparedness is not the better solution, it is something that even the poorest governments and local authorities can do now. Disaster preparedness measures can be undertaken usually without massive outside assistance or investments. The most disaster-prone areas can be quickly identified; contingency plans for relief can be developed: essential supplies can be stockpiled in the area; and plans can be drawn up, outlining the action to be taken by all concerned. While most of the money spent on disaster preparedness is not a direct investment in development, in an emergency this investment can save lives and property.

**COSTING ACY FOR SHELTER NEEDS**

Very few of the case studies carried out during the course of this study revealed the existence of shelter contingency plans, and it is apparent that there is a great reluctance by authorities to think about an unforeseeable disaster, though when a disaster has actually occurred, interest in pre-disaster planning suddenly comes to life. In determining emergency shelter needs, planners must decide on those responses which will facilitate reconstruction. Since the vast majority of emergency shelters in developing countries are provided by the survivors themselves during the emergency, capital or material assistance can be provided in such a way that it will serve both emergency and reconstruction needs. The role of assisting groups, therefore, should be to encourage more comprehensive and responsive disaster preparedness plans: to assist in identifying long-term post-disaster needs: to help local governments and agencies prepare to meet these needs; and to accelerate reconstruction.

**EVALUATION OF BUILDINGS AND SITE CONDITIONS**

Qualified engineers/architects should undertake the following evaluations, and communicate their findings to the authorities in charge of preparedness and prevention, giving estimations of probable damage for given hazards:

1. A study of the historical vulnerability of different types of construction to the prevailing hazards;
2. A study of the prevailing quality of building materials (it should be remembered, however, that most houses fail not because of the quality of materials, but because of the way in which they are used);
3. An examination of the quality of the workmanship typically used in building houses (the performance of many structures could be enhanced by simple, improved masonry or carpentry techniques);
4. Taking note of those features of traditional houses making them particularly vulnerable to prevailing hazards (e.g. asymmetrical forms in plan, section and elevation which increase vulnerability to earthquakes; porches and large roof overhangs which are particularly vulnerable in tropical cyclones, etc.);
5. An examination of the suitability of a house to its environment (building techniques and building types follow population migration, often into areas for which they are climatically and physically unsuited, thus increasing their vulnerability to natural hazards);
6. Analysing the site, especially location and soil conditions in relation to prevailing hazards (unstable slopes, loose unconsolidated soils, flood plains, etc. should in principle be avoided in housing reconstruction programmes). When suitable land is not available for housing reconstruction programmes—this is especially the case with low income populations living in marginal or "squatter" settlements—the continued risks must be reduced by other means, notably through improved disaster preparedness plans for evacuation and rescue.
**STOCKPILING**

The stockpiling of appropriate materials in strategic locations close to disaster-prone countries is a measure which has been discussed extensively for many years. This proposal, which has wide acceptance in the donor countries, has received little support from the governments of disaster-prone countries likely to receive aid. An examination of the problem of distribution following a disaster indicates that:

A massive influx of supplies following a disaster clogs ports, airports, and other points of entry; and in the mass confusion that results, the relief items most urgently needed are delayed.

The main problem of relief distribution occurs inside the disaster-stricken country. This is especially true when the disaster affects remote areas—heavy or bulky supplies may take days to reach the intended recipient, long after the emergency need has passed.

The problem is not so much how rapidly materials can be moved from the donor country to the recipient airport, but rather how rapidly they can be distributed internally. Therefore, if a relief agency wants to be effective during the emergency period, it must be able to distribute its supplies before the disaster occurs. In practice, the rapid distribution of shelter materials will receive a lower priority, compared with medical services, emergency food supplies, etc. Thus, large numbers of people within the affected area may not receive materials to build emergency shelters until after the initial emergency has passed. This is not to say that there is no need for these materials, but that if they are to play a significant role during the emergency, they must already be within the existing community, or very close to it.

Stockpiling is perhaps a poor choice of words to describe what is needed. Stockpiling should be active, not passive. The materials, skills, tools, etc.—need not be sitting in a warehouse or depot until they are needed. Tools can be placed in a community and used until a disaster occurs. Materials can be introduced, and plans developed to encourage a gradual change-over by incorporating them into new housing construction, and also non-housing activities. This active use of materials is still considered stockpiling, because it would be carried out on a priority basis, according to vulnerability and risk within the country.

An active stockpiling programme can only be successful, however, if local people are involved in planning, and understand the intended uses for all the materials and skills once a disaster has occurred. It must be recognized that in practice, however, there are likely to be three difficulties with stockpiling:

- Stocks of machines and materials are expensive and difficult to maintain over long periods;
- Authorities are understandably reluctant to create stockpiles for fear of improper use;
- It is technically difficult to maintain stockpiles for fear of improper use.

**CONTINGENCY PLANNING IN AREAS SUBJECT TO STORM SURGE, FLOODING AND HIGH WINDS**

1. **Warning systems.** Some warning is likely to be available for tropical cyclones and floods. The major problem is to communicate the warning, and to assure availability of an effective evacuation to follow it up.

2. **Protection options.** The authorities have several options open to them:
   - To build cyclone shelters for the local population (and possibly for their livestock);
   - To devise comprehensive contingency plans for the evacuation of the affected population (these plans will need to include the building of all-weather roads);
   - To relocate people living in the most vulnerable areas.

3. **Community cyclone shelters.** On the east coast of southern India, in the states of Andhra Pradesh and Tamil Nadu, the local authorities have combined with the Indian Red Cross to build community cyclone shelters. Such structures have been provided close to the highly vulnerable coastline for the protection of the local population against storm surge and winds. In addition to this function (for which they will only be required at certain times of the year), they serve a variety of everyday needs such as schools, dispensaries, creches, and, in certain instances, holiday centres for disadvantaged urban children.

But despite these additional uses, and the capacity of such structures to save lives, their creation raises some important problems which, as yet, have not been resolved. The very existence of these shelters could have a detrimental effect on the evacuation of populations from areas of extreme hazard. In effect, the shelters could immobilize an entire population in a very dangerous location. Moreover, the shelters have frequently been built in, or adjacent to, fertile delta regions. Since tropical cyclones occur during the summer harvest season, it is likely that the population of such areas will be swarmed with seasonal, migrant labourers. Inevitably, the cyclone shelters will not be able to provide accommodation for all; in fact, in some areas they are not even large or numerous enough to provide accommodation for half of the resident population. Thus a problem could arise as to who should, or should not, be admitted to the shelters; and, coupled with this issue, who should make the decision. Such shelters are usually built in communities where resources are scarce. The money used on their creation could probably be more effectively used to improve warning systems, evacuation routes, and local mitigation measures such as levees, dykes and wind breaks.

**Policy guidelines**

**Policies to avoid**

1. Large capital expenditure on prefabricated or in-situ emergency shelters, leading inevitably to capital losses owing to non-productive investment.

2. The immobilization of substantial stockpiles of emergency shelters and/or building materials at the cost of the housing process as a whole.

**Policies to adopt**

1. **Shelter.** A number of related items can be made available to disaster-prone communities ahead of disaster:
(a) **Tools to facilitate salvage operations.** Many types of tools can be provided for salvage, rather than the destruction of materials (for example, saws are better than axes).

(b) **Building materials for emergency shelters,** which can also be used in the re-construction of housing. Foremost among these are roofing materials and plastic sheeting.

(c) **Simple guidelines and training aids for action** which can be distributed quickly following the disaster.

(d) **Tents,** particularly in extreme climatic conditions.

(e) **Skills and ideas.** During the emergency period, there will be little time to train teams or to develop thorough, well thought-out plans; the time to place these skills and ideas in the communities is before the disaster occurs.

2. **Land.** In areas subject to regularly recurring disaster, especially floods, safe land should be earmarked ahead of time for evacuation and shelter. While this may pose the problem of requisition, ownership and tenure are not affected.

3. **Sanitation.** In limiting damage to the sanitary infrastructure, the measures to be adopted are mainly of an engineering type, and are part of the technical measures adopted at the time of construction of houses and other community facilities.

The simple water supplies to which some resort in emergency are the norm for other less affluent communities. Indeed, the acute problems of repair and maintenance of water supplies in natural disasters represent a dramatic concentration of the issues that confront most water supplies of developing countries. The types of solutions in disasters depend heavily on the previous pattern of water supplies.

Similarly for sanitation, the form of latrine proposed in some places for disaster situations is in other places the standard of everyday sanitation facility. Conversely, many of the methods which fall short of full water-borne sewerage systems are much less liable to be damaged by natural hazards.

The problems of contingency planning for sanitation are therefore extremely complex, bridging the social, economic, engineering and medical fields. UNDRO has devoted a full study to this subject (see Key references).

### Key references

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Chapter IV

POST-DISASTER HOUSING

4.1 RECONSTRUCTION: THE OPPORTUNITY FOR RISK REDUCTION AND REFORM

PRINCIPLE: A disaster offers opportunities to reduce the risk of future disasters by introducing improved land-use planning, building methods, and building regulations. These preventative measures should be based on hazard and vulnerability analyses, and should be extensively applied to all hazardous areas across the national territory.

Audience
- Private sector: Manufacturers/contractors
- Professionals: Architects/planners/engineers
- Policy-making administrators: National (tertiary) level
- Project managers of post-disaster shelter/housing projects: Regional/provincial (secondary) level

Time phases
- Pre-disaster phase—Overall mitigation/risk reduction
  - Phase 1—Immediate relief period (impact to day 5)
  - Phase 2—Rehabilitation period (day 5 to 3 months)
  - Phase 3—Reconstruction period (3 months onward)

HAZARD, VULNERABILITY AND RISK ANALYSES

In order to assess the disaster risk of an area, data are required on natural hazard, vulnerability and elements at risk.

1. Natural hazard. Techniques for the assessment of natural hazards are reasonably adequate, but in some areas and in some scientific disciplines there may be deficiencies of basic data both in quantity and quality. For the natural phenomena of main interest—meteorological and hydrological phenomena, earthquakes and volcanoes—it is essential that data requirements for the assessment of natural hazard should be formulated and, where gaps are identified, urgent steps should be taken to close them. These steps are important since natural phenomena are complex, and for their complete description and future development a number of different parameters are required. (Thus, a tropical cyclone is described in terms of its direction, speed of movement, maximum wind strength, the value of the surface pressure at its centre, etc.).

The preparation of hazard maps presents no particular problems, given adequate data of reasonable quality. In order to establish risk, a planner would expect to be provided with hazard maps for each phenomenon which is known to occur in the area under consideration. For example, hazard maps might be prepared for the extent of flooding for one or more average return periods, for flooding due to river flows exceeding the bankfull discharge, and for flooding due to storm surges in coastal and estuarine areas. There might, in addition, be other hazards of a geological nature which would have to be mapped (for example, fault lines, loose unconsolidated soils, etc.) and overlaid.

2. Vulnerability. Information on vulnerability is less plentiful, less reliable and less clearly defined than the information usually available on natural hazards themselves. Various categories of data are required, relating not only to the details of possible material damage but also to the degree of social and economic disorganization that may take place. There is a pressing need to assemble and publish as much information as possible on the damage that has occurred in past disasters. It might be met by the co-ordination and extension of damage surveys which have already been undertaken in a number of developed and developing countries.

3. Elements at risk. Information on elements at risk, such as population, housing public utilities, industry, infrastructure, etc., is normally taken into account as standard planning and engineering practice, even when disaster prevention and mitigation are not specifically considered. The inclusion of a disaster prevention and mitigation perspective in land-use planning, building generally, and housing in particular, is a basic requirement of planning for reconstruction.

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38 Definitions of these terms are contained in Appendix C.
HOUSING, HAZARDS AND VULNERABILITY

In earthquake-prone areas the collapse of buildings is the primary source of death. Landslides and subsidence are also primary sources of structural collapse and death. Houses built on loose unconsolidated soils, soils prone to liquefaction, and unstable slopes are therefore particularly at risk. The vulnerability of buildings under these conditions of hazard is increased where there is a lack of structural timber and lightweight building materials—for example in the arid zones of Asia and the Middle East.

The least problematical are the warm, humid tropics where timber, bamboo and thatch will normally be available, and can form the basis of safe, rigid, lightweight housing. An added advantage is that exposure to the climate is not a major risk: the basic needs are for space, shade and screening off for privacy, and basic services (water supply, waste disposal).

The widespread failure of reinforced concrete buildings in the Indian Andhra Pradesh cyclone of 1977, and in the southern Italian and El Asnam (Algeria) earthquakes of 1980, is a reminder that not all modern, high-technology housing is safe. There is a very real need to improve the quality of structural design and building supervision in urban mass-housing projects.

Removing housing from fertile flood plains is practically impossible for economic reasons. Indeed, land-use control for the mitigation of flood disasters acknowledges that high waters will occasionally invade the land, on river floodplains and along the coast, in spite of man's increasing efforts to hold them back. The purpose of control is to implement patterns of land use which reduce danger to life and property when the inevitable inundations occur. Relevant controls may take a number of different forms: directing people and economic activity away from the most hazardous places, insisting on designs and construction techniques that make buildings and other structures comparatively flood resistant, altering land-use patterns so that only those with low-damage potentials occupy the high-risk areas, and ensuring escape routes to higher buildings on higher ground for people in vulnerable low-lying areas.

BUILDING MODIFICATION

The preceding findings, which emphasize the importance of local building traditions, may have given the unqualified impression that local building methods, materials and traditions are always the best answer to Phases 2 and 3 (Rehabilitation and Reconstruction) of a disaster. But both historical evidence and case studies indicate that this is not always the case, the time intervals between certain types of hazard (particularly earthquakes) being too great to influence these traditions. Only if a disaster recurs relatively frequently (i.e. the last recurrence being within recent living memory and with a locally intolerable degree of intensity) will adaptation occur, bringing improvements to house siting and types of construction.
LOCAL CONSTRAINTS ON AND OPPORTUNITIES FOR MODIFICATION

Without support, such as subsidies and training programmes, it is unrealistic to expect low-income families to make changes in the siting, construction or form of their homes. The risk of unforeseen disaster appears to weigh lightly against everyday needs and established customs. Everyday needs, for families living at subsistence levels, pose continual "hazards" to their survival. For example, the short-term risks of crop failure, animal disease, or loss of income will be regarded as infinitely more important than the risks posed by infrequent hazards. However, while the modification of existing buildings may present difficulties, there will be greater opportunities for improvement in new housing, either during reconstruction or in the normal context.

Post-disaster housing programmes are different from normal low-income housing to the extent that:

In major disasters there is more money available for housing assistance;
The need to modify housing to achieve hazard resistance is generally accepted;
There are more agencies present than in normal conditions;
The provision of post-disaster shelter for the poorest sections of the community is of special international interest; and
The euphoric mood of the reconstruction period presents unusual opportunities for improvements.

THE RELEVANCE OF BYE-LAWS

Bye-laws regulating land use and building construction, though they may be appropriate to middle-income housing, have been found to be ineffective in the low-income sector where mitigation measures must be introduced through the local community structure, rather than simply introduced by legal and regulatory process. Reasons for this ineffectiveness include a lack of public awareness among those at whom the bye-laws are aimed, a lack of accompanying funds to achieve the higher standard of materials and construction stipulated, and difficulties of enforcement.

OPPORTUNITIES FOR WHOLESALE REFORM

Disasters will inevitably be regarded as ideal opportunities to introduce wholesale reforms in housing, building and planning. In reality, reforms are costly, technically difficult and politically complex. Progress in reform is generally slow, and an incremental approach is therefore easier to adopt.

PRE-CONDITIONS REQUIRED FOR CHANGE

Reforms in methods of housing reconstruction are dependent on a number of pre-conditions:
The capacity to keep the cost of construction and maintenance within the reach of the occupants;
The need to limit changes, respecting traditional values and housing forms;
The assurance of the long-term availability, at controlled costs, of materials required by new building methods;
The need for the confidence of survivors in those advocating change;
The capacity to teach new technology in a way that will be understood by the users;

In both the southern Italian and Algerian (El Asnam), earthquakes of 1980 there was widespread damaged to recently built, reinforced concrete buildings, despite the existence of aseismic building codes. This highlights the need for improved training of builders and the need for effective enforcement of building codes.
The willingness of groups providing technical assistance to remain active in a given area, with sustained support and encouragement to the surviving community beyond the relief period.

