Shelter after disaster

Guidelines for assistance

Note:

This electronic document has been produced only for this first edition of the tutored distance learning course “Shelter after disaster”. It is a freshen-up version of the book “Shelter after Disaster: Guidelines for assistance” published by UNDRO in 1982. The text and the tables have been kept as in the original book although they have been reformatted for easier reading. Most of the photos and their captions are the same as in the original book. When the original pictures were not available, they have been changed, together with their caption, for other pictures and text from Ian Davies or from other sources. IFRC, UNOCHA, and UNHABITAT are working on a second edition of the book “Shelter after Disaster: Guidelines for assistance” published by UNDRO in 1982. This second edition will be used in future editions of the tutored distance learning course “Shelter after disaster”.

Contents

Foreword to first edition

Since its creation in 1972, the Office of the United Nations Disaster Relief Coordinator (UNDRO) has striven 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 coordination, 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 workshops, 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 coordinator 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 analyzed. 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 there from 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 coordinate 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 ever 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 nongovernmental, 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 construction —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 Coordinator (UNDRO), under the responsibility of Mr. Ludovic van Essche, Senior Coordination 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 Krimgold, 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. Member of the Group were: Dr. Otto Koenigsberger (Chairman), Emeritus Professor of Development Planning, University College, London, United Kingdom; Mr. Jiirg 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 Germen, 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 Coordinator (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

1 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." [1]

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?

Though 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.

1 Norton, Reggie, "Disasters and Settlements," Disasters, vol. 4, No. 3, 1980, p. 339.

The Concepcion Earthquake, Chile, 1835
"... Much misery was alleviated by the good conduct and extreme hospitality of the inhabitants of Concepcion. Mutual assistance was everywhere rendered, and theft was almost unknown. The higher classes immediately set people to work, to build straw-covered huts and temporary houses of board living meanwhile in the open air under trees. Those who soonest obtained or contrived shelter, collected as many about them as they could assist, and in a very few days all had temporary shelter, under which they tried to laugh at their misfortunes and the shifts to which they were reduced..."

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 manmade disasters (for example, refugee 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.

-Capt. Robert Fitzroy, hydrographer accompanying Charles Darwin on the scientific voyage of *HMS Beagle* (1831-1836). Drawing by the expedition artist. Probably the first careful record of post-disaster shelter. [1]

1 Keynes, R. D., ed., The Beagle Record, selections from the original accounts of the voyage of HMS Beagle. Cambridge University Press. 1979, pp. 255-7.

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 constitute 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 heterogeneous 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.

Chart 1

Audience
Tertiary Level (National)
Policy-making administrators
Directors of government building research bodies
Directors of government housing, reconstruction and emergency planning agencies
Directors of international voluntary relief development agencies
Directors of housing finance institutions
Secondary Level (Regional/Provincial)
Project managers of shelter or housing programmes
Field staff of governments (donor and recipient), international organisations, voluntary organisations, 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 5.4—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.

The following time phases are used, although it is recognized that they will vary according the local 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.

2 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 in 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, frequently 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 modeled on the structure of this study.

Emergency shelter 3

3.1. The Needs and Resources of Survivors

Principle

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

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)

Response

In the disasters studied, the primary response to shelter needs has been provided by the survivors themselves. The secondary response has been that of local organizations, particularly those "in place" at the time of the disaster. The least effective response has inevitably come from expatriate organizations with no prior experience of the disaster-affected area. In no case have these organizations provided more than 20 per cent of the local shelter response. This percentage relates to both shelter units and materials provided in the emergency phase.[1]

The factors limiting the participation of external assisting groups include:

1 The ratio of locally provided shelter to external provision bears out be statistics issued by the Office of Foreign Disasters Assistance of the United States Government indicating that, in a 10 year period (1965-1975), for every dollar provided in disaster assistance from external sources, 42 dollars were provided within the countries affected. [Committee on International Disaster Assistance (C1DA) The United States Foreign Disaster Assistance Programme National Academy of Sciences, Washington D.C., USA, 1978.]

1. *Time.* External organizations cannot move fast enough to participate fully during the emergency period. It is not only extremely difficult to mobilize external resources quickly, but the enormous problems of shelter distribution in the stricken area limit the possibility of delivery within the emergency period.
2. *Scale of disaster.* The magnitude of many disasters, especially in relation to numbers affected and the cost of meeting their needs, clearly prohibits any major role for imported shelter. No expatriate agency has the resources to meet the massive needs which can be, and are, more often best met by local resources.
3. *Self-reliance.* The peoples of developing countries are more self-reliant in the basic skills of shelter construction than their counterparts in the industrialized countries. This is particularly true in rural areas where, in any case, families have always built their own houses. If the nature of the disaster allows them to stay in place, they can, in principle, rebuild their homes quickly, although they may require technical and material assistance.

Availability of Building Materials

In every type of disaster and post-disaster situation, a wide variety of building materials is available for emergency shelter and housing reconstruction programmes.[2]

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:

- Inventories of unused materials that existed before the disaster.
- Indigenous materials (both commercially and non- commercially available).
- 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:

2 Even in international refugee situations, where the refugees themselves may not have access to the normal housing materials supply market, the host government and supporting international and voluntary agencies will have access to local resources for emergency shelter and housing.

- That few assisting groups have prior housing or building experience and, therefore, are not familiar with the types of materials required or available.
- That indigenous and salvageable materials are often overlooked when the authorities or assisting groups reject pre-existing building standards.
- 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 preexisting 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. [3]

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 frequently 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).

Functions of Shelter

Emergency shelter serves several vital functions (not listed in order of priorities):

3 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 five had had prior housing experience in Guatemala; and of the remainder, only seven had staff with prior low-cost housing experience. Reconstruction of Housing in Guatemala: A Survey of Programs Proposed after the Earthquake of February 1976, Charlotte and Paul Thompson, UNDRO/Intertect, 1976.

Table 1

Shelter priorities of disaster survivors relative to roles of assisting groups										
Roles of assisting groups										
Preferences of disaster survivors in order of priority	International agencies	External donor governments	External voluntary agencies	Foreign experts	Local military	National government	Local administration	Local voluntary groups	Survivors	Examples of this preference
Remain as close as possible to damaged or ruined home									●	Guatemala 1976
Move into the home of family or friends									●	Skopje, Yugoslavia 1963 Managua, Nicaragua 1972
Improvise temporary shelters closed to ruined home									●	Guatemala 1976 Peking alert, China 1976
Occupy buildings temporarily requisitioned							●	●	●	Van, Turkey 1976
Occupy tents near ruined home					●		●	●	●	Gediz, Turkey 1970 Lice, Turkey 1975 Van, Turkey 1976
Occupy emergency shelters provided by external agencies	●	●	●			●	●			Chimbote, Peru 1970 Gediz, Turkey 1970 Managua, Nicaragua 1972 Lice, Turkey 1975
Occupy tented camp sites	●	●	●							Guatemala 1976
Compulsory evacuation to distant locations					●	●				Managua, Nicaragua 1972

- Protection against cold, heat, wind and rain.[4]
- 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.)
- Emotional security and the need for privacy.
- An address for the receipt of services (medical aid, food distribution, etc.)

4 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 Ressler, Everett. Issues Related to the Provision of Emergency Shelter in Winter Conditions (Report on visit to Caldivan Earthquake, Eastern Turkey). UNDRO/Intertect, 1977.

- Shelter within commuting distance of employment. Accommodation for families who have temporarily evacuated their homes for fear of subsequent damage.[5]

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

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.

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.

5 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 retreat. 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.

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.

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.

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.

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 stockist, 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

Improvised shelters in Guatemala, made from any waste materials: cardboard boxes, earthquake rubble, etc.

Here is an example of improvisation, in this case following the Van earthquake in Eastern Turkey in 1976.

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.
- 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).

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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 cooperation 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;
- Restore social services;
- Provide safe land for rebuilding;
- Assure a steady supply of building materials;
- Provide expertise to introduce safe construction and siting;
- Draw 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 salvageable 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 salvageable 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 salvageable 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 under-estimated. 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. 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 recognised that some clearance will be necessary to reestablish communications after a disaster. Employed as an automatically-implemented policy, however, 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;[1] 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

1 An exception to this broad conclusion occurred after the 1963 earthquake in Skopje, Yugoslavia, when military engineers from many countries provided valuable assistance in the erection of prefabricated housing. However, the context was not, strictly speaking, that of a developing country.

Families salvaging materials and beginning reconstruction five days after the earthquake.

population stricken by disaster. The period immediately after a disaster is a time when people need to get together and develop a collective responses. 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;

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.

- 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 recognise 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 fulfill 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 firmer 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 coordinating 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 results. 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 best be 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 avoid

1. The centralization at the national level of all authority and decision concerning shelter.
2. Permitting an anarchistic situation to develop, where various agencies perform their own tasks in an uncoordinated manner.
3. Allocating key roles to assisting groups who are unfamiliar with the local situation, or who lack any local counterpart group with whom they can effectively collaborate.
4. Any policy that encourages partiality of aid distribution. [2]

Policies to adopt

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 A traditional solution to the problem of proliferation of agencies has been the simple allocation of geographical areas whereby one agency will take responsibility for one community and so on. this policy has its attractions since it is relatively tidy and it recongnises pre-disaster patterns of working where certain agencies may have established close relationships with certain communities. however, it has many pitfalls, the most significant being partiality of aid distribution, since some agencies will have more resources than others. given the close contact between adjoining communities, such a policy can cause acute local dissention, and all local goodwill can be rapidly turned into hostility towards a particular agency. therefore, the role-allocating authority must be extremely sensitive to the question of the choice of different communities for aid projects. the overriding concern must be for fair distribution of resources.

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 5, section 5.3, on the accountability of donors to recipients of aid.

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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.

Table 2

Ideal roles for assisting groups relative to shelter provision											
Roles of assisting groups											
Activities	**International agencies**	**External donor governments**	**External voluntary agencies**	**Experts (multi-disciplinary group)**	**Private sector**	**Local professionals (architects, engineers, etc)**	**Local military**	**National government**	**Local administration**	**Local voluntary groups**	**Survivors**
Phase 1 – immediate relief period (impact to day 5)											
Search and rescue operations							●		●	●	●
Clearance of rubble (recycle materials)									●	●	●
Re-establish communications							●		●		
Coordinate external assistance	●							●	●		
Provide emergency shelter					●				●	●	●
Re-establish damaged infrastructure (water sewers etc)							●		●		
Assess unmet needs of survivors	●	●	●			●	●		●	●	●
Phase 2 – rehabilitation period (day 5 to 3 months)											
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	●					●	●		●	●	
Coordinate external assistance	●							●	●		
Re-establish local economy								●	●		●
Provide cash inputs to survivors		●	●					●	●	●	
Clearance of rubble (recycle materials)									●	●	●
Phase 3 – reconstruction period (3 months onward)											
Re-establish damaged infrastructure		●			●			●	●		
Formulate building codes for safe construction	●					●		●	●		
Provide expertise for safe housing construction	●	●	●			●					
Devise contingency plans for future disasters	●			●		●		●	●		
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 preexisting 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. The over-estimation of needs by local or national officials in order to receive maximum assistance.
   b. A higher priority being placed on damage surveys than surveys of basic human needs.
   c. A lack of active participation by the surviving community (or even the surviving local administration) in the assessment of needs.
   d. Confusion as to who has the responsibility for making the assessment.
   e. Problems of communicating the assessments of assisting groups.
   f. 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 recognise the value of assisting groups' advice on assessment, since many of these groups will probably have more experience of disaster impact than the government itself. Further, the government must be prepared to accept—where the assessment of needs and damage is a task beyond its resources—to enter into a close working relationship with all assisting groups, and, from the information so collected, to act as the clearing-house for information.

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.[1]
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.
3. 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 terms. There is an urgent need to transcend

1 Following the 1963 earthquake in Skopje, Yugoslavia, the authorities undertook detailed damage surveys in parallel with vulnerability analyses. Both activities continued whilst reconstruction began on less hazardous sites. In contrast, following the 1970 Peruvian earthquake, the micro zoning studies of Huaraz delayed the start of reconstruction for 3 to 4 years. This resulted in social disruption, declining value of cash allocations, and the dissipation of will to rebuild.

exclusive preoccupation with immediate relief needs, and to give more thought to reconstruction needs at the outset.

Guidelines for the Assessment of Needs and Damage

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:

   i. The rate at which the region is being urbanised, and under what conditions;

   ii. The economic profile of the area (incomes, level of employment, skills, the building industry, etc.);

   iii. 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 coordinated 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.

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 Of 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, after shocks, landslides etc.)

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

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.

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, and 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.[2]

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;

2 Following the Guatemalan earthquake of 1976, aerial photography was extensive, ranging from low-level high resolution material to photographs obtained from high altitude flights. The photographs provided basic information on damage to buildings, life-lines, and access ways.

- 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.

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.

c. 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 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.

Figure 1

Suggested information requirements for a needs assessment

Data of head of family at time of interview

Name_____Address_____

City or district_____State (province)_____

Marital status_____married or living together_____single

Age_____Occupation_____

Identification number_____Name of spouse/partner_____

Age_____Occupation_____

Number of minor children_____Sex_____ages_____

Housing data before the disaster

Tenancy of the house

1_____ owner occupied with title

2_____owner occupied without title

3_____rented

4_____occupied (squatter)

If the land is rented or occupied:

Name of owner_____Address_____

Available resources

1_____savings_____amount

2_____monthly savings_____amount

3_____building materials that can be salvaged_____

4_____time available for work___per week or other___

Conclusions

Total damaged

1_____completely destroyed

2_____seriously damaged

3_____light damage

4_____no apparent damage

Safety of house

1_____inhabitable

2_____unsafe but can be repaired

3_____unsafe and irreparable

4_____not sure of safety

Resolve housing on the same site

1_____rebuild or repair with owner's own resources

2_____rebuild or repair with loan

3_____rebuild or repair but does not have funds

Move to another site

1_____rent at another site

2_____build at another site

Immediate assistance needed

1_____materials for immediate shelter_____roofing_____

2_____site and materials

3_____help to clean the site

4_____temporary shelter (refugee centre)

5_____information on how to rebuild safely

6_____other_____

Long-term assistance

1_____building materials

2_____technical information

3_____loan

4_____other_____

Information for the family

Evaluation of safety of the house

1_____good

2_____needs repair

3_____unsafe without repair

4_____unsafe, must abandon the house

5_____not sure

6_____other

Your housing plans_____

(the same as 3.3 or 3.4)

Assistance requested_____

(the same 3.5 or 3.6)

For more information, go to_____

_____

Or call_____

Figure 2

Damage assessment survey form

Description

<Photo>

Size_____

Materials_____

Original cost_____

Replacement cost_____

Cost of repair_____

Percent of damage

0-25%_____

26-50%_____

Over 50%_____

Size

Urban_____Rural_____Open_____Protected_____

If protected, describe_____

Description of terrain_____

_____

Foundations

Anchoring foundation_____

Materials used_____

Evidence of failure_____

Preservatives_____

Walls

<Configuration>

Materials used_____

Height and width_____

Reinforcement system_____

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_____

_____

General information

Community_____

Location_____

Use_____

Age_____

Builder_____

Hazard type_____

Magnitude_____

Frequency/return period_____

Owner/occupant plans_____

Observations_____

_____

_____

Recommendations_____

_____

_____

Date_____

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.

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.

Summary of Policy Recommendations

1. Primary level (local)

a. *Pre-disaster*

   i. Carry out hazard mapping, and the mapping of elements at risk.

   ii. Prepare assessment and survey methodology accordingly.

   iii. Prepare logistics for duplicating, distributing, and collecting survey forms.

b. *Post-disaster*

   i. 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*

   i. As part of disaster preparedness, develop the database of existing housing conditions, housing demand, house types, labour and material resources, the normal building process and related social conditions against which a post-disaster needs assessment can be measured.

ii. Develop an assessment procedure that coordinates the efforts of all the assisting groups in collecting and sharing information.

iii. Support the establishment of a national team of experts, who will train local government officials and technicians in administrating pre- and post- disaster surveys (this team should also be 'on call' to assist in the execution of post-disaster surveys).

iv. Prepare post-disaster survey models, identifying all essential information, adapted to specific disaster-prone communities.

b. *Post-disaster*

i. Establish policy and programmes for the reconstruction of housing, in harmony with the prevailing development patterns.

Key references

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Table 3

The application of data obtained from damage surveys to various assisting groups			
Information mage surveysobtained from da			
	Damage to infrastructure such as roads/services	**Damage to local stocks of building materials**	**Number and location of houses damaged or destroyed, forms of damage, degrees of damage**
Method of assessing damage	Air surveys of roads, bridges, etc. Field sampling techniques for well contamination; village-by-village surveys of damage to water supply, sanitation	Air surveys when damage is to raw materials, such as trees, coupled with field surveys of warehouse stockpiles, etc	A mixture of low-level and high-level air surveys coupled with field survey sampling techniques
Survivors	Useful for avoiding blocked roads, contaminated water supplies, etc	Of possible use, but this data is probably already known to locals	Limited use
Local voluntary agencies and private sector	Necessary for private sector in deploying their resources	Essential in determining whether to order supplies from external sources. Also useful in determining stockpiles for future preparedness planning	Useful for determining: The supply of essential materials for construction The supply of tools
Local government	Essential in preventing secondary disasters such as epidemic diseases due to contamination, and in restoring services	Essential in determining whether to request supplies of materials from external sources	Essential to determine the need for: Supplying, in particular circumstances, emergency shelter (e.g. tents) Allocating funds to survivors Establishing what materials will be needed for reconstruction
National government	Essential in the event of major disasters, to determine the resources needed	Useful in determining what contributions are needed, particularly from adjoining countries	Needed to determine: Whether to provide temporary or emergency shelter Whether to provide building supplies (e.g. roofing materials) Whether expertise is needed to guide reconstruction
Local military	Essential	Useful since the army may use their own stockpiles of materials	Not needed
Foreign experts	Essential for all consultancy work	Essential for advice on the import of materials	Essential for any advice being offered on safe reconstruction
External voluntary agencies	Not relevant	Useful	Useful in determining which areas to deploy maximum resources
External donor governments	Relevant, if there is bilateral aid	Relevant, if there is bilateral aid	Relevant, if there is bilateral aid
International agencies	As above	As above	Relevant for the coordination of international assistance
NOTE: Table 3 provides synoptic guidance on the relevance of damage survey data to the various assisting groups concerned, including the survivors themselves.			

3.4 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 I —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 relieve 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).