TECHNOLOGY TRANSFER

Following disasters where the structural failure of houses has been a major cause of death, assisting groups involved in housing reconstruction have attempted to introduce improved building methods. Many groups, however, do not have technical staff experienced in undertaking structural analyses of indigenous structures, from which to develop an appropriate reconstruction process. Therefore, they develop prototype designs of their own and attempt to provide enough units for those in need. These units are built as models for those who are not direct beneficiaries of the scheme. A second approach has been to develop intensive educational programmes and teach new building methods to the disaster-affected population.

The record of both approaches in transferring technology has been disappointing. The weakness of the first approach is cost of construction and maintenance, and the long-term scarcity of building materials (often imported)—factors rarely considered in programme planning. Secondly, the hastily designed techniques of crash programmes are not always the most readily understood or rational for those being trained.

Concerning the second approach, incentives have been required to get people to accept new building techniques. The best incentive has been the provision of building materials. However, the ability to transfer technology is dependent upon the continued availability of the selected materials: many techniques to improve structural performance in earthquakes, for example, require the use of lightweight, industrially manufactured materials. These materials, plus the improved building techniques, may be too costly for the majority of survivors.

In several instances, agencies involved in emergency shelter operations have attempted to introduce new technology in the hope that, when they re-entered the "normal" building process, the survivors would carry with them these improved techniques, and incorporate them into their new structures. But there is no evidence that this approach has worked, the primary obstacle being that the people do not equate their emergency shelters with permanent housing.

TRAINING FOR IMPROVED CONSTRUCTION

To date the best approach has proven to be combined programmes of building demonstration houses, and training in improved construction techniques. This work is still in its infancy, however, and much research and development are needed.
Training for the Management of Reconstruction Programmes

In addition to training needs at the grass-roots level, there remains the need for training in the management of post-disaster housing programmes.

There are two general classifications of assisting groups active in disaster relief and reconstruction: development organizations, working for long-term objectives; and relief organizations, working principally in emergency situations. The primary difference between the two is that the development organization will have ongoing programmes in the country, and can reallocate the existing staff's time to meet emergency needs; whereas the relief agency will have only a skeleton staff in the country, bringing in personnel from outside to conduct their relief operation for a relatively short-term period.

A survey of both the development and relief organizations (conducted through the American Council of Voluntary Agencies and the International Council of Voluntary Agencies) reveals that among development organizations, little time is spent on training the staff in disaster preparedness or in managing post-disaster programmes. Few training aids exist within the organizations, other than their written standard operating procedures. Nevertheless, four of the largest development organizations have appointed officers at headquarters, responsible for preparing disaster operations guidelines, and maintaining liaison with other agencies/organizations. Training for field staff or volunteers on the planning and management of relief operations is virtually absent. As the majority of developing countries are disaster-prone, this lack of training represents a serious omission on the part of the development agencies, for there is the likelihood that their staff will be confronted with a disaster during their tour of duty.

In the relief organizations there is, of course, more emphasis on planning and managing disaster programmes. However, the nature of relief organizations tends to limit training to the higher, permanent echelons. In reviewing the training programmes of a sample of major relief organizations, it was found that few train their field staff on emergency shelter programmes, and especially on how to set objectives and choose options. Surveys of the libraries of two important relief organizations revealed little or no information on housing or emergency shelter, other than tent catalogues and several manuals on setting up tent encampments.

The apparent lack of staff training in the major development and relief organizations on emergency shelter and post-disaster housing must be remedied, for experience has shown that these areas constitute a substantial proportion of relief and reconstruction activities, both materially and financially.

Technical Improvements

1. The roofing problem

Most research on emergency shelter and post-disaster housing has concentrated on the development of either whole structural units, or improved materials for use in the walls (e.g. stabilized adobe). Field experience has shown, however, that the majority of the problems encountered relate to the roof and roofing materials.

Housing with heavy adobe roofs supported on unreinforced, dried mud (adobe) walls is one of the most vulnerable types of construction in seismic areas. This is indicated in an example of failure, with high loss of life, from an earthquake at Golbaf, Iran, in 1980.
Building research has shown that the performance of a structure in high winds or in an earthquake is in large measure dependent upon the weight and design of the roof, and how it is attached to the frame. Once these problems have been solved, it is almost inconsequential what type of infill is used in the walls. Normally, the local materials which were used before the disaster can be used again.

At present, the most common material used in post-disaster housing programmes is corrugated metal sheeting, available in a variety of forms and usually manufactured in the developing countries (corrugated galvanized iron, corrugated aluminium, etc.). A large market exists for the sale of these materials.

Only minimal efforts are being made to develop other types of light-weight materials from indigenous sources in the developing countries. Simultaneous and co-ordinated research is needed in two areas: development of new roofing materials using purely indigenous materials; and analysis of traditional structural types in order to determine how to improve their performance.

There is a major safety problem with heavy, flat earthen or tiled roofs, especially in earthquake areas. The need here is to try and devise a lightweight substitute that can retain the flat roof form and incorporate the insulation needed for extremes of climate.

This information is needed at all levels of the relief system, to enable a greater number of people to become familiar with the options available. But, most importantly, it must be available at the field level, where the survivors' points of view can be taken into consideration. It is necessary to prepare the information needed beforehand, and store it in the disaster-prone developing countries for use by the government and assisting groups, when needed. If one continues to rely on storing information in industrialized societies alone, third world access to it will continue to be limited, no matter how well established are the connections between the disaster-prone countries and the outside storage system. Recent research has indicated that the basic decisions in setting up post-disaster housing programmes are made within two weeks of the disaster's occurrence. Thus, the information must be on hand, in usable form, as soon as the disaster has happened.

**The developmental context**

1. **Development issues**

Any assisting group involved in post-disaster assistance, whether for relief or reconstruction, is automatically concerned with long-term development. Thus, all the problems of development, such as the growth of "dependency relationships" through the inadvertent stifling of local initiative, are vital considerations. Relief and reconstruction programmes cannot be regarded or conducted as separate or distinct operations. They must be conducted in the context of development.

The development issues which are most overlooked by assisting groups when formulating post-disaster housing strategies and programmes are:

(a) **Land tenure and land-use patterns**. Few agencies initially realize the connection between their housing programmes and land tenure, and prevailing...
land-use patterns: there is often the need for better
quality, safer and equally distributed at affordable
cost.

(b) The need to upgrade self-help skills. Assisting groups
consistently overlook the fact that a house provided
to a disaster victim is of only limited value, and for
the benefits of too few. With housing must come the
development of skills.

(c) The need to facilitate co-operative actions. Agencies
normally gear their housing programmes to help
individuals; yet it has been consistently shown that,
if a society is to develop socially or economically,
residents must maintain a degree of sophistication
in conducting co-operative activities. Many agen-
cies overlook this opportunity.

Policy guidelines

Policies to avoid

1. Restoration of pre-disaster conditions. Merely to re-
store “normal” pre-disaster conditions will result in
the loss of unique opportunities presented after a
disaster to use the financial resources offered, as well
as the political and social will for change to building
and settlement patterns, which will improve general
living conditions and reduce future risks.

2. Taking too narrow a view of risk-reduction policies. It
is important to avoid regarding the provision of safe
housing in isolation from other needs and priorities
(land, utilities, employment, education, health, etc.).
Communities vulnerable to natural hazards are nor-
manly aware of the risks they face, but their economic
survival may be directly dependent on their particu-
lar location. In such circumstances, to propose relo-
ation or modification of homes, without subsidies
to cover the full costs, or technical assistance, is
unrealistic.

3. Confusing the “normal” housing deficit with that
created by a disaster. Experience indicates that
authorities undertaking reconstruction are fre-
quently asked to address chronic problems as part of
the reconstruction process. Thus, pre-disaster hous-
ing deficits are added to disaster losses and recon-
struction targets. Such a policy is probably inevitable
but unrealistic, unless additional resources of cash,
land, building skills and planning expertise are made
available.

4. Regarding reconstruction as being limited to build-
ings or infrastructure. There is an urgent need follow-
ing a disaster to strengthen all the components of
reconstruction: institutions (administration and
management), training, employment, community
development, financing, the building materials indus-
try, etc.

Policies to adopt

1. Risk reduction. It is important to introduce policies
to modify the conditions which caused disaster.
There are unique opportunities following a disaster
to make substantial improvements to the infrastruc-
ture, building forms, building techniques and land-
use patterns. The foundations of risk reduction are
hazard mapping, vulnerability and risk analyses.

2. Whole policies. The need is not to place reliance on a
single, technocratic risk-reduction policy, such as
the introduction of structural regulations or land-use
controls, but to develop a policy combining techni-
cal, social and economic measures.

3. Establish priorities for building improvements. It is
axiomatic that all buildings must be made safe. How-
ever, pragmatism dictates that such a formidable
task needs to be tackled according to a scale of priori-
ities:

(a) Buildings for social groups such as children, the
disabled and the elderly: schools, creches, old
people’s homes;

(b) Public buildings: community halls, churches,
mosques, cinemas, markets;

(c) Buildings in regular rather than occasional use;

(d) Vital public buildings that cannot be damaged or
destroyed without major, secondary adverse
consequences: hospitals, dispensaries, fire sta-
tions, stockpiles of emergency goods, cyclone
shelter, power stations;

(e) Buildings that are known to be in a dangerous
condition.

It is proposed that priority lists of this nature should
be drawn up in localized risk on the basis of the
list, a system of regular structural checking and
maintenance should be instituted as a standard prepared-
ness measure.

4. Modification of existing housing. It is recognized that
this poses considerable difficulties, particularly in a
pre-disaster context, in view of potential social
upheaval and the cost of such modifications. How-
ever, in some situations—notably houses in arid, seismo-
nic or occasional use zones where there is an absence of
construction materials—the risks are such as to make it imperative to modify the design of
existing structures, as well as offer guidance on
improved building methods. More research is re-
quired into vulnerable types of indigenous con-
struction. Safe alternatives need to be developed which
satisfy the demands of culture, local economics,
climatic, available materials, skills and risks. In any
given area, research priorities need to be formulated
and communicated to appropriate national or inter-
national bodies providing assistance for upgrading
projects.

5. Training for management of relief and reconstruc-
tion. There are gaps in training at all levels of relief
and reconstruction management. Lack of formal
expertise is evident in both administration and tech-
nical understanding. It must be emphasized that the
provision of shelter and post-disaster housing is as
specialized an activity as, for example, the organiza-
tion of medical or nutritional programmes. The need
for properly trained personnel is therefore vital, and
applies to both governmental and external agency
staff.

6. Training of local builders. The collapse of, or damage
to, a structure in a disaster may result either from
ignorance of how or where to build in order to resist
extreme forces, or from the selection of materials and
construction methods. It is apparent that local builders or craftsmen often

...
TABLE 5
Constituents of a risk-reduction policy

<table>
<thead>
<tr>
<th>Low-income housing and settlement</th>
<th>Middle-high income conventional housing</th>
<th>Commerce and industry</th>
<th>Public services, utilities, community services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard mapping, vulnerability analysis</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Structural modification</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Land-use adjustments</td>
<td>•</td>
<td>•</td>
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</tr>
<tr>
<td>Building regulations and enforcement</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Compulsory reinforcement of buildings</td>
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<td>•</td>
</tr>
<tr>
<td>Land-use regulations and enforcement</td>
<td>•</td>
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<td>•</td>
</tr>
<tr>
<td>Training of small builders</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Official control and supervision of work done by major building and public works contractors</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Community preparedness, warning</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

require basic education in the rudimentary principles of building construction and safe building techniques. Training programmes should be devised and implemented by the secondary and primary levels (regional and local), but the allocation of resources requires a policy decision at the tertiary (national) level.

On the one hand, the process of urbanization has resulted in a migration to the town or city of skilled craftsmen who can often obtain higher wages working for contracting firms. This can seriously deplete rural skills. On the other hand, families migrating to towns from rural areas frequently include men with building skills. However, such skills may relate only to the handling of local materials found within the original village—mud, stone, timber, thatch, etc. Once in the town or city, these builders cannot gain access to such materials, and they have to switch to an improvised mode of construction, normally involving makeshift use of recycled materials salvaged from refuse dumps, etc. Inevitably, the resulting buildings are frequently unsafe. In both of these situations, training programmes are necessary. To be fully effective, they should be linked with:
(a) Financial assistance for those being trained;
(b) Incentives in cash or kind to build safer homes;
(c) The supply (possibly at subsidized prices) of key building materials such as timber and lightweight roofing;
(d) The provision of simple educational aids.

7. Mitigation policies as an element of upgrading programmes. Within large towns or cities, local authorities have frequently undertaken upgrading programmes for the improvement of areas of low-income housing and marginal settlements. Such programmes normally include:
(a) Official recognition of the existence of marginal or squatter settlements, i.e. they have been legalized;
(b) Provision of essential infrastructure, e.g. roads, bus services, electricity, water, sanitation, schools, dispensaries, etc.;
(c) Some form of assistance with local housing, e.g. supply of materials, provision of subsidies and loans;
(d) In disaster prone areas, upgrading programmes should also include hazard resistant building methods, and the safe siting of housing. These measures should be based on hazard, vulnerability and risk analyses.32

Key references


32 These will probably be needed for people with little reading ability. Techniques originally developed for medical or agricultural education may be adapted to the housing sector. For a detailed description of a major integrated training programme for builders in rural construction, see McKay, Mary, 1981 (Key references to this section).

32 See appendix D.
4.2 RELOCATION OF SETTLEMENTS

PRINCIPLE: Despite frequent intentions to move vulnerable villages, towns and cities at risk to safe locations, such plans are rarely feasible. However, at the local level, a disaster will reveal the most hazardous sites (e.g. earthquake faults, areas subject to flooding etc.). Partial relocation within the same town or city may therefore be essential.

Audience
- Private sector: Manufacturers/contractors
- Professionals: Architects/planners/engineers
- Policy-making administrators: national (ternary) level
- Project managers of post-disaster shelter/housing projects: Regional/provincial (secondary) level.

Time phases
- Pre-disaster phase—Mitigation/risk reduction
- Phase 1—Immediate relief period (impact to day 5)
- Phase 2—Rehabilitation period (day 5 to 3 months)
- Phase 3—Reconstruction period (3 months onward)

GENERAL CHARACTERISTICS OF RELOCATION POLICIES

Experience indicates that governments frequently consider the relocation of entire settlements as part of their reconstruction policy. Relocation usually reflects the will to vacate land that is excessively hazardous. It can also be an attempt to remove people from illegally occupied land (such as squatter settlements), or it can express a political will for change and reform.

THE ROLE OF ASSISTING GROUPS

Assisting groups often purchase plots of land outside the immediate disaster area and erect large numbers of housing units for survivors. Families are given the opportunity to purchase houses and parcels of land, provided they can afford loan reimbursements.

PROBLEMS OF RELOCATION

1. Relocation away from urban centres is largely motivated by the availability of cheap (and often undesirable) land.
2. Distances from jobs and the costs of commuting are a cause of either a reduction of income, or missed opportunities for employment.
3. Urban services are frequently missing (schools, hospitals, shops, markets, etc.).
4. Utility systems such as water, sewerage, electricity, etc., are often insufficient, or non-existent, for lack of planning and preparation.
5. Few assisting groups are equipped to master-plan this type of development as part of relief management. The situation is worsened when the local authorities also lack planners, architects, administrators and capital resources.
6. If the economic and environmental situation worsens beyond endurance, people migrate back towards their original sites and jobs, leaving a vacuum behind them, quickly filled by rural-to-urban migrants, thus compounding problems of uncontrolled urbanization.
7. There are problems of default and difficulty to pay instalments on time, creating, for example, problems of overcrowding in order to obtain additional rent, with the environmental and social degradation that ensue.
8. If the new settlements are within the administrative boundaries of the disaster-stricken town, utilities (water, sewerage, electricity, etc.), will have to be extended. The demand for new services will compete with the need for repairs and reconstruction inside the devastated area, at the cost of social and economic recovery.
9. Settlements created outside municipal boundaries subsist in a kind of limbo, with neither the local nor the regional authorities willing to bear the costs of development and maintenance.
10. In developing countries, urban infrastructure costs are extremely high, the per capita costs far exceeding the per capita capacity to amortize such costs. The price of serviced land has risen out of all proportion to the costs of other resources and services, and especially in relation to wages.