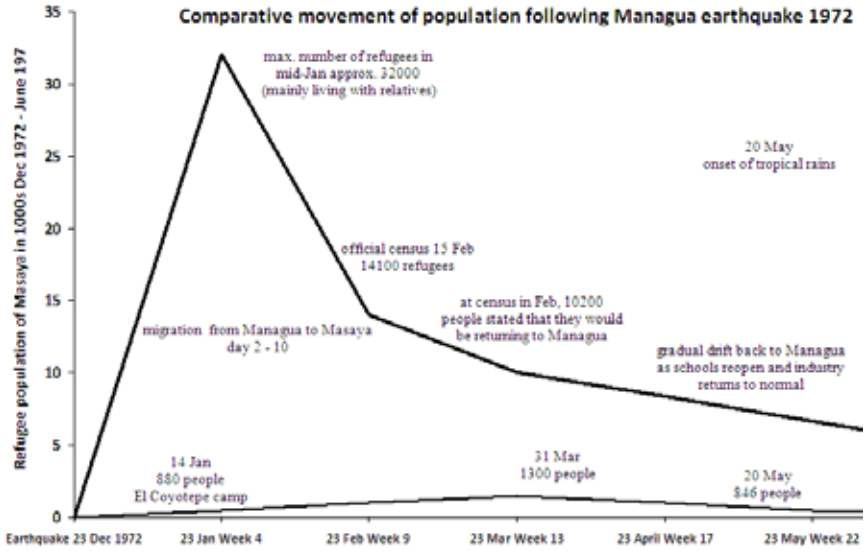
Problems of Compulsory Evacuation

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.

Photo showing the "buffer zone" that the government of Sri Lanka declared after the 2004 Indian Ocean tsunami. No buildings were to be built in this buffer zone. This policy was changed later and the buffer zone disappeared.

CHART 2



- 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
- Without any awareness of the potentially adverse social and economic costs of a major evacuation.

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.

Policy guidelines

(See chart 2)

Unless there are exceptional circumstances, compulsory evacuation should be avoided. However, the voluntary movement of families or pans 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

Drabek, T *"Social Processes in Disaster Family Evacuation", Social Patterns* 16, 1969, pp. 336-349.

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Perry, Ronald W., Marjorie R. Greene and Michael K. Lindell, *"Enhancing Evacuation Warning Compliance: Suggestions for Emergency Planning", Disasters* vol. 14, No. 4, 1980, pp. 433-449.

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]

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:
   a. That there automatically exists a need for outside agencies to provide large numbers of imported, prefabricated shelters;
   b. That universal, prefabricated (and preconceived) shelter systems are desirable and feasible;
   c. That "Shelter" implies an industrial product rather than a social and economic process;
   d. That survivors do not possess building skills, or resourcefulness in salvaging materials or obtaining traditional materials to carry out their own building;
   e. That survivors are passive, dazed and willing to accept any form of emergency shelter;
   f. That imported emergency shelter can be provided rapidly and cheaply;

1 Reference here is made principally to prefabricated products, manufactured in industrialized counties, rather than to that ubiquitous relief item—the tent—which is in a privileged category of its own.

g. That temporary housing is not a cost factor in the total[2]

h. reconstruction programme, and will be demolished after a limited period;

i. 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.[3] 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.
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

Within 24 hours of the 2007 Bangladesh cyclone Sidr, people started improvising emergency shelters with salvaged materials, leaves and branches.

2 The issue of "low-cost" is relative, being a function of the general economic level of the recipient country. To the cost of manufacture of the shelter itself, must be added the cost of transport, distribution and assembly.
3 The evidence contained in the case study summary sheets in appendix A consistently bear out this contention.

Table 4

The timing of assistance: a summary of the most effective phases for assistance by various groups			
	Phase 1: immediate relief impact to day 5	Phase 2: rehabilitation day 5 to 3 months	Phase 3: reconstruction 3 months onwards
Survivors	●	●	●
Local voluntary agencies	●	●	●
Local government	●	●	●
National government	●	●	●
Local military	●	●	●
Foreign experts		●	●
External voluntary agencies		●	●
External donor governments		●	●
International agencies	●	●	●

changing. They have also been apt to overestimate emergency shelter needs for the following reasons:

a. The simple correlation between a damaged or destroyed house and the need for an emergency shelter;

b. The over-estimation of needs by government officials in anticipation of deductions from their assessments, or in order to replenish depleted stocks;

c. An apparent lack of awareness of the ability of survivors to deal with their own shelter needs;

d. A lack of understanding of the priority scale with which survivors assess their own shelter needs;

e. The desire to give "visible" aid;

f. The assumption that shelter needs in developing countries are similar (or even identical) to those in industrialised societies.

4. *Standardization.* Relief agencies normally standardize the size or form 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:

a. The high price and poor cost effectiveness of the product in the disaster affected country;

b. Its potentially harmful social consequences;

c. The need to involve disaster survivors in satisfying their own shelter needs;

d. Climatic variations;

e. Variations in cultural values and house forms;

f. Variations in family size;

g. The need of families to earn their livelihood in their houses;

h. Local capacity to improvise shelter;

i. The problems of obtaining suitable land at low-cost on which to build such shelters;

j. The logistical problem of transporting and distributing such shelters in time for the emergency period;

k. 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.[4]

4 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.

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 sites 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 climatic exposure does not systematically post a threat to survival.[5] 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.

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

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

In the light of the obstacles posed to "emergency" shelter, this section examines alternative shelter strategies, and proposes corresponding policy guidelines.

There are eight basic types of post-disaster shelter provision:

1. Tents;
2. Imported designs and units;
3. Standard designs incorporating indigenous materials;
4. Temporary housing;
5. The distribution of materials;
6. Core housing;
7. Hazard-resistant housing;
8. Accelerating reconstruction of permanent housing.

1. 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:

a. They are relatively lightweight, compact, and easy to transport;

b. They can be erected rapidly and easily;

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

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

e. They are normally stockpiled by the army and can be Quickly released for disaster survivors;

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

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

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

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

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

k. 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;

l. 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;

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

n. A further difficulty has arisen in numerous disasters: tents have been erected on emergency campsites, but have been underoccupied. 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.

2. 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

Where there is a severe exposure risk there is obviously a need for emergency shelter with a strictly life-saving function. But it should never be assumed that an able-bodied person will willingly die of exposure without taking personal action such a lighting a fire from debris. Here, in the mid-winter earthquake at Van, Turkey, in 1976, survivors have dug a hole in the ground and covered it with an improvised structure of plastic sheeting, thus obtaining warmth from the ground surface.

Gediz (Turkey), Chimbote(Peru), and Managua (Nicaragua), and the OXFAM 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 imported 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.

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

It is important to recognise that any form of emergency shelter has to start where people actually are. This family in Van have taken the tent which has been provided by the Turkish Red Crescent and erected it within the ruins of their house. To them this is vital: they want to protect their land, they want to look after their animals and belongings. Naturally, they want to stay 'at home,' even if it is a ruin.

As the preceding illustrations suggest, it is important to understand survivors' priority concerns for shelter if assistance is to be effective. Tents may be useful, but it should be stressed that the emergency campsite run on military lines is never an attractive option, which is apparent from the evidence of the underuse of campsites from various disasters.

Following the 1970 Gediz earthquake in Turkey, the West German Red Cross in collaboration with the Bayer Chemical Company used their polyurethane disaster shelter igloos for the first time. (They were used on three other occasions: Chimbote, Perú 1970, Nicaragua 1972 and the 1975 Lice earthquake in Turkey.) They were finally abandoned as a system following the experiences in Lice (1975).

Adjacent to the El Coyotepe camp-site 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 has been built, families had already made 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 the proved very easy for such additions to be made.

This is a typical scene in most of the Italian towns that suffered in the earthquake. Caravans came from all over Italy and Europe to serve as emergency accommodation. Most were on lon- term loan pending the building of temporary housing.

In the early 1970s two agencies developed these disaster from polyurethane foam. However, after their initial use in four contexts both systems were abandoned. A great deal of money, time and energy was spent in the pursuit of a 'universal' disaster shelter, but gradually their sponsors recognised that the effort was doomed to failure given local cultural and climatic variations, which resulted in diverse forms of shelter.

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.

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).[1]

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

1 In Nicaragua the Bayer/Red Cross polyurethane igloos were not in use until 138 days after the earthquake of 1972.shelter units from the outside often forces relief officials to adopt hastily conceived plans for distribution and erection.

camps following natural disasters has a negative impact, creating long-term problems. Indeed, the introduction of emergency

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.

h. 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 designs making better structural use of these materials.[2] 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:

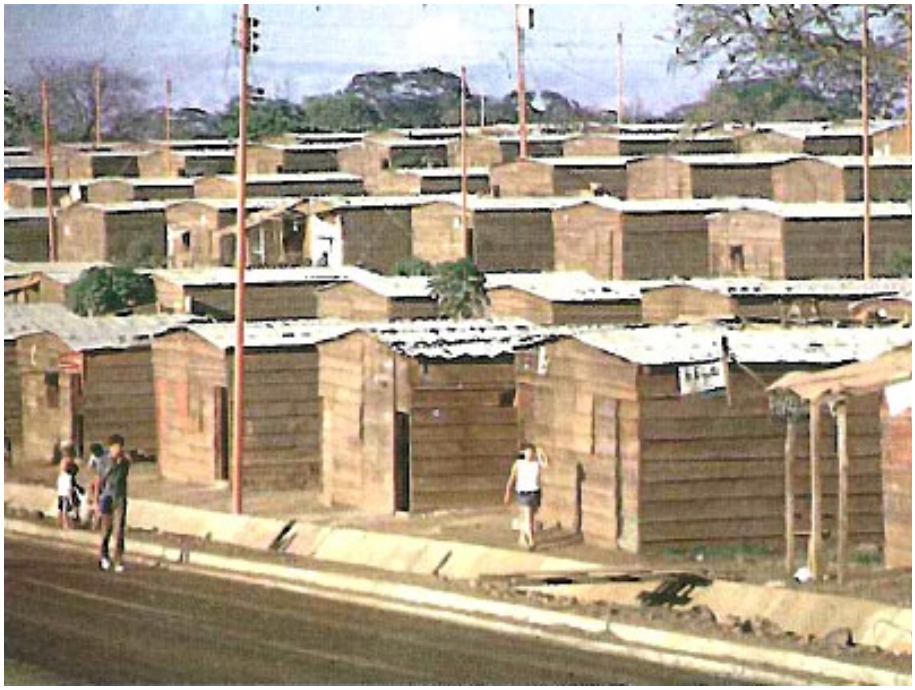
a. Structural improvements often increase the quantity of materials required, thus making the unit more costly (even though it may be less costly than one made of industrialized materials).