A frequent response of governments is the promise to move survivors into new, less hazard-prone areas. But the evidence is clear that in practice this is rarely feasible, for the following reasons:
1. Reconstruction, especially of housing, normally starts very rapidly after a disaster.
2. People are unwilling to abandon well-established patterns of land ownership.
3. Even in a major catastrophe, it is likely that a relatively small proportion of the total urban fabric will...
have been destroyed. The costs of relocation heavily outweigh the costs of repair and reconstruction.

4. Vested interests usually apply pressure to rebuild rather than move.

5. Despite the effects of a disaster, people naturally resist moving from their familiar surroundings.

Policy guideline

An alternative to wholesale relocation is the selective relocation of segments of the community away from the most hazardous sites, but remaining within the same general area. Even this alternative can be prohibitively expensive for the public and the local authorities. In any case, it is more than likely that vacated land will be rapidly re-occupied by others who will in turn live at risk, because of the extreme scarcity of serviced urban land, and especially land that is within reach of jobs. In many developing countries there is no formal way out of the dilemma: perhaps the only approach is to persuade communities to reduce their own vulnerability, through public education on the effects of severe natural hazards, and the gains to be derived from partial relocation.

There are five pre-conditions for successful, partial relocation:

- The consent of the affected community;
- The availability of safe land at a cost the community can bear;
- Proximity to employment and social services;
- The provision of utilities at the community level (if not for every family);
- Facilities for home building as described in this study.

4.3 LAND TENURE AND LAND USE

**PRINCIPLE:** Success in reconstruction is closely linked to the question of land tenure, government land policy, and all aspects of land-use and infrastructure planning.

**Audience**

- Private sector: Manufacturers/contractors
- Professionals: Architects/planners/engineers
- Policy-making administrators: National (tertiary) level
- Project managers of post-disaster shelter/housing projects: Regional/provincial (secondary) level

**Time phases**

- Pre-disaster phase—Mitigation/risk reduction
- Phase 1—Immediate relief period (impact to day 5)
- Phase 2—Rehabilitation period (day 5 to 3 months)
- Phase 3—Reconstruction period (3 months onward)

LAND AND POPULATION

The major regions of the world exposed to violent natural phenomena (especially earthquakes, tsunamis and tropical cyclones) stretch across the tropical and sub-tropical portions of Africa, Asia and Latin America. These areas coincide with areas of rapid population growth and urbanization, and are extremely disaster-prone. In addition, virtually no country is entirely safe from floods.

Indeed, the rapid growth and spread of population in hazardous areas is a matter of increasing concern, and is rapidly contributing to mounting costs of disasters in terms of lives lost, and damage to property and investments. Most developing countries are doubling their population every 20 to 25 years (assuming national population growth rates of 2 per cent to 3 per cent), while the urban population in these countries is doubling every 12 to 15 years (assuming urban growth rates of 4 to 7 per cent). Equally significant, and of critical importance in areas subject to natural phenomena likely to cause disasters, is the growth rate of low-income slum and squatter settlements around major urban agglomerations.

Slum and squatter populations grow at about twice the average urban rate. In settlements such as these there is a doubling of population every 5 to 7 years, and the density is usually very high. In many cases, entire families may occupy a single room. Urban population densities per square kilometre, as measured in slums and squatter settlements, are even more revealing. In squatter areas, densities may be as high as 100,000 persons per km² (Morocco) and rise to 148,000 (India).
Even the average densities for urban areas as a whole are high enough to cause concern in areas exposed to earthquakes, floods, or landslides. The older sections of some cities may contain as many as 20,000 to 60,000 persons per km², although the average densities for such cities may be less than 10,000 persons per km². Dense populations pose special disaster risks in areas exposed to natural phenomena. Rural populations densities can surpass 1,000 persons per km² in areas where rainfall and soil conditions limit the amount of arable land. Wherever rural populations are sedentary (as opposed to being nomadic and pastoral) and engaged in agriculture on hazardous land, the risk of substantial disaster cannot be ignored.

The problem of exposure to disaster risk among rural populations, however, should not be underestimated. Although the population growth rate in rural areas is usually lower than the national average due to rural-urban migration, the scarcity of arable or developed land in many developing countries, combined with the fact that the average more than 70 per cent of total national populations are still rural, can create significant risks in areas exposed to natural phenomena. Rural population densities can surpass 1,000 persons per km² in areas where rainfall and tropical soil conditions limit the amount of arable land. Wherever rural populations are sedentary (as opposed to being nomadic and pastoral) and engaged in agriculture on hazardous land, the risk of substantial disaster cannot be ignored.

Dramatic increases in population size, distribution and density increase disaster risk: natural hazards such as floods, earthquakes or tropical cyclones do not in themselves constitute disasters until they strike at human lives and property.

The earthquake in Guatemala on February 1976 serves to illustrate how global and unselective disasters can be. More than 1 million people were left homeless, and more than 222,000 dwelling units were partially or totally destroyed. Of the 1.2 million people left homeless, 350,000 were in the country's largest urban area, Guatemala City. The remainder, largely rural populations living in small towns or villages, scattered throughout the earthquake zone. The single largest damage impact was on housing. Loss to the private sector (and particularly to low-income housing) was more than two-and-a-half times that incurred by the public sector.

There are two fundamental alternatives to disaster mitigation: the first aims at steering development away from hazardous areas toward safer locations; the second comprises structural measures aimed at resisting or deflecting the impact of natural phenomena. Comprehensive land-use planning is a discipline which began early in the twentieth century in industrialized countries and has since gained widespread acceptance in most industrialized countries. The more centralized the system of government, the more effectively can land-use be controlled, usually because private ownership of land is limited or strictly regulated. In free market economies, land-use controls are more complex and policies more difficult to implement due to the high rate of private land ownership and the resultant tensions between public and private interests.

In disaster-prone developing countries, land-use planning and control for disaster mitigation may act as a spur to comprehensive land-use planning, especially where natural disasters have become a permanent development problem owing the their intensity and frequency.

Land-use planning and control are key factors for the orderly and safe growth of human settlements. Although there is no immediate shortage of raw (undeveloped) land for urban expansion in most developing countries, land is ultimately a finite resource and is extremely costly to develop.

Alternative methods have been explored, seeking to expand urban infrastructure and housing in planned and progressive stages with heavy reliance on purely local resources, including self-help. In disaster-prone areas, orderly urban expansion becomes prohibitive unless investments in infrastructure, housing and other services are protected from damage at all stages of their development. Land-use control measures establish not only static norms, such as function, density, and location, but also dynamic norms, such as the rate of development and growth.

The major elements of land-use may be summarized as follows:

1. Land and post-disaster housing

   1. A policy of homeowners only. Many assisting groups are apprehensive of the problems related to land acquisition. Their programmes offer housing preferably to families who have title to land. However, few low-income families are landowners. Thus programmes such as these only help those who are better off to begin with, and who would in any case be eligible for financial assistance. In the aftermath of a disaster this built in discrimination against the majority of survivors (who, as we have seen, are mostly poor and landless) can be the source of social and political tensions.

   2. Provision of housing for those who do not own the land. Many agencies offer to provide emergency shelter and/or temporary housing to families on the site of their former house. These units usually evolve into formal structures over a period of years, and become permanent dwellings. If the family has paid for a house, built on land which it does not own, a legal question arises as...
A consequence of land-tenure problems can be seen in these photographs of devastation after the Guatemalan earthquake of 1976. Within the city area, poor families had illegally occupied unstable, sloping "Barrancos" (canyons in the city with very steep slopes subject to landslides). The earthquake resulted in the progressive collapse of houses. Assisting agencies were faced with the dilemma of whether or not to provide assistance to rebuild in such dangerous locations. The ultimate solution is a change in the pattern of land tenure, with the government making safe land available for low-income families.
1. The land issue must be recognised, an integral part of post-disaster housing programmes. The political and economic nature of the issue may present difficulties, but nevertheless there may be opportunities for land reform, and safe land for resettlement must be made available after a disaster.

2. The release of safe land for building, designated for low-income families, must be supplied with basic infrastructure—at least water, waste disposal and all weather roads—and must be within reach of employment. It is recognized that this may appear unduly idealistic, since safe land near urban centres will inevitably be very valuable. However, it is essential to recognize that poor families have to live close to centres, since their livelihood may depend on it. They are unlikely to have the time or money for travelling long distances to work.

3. The costs of land development cannot be overlooked. It is necessary therefore to incorporate land purchase and development costs within the financing system established for housing reconstruction. Financing systems are described in section 4.4.

4. For low-income groups, security of land tenure must be assured in order to encourage the entire grassroots system of self-help and popular participation in development. The evidence clearly indicates that families will put their resources (skills, energy, money) into housing only if they can see some personal return from such investment. Safe house construction by local families requires security of tenure at the outset of building (not at the completion of the loan repayment period). In many countries such provision will require land reforms.

Key references


3. WHITEMORE, Claire, Land for People: Land Tenure for the Very Poor, OXFAM, Oxford, United Kingdom, 1981.
Principle: One of the most important components of a post-disaster shelter programme is its financing system. Outright cash grants are effective in the short term only, and can create a dependency relationship between survivor and assisting groups. It is far more advantageous for both the individual and the community to participate in the financing of their own shelter programmes, especially permanent reconstruction.

Audience
- Private sectors: Manufacturers, contractors, banks, co-operatives.
- Professionals: Architects, planners, economists
- Policy-making administrators: National (tertiary) level
- Project managers of post-disaster shelter housing projects: Regional, provincial (secondary) level.

Time phases
- Pre-disaster phase - Risk reduction, preparedness
- Phase 1 - Immediate relief period (impact to day 5)
- Phase 2 - Rehabilitation period (day 5 to 3 months)
- Phase 3 - Reconstruction period (3 months onward)

The Need for Housing Finance

One of the most important components of a post-disaster shelter programme is its financing system, i.e., the means by which the survivor ultimately pays for shelter aid. Unfortunately, it has been one of the components whose importance has been least understood. Some assisting groups, as long as a year after the completion of their project, have not even finalized the financing system. The recipients of aid have often been unaware of their financial obligations, leaving a cloud of uncertainty and anxiety hanging over them. On the other hand, financing programmes that have been well planned have had the positive effects of reinforcing the recipients' self-esteem, furthering local development and contributing towards economic recovery.

The following is an overview and critical evaluation of the most common financing systems or arrangements that have been used for post-disaster shelter and housing programmes:

1. **Outright gift.** Some shelter programmes solve the question of financing by simply eliminating its attendant charges. The assisting group gives the aid to the recipient who has fulfilled certain, more or less formal, conditions of entitlement, such as proof of being a genuine disaster victim, proof of ownership of the land on which the shelter is to be built, evidence of low income level, etc. Once the aid has been given, the recipient has no further obligation to repay part, or all of the cost of the shelter. This may seem justifiable when the shelter is clearly temporary and erected on land not ultimately destined for housing.\(^{28}\)

   - **Advantages**
     - It eliminates the need to recuperate the money; it may be difficult for an assisting group to do this, especially if it only operates in the disaster area for a short time, or has no staff qualified to direct a financing programme.
     - It may conform to the charter or mandate of certain assisting groups who are required to give their aid.
     - It allows the recipient to spend what money he may have on other necessities.

   - **Disadvantages**
     - The money may be used inappropriately, thus compromising the reconstruction process.
     - It may undermine the vital resource of the survivors' own "coping" mechanisms, including traditional, community self-help.
     - It may result in the imposition of housing solutions which do not respond to people's needs and preferences.
     - It may weaken local co-operatives, and other institutions, by bypassing them.
     - It deprives the donor from recuperating funds for new projects.
     - Because construction materials are expensive, and because agencies have limited funds, it limits the number of people it can serve.

2. **Straightforward purchase.** This is virtually the opposite of the outright gift, and is seldom the financing mechanism used by assisting groups, especially those which are charities. It is employed by profit-making businesses that see the demand created by the disaster as a marketing opportunity. Its advantage is that it maintains the freedom of the open market, though this could obviously become a disadvantage if the

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\(^{28}\) Such was the case of shelters built by the government after the 1970 earthquake in Peru.
seller is in a position to exploit survivors with few options. In practice the numbers of survivors who can afford full market prices will probably be very limited.

3. No-cost self-help. Several assisting groups have instituted programmes where they give building materials and usually furnish supervisory and administrative personnel to an organized group of families who build their own houses. As with the outright gift of a house, the recipients do not repay any money for the costs of materials. This method is viewed as a means of involving the recipient in the programme without straining his meager or reduced economic resources.

Advantages
As with the outright gift, it eliminates the need for an organization and procedure to recuperate money;
It allows the recipient to spend what money he may have on other necessities;
By virtue of building the shelter, the recipient will have a greater commitment to the programme than if he had been a passive spectator.

Disadvantages
To a lesser extent, the disadvantages of the outright gift will tend also to hold true with the no-cost self-help approach:
The assisting group may feel it has a right to influence the organization and timing of the self-help because it is giving the materials and technical assistance, to the possible detriment of the recipient community.
The time spent on the construction of the shelter is valuable to the recipient. He may have difficulty in choosing between building a house and providing the family with economic support.
The successful implementation of a no-cost self-help programme can only be achieved with great care.
The design of the programme must respond to traditional patterns of building, to the time available, and to the economic priorities of the victims.

4. Loan programmes. Loan programmes may take a variety of forms, and be either a part, or the whole of an assisting group's shelter programme. Specific loan conditions vary considerably, but they generally require that the recipient be a genuine disaster victim, living in a given locality; that his income falls within a prescribed range; that his employment is secure; that he has prior experience of credit repayment, and that he agrees to the terms of the loan. The lender may also make the additional condition that the new building must conform to minimum standards of safety, or that it be built away from hazardous areas.
The non-profit lender is often capable of providing advantageous terms of repayment. Various programmes have allowed subsidies in the form of low interest, no interest, repayment of only a percentage of the principal, long term repayment, or repayment at an affordable proportion of the family's income.

(a) Long-term straight loan. The long-term straight loan is perhaps the most commonly conceived form of loan financing. It is typically extended by a bank or lending institution at prevailing or sub-

sidized bank rates. After many major disasters, the World Bank and the Regional Development Banks in Asia and Latin America have made large scale loans to financing institutions within national governments. These institutions in turn offer loans to survivors (individuals or communities) for reconstruction, but may not always offer the complementary assistance of building materials or technical support, which the lowest incomes require as well.

Advantages
It accommodates survivors who typically do not have cash to spend on building materials right after a disaster, but who can pay the full costs of the materials, plus interest and administrative charges in the long-term:
It removes the stigma and problems of free aid;
It introduces the discipline of credit, becoming an experience that may facilitate future credit for economic development.
The lending institution is likely to expand its own experience and capabilities, and perhaps extend its services to the lowest income groups.
The amount of the loan can be tailored to the need and capability of the recipient;
The recipient has the freedom to rebuild a house of his own choosing or design, and not be tied to a uniform housing programme.
The lending institution, will in its own interest, be concerned with the economic well-being of the recipients for at least the life of the loan.

Disadvantages
The lender may place undue restrictive conditions on the loan. In rural areas, it is unlikely that credit loan administration facilities will exist.
The recipient may not have been adequately prepared for the economic burden of repayment. This could occur if he has no experience of credit, does not understand its concept, or is not adequately motivated to make repayments.
Some people are reluctant to take out loans because they believe that their property will be placed in jeopardy if they do not repay installments on time.
The costs of loan administration are high and add to the burden of repayment.28

Conservative financing institutions tend to make loans exclusively to middle class, relatively high-income groups, i.e. to people who are at low risk.

(b) Loan for loan. Many lending institutions require a substantial down-payment, for example, 20 per cent of the loan they make. For those without the cash, a loan is therefore an inaccessible form of aid. Assisting groups, particularly voluntary agencies, have therefore made additional loans to cover the down payment, hence the concept "a loan for a loan".