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 utilise bamboo, it must not only know how best to use the bamboo structurally, but 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.

This row of "transitional shelters" in Bristol, built after the Second World War, is still occupied in 2010.



The US government donated money to build a total of 11635 wooden huts as temporary houses for earthquake victims. The first units were completed 14 weeks after the earthquake. They were ineffective: remotely sited and paid insufficient attention to infrastructure, such as water supply, sanitation and road access.

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 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.

The following conclusions can be drawn from experience with imported temporary housing:

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.

This picture illustrates three types of disaster assistance following the Lice earthquake in Turkey, 1975. On the right, a pre-fabricated house as provided by the Turkish government; on the left an emergency shelter made of polyurethane provided by OXFAM; and in the centre, an improvised addition to the house made by occupants. Many families objected to the form and siting of the housing. These objections related to their lack of participation in what was provided, and the cultural and climatic unsuitability of the housing. OXFAM used their polyurethane house for the first and only time. Four hundred and sixty-three units were produced.

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 fulfils 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.

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 these 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. If the material is not local, the demand it creates may not be met in the long term for maintenance and repair;

b. The introduction of such materials may necessitate the modification of basic designs, creating unforeseen problems;

c. Perhaps most importantly, this approach requires the introduction of effective price controls.

d. There are various measures which can be employed by national governments and assisting groups to assure a steady supply of materials at fair prices after a disaster.

These include:

a. *Stockpiling*. This topic is discussed in section 3.7. It is a mechanism with many limitations, but a stockpile programme may be necessary to guarantee a material's supply, and mitigate the effects of commercial speculation.

b. *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.

c. *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

d. *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.

After the India cyclone 1977, the government made stocks of thatch and bamboo available so that families could improvise shelters. Non-governmental organisations also built many thousands of these shelters.

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:

a. Providing such advice in time;

b. Finding an appropriate format for the advice, given that many builders may be illiterate and unable to read working drawings;

c. Providing technical advice relevant to the skills of local builders on structural improvements, using the available building materials;

d. 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

In the Van earthquake, Turkey 1976, there was evidence of families beginning to rebuild their own homes at once, and in many cases the improvised shelters form the core of a new house. Here, the provision of tools and building materials (or the money to buy them), together with training for safe rebuilding, is clearly the most effective form of relief.

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:

a. It enables limited resources to be concentrated where they will have a permanent effect, and thereby be cost effective;

b. It reduces the time during which people are without permanent accommodation;

c. The use of self-help methods keeps housing at a price the local people can afford, and allows decision-making to be kept at a "grass-roots" level;

d. 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.

Another response of many families displaced by sudden disasters is to move in with relatives or friends living in unaffected areas. In some cases officials may improvise this form of assistance by requisitioning schools or churches, etc. however, with the likelihood of overcrowding, and the need for public buildings to return to their normal use, such measures are strictly short term.

Subject to safety checks, undamaged public buildings may provide temporary accomodation such as this convent in bolivia used to house flood victims. These buildings should be identified in advance of a disaster. They may play a significant role, but this will always be limited to the need to return them to their original function as soos as possible.

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, and 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 undamaged houses, in case of aftershocks and subsequent damage.
5. Considering shelter as a product rather than as a process.

6. Erecting large, camp-like concentrations of tents Or temporary housing.
7. Building temporary housing as a form of emergency shelter.[3] Since temporary housing is rarely, if ever, replaced by permanent housing, assisting groups should, whenever possible, by-pass 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.[4]
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.

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3 There may be certain exceptions to this, principle where rapid reconstruction cannot occur i.e. in extreme winter conditions, or in the industrialised countries. The evidence from Skopje (Yugoslavia) 1963, Friuli (Italy) 1976, and El Asnam (Algeria) 1979, indicates that there was a massive demand from both the public and the authorities for temporary housing. Reasons for this included: high expectations of governmental aid; climatic risk; an active private building sector; expectations of very slow reconstruction.

4 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.

Contigency Planning 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 low 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:

- There is a well-founded reluctance to immobilize capital expenditure on stockpiles against an eventuality that may never occur;
- 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.

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:
    a. To build cyclone shelters for the local population (and possibly for their livestock);
    b. To devise comprehensive contingency plans for the evacuation of the e affected population (these plans will need to include the building of all-weather roads)
    c. 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, crèches 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 swollen 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).

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4 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]

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

1 Definitions of these terms are contained in Appendix C.

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 coordination 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.

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

The vulnerability siting of settlements is apparent in this example of flood devastation following Pakistan floods and cyclones 2007.

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 Byelaws

Byelaws 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 byelaws 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;
- 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

In many earthquakes, including the one in Peru in 2008, 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.

This masonry house in Lice, Turkey, was badly damaged in the earthquake of 1975. Inadequate bracking of stones, and the use of mud mortar were two reasons for the failure. Techniques can be communicated to local craftsmen on a seismic building techniques.

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 on-going programmes in the country, and can reallocate the existing staffs 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

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.

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

Housing with heavy roofs supported on unreinforced 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 in Pakistan in 2005.

In areas subject to high winds, the roof is the most vulnerable part of the structure, as is indicated in this example after Hurricane Ivan in Grenada, 2004. Improved building techniques can greatly reduce this risk.

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 coordinated 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.

The transfer of technical information

Currently, there is adequate technical information available for qualified architects and engineers to make decisions on design, the selection of materials, etc. However, this information is too technical for most relief or rehabilitation programme administrators. Therefore, simple technical information must be provided, in a form comprehensible to administrators, on:

- Advice on the most appropriate type of shelter programme to select for the local situation;
- How to use various types of indigenous materials;
- Simple structural methods.

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.[2]

Thus, the information must be on hand, in usable form, as soon as the disaster has happened.

The Developmental Context

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,

2 Post-Disaster Technical Information Flow for the Reconstruction of Housing, Everett Ressler, Intertect, Dallas, Texas, 1976.

and prevailing land-use patterns: there is often the need for better quality, safer land equitably 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 benefit 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 agencies overlook this opportunity.

Policy guidelines

Policies to avoid

1. *Restoration of pre-disaster conditions*. Merely to restore "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 normally aware of the risks they face, but their economic survival may be directly dependent on their particular location. In such circumstances, to propose relocation 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 frequently asked to address chronic problems as part of the reconstruction process. Thus, pre-disaster housing deficits are added to disaster losses and reconstruction 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 buildings or infrastructure*. There is an urgent need following a disaster to strengthen all the components of reconstruction: institutions (administration and management), training, employment, community development, financing, the building materials industry, 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 infrastructure, building forms, building techniques and land- use patterns. The foundations of risk reduction are hazard mapping, vulnerability and risk analyses.

2. *Varied 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 technical, social and economic measures.
3. *Establish priorities for building improvements*. It is axiomatic that all buildings must be made safe. However, pragmatism dictates that such a formidable task needs to be tackled according to a scale of priorities:
    a. Buildings for social groups such as children, the disabled and the elderly: schools, crèches, 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 stations, stockpiles of emergency goods, cyclone shelters, power stations;
    e. Buildings that are known to be in a dangerous condition.
    f. It is proposed that priority lists of this nature should be drawn up in localities at risk. On the basis of the list, a system of regular structural checking and maintenance should be instituted as a standard preparedness 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. However, in some situations—most notably houses in arid, seismic zones where there is an absence of timber and other spanning 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 required into vulnerable types of indigenous construction. Safe alternatives need to be developed which satisfy the demands of culture, local economics, climate, available materials, skills and risks. In any given area, research priorities need to be formulated and communicated to appropriate national or international bodies providing assistance for upgrading projects.
5. *Training for management of relief and reconstruction*. There are gaps in training at all levels of relief and reconstruction management. Lack of formal expertise is evident in both administration and technical understanding. it must be emphasized that the provision of shelter and post-disaster housing is as specialized an activity as, for example, the organization 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 basically inferior building construction. But normally, a combination of both factors provides the fundamental cause of failure. It is apparent that local builders or craftsmen often require basic education in the rudimentary principles of building construction and safe building techniques. Training programmes should be devised and implemented by the secondary

Table 5

Constituents of a risk-reduction policy				
	Low-income housing and settlement	Middle/high-income (conventional) housing	Commerce industry	Public services, utilities, community facilities
Hazard mapping, vulnerability analyses, risk	●	●	●	●
Structural modification	●			
Land-use adjustments	●			
Building regulations and enforcement		●	●	●
Compulsory reinforcement of buildings		●	●	●
Land-use regulations and enforcement		●	●	●
Training of small builders	●			
Official control and supervision of work done by major building and public works contractors		●	●	●
Community preparedness, warning	●	●	●	●

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.[3]

7. *Mitigation policies as an element of upgrading programmes*. Within large towns or cities, local authorities have frequently undertaken upgrad-

3 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 safe construction, see McKay, Mary, 1981 (Key references to this section).

ing 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.[4]

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4 See appendix C.

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 (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)

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, and electricity 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 installments 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 guidelines

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 atrisk, 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 Of 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)
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- 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 km^2 (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 km^2,

although the average densities for such cities may be less than 10,000 persons per km^2.[1] Densities such as these are all the more critical in hazardous areas.

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 on 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 of February 1976 serves to illustrate how global and unselective disasters can be,[2] affecting rural and urban populations with equal intensity. More than 3.4 million people out of a total of 5 million (64 per cent) were affected by the earthquake. More than 1 million persons 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 were largely rural populations living in small towns or villages, scattered throughout the earthquake zone. The single largest damage impact was on housing. The 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 with scarce land resources, such as the Netherlands, Denmark and Great Britain. It is a physical planning tool which 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

1 World Housing Survey, 1974, (ST/ESA/30), United Nations, New York, 1976. Sales No. E.75.IY.8).
2 Damage Caused by the Earthquake in Guatemala and its Repercussions on the Country's Economic and Social Development (CEPAL/MEX/76/Guat.1), February 1976.

(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:

- Land-use policies and plans setting out the social, economic and environmental goals of comprehensive land development, and their stages of development;
- Land ownership and land tenure patterns, identifying the legal, social and economic basis of ownership and tenure;
- Land values and prices, reflecting the forces of supply and demand for land with respect to free market economies;
- Land-use controls which may be subdivided into three broad categories: legal, fiscal and directive (by direct government intervention).

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 to who owns the structure, the landlord or pant. [3]
3. *Reconstruction on unsafe sites*. To head off demands for land reform some governments will turn tracts of land over for low income hous-

3 In a number of recent post-disaster operations in Latin America, where in many counties the law holds that the property owner has title to any structures on his land, low-income families have been hit hard by having to pay off the cost of their shelter, while still paying rent on both the land and, eventually, the structure.

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 "Barracks" (ravines 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.

ing reconstruction. Usually, however, this land is of little economic value, and is likely to continue exposing its occupant to risk.[4]

4. *State ownership*. In general, countries enjoying state ownership of land have been more successful with resettlement than those in which private land ownership prevails, even though the latter frequently possess emergency powers of compulsory land purchase, such powers, however, being rarely used. One example of the use of emergency powers occurred after the 1963 earthquake in Skopje, Yugoslavia. Safe land on the outskirts of the city was scheduled by the government for housing. The ability to requisition land was the reason why 14,000 housing units were erected within eight months of the earthquake.

Policy guidelines

1. The land issue must be recognised as 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 recognise that poor families have to live close to

4 In one country, land designated for resettlement of refugees was subject to intense flooding. In another, a site chosen lay directly downstream from an impending mud slide In yet another, some resettlement land was on an unstable plateau at the edge of a steep ravine. While the demand for land was met, the people were no better off than they had been before in other equally vulnerable areas.

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 pro-. vision will require land reforms.

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4.4 Housing Finance

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.[1]

1 Such was the case of shelters built by the government after the 1970 earthquake in Peru.

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 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 meagre 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 subsidized 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 unduly 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.[2]
- Conservative financing institutions tend to make loans exclusively to middle class, relatively high- income groups, i.e. to people who are a 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 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 economies 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

2 In Guatemala, the staff of the OXFAM/World Neighbours housing programme estimated that the loans would cost about 30 per cent to administrate in the first year alone. In the end, the costs of administration would have to be added to the original cost of the programme.

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.

e) Material price subsidy and money reflow. This financing system is actually a hybrid of material supply 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 reflow 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.[3]

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 vari-

3 After the 1976 earthquake in Guatemala, USAID implemented a programme utilizing this approach. Corrugated galvanised iron roofing sheets were bought in large quantities and shipped to Guatemala. USAID made agency agreements with local co-operatives for the distribution of the material which was then sold directly to survivors at approximately half the cost, with a limit of 20 sheets per family. The community was asked to identify community projects that needed attention. The money received from the material sales was used to finance these projects, the survivors who formed the labour being paid a daily wage. This, of course, increased the purchasing power of the survivors and accelerated their economic recovery.

ety can itself lead to problems, irrespective of the merits or otherwise of the individual systems being used.[4]

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 should be as similar to traditional debt repayment 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 cooperate 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 effectively 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;

4 These problems are clearly illustrated by the experience at Cholma, Honduras, after Hurricane Fifi in 1974. They were exacerbated by the fact that there was also a great range in the quality and user desirability of the housing projects. The cost of the agency built housing ranged from USA$400 to $2,150. Some families received highly desirable concrete block houses which cost $1,000, and did not have to pay anything. Others received less desirable $6CX:1 wooden houses and had to pay a portion of the cost, whilst others received $450 wooden houses, and were required to repay the entire cost. Such inconsistencies led to frustration, confusion and anger on the part of the beneficiaries. For many, there was the uncertainty and insecurity created by an unknown status of payment, many months or even years after occupancy. These feelings sometimes leave a bitterness which upsets social patterns in a community for years to come.

more people benefit from the resource made available; and the ends of development are served.

5 Conclusions

5.1. General Conclusions

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 posed are 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 housing, but the entire housing policy of a country. In the final analysis social, economic, and cultural obstacles are far more difficult to overcome than purely technical, material problems.

Lastly, the study recognizes that guidelines on emergency shelter and post-disaster housing for individual communities must be drawn up at the local level itself The design of local guidelines cannot, therefore, be incorporated in a global study of this nature_ Nevertheless, in concluding the study some guidance is given on how to design a local plan.

5.2 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 countries—particularly in urban areas—for so-called "modem" housing. This may be due to the view that traditional houses symbolize 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 follow 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 the 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 to-wards "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 appropriable 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 recognise 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 modem 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.

5.3 Accountability of Assisting Groups to Recipients of Aid

Accountability: A Key Issue of Shelter After Disaster

Since the most effective relief and reconstruction projects result from the participation of survivors in determining their own needs, and in the decision-making process for the rebuilding of their own settlements, the successful performance of assisting groups is dependent on their *accountability* to the recipients of aid. Evidence from the 1976 earthquake in Guatemala has revealed a number of emergency shelter and housing programmes where voluntary agencies have attempted, probably for the first time, to establish and maintain accountable relationships, and where mutual responsibilities of assisting groups and surviving communities were defined and accepted by both parties. This radically improved the acceptance of their proposals by the local community and assisted rapid recovery.

The development of accountability to survivors will foster working relationships likely to result in more appropriate shelter and housing provision, and in avoiding the waste of local resources and misallocation of funds. However, since the concept of accountability is still largely untried in the post-disaster context, to judge its usefulness on the evidence of past disasters is still difficult. But, if the findings on accountability in the low-cost housing sector of western, industrialized societies are accepted, there is considerable positive evidence of its value.[1]

Table 6 offers an analysis of the functional and attitudinal relationships between various types of assisting groups and survivors.

Corrective Mechanisms to Establish Accountable Relationships

In most disaster situations, there tends to be a gulf between assisting groups and the survivors. The gulf may be political, social, cultural, economic, linguistic, or a combination of these and other factors. It inhibits the accountability relationship between assisting groups and survivors. In practice many relief agencies are accountable to:

- Their donors and their constituency at home;
- Their own government;
- The news media.

Ostensibly, foreign assisting groups are also accountable to the government of the disaster-affected region, but in practice few real controls exist Ultimately, accountability must be to the survivors and must include the concept of *mutual accountability*. Hardly anyone questions humanitarian aid following a disaster,

1 Turner, J. E C., and R. Fischer, Freedom to Build, Macmillan, New York, 1972; J. F. C. Turner, Housing by People, Marion Boyars, London 1976.

but few assisting groups involved in relief feel pressure to assume long-term responsibility for their actions. Unfortunately, relief agencies are only present for a relatively short period, and usually leave before the full impact of their actions on development is felt (or before they have had time to analyze the results). Finally, there is no process for the redress of grievances by survivors.

There are a number of corrective mechanisms which can help assisting groups to become accountable to survivors. Among these are:

- New models of administration and programme organization, placing planning and decision-making at the field level;
- Participatory management, i.e. meaningful participation by the survivors in the administration and control of relief and reconstruction programmes;
- The formulation and application of preparedness policies by the disaster-prone countries;
- Informing and educating the public on their rights and responsibilities following disaster;
- Adapting standard relief procedures to the local situation;
- Working through existing local organizations, rather than setting up a separate circuit of relief groups.

Difficulties in Establishing "Accountability Relationships"

It is recognized that there are major difficulties in establishing accountable relationships. There is the risk, for instance, of assisting groups from outside short-circuiting the local administration by attempting to achieve direct contact with survivors. A further subtle problem of accountability arises when the survivors may want one form of assistance, while the local authority advocate another.

Accountability and the Equitable Distribution of Assistance

The concept of accountability is closely related to the equitable distribution of assistance. Evidence from case studies of earthquakes in the Middle East, Europe and Latin America indicates that the recovery of a community can be retarded by the uneven distribution of assistance. In these studies, a very wide variety of housing types, building components and materials were distributed. Survivors saw some as of superior quality and considered others as inferior. In addition, assisting groups often adopted differing policies for the distribution of goods, some selling while others were making outright gifts. Further, survivors observed some communities receive a considerable volume of aid while others (perhaps adjacent) were receiving little or no assistance.