(c) Guaranteed loan. As previously noted, a disadvantage of many loan programmes is the tendency for lending institutions to make loans

28 In Guatemala, the staff of the OXFAM/World Neighbours housing programme estimated that the loans would cost about 36 per cent to administer in the first year alone. In the end, the costs of administration would have to be added to the original cost of the programme.
available only to the most credit-worthy individuals. Lending institutions have also been reluctant to venture out of familiar territory, i.e. into marginal, low income settlements and rural areas. Assisting groups addressing the problem have made guarantees to these lending institutions, enabling them to extend loans to previously disadvantaged populations. This is a particularly effective form of assistance from agencies involved in development programmes continuing beyond the emergency phase of a disaster. The advantage of the guaranteed loan is its cost effectiveness, for it reaches a proportionately large number of people, thus introducing economics of scale.

(d) Revolving loan. A revolving loan system allows money brought into a disaster-affected community to be used many times over. As the original recipients begin to repay the loan, a new fund is created which can in turn be used to lend to other survivors. This form of aid is most appropriate when the assisting group provides assistance in the form of a grant that does not have to be recovered, as with the traditional loan. The financing system has the multiple advantage of extending the use of the original money to many times the number of the original loan recipients. This money also has the side effect of creating additional employment in the community. It may further assist in the creation of new credit institutions, providing them with a sound base of experience the funds and financial expertise carrying far into the reconstruction period.

(c) Material price subsidy and money reflux. This financing system is actually a hybrid of material subsidy and community economic development, combining the advantages of both, at a period when the disaster-stricken community is most in need of these kinds of external support. Although they are actually two separate financing mechanisms, material price subsidy and money reflux have been successfully linked in several shelter programmes. The money recovered from the initial sale being used to pay disaster survivors for their labour on public works projects.

Advantages

Subsidized prices, as opposed to full prices, make materials available to poorer and more numerous families; the programme's benefits are threefold: the survivors receive materials, community projects are built; personal income is generated. The poorest families, initially unable to purchase materials, can do so later by participating in public works or community projects.

The managerial experience acquired, especially if the executing agency is governmental, may contribute significantly to the long-term recovery and development of the affected region in general.

A materials purchase programme allows the recipient the freedom to use the materials when he chooses.

Disadvantages

The only major disadvantage with this approach is that it must inevitably be carried out on a large scale, and therefore requires an extensive administration which may be difficult to staff with enough and adequately trained people.

Conclusion

Where there are a number of assisting groups providing shelter programmes, there is likely to be a wide range of financing systems in operation. This variety can itself lead to problems, irrespective of the merits or otherwise of the individual systems being used. The issue of financing is closely interrelated with the total cost, value and desirability of the project. It should also relate to survivors' incomes and ability to pay. As obvious as that may seem, it has not often been the case.

Policy Guidelines

It is necessary to create a common approach to financing systems among all assisting groups. Some authoritative body, such as the disaster coordinating agency of the national government, should establish a policy to achieve this objective. The policy could take the form of a set of criteria which all shelter programme financing systems must meet. Because of the great diversity of cultural traditions and economic bases, it is not possible here to set forth a model set of criteria. Rather, a set of principles can act as a guide for each country to develop its own criteria:

1. All recipients of aid should be required to repay a substantial proportion of the cost of that aid. A nominal repayment of only 5 or 10 per cent may be perceived as a gift. On the other hand, 100 per cent repayment of costs may be too great a burden for families that may have suffered economic losses from the disaster.

2. The cost of a shelter should approximate the cost of pre-disaster housing. There may be extenuating factors justifying a somewhat higher cost that may include, for example, structural modifications using additional building materials. The form of the repayment...
ment should be as similar to traditional debt repay-ment practices as possible, allowing repayment to reflect income, capacity, and taking place at a familiar location.

3. Preparedness plans should identify lending institutions which would co-operate with special post-disaster loan programmes, such as the guaranteed loan or loan-for-loan. These same institutions might also agree to act as loan recuperating agencies in contract with assisting groups who choose not to set up their own loan recovery administration. This would efectively eliminate the chief argument such groups have for giving away their assistance. Where a reflow programme is anticipated, the mechanism and institution to operate it could also be anticipated.

4. It is the responsibility of all assisting groups, and their target communities, to identify the financing systems that serve the best interests of the survivors. Financing and loan mechanisms, in the last analysis, are better than outright gifts: human dignity is preserved; more people benefit from the resource made available; and the ends of development are served.
The most significant finding of this study is that the emergency shelter problem in developing countries is fundamentally different from that in industrialized societies, for in the third world the question of emergency shelter cannot be dissociated from the prevailing housing problem as a whole. This finding alone has influenced every other conclusion of the study.

The process of rapid and uncontrolled urbanization in developing countries has resulted in the proliferation of vast slums and squatter settlements. These account, on the average, for more than 70 per cent of urban development. In such areas, and therefore for the majority of urban populations, the concept of temporary shelter in times of emergency is somewhat equivocal when, under “normal” conditions, urban dwellers are permanently lodged in housing which the authorities do not recognize, or which they consider as temporary to start with. Furthermore, in conditions of chronic housing shortages, overcrowding, unsanitary conditions and high rents, the investment of scarce capital resources in prefabricated temporary or emergency shelters, specifically designed to be stockpiled and used only in case of natural disasters, can only create additional obstacles to the provision even of minimal housing.

In rural areas, tradition dies hard, and cultural resistance to donor emergency shelters often provokes frustration and misunderstanding among all concerned. So-called “temporary” or “emergency” shelters are often inappropriate, but at the same time become permanent only to create fresh sets of problems.

Emergency shelters, especially those donated by the international community and imported into disaster-stricken areas, can serve to upset a delicate socio-economic balance by raising expectations, which, in most cases, neither the local, nor the national, nor indeed the international authorities have the means to satisfy. The importation of shelters can furthermore play a negative role by stifling local and even national initiative, especially when they comprise prefabricated systems invariably posing problems of appropriateness, assembly, and cost-effectiveness.

In several major natural disasters throughout the developing world over the last decade, it has been shown that imported donor shelters have never produced the impact that most relief agencies would have desired. Shelters often arrive in insufficient numbers, or too late to be of value during the emergency phase properly speaking. Their unit cost is nearly always disproportionate vis-à-vis the recipient economy, and if one adds the cost of transport they are seen to be quite uneconomical. For this reason alone, the emergency shelter policies of the donor community at large need to be re-examined, and this study, it is believed, suggests some of the alternatives.

A further important conclusion is that the problem of emergency shelters is less one of product, design or manufacture, than one of planning, management and the mobilization of local resources. The problems pose not, as a priority, technological (as is so widely believed), but are functions of development policies themselves, and of the changing relationships between donors and the developing countries. The study stresses that relief agencies and international organizations should encourage disaster-prone developing countries to build up their own state of preparedness, notably in the emergency shelter field, by mobilizing local material and technical resources, and to encourage self-help schemes for this purpose. It is essential to link donor assistance to local initiative and effort.

The study has revealed quite clearly that the spontaneous reconstruction of housing begins extremely rapidly after a disaster, and often during the emergency phase itself. All action to discourage this process should be avoided, except in cases of extreme danger. Assisting groups who support rapid reconstruction policies are likely to obtain the most positive and far-reaching results. However, the assisting groups themselves require education and training on how to assist and manage post-disaster housing programmes within a risk reduction framework: they require education on what is the housing process as a whole in developing countries, on appropriate building technology, on financing and management, and on the socio-economic aspects of low-income housing.

The key to success ultimately lies in the participation of the local community—the survivors—in reconstruction. Assisting groups, and those they help, must be accountable to each other in order to ensure social satisfaction, economically-viable housing, technically-sound buildings, and a safer environment. Accountability is therefore a key criterion of assistance to survivors, especially those in the developing countries. As it is not a widely understood or accepted policy, it has been given special treatment in concluding this study.

Linked to the question of accountability is that of rising expectations among all peoples in the developing countries. Rising expectations are frequently the source of conflict and confusion in post-disaster housing policies and programmes, and a lack of awareness of the phenomenon can compromise, not only post-disaster
Rising expectations

Despite the frequent rejection of temporary shelters, there is evidence of rising expectations for permanent housing. Whilst expatriate experts are advocating appropriate low technology solutions, poor families are inclined to reject their traditional form of housing in favour of a modern, or urban image. Such aspirations are accelerated by the distribution of goods following a disaster. The sudden (and possibly unique) presence of large amounts of relief aid may generate expectations for vastly improved housing, which are unlikely to be fulfilled. Under the circumstances, it is best to help the survivors form an accurate picture of the situation by providing them with clear information on the capacity and constraints of their own resources in the long-term, as well as those of their government and assisting groups. In addition, it is apparent that shortages of traditional materials in the aftermath of a disaster will in themselves stimulate the private sector to bring to the area specialised building materials not normally used locally. This also increases expectations for “modern” solutions.

It has been pointed out that a solution to the problem of supplying large numbers of houses for disaster survivors may be found in examining the types of housing which existed before the disaster. Housing can be rebuilt to pre-existing standards, or can be improved with better construction techniques or improved materials. This strategy based on local tradition is apt to meet the housing demand following a disaster. But there is a strong and growing demand on the part of numerous groups and individuals within developing countriesparticularly in urban areas—for so-called “modern” housing. This may be due to the view that traditional houses symbolise poverty, to the desire for a maintenance-free house, or it may be simply an urban/metropolitan image of affluence and progress.

Many governments have attempted to develop low-cost housing schemes that would produce large numbers of units similar in appearance to those found in the industrial nations, or in their own middle class urban environments. In spite of the fact that these units are uneconomic for the majority of low income groups, and perhaps unsuitable for their climate and life-styles, demands for this type of solution are increasing. Assisting groups must be aware of this trend, and must be able to provide reasonable alternatives in the post-disaster context.

Assisting groups who decide to opt for indigenous-style housing, or to improve existing housing types, may be rebuffed by the government and others. Many groups within developing countries view the movement towards “appropriate technology” as an attempt to perpetuate the poverty of nations, and rebuild slums. Until all parties to the post-disaster housing process fully understand the meaning of appropriate technology (perhaps better termed “appropriate technology”), assisting groups can expect to come under increased criticism for opting for these types of solutions.

The evidence further shows that many assisting groups and experts committed to “low-technology” responses, have regarded rising expectations as irrational. But although aspirations for housing which is still out of economic range, and which may possess for its potential occupants unforeseen difficulties of maintenance and payment, rising expectations must be recognised as an element in the perception of shelter needs.

Assisting groups involved with shelter or assistance need to present their advice for appropriate housing, and the housing types they will support, with an awareness of the distinction between “expectations” and “aspirations”. In general, their policies should not be socially deterministic: and if families have a desire for housing which may be beyond their resources, assisting groups (whilst explaining the inherent problems) should support these aspirations.

To summarize:

1. There is a need for any group involved with shelter or housing to recognize the importance of the house as a symbol of wealth, progress, or urban sophistication, and not to merely regard it as protection from the elements (or extreme hazards).
2. Assisting groups must recognize the positive value of rising aspirations within poor communities.
3. Support for such aspirations, however, does not imply the need to support inappropriate “modern” housing with unconditional aid.
4. If there is a strong movement for “modern” housing, assisting groups must use their resources to educate (not coerce) people as to the relative strengths and weaknesses of alternative housing systems.
5. Assisting groups should provide their help in terms of cash grants only for what they consider is suitable housing. However, they may offer expertise in the provision of modern housing, even if they are unconvinced as to its local appropriateness.
6. Greater sensitivity is needed to the issue of “intermediate” or “appropriate” technology in view of the frequent response that this advocacy is a form of paternalism.
7. Public information and education on housing economics is a vital need from all assisting groups.
53 ACCOUNTABILITY OF ASSISTING GROUPS TO RECIPIENTS OF AID

Since the most effective relief and reconstruction programs result from the participation of survivors in determining their own needs, and in the decision-making and planning processes, this has been the goal of efforts by the UN and others to help establish accountability in the delivery of aid.

There are a number of corrective mechanisms which can help to establish accountability in the delivery of aid. These include: the establishment of a mechanism for the review and follow-up of aid programs; the development of mechanisms for the coordination and integration of aid programs; the establishment of mechanisms for the monitoring and evaluation of aid programs; and the establishment of mechanisms for the provision of technical assistance to aid programs.

One of the key mechanisms for establishing accountability is the establishment of a mechanism for the review and follow-up of aid programs. This mechanism should be independent of the aid agency and should be established at the national level. It should be responsible for reviewing the implementation of aid programs, identifying problems, and making recommendations for improvements.

Another key mechanism for establishing accountability is the development of mechanisms for the coordination and integration of aid programs. This mechanism should be established at the national level and should be responsible for coordinating and integrating the activities of different aid agencies.

A third key mechanism for establishing accountability is the establishment of mechanisms for the monitoring and evaluation of aid programs. This mechanism should be established at the national level and should be responsible for monitoring and evaluating the implementation of aid programs.

A fourth key mechanism for establishing accountability is the establishment of mechanisms for the provision of technical assistance to aid programs. This mechanism should be established at the national level and should be responsible for providing technical assistance to aid programs.

The establishment of these mechanisms will require the active participation of the recipients of aid and the local community.

DUTIES OF THE ADMINISTRATION

The administration has a key role to play in establishing accountability. It has the responsibility to ensure that aid programs are implemented in a transparent and accountable manner. This includes the establishment of mechanisms for the review and follow-up of aid programs, the development of mechanisms for the coordination and integration of aid programs, the establishment of mechanisms for the monitoring and evaluation of aid programs, and the provision of technical assistance to aid programs.

The administration also has a key role to play in establishing accountability by ensuring that aid programs are implemented in a way that respects the rights and interests of the recipients of aid. This includes the establishment of mechanisms for the review and follow-up of aid programs, the development of mechanisms for the coordination and integration of aid programs, the establishment of mechanisms for the monitoring and evaluation of aid programs, and the provision of technical assistance to aid programs.

In summary, the establishment of accountability in the delivery of aid requires the active participation of the recipients of aid and the local community, as well as the active involvement of the administration.
### Table 6. The present accountability of assisting groups

<table>
<thead>
<tr>
<th>Assisting groups</th>
<th>Reasons for their presence</th>
<th>Accountability in practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local voluntary agencies</td>
<td>To help earthquake survivors</td>
<td>To the director of their charity; Normally accountable to survivors</td>
</tr>
<tr>
<td>Local administration</td>
<td>To help earthquake survivors</td>
<td>To the local affected community; Normally accountable to survivors</td>
</tr>
<tr>
<td>National government</td>
<td>To help earthquake survivors</td>
<td>To the local affected community; When it works with local grassroots organisations, otherwise no direct accountability</td>
</tr>
<tr>
<td>Local military</td>
<td>To help restore normality</td>
<td>To their superiors; To their national government; No direct accountability</td>
</tr>
<tr>
<td>Foreign experts</td>
<td>To use their expertise in conjunction with one of the above organisations</td>
<td>Possibly to their superiors in home university or agency; To those who have sponsored their work; No direct accountability</td>
</tr>
<tr>
<td>External voluntary agencies</td>
<td>To aid disaster victims</td>
<td>To the director of their charity; To their charity’s financial supporters including their home government; Through the local grassroots organisations when they work with them, otherwise no accountability</td>
</tr>
<tr>
<td>External donor governments</td>
<td>To assist less fortunate nations, often formalised in official treaties</td>
<td>To their home government; To the local government; No direct accountability</td>
</tr>
<tr>
<td>International agencies (United Nations system)</td>
<td>Responsibility to member nations, embodied in their terms of reference mandates</td>
<td>To Agency heads, recipient government, and to the Secretary General of the United Nations; No direct accountability</td>
</tr>
</tbody>
</table>
ACCOUNTABILITY AND THE MONITORING OF EMERGENCY SHELTER AND HOUSING PROGRAMMES

The long-term effects of emergency shelter programmes on housing reconstruction, land tenure, land reforms, and risk reduction. It appears that each time a disaster occurs, everyone has to begin from scratch and relearn all the lessons that have been learned before. There are several reasons why:

1. Many organizations set up their programmes without the provision of funds in the budget for evaluation, often for fear of criticism that the budget will show too much money being spent in administration, and not enough on relief goods or services. There is also the fear of critical evaluation and its possible effects on public opinion, donors, the staff, etc. While one can understand human nature, lack of evaluation leads to stagnation or mediocrity of performance.

2. The turnover of foreign relief staff is high. People carrying out field programmes are usually retained for short periods of time only. It is rarely part of their contract to write a detailed evaluation of their programme's performance. Furthermore, because many of these people are not full-time relief or development specialists, they may understandably not feel qualified to analyse work executed in an agency context.

3. With the emphasis on rapid response, data collection (and especially statistical data for analysis) obtains a low priority. Many field workers are action-oriented people, with little time or resources for analytical reporting and evaluation. Many temporary field staff also believe that field directors, or other persons in charge of their programme further up the hierarchy, will conduct such evaluations and, therefore, do not feel that continuing reporting or documentation is part of their duties.

4. The nature of the system discourages analysis. The object of relief is obviously to satisfy emergency needs...

There exists an urgent need to analyse programmes and strategies. Information is needed on actions at all stages of relief operations and at all levels of the relief system. But most important, it is needed at the level of the participants in the programmes. Few reports state what the initial social or other objectives of a programme were, and how the programme lived up to these objectives. Performance data about programmes is very sketchy, especially with regard to:

- The effectiveness of different approaches;
- The performance of agency field staff (professionals and volunteers);
- The relative performance of relief and development organizations;
- The cost-effectiveness of emergency shelter programmes;
- The acceptance of shelter programmes by the survivors, and rates of occupancy;
- The longitudinal effects of emergency shelter programmes on housing reconstruction, land tenure, land reforms, and risk reduction.

For instance, the reaction of Muslim communities in the Middle East to well-insulated but utilised temporary shelters, which do not allow for adequate privacy for family life, is to reject them. The rejection of such culturally unacceptable solutions is often viewed by assessing groups as irrational. Such judgements are examples of clashing cultural values.
Until this type of information is available, we will continue to know too little of the effectiveness of the funds spent on emergency shelter and reconstruction. As the amount of money and effort spent on international disaster relief can be expected to continue increasing, it is imperative that this information be collected.

Policy Guidelines

1. The mutual responsibilities and costs of accountability.

While the concept of accountability offers genuine opportunities for reform throughout the disaster relief system, it must be recognized that for accountable relationships to work in practice, donors and recipients alike must acknowledge their mutual responsibilities and all that this implies.

<table>
<thead>
<tr>
<th>Donor</th>
<th>Recipient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsibilities</td>
<td>To accept accountability to recipients of aid as a basic working principle, affecting not only field policies but the financial, legal and administrative policies of donor organizations.</td>
</tr>
<tr>
<td>Implications</td>
<td>A sharing of power and authority.</td>
</tr>
<tr>
<td></td>
<td>Forms of management which will be more responsive to the free flow of information.</td>
</tr>
<tr>
<td></td>
<td>A longer term commitment beyond the relief phase.</td>
</tr>
</tbody>
</table>

2. Accountability and the equitable distribution of assistance

Assisting groups must ensure that the overriding principle of the equitable distribution of aid is not undermined when selecting recipients of aid. The application of this principle will be greatly assisted by formal monitoring.

3. Accountability and participation of survivors in assistance programmes

Once it is recognized that the surviving community is a key resource for recovery, it follows that any accountable relationship will seek to assume active public participation in all shelter and housing programmes. This is difficult to achieve unless it is foreseen in disaster preparedness plans, and through public education and information. Pressures of time and the predetermining of activities (by the existence of a Standard Operating Procedure, for instance) militate against participation.

4. Accountability and the imposition of alien cultural values

As has been stated elsewhere in this study, the quest for a universal shelter is not viable for many reasons, especially cultural ones, emphasizing the wide and rich diversity of forms of shelter that are required. Mutual accountability will help ensure that there is a very close fit between shelter provision and the cultural values of survivors.

It is necessary for assisting groups:

To understand the complexities of the local housing process:
To seek the active participation of future occupants of shelter and housing in all aspects of planning, designing and building, and in the monitoring/evaluation of programmes once undertaken.

5. Accountability and the monitoring/evaluation of shelter and post-disaster housing programmes

One of the “costs” to assisting groups is the longer term commitment to a community than would be the case with a programme where there is minimal local participation. This commitment to a community will involve the close monitoring of shelter and housing programmes as they are built. Ideally both monitoring and evaluation will involve surviving communities in reporting on such questions as:

Occupancy. Have the assigned families sub-let the houses: what percentage are occupied, etc.?

Adaptation. Have any patterns emerged which may contribute to the improvement of the design?

User Satisfaction. Does the shelter or housing satisfy the lifestyle, aspirations, and practical needs of the users?

Use of Finance. Has value for money been obtained: was the money used in accordance with the objectives; have any “corruption factors” been identified that may require changes in management?

Monitoring and evaluation are so important that a specific percentage of any given shelter or housing budget should be designated for this purpose. Various percentages have been considered, and it is apparent that some agencies are already allocating an average of 5 per cent for this purpose.

Conclusion

The principle of accountability is implicitly contained in all the recommendations of this study. If the surviving community is regarded as the principal partner in disaster relief, shelter and reconstruction, more effective programmes of assistance will emerge.

Key References

The unique aspect of this "Housing Education Programme" was not to build large numbers of houses, but to build a "model" house (shown here) in order to explain the techniques of applying seismic principles to the design of low income housing. Throughout the project the staff of the assisting group attempted to make themselves accountable to the surviving families, on the principle that they were their clients, and not the passive recipients of products emerging from decisions made elsewhere.

In addition to the programme objectives of materials distribution, advice was offered to local builders and craftsmen on how to build safe houses.

Comic-strip booklets were produced to offer guidance on layout of buildings and construction.
A selection of photographs illustrating a project in which the concept of accountability was applied.

These photographs all illustrate the OXFAM/World Neighbors Housing Reconstruction project which was undertaken from 1976-79 in Guatemala following the 1976 earthquake. The expressed need of the population in the rural highland areas was for corrugated iron sheeting “Lamuna”- this was distributed by direct gift for very poor families, subsidies or normal sale. It served as temporary shelter in the initial instance, later to become permanent roofing.

5.4 ADVICE FOR THE LOCAL LEVEL

In concluding this study, the Office of the United Nations Disaster Relief Co-ordinator (UNDRO) wishes to emphasise, once again, that there is no universally applicable emergency shelter system, and that attempts to invent such systems are based on the many mistaken assumptions discussed throughout the study. Guidelines on post-disaster shelter for individual communities can only be formulated by qualified local personnel, in the light of the prevailing local conditions (types of hazard, climate, building traditions, economic base, social organization, etc.). Such guidelines can, however, be modelled on the structure of chapters III and IV.

Chart 3 indicates the relative roles of all those assisting in the formulation of specific community guidelines of manuals.

ACTION AT THE LOCAL LEVEL

1. The production of a local manual for emergency shelter and post-disaster housing provision. This will probably be necessary in all situations. It is suggested that its structure follow the principles discussed in this study with modifications, where necessary, in light of local conditions.
CHART 3

Roles in developing advice for use at the local level

<table>
<thead>
<tr>
<th>Key: ***</th>
<th>&quot;*** Major role; ** Intermediate role; * Minor role; * No role.</th>
</tr>
</thead>
</table>

2. The incorporation of advice on emergency shelter and post-disaster housing provision in local contingency plans. It may be appropriate to integrate plans for shelter and housing with advice on building needs for other sectors (health, food storage, etc.).

3. The introduction of statutory provisions. If land-use controls or building regulations do not exist they should be drafted for legislative action. However, the local administration must also have or develop the capacity to enforce regulations.

4. The introduction of training programmes for local personnel and field staff. Training in shelter management and improved building construction, including hazard-resistant building techniques, is necessary at the field level.

5. Public education. All levels of the public (i.e. school children, public institutions, public officials, etc.) will need to be better educated and informed on the characteristics of local natural hazards, the likely behaviour of structures, and elementary community preparedness.

PERSONNEL TO BE INVOLVED IN THE DRAWING UP OF LOCAL GUIDELINES

The personnel needed will vary according to local conditions, but ideally should include the following representatives:

Local builders or craftsmen: It may be difficult to secure this involvement, but their potential contribution is considerable;

Local government officials involved with the management of relief and reconstruction programmes; ideally, these officials should chair committees and sub-committees for various components of relief programmes;

Local architects and engineers who are sensitive to low-income housing issues;

Field directors of voluntary agencies with local post-disaster housing experience;

All government research bodies concerned with disaster management and risk mitigation.

SCOPE AND CONTENT OF INFORMATION NEEDED FOR DRAWING UP LOCAL GUIDELINES

1. Hazard, vulnerability and risk. The risks must be studied and known. Case studies and damage surveys of previous disasters are necessary to estimate vulnerability. All historical records will be useful for undertaking probabilistic studies of hazard and risk.

2. Resources. Detailed inventories will need to be made of the following:

The resources of the normal housing process;

Local public buildings that can be requisitioned in the event of an emergency;

Local training bodies;

Local institutions/agencies, both governmental and non-governmental, with an interest in emergency shelter and post-disaster housing;

Local expertise available to assist with hazard-resistant design and building, as well as all aspects of building management;

Relevant printed matter—manuals, handbooks, reports, case studies, etc.

3. The dissemination of guidelines. The resulting information will need to be disseminated in a form appropriate to the target audience, which will probably include:

The elected or chosen leaders of communities at risk, whose need will be for information and advice concerning their roles and the protective measures that can be undertaken within the community at minimal cost;

Local institutions, especially those which have had no previous experience of shelter or housing, but which may be able to give important assistance in the implementation of training programmes (e.g. agricultural co-operatives);

Local non-governmental agencies concerned with relief assistance.

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14 Though it is possible that local personnel may feel that they lack the necessary expertise to undertake this assignment, their experience should not be under-estimated. If, however, after detailed searches the appropriate skills are not found to be available locally, outside sources may be able to help, beginning with the central government and extending to the international community via the United Nations system or other international relief or development agencies.
Local private building enterprises, including supply firms, contractors, craftsmen and building finance organizations;
Local government agencies concerned with housing, building and the environment;
Local experts.

Broader dissemination may be achieved through such means as village or community meetings and workshops, pamphlets containing simple guidelines, and training programmes for local builders and craftsmen. Ideally, effective dissemination to a diverse audience will be the responsibility of the local government officials who chair disaster relief. The ultimate aim must be to secure an individual concern, backed up by the authority and resources of the local government.

4. The development of local guidelines. The process of information gathering and analysis must be regarded as continuous. In normal times this will largely be a question of maintaining the information base outlined above. In ideal circumstances it will be the responsibility of a single individual (with a deputy), familiar with the local guidelines and able to assume control. In the event of a disaster actually occurring, monitoring procedures must be established at once to evaluate the effectiveness of the existing guidelines, so that improvements can be made in the light of practical experience.

Key Reference

Few examples, if any, of the kind of local manual envisaged in this section appear to have been produced up to now. Closest in terms of scope and content is the *Sri Lanka Cyclone Handbook*, edited by Everett M. Reeser and David Oakley, for the United Nations Development Programme (UNDP), published by the Ministry of Local Government, Housing and Construction, Government of Sri Lanka, 1979.
APPENDICES

Appendix A

CASE STUDY SUMMARIES

The following eleven summaries give examples of emergency shelter and housing provision from a selection of major disasters between 1963 and 1980. The preponderance of earthquake examples stems partly from the experience of those who prepared this study, but equally because earthquakes provoke the most damage to houses, and kill the most people. The figures quoted are as accurate as could be determined, but it is recognized that some are open to challenge. Nevertheless the orders of magnitude are in all probability correct, and serve to illustrate or substantiate the findings of this study.

Figures have been obtained from official sources, scientific journals, interviews, and personal observation.

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of disaster</th>
<th>Location</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Earthquake</td>
<td>Skopje, Yugoslavia</td>
<td>1963</td>
</tr>
<tr>
<td>2.</td>
<td>Earthquake</td>
<td>Gediz, Turkey</td>
<td>1970</td>
</tr>
<tr>
<td>3.</td>
<td>Earthquake mud slide</td>
<td>Peru</td>
<td>1970</td>
</tr>
<tr>
<td>4.</td>
<td>Earthquake</td>
<td>Managua, Nicaragua</td>
<td>1972</td>
</tr>
<tr>
<td>5.</td>
<td>Hurricane (“Fifi”)</td>
<td>Honduras</td>
<td>1974</td>
</tr>
<tr>
<td>6.</td>
<td>Earthquake</td>
<td>Lize, Turkey</td>
<td>1975</td>
</tr>
<tr>
<td>7.</td>
<td>Earthquake</td>
<td>Guatemala</td>
<td>1976</td>
</tr>
<tr>
<td>8.</td>
<td>Earthquake</td>
<td>Frutt, Italy</td>
<td>1976</td>
</tr>
<tr>
<td>9.</td>
<td>Earthquake</td>
<td>Calabrian (Vand), Turkey</td>
<td>1976</td>
</tr>
<tr>
<td>10.</td>
<td>Cyclone / storm surge</td>
<td>Andhra Pradesh, India</td>
<td>1977</td>
</tr>
<tr>
<td>11.</td>
<td>Earthquake</td>
<td>El Asnam, Algeria</td>
<td>1980</td>
</tr>
</tbody>
</table>

CASE STUDY SUMMARY 1

Earthquake (Richter 6.4)

Skopje, Yugoslavia—July 1963 (04.17 hrs)

Population
Pre-disaster: 200,000
Homeless: 160,000 approx. (ratio 1:1.25)
Injured: 3,700
Killed: 1070

Dwellings
Pre-disaster: Unknown
Damaged: 13,700
Destroyed: 15,766

Value of damage (US dollars): $1 billion approx. (at 1963 values)

Needs of affected populations: Shelter, food, water, sanitation

Value of assistance (US dollars): Unknown

Emergency shelter

<table>
<thead>
<tr>
<th>Type</th>
<th>Number provided</th>
<th>Percentage available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tents</td>
<td>5,000</td>
<td>Unknown</td>
</tr>
<tr>
<td>Caravans</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Prefabricated units</td>
<td>1,900</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Housing reconstruction

Type
Prefabricated houses and apartment buildings

Number built
Unknown

Allocation of roles

Survivors: Search, rescue, shelter provision (tents), evacuation to nearby towns.
National/local authorities: Operation of emergency plan, rapid building repair.
Military: Search, rescue, provision of tents, clearing debris.
Assisting groups (external): Provision of emergency shelter, housing, clearing debris.

Emergency shelter policy: A preparedness organization, STAB, assumed control. Within 24 hours tents were provided for 25,000 people. An evacuation policy was implemented, and 150,000 women and children left the city within 3 weeks. 60,000 men were available for cleaning, repairing, and erecting housing. 1,711 “temporary” houses were built (1,566 by War on Want, UK, and by a team of Royal Engineers) intended for eventual agricultural use.

Timing: Tents were erected very rapidly and were used for 3-4 months. People then moved into the 1,711 temporary houses. Some remained in these houses (which still exist); others moved into the new prefabricated houses.
Reconstruction Policy: A decision was made to requisition land to build 14,000 houses for a total of 70,000 people. Repairs to existing houses were undertaken to provide housing for 80,000. A new town plan was designed and implemented. This included an international competition for the design of the city centre.

Lessons learned
1. The emergency organisation was highly effective.
2. The tents were not all used.
3. The evacuation policy was only partially effective (all returned within 3-4 months).
4. The ability to requisition land contributed to the rapid reconstruction of houses. Another contributory factor was the massive aid received from Eastern and Western European sources (82 countries).
5. Overall there was a balanced, diversified approach to shelter provision which satisfied the needs in spite of the exposure threat of cold weather, which came 3 months after the disaster.
6. The estimated damage total was US$2.4 billion, while the overall cost of reconstruction was in the order of US$40 billion.
7. Much of the damage to property can be attributed to (a) rapid urbanization in the preceding decade; (b) damage to building foundations in the 1962 flood.
8. Needs of ethnic minority groups (40 per cent of the population) were insufficiently considered by authorities.