The evidence has shown that such disparities in distribution have caused internal dissention, and can have long-term detrimental effects. Nevertheless, in fairness, it has to be recognized that any relief or rehabilitation programme must, at some stage, be selective, possibly resulting in some unevenness of

Table 6

The present accountability of assisting groups			
		Accountability in practice	
Assisting groups	**Reason for their presence**	**Officially**	**To the victim?**
Local voluntary agencies	To help disaster survivors	To the director of their charity	Normally accountable to survivors
Local administration	To help disaster survivors	To the local affected community	Normally accountable to survivors
National government	To help disaster survivors	To the local affected community	When it works with local grassroots organisations, otherwise no direct accountability
Local military	To help restore normality	To their superiors; to their national government	No direct accountability
Foreign experts	To use their expertise in conjunction with one of the above organisations	Possibly to their superiors in home university or agency; to those who have sponsored their work	No direct accountability
External voluntary agencies	To aid disaster victims	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
External donor governments	To assist less fortunate nations, often formalised in official treaties	To their home government; to the local government	No direct accountability
International agencies (United Nations system)	Responsibility to member nations, embodied in their terms of reference/mandates	To agency heads, recipient government, and to the Secretary General of the United Nations	No direct accountability

assistance. This only serves to highlight the need for the adoption of the corrective mechanisms listed above.

Accountability and Emergency Shelter Provision

The delivery of an artifact, such as a shelter, from one culture to another may unintentionally represent an imposition of the donor's cultural values. The priority attached to shelter and housing by donors may in itself reflect alien cultural values (this form of property being a key indicator of wealth in industrial urban-based cultures), whereas in the third world, land ownership, crops or livestock may be of far greater significance.

The decisions which are incorporated in the design of a shelter also represent an accumulation of the cultural values and priorities of the donor and his society. Assumptions are made about the relative importance of such elements as family life, storage of belongings, the functional layout of rooms, sanitary habits, etc. These functions are expressed as a physical statement of cultural priorities, which the foreign designer often assumes are similar to his. Although the finished artifact may represent a rational ordering of priorities in terms of designer/donor values, it may represent an unacceptable ranking of priorities to the recipient.[2]

2 For instance, the reaction of Moslem communities in the Middle East to well-insulated but undivided 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 assisting groups as irrational. Such judgments are examples of clashing cultural values.

Thus, one of the most important consequences of an accountable relationship between assisting groups and the surviving community will be to minimize the adverse socio-cultural impacts of shelter assistance. It is apparent that where the local community are regarded as the "client", with their evaluation of shelter needs being sought and followed, shelter programmes will enjoy wide acceptance and high rates of occupancy.

Accountability and the Monitoring of Emergency Shelter and Housing Programmes

One of the most important constraints on the development of "accountable relationships" is the lack of information which, in the last resort, can serve as evidence of liability. After disasters, assisting groups usually prepare detailed reports listing the assistance which they have provided during their involvement in relief and/or reconstruction. However, the record of these groups in analysing their own programmes is limited.

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 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 stag 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 field level. The majority of reports written about relief operations describe actions and decisions made at the two top levels of the disaster system (at the headquarters and field director levels). There is almost no information on decision-making, actions, operations, or problems encountered by those people who actually carry out the relief programme at the local level.

There is also a pressing demand for information on the impact of programmes, both in the short-term and the long-term. Data should be in process of assembly soon after a programme becomes operational, outlining its objectives, the philosophies behind it, a brief history of the personnel involved, and their backgrounds. At the midpoint of the programme, an analysis should be undertaken to determine performance as against the original objectives, so that changes can be made, if necessary. At the end of the programme, a history should be written and an analysis made of the immediate impact. Several years later, the agency should return to the same area and study the long-term impact of their actions.

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

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.

Donors	Recipients
Responsibilities	
To accept accountability to recipients of aid as a basic working principle, affecting not only field policy but the financial, legal and administrative policies of donor organisations.	To be prepared to participate through elected representatives in all aspects of disaster recovery, involving the assessment of needs, the collection, allocation and distribution of assistance and the monitoring and evaluation of assistance programmes.
Implications	
A sharing of power and authority. Forms of management which will be more responsive to the free flow of information. A longer term commitment beyond the relief phase.	Willingness to accept the demands of the above processes, ultimately involving liability.

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.

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.

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.

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.

The unique aspect of this "Housing Education Programme" was not to build large numbers of houses, but to build a -model" house (shown safe here)in order to explain the techniques of applying aseismic 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 client, 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 houses.

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.

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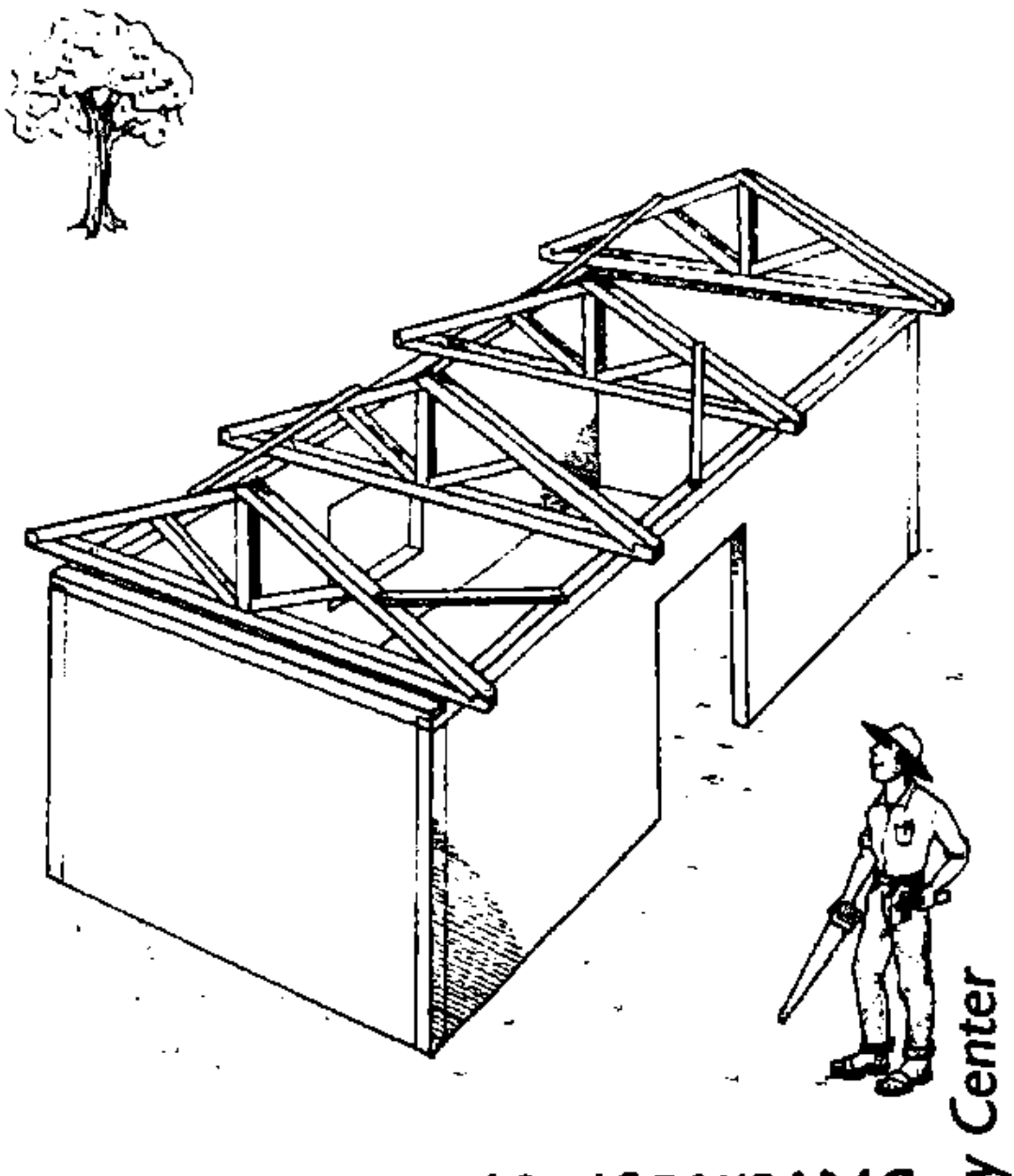
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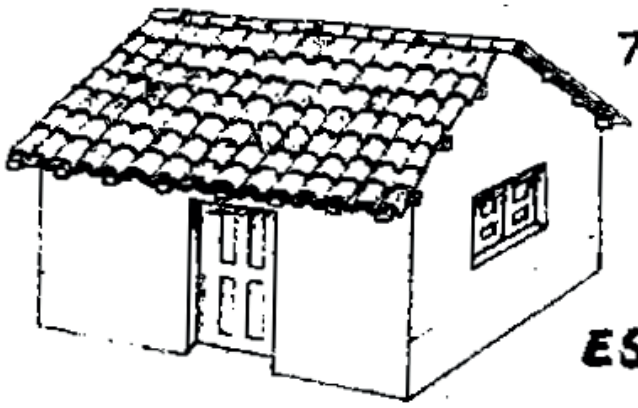

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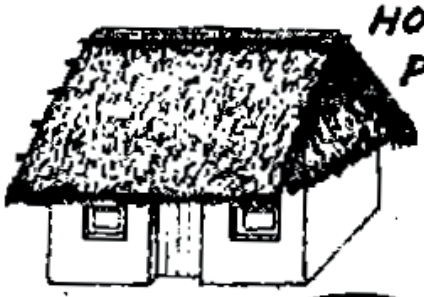

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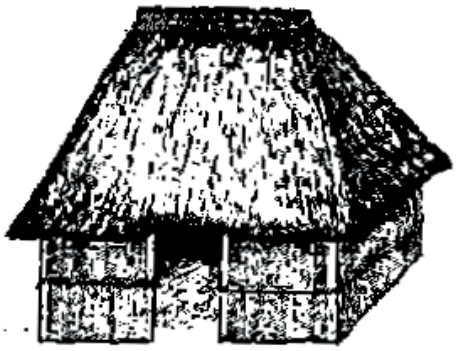