References

CASE STUDY SUMMARY

**Earthquake (Richter 7.1)**

Gedez, western Anatolia, Turkey—March 1970

<table>
<thead>
<tr>
<th>Population</th>
<th>Pre-disaster: Unknown</th>
<th>Homeless: 90,000</th>
<th>Injured: 1,265</th>
<th>Killed: 1,086</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dwelling</td>
<td>Pre-disaster: Unknown</td>
<td>Damaged: 5,105</td>
<td>Destroyed: 1,482</td>
<td></td>
</tr>
</tbody>
</table>

| Value of Damage (US dollars): $23 million |
| Needs of affected population: Shelter, treatment of injured, restoring water supply, roads etc. (life-line systems) |
| Value of assistance: Unknown |

**Emergency shelter**

<table>
<thead>
<tr>
<th>Type</th>
<th>Number provided</th>
<th>Percentage coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyurethane domes</td>
<td>300 in first week, ultimately 400</td>
<td>High</td>
</tr>
<tr>
<td>Tents</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

**Housing reconstruction**

<table>
<thead>
<tr>
<th>Type</th>
<th>Number built</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apartment dwellings</td>
<td>2,600 apartments built by mid 1971. 9,100 apartments by 1973</td>
</tr>
</tbody>
</table>

**Allocation of roles**

Survivors: Improvising their own shelter, moving in with friends and relatives.
National/local authorities: Relief co-ordination among national and local relief committees. Recruitment of labour from other parts of Turkey.
Military: Clearing of debris, rescue and relief.
Assisting groups: Turkish Red Crescent (major role), providing emergency shelter.

**Emergency shelter policy**: In Gedez temporary shelter was used only for a very short period; in Askalan temporary shelter (polyurethane domes) was used for a considerably longer period. Import of labour was used for clearing damage.

**Timing**: Emergency shelter was provided rapidly.

**Reconstruction policy**

1. The Government decided to rebuild Gedez 5 km to the south of the destroyed town.
2. New housing was built very rapidly by the Government.
3. The town of Askalan was rebuilt on the original site.

**Lessons learned**

1. The relocation of Gedez has created long-term problems, occupants still maintaining close links with the old town.
2. Residents of Askalan argue that a longer period in temporary accommodation gave rise to better construction of permanent homes due to increased time available for construction.
3. Co-ordination between village communities and Government planning officers was not satisfactory.
4. The very swift reconstruction of buildings created many problems. Local residents believed that more time could have been devoted to the planning process with long-term benefits.

References

CASE STUDY SUMMARY

**Earthquake (Richter 7.1)**

Chimbote, Peru—May 1970 (15.25 hrs)

| Population | Pre-disaster: 1.8 million | Homeless: 500,000 (ratio 1: 3.6) | Injured: 143,300 | Killed: 47,100 (unaccounted: 19,600) |

| Value of Damage (US dollars): $23 million |
| Needs of affected population: Shelter, treatment of injured, restoring water supply, roads etc. (life-line systems) |
| Value of assistance: Unknown |

**Emergency shelter**

<table>
<thead>
<tr>
<th>Type</th>
<th>Number provided</th>
<th>Percentage coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyurethane domes</td>
<td>300 in first week, ultimately 400</td>
<td>High</td>
</tr>
<tr>
<td>Tents</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
Reconstruction policy: A reconstruction commission (CRYRZA) was established with the following objectives:

1. To link reconstruction with general development programmes (including industrial and agricultural projects).
2. Establish new seismic codes for all buildings.
3. Not to permit the repair of damaged adobe buildings.
4. Re-use of emergency shelter materials in reconstruction.

Lessons learned:

1. Reconstruction materials, namely corrugated iron sheets, and the woven timber straw of the estacas huts served a useful function, being re-used in permanent reconstruction.
2. The Bayer/R Red Cross polyurethane igloos were generally well received; 50 per cent were still in use six years after the earthquake, but had been modified through additions and alterations.
3. The Government decision to relocate some towns, due to risks of further mud slides was logical but highly unpopular with those affected.
4. The decision to halt all reconstruction activity in Huarmo until seismic micro-zoning studies and the master plan were completed seriously retarded the reconstruction process.
5. The 16,300 conventional houses built were only accessible to middle class families.

References


CASE STUDY SUMMARY 4

Earthquake (Richter 5.6)

Managua, Nicaragua - December 1972 (25 000 hrs)

Population

Pre-disaster: 500 000
Homeless: 200 000 (ratio 1: 2.5)
Injured: 20 000
Killed: Between 6 000 and 10 000.

Dwellings

Pre-disaster: 80 000
Damaged: unknown
Destroyed: 50 000

Value of damage (US dollars): Approximately $100 million

Needs of affected population: Water supply, sanitation, shelter, access to sources of employment.


Emergency shelter

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tents</td>
<td>60</td>
<td>Polyurethane</td>
</tr>
<tr>
<td>Polyurethane igloos</td>
<td>45</td>
<td>Metal frame</td>
</tr>
<tr>
<td>Wooden huts (US Govern-</td>
<td>100</td>
<td>Metal frame</td>
</tr>
<tr>
<td>ment)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total: 146,300

Note: Of the homeless, 90 per cent were housed in lodging with relatives and friends, and a small proportion were occupying improvised shelters.
Housing Reconstruction

<table>
<thead>
<tr>
<th>Type</th>
<th>Number built</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wide variety, including the upgrading of the very active private sector Wooden huts</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Allocation of roles

- **Survivors**: Moved in with relatives and friends in outlying towns/villages.
- **National/local authorities**: Evacuation of Managua city ( compulsory), building of campsites and wooden shelters.
- **Military**: Execution of evacuation order.
- **Assisting groups (external)**: Provide tents, polyurethane igloos, wooden huts.

Emergency shelter policy: Government policy to evacuate Managua city-centre—reasons given: risks of looting and epidemics—and provide campsites in Masaya and outskirts of Managua, assist in building wooden huts for 11,600 families. Initially, survivors tended to ignore government action, preferring to stay with friends and relatives.

Timing

- **Managua**: 40 tents in 2 days
- **Masaya**: 40 tents in 3½ weeks

Full complement of tents arrived and erected after 5 weeks. Wooden huts (USA) completed in 14 weeks, igloos in 5 months. A number of voluntary agencies erected simpler wooden huts within 3 weeks.

Reconstruction policy: Prior to the Popular Revolution, Government policy was to cordon off city centre, pending reconstruction using new aseismic building codes. Reconstruction placed under special ministry. Freezing of central area encouraged vast suburban sprawl, increasing costs of infrastructure development, maintenance, and altering socio-economic base of the affected population. Reconstruction policy was dictated by the interests of a small but wealthy land-owning class under former regime.

Lessons learned

1. The evacuation policy was the basic cause of the waste land that remained undeveloped in the central of Managua until the 1979 revolution. If families had been allowed to remain within the earthquake ruins, it is probable that rebuilding would have proceeded rapidly. Thus, the obvious benefits of aseismic planning and building construction have to be set against the cost and social disruption of such measures.
2. A consequence of the restriction of development in the urban centre has stimulated suburban decentralization, which has radically changed the form of post-earthquake Managua.
3. The extended family system was a highly effective “sponge”, absorbing the homeless. (This may have been due in part to rapid urbanization in the previous decade with extensive rural/urban ties).
4. Polyurethane igloos arrived too late to satisfy emergency shelter needs.
5. The USAID wooden huts were ineffective as emergency provisions; they were removed, sided, with inadequate attention having been paid to infrastructure.
6. The private sector played a key role in reconstruction, particularly on the periphery of the city.

References

Activities of the National Emergency Committee, Nunez, Christobel Roana, Oakland, California, 1975.
Lessons learned

1. One of the new housing settlements “Colonia Canada” in Choloma is interesting in that it evolved from a refugee camp of 485 families to a permanent settlement of 381 houses.
2. There was a marked absence of governmental provision of new housing.
3. There was marked lack of local involvement in the refugee camp and in rehousing programmes, many of which were culturally unsuited to local conditions.
4. The distribution of aid was concentrated in certain centres such as Choloma, causing a dependency a spiral with adverse long-term consequences.
5. Many of the housing systems have not been easily modified.
6. New buildings have not been designed or sited to adequately resist future high winds or flood action.

References


Housing reconstruction

<table>
<thead>
<tr>
<th>Type</th>
<th>Number provided</th>
<th>Percentage occupancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tents (Turkish Red Crescent)</td>
<td>3681</td>
<td>90</td>
</tr>
<tr>
<td>Polyurethane igloos (OXFAM)</td>
<td>463</td>
<td>10</td>
</tr>
<tr>
<td>Improvised shelter</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Allocation of roles

Survivors: Some limited improvisation of shelter. Overall role of survivors was minimal.

National local authorities: Housing reconstruction.

Military: Search and rescue, demolition of dangerous ruins.

Assisting groups (external): Red Cross/Red Crescent provided tents: OXFAM provided polyurethane igloos, 40 per cent of prefabricated housing reconstruction built with foreign assistance.

Emergency shelter policy: The policy was to provide tents through the Turkish Red Crescent, and to accelerate reconstruction. Voluntary Agencies followed their own policies. e.g. the OXFAM igloos.

Timing: The majority of tents were in place within 2 weeks, the most urgently needed having been provided within 2 days. The first polyurethane igloos were provided after 60 days, and completed after 90 days.

Reconstruction policy:

1. The Ministry of Reconstruction and Resettlement moved the town of Lice 2 km to the south due to the risk of rockfalls at the old site.
2. The housing policy was to provide prefabricated homes, not to rebuild in local building traditions. The town of Lice was planned for an eventual population of 20,000 (twice the pre-earthquake total).
3. Some of the housing assistance from external sources, notably Libya, incorporated employment provision, animal shelters, etc.

Lessons learned

1. Tents effectively met short-term needs. A particular quality of Red Crescent policy is to ask surviving families to make new tents to replenish the stockpile while using their tents.
2. Of the 463 OXFAM igloos, 44 were damaged, and it is probable that fewer than 50 were used. They failed on grounds of high cost, timing, fire risk and cultural issues. After the experience in Lice, OXFAM abandoned the system.
3. Lice was the second major disaster to attract extensive financial aid from the Arab world, with the receipt of $11 out of $15.7 million of external aid, resulting in an imaginative project by Libya.
4. The decision to relocate Lice has been very unpopular with its residents, and was made without their participation. The new site does not possess climatic shelter from the hillside, has taken valuable agricultural land out of use, and was initially without water supply. The new choice of a flat site may have been influenced by the requirements of the prefabricated houses.
5. The capacity of the Turkish Government to build prefabricated houses so rapidly (1,358 units in 54 days) was an achievement, but conversely the houses had many deficiencies: climatic and cultural unsuitability; no provision for animals; they were too small; and they did little to generate local work. Essentially, they reflected an urban middle class set of values, in sharp contrast to rural values and priorities.

CASE STUDY SUMMARY

Earthquake (Richter 6.9)

Lice, Turkey—September 1975 (12.20 hrs)

Population

Pre-disaster: 50,000 (8,100 Lice town)
Homeless: 5,000 (ratio 1: 10 region and 1: 1.6 town)
Injured: 3,400
Killed: 2,385

Dwellings

Pre-disaster: unknown
Damaged: 8,450
Destroyed: 7,710

Value of damage (US dollars): Estimated between $17 million and $34 million.

Needs of affected populations: Shelter was a particularly important need owing to approaching winter conditions. Owing to high casualty figures, emotional security was an important factor in relief.

Value of assistance (US dollars): $34 million (internal sources): $15.7 million (external sources).

Emergency shelter

<table>
<thead>
<tr>
<th>Type</th>
<th>Number provided</th>
<th>Percentage occupancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tents (Turkish Red Crescent)</td>
<td>3681</td>
<td>90</td>
</tr>
<tr>
<td>Polyurethane igloos (OXFAM)</td>
<td>463</td>
<td>10</td>
</tr>
<tr>
<td>Improvised shelter</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
CASE STUDY SUMMARY 7

Earthquake (Richter 7.5)
Guatemala—February 1976

Population
Pre-disaster: Unknown
Homeless: 1.6 million (ratio: unknown)
Injured: Estimates up to 77,000
Killed: 27,000 estimated

Dwellings
Pre-disaster: Unknown
Damaged: Unknown
Destroyed:
- Guatemala City: 221,261
- Rural areas: 163,301
- Total: 384,762

Value of damage (US dollars): $750 million estimated

Needs of affected populations:
- Restoration of water supplies/sanitation: shelter at high altitude; re-establishment of local economies.

Value of assistance (US dollars):
- External sources: $7.5 million for relief, and $17.5 million for reconstruction.

Emergency shelter
- Tents: 10,000 approx.
  - Low in campsites: nearly 80% erected near mined homes
- Corrugated iron roofing sheets: Unknown
  - High
- Improvised shelters: 50,000 in Guatemala City
  - Very high
- Temporary wooden houses: Unknown

Housing reconstruction
- Wide variety of traditional construction and light prefabrication

Allocation of roles
- Survivors: Widespread improvised shelter.
- Military: Search and rescue; erection of campsites (in conjunction with Red Cross).
- Assisting groups (external): Provision of tents, temporary shelters and building materials, especially corrugated iron roofing sheets.

Emergency shelter policy
1. No clear policy on shelter emerged in the initial weeks following the earthquake. The Reconstruction Commission allocated towns and villages to the very large number of relief agencies.
2. The Government planned to build 100,000 temporary houses with military support, but there was little follow-up.
3. Many agencies adopted a policy of providing corrugated iron sheeting (lamina) which could serve as emergency shelter, and subsequently as permanent lightweight roofing. These programmes developed from week 1 onwards.

Reconstruction policy
1. There was no clear reconstruction policy. This was left to individual municipalities to determine, in consultation with assisting groups.
2. Reconstruction in Guatemala City was made more complicated by land tenure problems, which delayed all urban reconstruction.

Lessons learned:
- A Committee of voluntary agencies writing to the President of Guatemala two years after the earthquake of the 4th February, 1976, admitted that many mistakes had been made and listed the following five as the most important: too much aid was given away; too many of the houses constructed were merely of an emergency type; some organizations used large numbers of foreign volunteers; too much was done under pressure and without proper consultation, so that the victims became mere spectators of the work carried out rather than participants; a lot of reconstruction work was undertaken without first consulting the Government's Reconstruction Committee—R. Norton.

Other vital lessons included the following:
1. The widespread improvisation of shelter in Guatemala City underlined the resourcefulness of survivors.
2. The Oxfam/World Neighbours Housing Education Programme was a major innovation in post-disaster housing programmes, with its emphasis on accountability and training in low-cost anti-seismic construction.
3. Problems of land use were a fundamental issue in Guatemala City, since the majority of earthquake deaths related to unsafe siting as much as to precarious building.

References
- Reconstruction of Housing in Guatemala, Paul and Charlene Thompson, Organization of American States and Intersect, Dalles, 1976.
- The OXFAM/World Neighbours Housing Education Programme in Guatemala, Mary McKay, Disasters and the Small Dwelling, Pergamon, Oxford, United Kingdom, 1981.
- Guatemala Shelter and Housing Policy in Weeks 1-3, Ian Davis, Oxford Polytechnic, United Kingdom.
CASE STUDY SUMMARY 8
Earthquake (Richter 6.3)

Friauli, Italy — May and September 1976

Population
Pre-disaster: 89000
Homeless: 45000 (ratio 1:1.9)
Injured: 2400
Killed: 965

Dwellings
Pre-disaster: Unknown
Damaged and destroyed: 30517

Value of damage (US dollars): $1.1 billion

Needs of affected populations: Repairs and infrastructure, especially water supply, restoration of economic activities. Emergency shelter (which was not strictly speaking a major problem because of an abundant supply).