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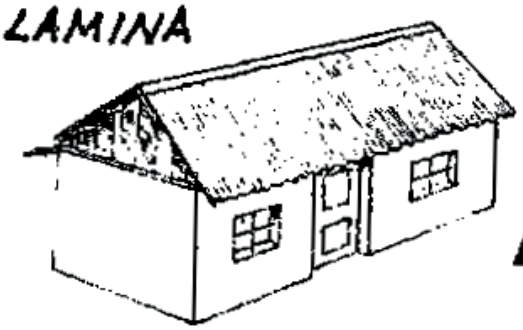

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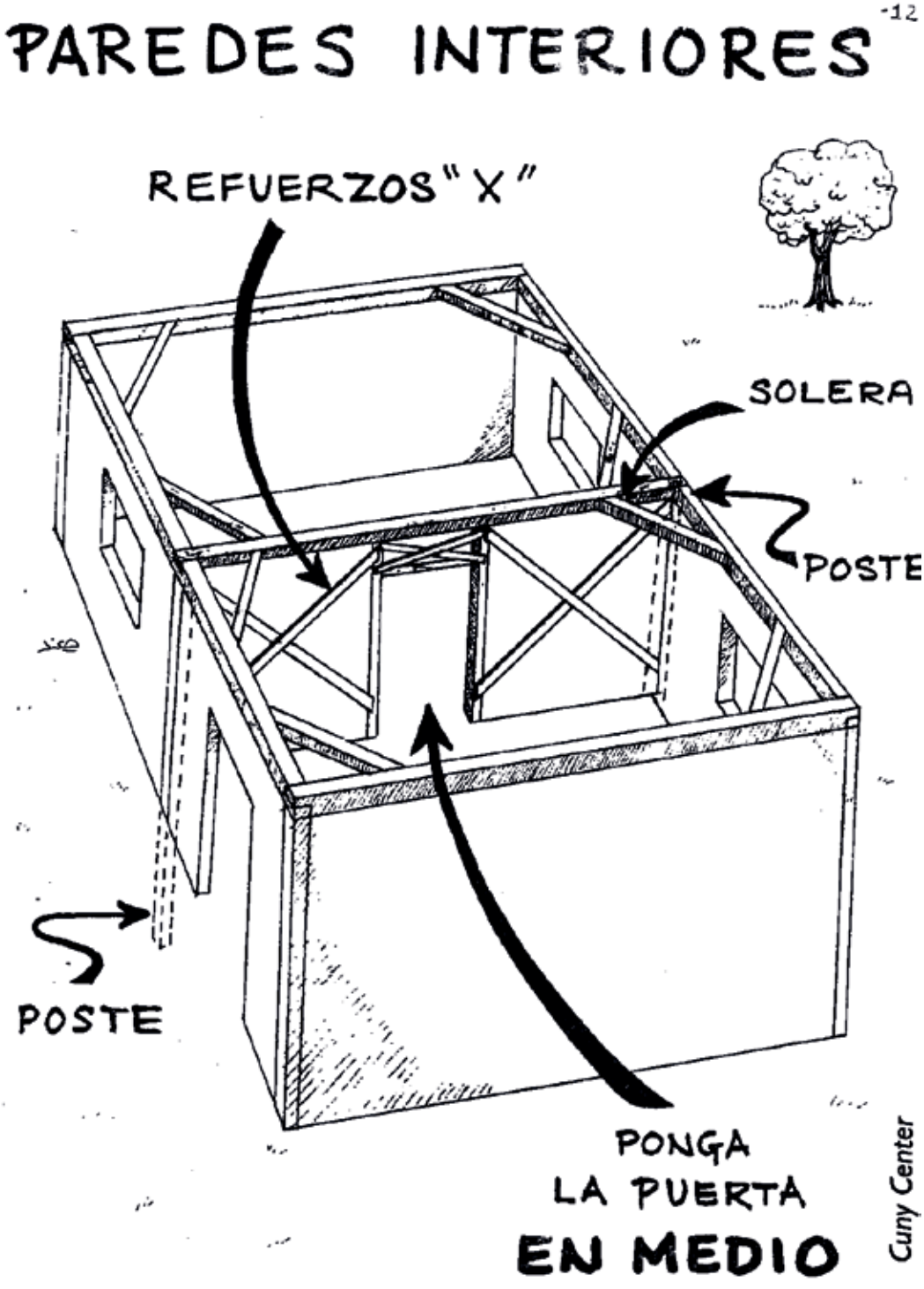

Comic strip booklets were produced to offer guidance on layout of buildings and construction.

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 *"Lamina"*. 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 Coordinator (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 modeled 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.
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[1]

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;

1 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.

Chart 3

Roles in developing advice for use at the local level					
	Actions to be taken at the local level				
Personnel involved with the development of guidelines	Production of local manual on emergency shelter and post-disaster housing	Incorporation of advice on emergency shelter in local contingency plans	Introduction of statutory provisions (i.e. draft legislation)	Introduction of training programmes	Introduction of public education programmes
Local builders/ craftsmen	***	***	*	***	*
Local community leaders	*	***	*	***	****
Local government officials	***	****	****	***	****
Local architects/ engineers	***	***	***	***	**
Field directors of voluntary agencies	***	**	-	****	**
Government building research officials	**	****	****	***	*
Key: **** Major role *** Substantial role ** Intermediate * Minor role - No role					

- Local government officials involved with the management of relief and reconstruction programmes: ideally, these officials should chair committees and subcommittees 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:

a. The resources of the normal housing process;

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

c. Local training bodies;

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

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

f. 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:

a. 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;

b. 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);

c. Local non-governmental agencies concerned with relief assistance;

d. Local private building enterprises, including supply firms, contractors, craftsmen and building finance organizations;

e. Local government agencies concerned with housing, building and the environment;

f. 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, example 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. Ressler 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.

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.

Case no.	Type of disaster	Location	Date
1	Earthquake	Skopje, Yugoslavia	1963
2	Earthquake	Gediz, Turkey	1970
3	Earthquake/mud slide	Peru	1970
4	Earthquake	Managua, Nicaragua	1972
5	Hurricane (“Fifi”)	Honduras	1974
6	Earthquake	Lice, Turkey	1975
7	Earthquake	Guatemala	1976
8	Earthquake	Fruffi, Italy	1976
9	Earthquake	Caldiran (Van), Turkey	1976
10	Cyclone/storm surge	Andhra Pradesh, India	1977
11	Earthquake	El Asnam, Algeria	1980

Case Study Summary 1

Earthquake (Richter 6.1)

Skopje, Yugoslavia—July 196 (04.17 hrs)

Emergency shelter		
Type	Number provided	Percentage occupancy
Tents	5 000	Unknown
Caravans	Unknown	Unknown
Prefabricated units	1900	Unknown

Housing reconstruction	
Type	Number built
Prefabricated houses and apartment buildings	Unknown

Housing reconstruction	
Type	Number built
Prefabricated houses and apartment buildings	Unknown

Population

Pre-disaster: 200 000
Homeless: 160 000 approx. (ratio 1:1.25)
Injured: 3 700
Killed: 1 070

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

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, resale, 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); they were 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 organization 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 counties).
5. Overall there was a balanced, diversified approach in 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 USS2.4 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.) were insufficiently considered by authorities.

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Case Study Summary 2

Earthquake (Richter 7.1)

Gedez, western Anatolia, Turkey—March 1970

Emergency shelter		
Type	Number provided	Percentage occupancy
Polyurethane domes	300 in first week, ultimately 400	High
Tents	Unknown	Unknown

Housing reconstruction	
Types	number built
Apartment dwellings	2 600 apartments by mid 1971, 9100 apartments by 1973

Population

Pre-disaster: Unknown
Homeless; 90 000
Injured: 1 265
Killed: 1 086

Dwellings

Pre-disaster: Unknown
Damaged: 5 105
Destroyed: 14 852

Value of Damage (US dollars)

$23 million

Needs of affected populations

Shelter, treatment of injured, restoring water supply, roads etc. (life-line systems)

Value of assistance

Unknown

Allocation of roles

Survivors: Improvising their own shelter, moving in with friends and relatives

National/local authorities: Relief co-ordination and direction through 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 Ackaalan temporary shelter (Bayer domes)was used for a considerably longer period. Imported labour was used for the 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 Ackaalan 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 Ackaalan 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.

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Case Study Summary 3

Earthquake (Richter 7.7)

Chimbote, Peru—May 1970 (15.25 hrs)

Emergency shelter		
Types	Number provided	Percentage occupancy
Tents	12400	high
Traditional shelters (este-vas)	Unknown	Unknown
Corrugated iron roofing sheets	For 50 000 families	100
Metal frame shelters (Operation Roof)	Unknown	100
Polyurethane igloos	Unknown	Unknown

Housing Reconstruction		
Types	Number	
Wide variety, from prefab-ricated systems to adobe houses	built	
By the Government	10	600
Through loans	3	180
From other sources	2	400
Roofing schemes	40	000
Total	56	180

Population

Pre-disaster: 1.8 million
Homeless: 500 000 (ratio 1:3.6)
Injured: 143 300
Killed: 47 100 (unaccounted: 19600)

Dwellings

Pre-disaster: 2 550 000
Damaged: 59 800 (urban: 31800; rural: 28 000)
Destroyed: 139 000 (urban: 51700; rural: 87300)

Value of Damage (US dollars)

Unknown

Needs of affected populations

Restoration of water and electricity supplies, opening up of roads and communications, treatment of injured and sanitary evacuations, fuel, blankets, shelter.

Value of assistance (US dollars)

$ 44 billion from all sources, for relief and reconstruction.