Value of assistance (US dollars): Unknown

Emergency shelter

<table>
<thead>
<tr>
<th>Type</th>
<th>Number provided</th>
<th>Percentage acceptance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campsites with tents</td>
<td>Unknown</td>
<td>Very low</td>
</tr>
<tr>
<td>Tents (distributed individually)</td>
<td>Unknown</td>
<td>0%</td>
</tr>
<tr>
<td>Mobile homes</td>
<td>Unknown</td>
<td>100%</td>
</tr>
<tr>
<td>Railway sleeping cars</td>
<td>125</td>
<td>High</td>
</tr>
<tr>
<td>Hotels on Adriatic coast</td>
<td>20000 beds</td>
<td>100%</td>
</tr>
<tr>
<td>Temporary housing (prefabricated)</td>
<td>25000 (by 1980)</td>
<td>100%</td>
</tr>
</tbody>
</table>

Housing reconstruction

<table>
<thead>
<tr>
<th>Type</th>
<th>Number erected</th>
<th>Percentage availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>All damaged and destroyed houses to be rebuilt to original form, incorporating earthquake-resistant design codes</td>
<td>Unknown</td>
<td></td>
</tr>
</tbody>
</table>

Allocation of roles

Survivors: Clearing of rubble, erection of tents, moving into alternative accommodation.
National/local authorities: Provision of campsites, hotel accommodation, sleeping cars and temporary prefabricated housing.
Military: Search and rescue, clearing debris, erecting campsites.
Assisting groups (external): Provision of tents, some prefabricated units, schools, mobile homes.

Emergency shelter policy: Municipalities were responsible for providing temporary accommodation (of the type indicated above) for their affected citizens. Workers commuted between their temporary accommodation and the affected villages.

Timing: Tents were used from May to October 1976. Hotels and sleeping cars were used in winter. The first temporary prefabricated houses were built by the winter of 1976, but the process continued for a number of years.

Reconstruction policy: Pending the rebuilding of houses to their historical form, "temporary" prefabricated houses were provided on specially prepared and serviced sites. All reconstruction was to be in earthquake-resistant standards. This policy of building twice over was designed to prevent migration away towards the large industrial centres of the works.

Lessons learned: The "temporary" housing policy, pending permanent reconstruction, proved to double the costs of reconstruction in view of the price of prefabricated units and the investments needed to provide sites and services. This policy in effect retarded reconstruction. The decentralization of responsibility to the local authorities, however, proved to be beneficial by increasing the accountability of officials to the disaster victims, even though there were unequal performances between some municipalities. The "temporary" housing policy was brought about by pressure from the media and politics. The extensive use of mobile homes and hotels (in winter) was most successful, in contrast to low occupancy of tent camps.

References


CASE STUDY SUMMARY 9
Earthquake (Richter 7.6)

Calidram (Van, Turkey — November 1976: 02:22 hrs)

Population
Pre-disaster: 180700
Homeless: 51000 (ratio 1:3.5)
Injured: 5000 (approx.)
Killed: 3870

Dwellings
Pre-disaster: 30000 (approx.)
Damaged: 5250
Destroyed: 9200

Value of damage (US dollars): $3.2 billion

Needs of affected populations: Shelter in harsh winter conditions for survivors and their livestock. Medical care and other standard relief needs.

Value of assistance (US dollars): $17.4 billion for relief and reconstruction from internal sources. Monetary value of assistance from inside Turkey unknown, but considerable in terms of prefabricated housing alone.

Emergency shelter

<table>
<thead>
<tr>
<th>Type</th>
<th>Number provided</th>
<th>Percentage availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tents, including winterized tents with stoves</td>
<td>5000</td>
<td>95% for winterized tents, low for others</td>
</tr>
<tr>
<td>Improvised shelter</td>
<td>Unknown</td>
<td>100%</td>
</tr>
</tbody>
</table>

Housing reconstruction

<table>
<thead>
<tr>
<th>Type</th>
<th>Number erected</th>
<th>Percentage availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prefabricated houses asbestos panels/timber frames</td>
<td>110000 erected between April and November 1977</td>
<td></td>
</tr>
</tbody>
</table>
Cases

1. The debate between supporters of "pukka" housing and those of traditional types of construction. (The houses to cost about Rs. 6,500 with a plinth area of about 190 sq. ft.).

2. The Government made stocks of thatch and bamboo readily available for families to improvise shelters, and repair or rebuild their homes.

3. CARE, a voluntary agency from the United States, worked through Indian voluntary agencies to build 7,000 shelters.

References


Provision of Emergency Shelter in Winter Conditions, Everett Ressler, Dallas, Texas, USA, 1977.


CASE STUDY SUMMARY 10

Tropical cyclone (winds up to 270 km/hr)

Andhra Pradesh, India - November 1979

Population

Pre-disaster: Unknown
Homes/da: 25,000
injured: Unknown but minimal in comparison to numbers killed.
Killed: 30,000

Dwellings

Pre-disaster: Unknown
Damaged and destroyed: 150,000 homes, probably 90 per cent of all houses in coastal area.

Values of damages (US dollars): Monetary value unknown, but considerable losses to crops, livestock and fishing equipment.

Needs of affected populations: Re-establishment of local economies, clean drinking water (wells were contaminated), clearing of roads, food, household goods, paramedical care. Shelter was not a priority in view of warm climate.

Value of assistance (US dollars): Unknown

Emergency shelter

Shelter

Number provided

Pre-disaster provision of tents and evacuation. Everett Ressler, Dallas, Texas, USA, 1977.

Allocation of roles

Survivors: improvisation and repair of shelter from cyclone debris.
National/local authorities: "Pukka" housing and community cyclone shelters.
Military: Rescue, clearing roads etc.
Assisting groups (external): Forty voluntary agencies working with Government to build simple shelters. Some (limited) training on housing reconstruction and related issues.

Emergency shelter policy

1. Shelter needs were of a high priority, the climate being warm and the monsoon season not imminent.
2. The Government made stocks of thatch and bamboo readily available for families to improvise shelters, and repair or rebuild their homes.
3. CARE, a voluntary agency from the United States, worked through Indian voluntary agencies to build 7,000 shelters.

Timing: The CARE housing was started within a month of the cyclone, and was completed in about 10 weeks (to fit a US Government requirement of confining assistance to a 90-day, post-impact period).

Reconstruction policy

1. The State Government made certain promises to provide "pukka" housing for survivors in lieu of providing support for traditional types of construction. (The houses to cost about Rs. 6,500 with a plinth area of about 190 sq. ft.);
2. Build 1,300 community of cyclone shelters (500 completed by March 1982);
3. Build environmental protection measures, such as tidal embankments tree belts and other plantation.

Lessons learned

1. The debate between supporters of "pukka" housing and those of traditional housing was ultimately won by the former, with the proposed building of 20,000 "pukka" houses.
2. The Government adopted a Preparedness Plan which included 13,000 Community Cyclone Shelters.
3. Despite the minimal need for emergency shelter and pressing agricultural priorities, one agency devoted extensive resources to build 7,000 shelters. This was mainly the work of contractors, generating limited local employment.

4. Nevertheless initial evidence suggest that the concrete block housing has had a positive effect in the local economy.

5. Opportunities were missed to instigate training programmes in improved construction techniques, the only exceptions being the programmes organized by the Village Reconstruction Organization (VRO), and an organization called Appropriate Training and Information Center (Artic).

References


Initial issues following the Andhra Pradesh Cyclone of November 1979, F. Cuny, Interfect, Dallas, Texas, USA, 1980.

CASE STUDY SUMMARY II

Earthquake (Richter 7.3)

El Asnam, Algeria - Friday (p.m.) 10 October 1980

Population

Pre-disaster: 100,000 (region)

Homeless: 400,000 (ratio 1:4)

Injured: 8,367 serious: 15,000 light

Killed: 2,633

Dwellings

Pre-disaster: 20,000 (region)

Damaged: 60,000

Destroyed: 80,000

Value of damage (US dollars): Unknown

Needs of affected populations: Medical care, shelter, rapid economic recovery (especially to agricultural sector), re-establishment of social and administrative services, and education, especially the rebuilding of schools (85 destroyed).

Value of assistance (US dollars): $50 million for relief in December 1980

Emergency shelter

Types

Tents: 15,000 (camp-sites)

Percentage occupancy: Initially low; high later as a result of policy of keeping inhabitants away from damaged areas

Improvised shelter (using plastic sheeting, among other material): Unknown

Lodging with family and friends: Unknown

Housing reconstruction

Type

Prefabricated “temporary” housing (pending reconstruction) in El Asnam town

Number

20,000 with expected 20-years occupancy, on-going programme

Reconstruction of traditional housing in rural areas

Unknown

Allocation of roles

Survivors: Some improvised shelter (rural areas), loading with family/friends outside affected area.

National/local authorities: Provision of tents, campsites, building materials for rapid reconstruction in rural areas.

Military: Rescue, relief, erection of tent campsites.

Assisting groups (external): Provision of tents, plastic sheeting, prefabricated housing (and schools).

Emergency shelter policy: One day after the earthquake, the Algerian President formed an Inter-Ministerial Reconstruction Commission. They were charged with three tasks in order of priority:

1. Save lives, prevent epidemic diseases, establish tent campsites.
2. Evaluate losses, protect property.
3. Prepare for reconstruction, noting the experiences of other earthquake-prone areas.

Timing: Urgent attention was given to provide tents/shelter materials/campsites in view of impending winter conditions. Affected population was asked by Government to occupy campsites for one year pending provision of temporary prefabricated housing. This promise was kept (El Asnam town). It is expected that the complete reconstruction process may take up to twenty years.

Reconstruction policy

1. After some debate, decision to retain existing site of El Asnam. Reconstruction only after microzoning study.
2. Provide prefabricated temporary housing, pending reconstruction.
3. Reconstruct conventional, reinforced concrete housing to earthquake-resistant standards.

Lessons learned

1. As a consequence of recent rapid urbanization many unsafe modern, reinforced concrete structures collapsed in the earthquake.
2. The collapse of 83 schools indicated the priority need for seismic design and construction of public buildings.
3. Overestimates of casualties and relief needs gave rise to some waste, with excessive provision of medical aid.
4. Officials underestimated the self-help capacity of survivors.
5. Tents and plastic sheeting served a useful function, particularly when freely adapted or located by the surviving families.

References


Comments and Findings in the Post-Earthquake Situation in the Wilaya A. Chabertowski, United Nations Centre for Human Settlements (UNCHS), Nairobi, 1981.

Appendix B

FUTURE RESEARCH NEEDS

The following research topics were identified by the Expert Group Meeting which reviewed this document in December 1981.

A. The resources of survivors

1. SELF-HELP

Case studies on the limitations of self-help in the provision of shelter and inputs needed from assisting groups:
- Cash grants (to stimulate the economy);
- Cash grants (for rebuilding);
- Subsidies;
- Distribution of materials (both for emergencies and reconstruction);
- Sharing of expertise on hazard resistant housing.

Ideally, case studies should cover different types of disasters in diverse climates, and at different scales of impact.

2. COMMUNITY-BASED FLOOD MITIGATION MEASURES

Case studies on:
- Protection of infrastructure:
  - The protection of settlements by simple warning devices for flash floods, raising village levels, building protective walls, dykes, overflow lanes;
- The protection of buildings:
  - Flood mitigation measures for low-cost housing: consideration of using improved techniques and materials in flood-prone environments.

3. PROTECTION OF PEOPLE LIVING IN BUILDINGS WITH HEAVY EARTHEN ROOFS IN EARTHQUAKE-PRONE AREAS

Considering recent earthquake casualties in the Middle East, a very useful and practical piece of research, probably best undertaken with a local voluntary agency or co-operative group, would be to explore very cheap, low-technology methods to protect houses which have heavy earthen or tiled roofs, and other vulnerable characteristics.

4. HUMAN EXPOSURE AND DISASTER SHELTER

In view of the often-stated risk of exposure, thus necessitating shelter, to mount a research project on winter disasters.

This could examine medical evidence from previous disasters. Secondly, a more detailed monitoring of a future disaster could be undertaken, with advance study of how to investigate this issue. UNDRO, WHO, PAHO and natural disaster research institutes would all have possible inputs into such a study.

B. Research into hazard-resistant housing and settlements

1. SOCIAL, CULTURAL AND ECONOMIC ASPECTS OF IMPROVED ADOBE BUILDINGS

Although some work has been done on the scientific analysis of the performance of low-cost adobe dwellings in seismic areas, there remains an urgent need to consider:

- The social, cultural and economic aspects of housing improvement projects;
- The most effective way of implementing such programmes.

2. DISASTER MITIGATION AND UPGRADING PROGRAMMES

A project perhaps best undertaken with UNCHS, would be to consider how disaster mitigation measures can be incorporated into upgrading programmes within the informal sector (slums, squatter settlements), and rural settlements.

3. RESTORATION OF SETTLEMENTS AND BUILDINGS AFTER FLOODS

Post-flood measures to restore buildings.

C. Activities of assisting groups

1. ASSESSMENT OF NEEDS

Given the difficulties of assessing shelter needs after a major disaster, what are the most effective assessment techniques available and who should undertake them?

2. ACCOUNTABILITY

An examination of practical measures to introduce the concept of "accountability" to governments and assisting groups.

3. LONG-TERM CONSEQUENCES OF SHELTER PROGRAMMES

The long term consequences of large-scale emergency shelter programmes considering:
(a) Whether they retard or accelerate reconstruction.
(b) Planning implications for new settlements.

D. INFORMATION EXCHANGE

To develop a good annotated bibliography (with the widest international spread of documentation) on the topic of disasters and settlements.
Appendix C
DEFINITIONS OF UNDRO TERMS

Natural hazard: meaning the probability of occurrence, within a specific period of time in a given area, of a potentially damaging natural phenomenon.

Vulnerability: meaning the degree of loss in a given element at risk, or 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: meaning the population, buildings and civil engineering works, economic activities, public services, utilities and infrastructure, etc., at risk in a given area.

Specific risk: meaning the expected degree of loss due to a particular natural phenomenon and as a function of both natural hazard and vulnerability.

Risk: meaning the expected number of lives lost, persons injured, damage to property and disruption of economic activity due to a particular natural phenomenon, and consequently the product of specific risk and elements at risk.

Appendix D

BIBLIOGRAPHY

1. Office of the United Nations Disaster Relief Co-ordinator

Case report, No.003—Turkey, Earthquake, Van Province, 1976;
No.004—Mozambique, Floods, 1977; Vol.005—Oman, Cy-
clone and Torrential Rains, 1977; Vol.007—Jamaica, Floods,
1979; No.008—Dominica, Hurricane David, 1979; No.009—
Dominican Republic, Hurricanes David and Frederic, 1979;
No.010—Iran, Kerman Earthquake, 1981.

Disaster Prevention and mitigation: a compendium of current know-
ledge. Vol. 1—Volcanological Aspects; Vol. 2—Hydrological As-
pects; Vol. 3—Seismological Aspects; Vol. 4—Meteorological As-
pects; Vol. 5—Land Use Aspects; Vol. 6—Building and Civil Engi-
ering Aspects (in Frech only); Vol. 7—Economic As-
pects; Vol. 8—Sanitation Aspects; Vol. 9—Legal Aspects;
Vol. 10—Public Information Aspects.

Guidelines for disaster prevention. Vol. 1—Pre-disaster Physical
Planning of Human Settlements; Vol. 2—Building Measures for
Minimizing the Impact of Disaster, Vol. 3—Management of
Settlements.

Ten questions on UNDRO (leaflet).
UNDRO news, published every two months.

REPORTS

Composite vulnerability analysis. A methodology and case study of
the Metro Manila area (Revised technical report)

Disaster Preparedness and prevention in Peru. An assessment of the
needs and possibilities for international assistance: Report of
Joint UNDRO/OFDA/PAHO/LRCS Mission (23-31 January

Drought and floods in the people's Republic of China. Report of the
Multi-Agency Fact-Finding Mission to the Hebei and Hebei

Displaced and drought-affected persons in southern and central Ango-
la. Report of the Multi-Agency Fact-Finding Mission (29 August
- 12 September 1981) (Restricted).

Natural disasters and vulnerability analysis. Report of Expert Group
Meeting, (July 1979).

Office of the United Nations Disaster Relief Co-ordinator (April 1980-
March 1981). Report of the Secretary-General to the Thirty-sixth
Session of the UN General Assembly (A/36/259).

DOCUMENTS

The Role of Resident Representatives in respect of Pre-Disaster Planning
and Disaster Relief, UNDP/PROG/73 (Restricted).

The Protection of Human Settlements from Natural Disasters
(A/CONF.70/B/7).

The potential Applications of Satellite Remote Sensing Technology to

Water Hazard (paper submitted on behalf of the United Nations
Disaster Relief Co-ordinator to the 1981 International Conference
on Hydrology and the Scientific Bases for the National
Management of Water Resources). Paris, August 1981,
HYGR/INF.15 (restricted).

2. General Bibliography

Note: It has been decided to limit the bibliography to the full list of
key references already listed at the conclusion of each section of the
study. The limitation in length and scope of the bibliography is owed
to the basic function of the study: to provide sufficient information to
all assisting groups responsible for developing post-disaster shelter
and housing programmes.

AMBRASEYS, N.M., "Earthquake Hazard and Emergency Planning"

AMERICAN INSTITUTE OF ARCHITECTS (AIA), How to Evaluate Housing
Failure following Earthquakes (form with checklist for assessors
of damage). AIA, Washington, USA.

COMMITTE ON INTERNATIONAL DISASTER ASSISTANCE (CIDIA), As-
sessing International Disaster Needs. National Academy of

CUNY, Frederick C., Strategies and Approaches for the Provision of
Emergency Shelter and Post-Disaster Housing. InterAct (with
funding from USAID), Dallas, Texas, USA, 1973.

DAVIS, Ian, "The Interview", New International, No. 53, 1977,
pp. 21-23.

Shelter after disaster, Oxford Polytechnic Press, Oxford, United
Kingdom, 1978.

Arquitectura de Emergencia. Gustavo Gilli S.A., Barcelona,
1980 (Spanish translation of Shelter after Disaster, 1978).

DAVIS, Ian, ed. (contributions by Frederick Cuny, A. Fernandez, J.
Howard and R. Mister, M. McKay, Paul Oliver, Everett Ressler,
J. Rivers and G. Brown, Alan Taylor, and Kenneth Weggela),
Disasters and the Small Dwelling, Pergamon, Oxford, United
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FISHER, Harold D., Disaster Planning: The Preservation of life and

HAAS, J.E. H.C. COCKFANE, and D.C. EDDY, The Consequences of
Large-scale Evacuation Following Disasters: The Darwins,
Australia, Cyclone Disaster of 25 December 1974, Natural Hazards

HOWARD, J., and R. SPICE, Plastic Sheeting - Its Use for Emergence
Evacuation and Other Purposes. OXFAM, Oxford, United
Kingdom, 1977.

HUGUES, Richard, "Guide to Post-Earthquake Building Damage

KRUGLOD, Frederick, Pre-Disaster Planning: The Role of Interna-
tional Aid for Pre-Disaster Planning in Developing Countries,

LEWIS, James, A Primer of Precautionary Planning for Natural
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Kingdom, 1977.

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Disaster and Recovery: A Longitudinal Study of the 1970 Gulf
Earthquake in Western Turkey, United States Air Force Academy,

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NORTON, Robie, "Disasters and Settlements", Disasters, vol. 4, No. 3,

OAKLEY, David, Transition Housing for Victims of Disaster, Disaster
Assistance Manual, vol. 1, Office of Housing, Office of US For-


Whitemore Elaine. Land for Settle: Land Tenure for the Very Poor. OXFAM, United Kingdom, 1981.

3. ANNOTATED BIBLIOGRAPHIES


3. DEPARTMENT OF SOCIOLOGY. DISASTER RESEARCH CENTRE, OHIO STATE UNIVERSITY. A 100-item Annotated Bibliography on Disasters and Disaster Planning. Ohio State University, Columbus, Ohio, USA 1980. These fully annotated references mainly consist of books, monographs, reports, etc., concerning organizational or sociological aspects of disaster.

4. INTERFET. Publications from Intersect. An annotated listing of 76 publications available from Intersect, Dallas, Texas, USA, 1981, on the following topics: disaster management, state of the art studies: disaster mitigation; general disaster studies; construction guides and training aids; briefing papers: case studies of operations: reports and evaluations.


Appendix E

COMPLEMENTARY STUDIES

Three complementary documents have been published:

   This document is concerned with the formulation of "transition housing" policy in devising post-disaster housing planned, designed and constructed to provide for the immediate shelter needs of the disaster victims, as well as for the orderly and progressive transition of such projects to permanent, improved communities.

   This document contains guidance on topics parallel to this study: Health issues related to different disaster types, methods of assessing survivor needs, basic sanitation needs, management of temporary settlements and refugee camps.

   This document has been compiled by UNHCR to improve its response to refugee situations. It includes sections concerned with shelter, means of water and sanitation. A characteristic of these guidelines is the concern for a humane, family-oriented attitude to shelter provision.
Appendix F

FILMS AND SLIDE LECTURES

1. 16 mm film and video cassette (20 mins)
   At home with Hurricanes. A description of building techniques to resist high winds describing the
   Building Research Establishment project in St. Vincent. Hire from Central Film Library,
   Chalfont Grove, Gerrards Cross, Bucks. SL9 8TN United Kingdom or Purchase from:
   Building Research Establishment, Garston, Watford, WD2 7JU United Kingdom.

2. 16 mm film and video cassette (approximately 15 mins)
   Building for safety in Hazardous Areas. An excellent review including animation photography of
   the performance of buildings against earthquakes and high winds. The film includes advice
   on hazard-resistant construction. Produced by Paul Thompson for the Office of Housing.
   Agency for International Development, Washington, D.C., USA, 1982. (For details of hire or
   purchase contact above address.)

3. The following three films are available on loan from Vision Habitat, United Nations Centre for
   Human Settlements (Habitat), Habitat Film Distribution Centre, Room E. 47 Palais des Nations.
   CH-1211 Geneva 10, Switzerland.
   (a) 16 mm film (24 mins)
      Living with Disaster. An Australian film describing the lessons learned from the Darwin cyclone
      evacuation as well as other lessons from flood and bush fire disaster.
   (b) 16 mm film (20 mins)
      Managing Earthquakes. A graphic account of the 1972 disaster and reconstruction planning.
   (c) 16 mm film (26 mins)
      Westmanna Island. Description of measures to prevent volcanic lava from destroying this 1-
      hande town.

4. Slide lectures: tapes slides manual (approximately 20 mins each lecture)
   Human Settlements and Disasters. Editor of series, Ian Davis. No. 1—Defining an Approach for
   Designers, Ian Davis; No. 2—Mitigation Measures, Ken Westgate and Ian Davis; No. 3—
   Simple Techniques for Making Adobe Houses more Earthquake-Resistant, Everett Resler,
   No. 4—Making Low-Income Housing Wind Resistant: A Case Study of Andhra Pradesh,
   India, Everett Resler and Ian Davis, No. 5—Emergency Shelter after Disaster, Ian Davis.
   Available from Commonwealth Association of Architects, Building Centre, 26 Stone Street,
   London, WC1, UK.

5. Slide lectures: tapes slides manual (approximately 20 mins each lecture of 36 slides)
   Disasters and Settlements, by Ian Davis. No. 1—Reducing Risks; No. 2—Preparing for Disaster;
   No. 3—Shelter after Disaster; No. 4—Reconstruction Planning. Produced by the United
   Nations Centre for Human Settlements (Habitat) in co-operation with the Office of the
   United Nations Disaster Relief Co-ordinator (UNDRO). These slide lectures are based on
   the present UNDRO study. They can be obtained from UNCHS (Habitat), P.O. Box 30030,
   Nairobi, Kenya, or from Human Settlements Information Office Europe, United Nations,
   CH 121 Geneva 10, Switzerland.
Appendix G

PERIODICALS

1. Appropriate Technology

2. Basics: A Source of Shared Information on Rural Development
   Rural Communications, 17 St. James Street South Petherton, Somerset, United Kingdom. Newsletter providing information on development problems in an easily understood form. Settlements and housing, education and training, appropriate technology ideas and options. Bi-monthly.

3. Beyond Impact
   Centre for Information and Research on Disaster and Natural Hazards, Caufield Institute of Technology, P.O. Box 197, Caufield East, Victoria 3145, Australia. A review of the effect of disasters and natural hazards in the Australian situation.

4. Development Communication Report
   Clearing House on Development Communications, 1414 22nd Street NW, Washington DC., 20037, USA. Good source for information on communications projects and technology. Quarterly.

5. Development Forum
   Division of Economic and Social Information, United Nations, 1211 Geneva 10, Switzerland. Primarily devoted to development issues but includes some relief/reconstruction information. Good source for publications and contacts. Articles on non-governmental organizations, UN Agencies, technology, desertification, ecology, development education. Monthly.

6. Disasters: International Journal of Disaster Studies and Practice
   Pergamon Press, Headington Hill Hall, Oxford OX3 OBW (United Kingdom). Edited by the staff of the International Disaster Institute. Articles and information on all aspects of relief: pre-disaster planning and mitigation, disaster case studies, epidemiology. Good resource for publications and contacts. Quarterly.

7. Disaster Management
   Joint Assistance Centre (a voluntary action group for disaster assistance), Adhyatma Sadhana Kendra Mehrauli, New Delhi, 110003 India. Highlights information from India and S.E. Asia on all aspects of disaster mitigation and relief/reconstruction management. Quarterly.

8. Disaster Preparedness in the Americas

9. Invention Intelligence
   Department of Science and Technology, National Research Development Corporation of India, 61 Mahatma Gandhi Marg, Lajjgarh III, Delhi-4, India. Includes articles on technology for the poor, rural-based industry, housing. Monthly.

10. Natural Hazards Observer
    Institute of Behavioral Science, University of Colorado, Boulder, Colorado 80309, USA. Primarily aimed at researchers. Information on available studies and contacts, conferences and meetings, federal and state policies, regulations and forthcoming legislation, organizations and their projects, grants for research, recent publications. Quarterly.

11. Sounds from Around the World
    World Neighbors, 5116 N. Portland, Oklahoma City, Oklahoma 73112, USA. Review of books, reports, periodicals, audio-visual training aids, etc. produced by World Neighbors and other organizations throughout the world. Excellent resource for all aspects of development. Quarterly.

12. TRANET Newsletter

13. TRANET (Transnational Network for Appropriate/Alternative Technologies), P.O. Box 567, Rangeley, Maine 04970, USA. Publishes lists of appropriate technologies, publications, and resources. Also good source for recent publications. Articles, etc. on natural disasters and related subjects. Bi-monthly.

14. UNDRO News
    Office of the United Nations Disaster Relief Co-ordinator, Palais des Nations, 1211 Geneva 10, Switzerland. Reviews recent disasters throughout the world and the response by UN agencies, other organizations and national governments. Good resource for meetings and conferences organized by the UN non-governmental and intergovernmental organizations, voluntary agencies and others. Also good resource for recent publications, articles, etc. on natural disasters and related subjects. Bi-monthly.

15. Unscheduled Events
    Disaster Research Center, Ohio State University, College of Social and Behavioral Sciences, 128 Derby Hall, 154 N. Oval Mall, Columbus, Ohio 43210, USA. Articles on studies and research projects, forthcoming conferences and meetings, recent publications. Good resource for contacts and references. Quarterly.

16. UTC News
Appendix H

SOURCES OF INFORMATIONS ON DISASTER RELATED SUBJECTS

Note: Organizations marked with an asterisk (*) are known to have particular interest in post-disaster shelter and housing.

1. * AIA Research Corporation
   Director: Earthquake and Flood Research Program
   1735 New York Ave. N.W.
   Washington, D.C. 20006
   USA

2. * Building Research Establishment
   Dr. Keith Eaton
   Overseas Division Building Research Station
   Garston, Watford, Herts.,
   United Kingdom

3. Caulfield Institute of Technology
   Centre for Information and Research on Disasters and Natural Hazards (IRIDNH)
   P.O.Box 197
   Caulfield East
   Melbourne, Victoria 3145
   Australia

4. Centre de Recherche sur l’Epidemiologie des Désasters
   Ecole de Santé Publique
   Unité d’épidémiologie
   Université catholique de Louvain
   Clos Chapelle-aux-Champs, 30
   B-1200 Bruxelles
   Belgium

5. * Earthquake Engineering Research Institute (EERI)
   2620 Telegraph Avenue
   Berkeley, California
   USA

6. * International Council of Building Research Studies and Documentation
   704 Weena
   P.O. Box 20704
   Rotterdam 3
   Netherlands

7. International Disaster Institute (IDI)
   Dr. Frances D’Souza
   85 Marylebone High Street
   London W1M 3DE
   United Kingdom

8. * International Institute of Seismology and Earthquake Engineering
   Building Research Institute
   Ministry of Construction
   3 38 8 Hynokino cho
   Shinjuku-ku, Tokyo
   Japan

9. International Society on Disaster Medicine
   10-12 Chemin de Sutville
   1213 Petit-Lancy
   Geneva
   Switzerland

10. International Tsunami Information Center (ITIC)
    P.O. Box 200027
    Honolulu, Hawaii 96850
    USA

11. * Intersect
    Frederick C. Cuny
    P.O. Box 10902
    Dallas, Texas 75227
    USA

12. James Cook University of North Queensland
    Dr. John Oliver
    Centre for Disaster Studies
    PO James Cook University
    Queensland 4811
    Australia

13. * Joint Assistance Centre
    Adhyatma Sadhana
    Kendriya Mehandi
    New Delhi 110000
    India

14. League of Red Cross Societies
    17 Chemin des Crets, Petit-Saconnex
    1211 Geneva 19
    Switzerland

15. * Middle East Technical University
    Earthquake Engineering Research Institute
    Ankara
    Turkey

16. Munchener Raubversicherungs-Gesellschaft
    Konigstrasse 107
    D-8000 Munchen 40
    Federal Republic of Germany

17. * National Building Research Station
    Director: Small Buildings Under Earthquake Stress Programme
    Roorkee
    North India

18. National Climatic Center
    NOAA Tropical Cyclone File
    Federal Building
    Asheville, North Carolina 28801
    USA

19. National Geophysical and Solar-Terrestrial Data Center
    NOAA Earthquake Data File
    Environmental Data and Information Service
    Boulder Colorado 80303
    USA

20. * National Information Service for Earthquake Engineering
    EERI: 415 RPS
    47th Street and Hoffman Boulevard
    Richmond, California 94804
    USA

21. National Science Foundation
    Dr. Frederick Krimgold
    Earthquake Hazard Mitigation
    1800 G Street NW
    Washington DC 20550
    USA
22. *Office of the United Nations Disaster Relief Co-ordinator (UNDRO)
Palais des Nations
CH-1211 Geneva 10
Switzerland

23. Ohio State University
Professor Henry Quarantelli
Disaster Research Center
127-129 West Tenth Ave
Columbus, Ohio 43201
USA

24. *Oxford Polytechnic
Disasters and Settlements Unit (DSU)
Headington, Oxford OX3 0BP, UK

25. *UNNAYAN
Jai Sen
36/1A Gareha Road
Calcutta 700 019
India

Kenya Conference Centre
P.O. Box 30030
Nairobi
Kenya

27. United Nations Development Programme (UNDP)
One, UN Plaza
New York, NY 10017
USA

28. *United Nations High Commissioner for Refugees
Palais des Nations
CH-1211 Geneva 10
Switzerland

29. *United Nations Regional Housing Center
Nirman Bhavan, Maulana Azad Road
New Delhi 110011
India

30. University of Colorado
Natural Hazard Research Program
Institute of Behavioral Science No. 6
Boulder, Colorado 80309
USA

31. University of Michigan
Professor Glen V. Berg
Earthquake Codes Program
Department of Civil Engineering
Ann Arbor, Michigan
USA

32. University of Minnesota
Underground Space Center
11 Mines and Metallurgy Building
221 Church Street S.E.
Minneapolis, Minnesota 55455
USA

33. Universidad Nacional de San Juan
Instituto de Investigaciones Antisismicas
San Juan
Argentina

34. University of Toronto
Natural Hazard Research Program
Department of Geography
Toronto, Ontario
Canada

35. *US Department of Housing and Urban Development
Office of International Affairs
Washington, D.C. 20410
USA

36. *US Department of State
Agency for International Development
Office of Foreign Disaster Assistance
Washington, D.C. 20523
USA

37. Volunteers in Technical Assistance, Inc. (VITA)
3706 Rhode Island Avenue
Mt. Rainier, Maryland 20822
USA