Allocation of roles

Survivors: Clearance of debris, erection of shelters (in food-for-work programmes).

National/local authorities: National commission for relief and reconstruction.

Military: repair of roads, bridges, irrigation systems, etc. Assisting groups (external): All aspects of relief; loans for reconstruction from the International Development Banks for housing, clinics, schools, etc.

Emergency shelter policy

1. The Housing Ministry established an emergency shelter committee to assess damage, provided temporary shelter and reestablish essential water, sanitation and other services.
2. Widespread use of tents (12,400).
3. 19 tons of building materials and 602 tons of building equipment and tools, etc. were sent to the affected area.
4. Over 50,000 families received corrugated iron sheets for emergency shelter.

5. Emergency camps were established by the Government, broken down into family units in a project called "Operation Roof'. These emergency shelters were formed from metal frames, with corrugated iron sheet roofing; 80 per cent of the materials were re-used in permanent reconstruction.

Timing

1. Initial tents and estevas built in the first week.
2. 12,400 tents erected in 10 weeks.
3. By the second month credit was available for reconstruction.
4. By January 1971 (7 months later) shelter had been provided for 14,130 families & a roof had been provided for 50,000 families.

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 estevas huts served a useful function, being re-used in permanent reconstruction.
2. The Bayer/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 father mud slides was logical but highly unpopular with those affected.
4. The decision to halt all reconstruction activity in Huaraz until seismic micro-zoning studies and the master plan were completed seriously retarded the reconstruction process.
5. The 16.180 conventional houses built were only accessible to middle class families.

References

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Case Study Summary 4

Earthquake (Richter 5.6)

Managua, Nicaragua—December 1972 (23.00 hrs)

Emergency shelter		
Type	Number provided	Percentage occupancy
Tents		
-Masaya	360	60
-Managua	1 600	20
Polyurethane igloos (Red Cross)	500	45
Wooden huts (US Government)	11 600	35 (first year) WO (second year)
		Total 14 060
Note: of the homeless. 90 per cent were listed as lodging with relatives/friends, and a small proportion were occupying improvised shelter.		

Housing Reconstruction	
Type	Number Built
Wide variety, including the upgrading of the wooden huts	Unknown, but very active private sector

Population

Pre-disaster: 500 000
Homeless: 200 000 (ratio 1:23)
Injured: 20 003
Killed: Between 6 000 and 10000.

Dwellings

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

Value of damage (US dollars)

Approximately $800 million.

Needs of affected population

Water supply, sanitation, shelter, access to sources of employment.

Value of assistance (US dollars)

5226 million between 1975 and 1978.

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 3 1/2 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 antiseismic 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 remotely sited, 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.

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Case Study Summary 5

Hurricane ("Fifi")

Honduras— 18-20 September 1974

Emergency shelter		
Type	Number provided	Percentage occupancy
Tents	Unknown	Unknown
Prefabricated units	500	Unknown

Housing reconstruction	
Types	Number built
Wide variety of systems including prefabricated timber and precast concrete systems	Unknown

Population

Pre-disaster: Unknown
Homeless: Up to 350 000
Injured: Unknown
Killed: 8 000

Dwellings

Pre-disaster: Unknown
Damaged: 12 000
Destroyed: Up to 15 000 (according to different estimates)

Value of damage (US dollars)

$500 million

Needs of affected populations

Food, drinking water, sanitation, medical case shelter

Value of assistance (US dollars)

$11.6 million from external sources

Allocation of roles

Survivors: Improvisation of shelter.

National/local authorities: Damage/needs assessment, medical supplies, provision of tents.

Military: Unknown, but conventional role presumed: rescue, clearing debris, setting up camps, etc.

Assisting groups (external): Provision of wide variety of relief supplies.

Emergency shelter policy

Eight large refugee camps were established. The largest was built in Choloma to house 318 families (1,831 people). In addition there were improvised shelters. The extended family system does not appear to have functioned effectively. Existing buildings e.g. schools, were used as temporary shelter.

Timing

Honduran Red Cross dealt with immediate needs; 19 Sept., damage assessment teams requested from UNDRO and US Government 20 Sept, arrival of first supplies for emergency shelter; requests changed due to continuing surveys; 26 Sept., meeting of agencies, each asked to indicate in which area of relief it wished to work.

Reconstruction policy

There were the major programmes of house building—each by a voluntary agency. In addition, CARE distributed roofing materials for 5,324 houses; housing was built above the flood plain, on the hill side, but remained vulnerable in many instances, due to poor "cut and fill" techniques.

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.

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Case study summary 6

Earthquake (Richter 6.9)

Lice, Turkey—September 1975 (12.20 hrs)

Emergency shelter		
Type	Number Provided	Percentage Occupancy
Tents (Turkish Red Crescent)	3 681	90
Polyurethane igloos(OXFAM)	463	10
Improvised shelter	Unknown	Unknown

Housing reconstruction	
Types	Number Built
Prefabricated housing (asbestos sheets in timber frames) provided by Turkish Ministry of Reconstruction and Settlement	1568 in 54 days, 5805 after 9 months in affected region as a whole

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/Crescent provided tents; OXFAM provided polyurethane igloos; 46 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.

Population

Pre-disaster: 50 000 (8 100 Lice town)
Homeless: 5 000 (ratio 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 sons); $15.7 million (external sources).

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 tradition. The town of Lice was planned for an eventual population of 20,0013 (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 Libre
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 (1,568 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.

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Case Study Summary 7

Earthquake (Richter 7.5)

Guatemala—February 1976

Emergency shelter		
Type	Number provided	Percentage occupancy
Tents	10 000 approx	Low in campsites; high where erected near ruined homes
Corrugated iron roofing sheets	Unknown	High
Improvised shelters	50 000 in Guatemala City	Very high
Temporary wooden houses	Unknown	Unknown

Housing reconstruction	
Type	Number built
Wide variety of traditional construction and light prefabrication	Unknown, except that within 4 months, 24 agencies were providing many different types of programmes with widely differing levels of success.

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	163 501
Total	384 762

Value of damage (US dollars)

$750 million estimated

Needs of affected populations

Restoration of water supplier/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.

Allocation of roles

Survivors: Widespread improvised shelter.

National/local authorities: Provision of tents and temporary 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 assiting 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.

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Case Study Summary 8

Earthquake (Richter 6.3)

Friuli, Italy — May (and September) 1976

Emergency shelter		
Type	Number provided	percentage occupancy
Campsites with tents	Unknown	Very low
Tents (distributed individually)	Unknown	60
Mobile homes	Unknown	100
Railway sleeping cars	125	High
Hotels on Adriatic coast	20000 beds	100
Temporary housing (prefabricated)	25000 (by 1980)	100

Housing reconstruction	
Type	Number Built
All damaged and destroyed houses to be rebuilt to original form, incorporating earthquake-resistant design/codes	Unknown

Population

Pre-disaster: 89 000
Homeless: 45 000 (ratio 1:1.9)
Injured: 2400
Killed: 965

Dwellings

Pre-disaster: Unknown
Damaged and destroyed: 30 527

Value of damage (US dollars)

$1.1 billion

Needs of affected population

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

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: Smith 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 ears 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 to 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 to some extent 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 campsites.

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Case Study Summary 9

Earthquake (Richter 7.6)

Caldiran (Van), Turkey - November 1976 (12.22 hrs)

Emergency shelter		
Type	Number provided	Percentage occupancy
Tents, including winterized tents with stoves	5 000	95 for winterized tents; low for others
Improvised shelter	Unknown	100

Housing reconstruction	
Type	number built
Prefabricated houses asbestos panels/timber frames	10000 erected between April and November 1977

Allocation of roles

Survivors: Improvised shelters (many dug into the ground for warmth.)

National/local authorities: Provision of tents and evacuation. Military: Search, rescue, clearing debris.

Assisting groups (external): Provision of tents (Red Cross /Red Crescent; USAID).

Emergency shelter policy

1. Survivors were encouraged by Government to move away from the affected area (one designated area was the Aegean coast).
2. Provide suitable tents to accommodate families during the harsh winter conditions until prefabricated housing could commence in April 1977. (Building work was not possible during the winter). There were difficulties in obtaining winterized tents, the entire world stockpile being inadequate.

Timing

Evacuation occurred for a small proportion of families (approx. 200) within 2 months. Tents, including winterized models, were provided within 6 weeks

Reconstruction policy

1. The Ministry of Reconstruction and Settlement provided prefabricated housing for all homeless families.
2. Advice was not provided for the improvement of traditional adobe or masonry dwellings.

Population

Pre-disaster: 180 700
Homeless: 51 000 (ration 1: 3.5)
Injured: 5 000 (approx.)
Killed: 3 870

Dwellings

Pre-disaster: 30 000 (approx.)
Damaged: 5 250
Destroyed: 9 200

Vales 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 external sources. Monetary value of assistance from inside Turkey unknown, but considerable in terms of prefabricated housing alone.

Lessons learned

1. In the worst winter earthquake in Turkey for 40 years, authorities feared that vast numbers of survivors would die of exposure to the harsh climate. Thus winterized tents, with heating and insulation were requested from world-wide sources. The assumed need was probably incorrect, as is evidenced by the resourcefulness of surviving families who improvised by half submerging makeshift shelters in the ground.
2. The Government policy of relocating families in other parts of Turkey was interpreted by some critics as being politically motivated. It appears that few families took up the offer, which consisted of removal costs, provision of new land and an initial grant of livestock.
3. The Government (as in Lice in 1975), adopted a policy to provide prefabricated housing, with plans to build 10 000 units. No attempt was made to provide resources for training local builders in antiseismic construction of traditional buildings.
4. The above policy was underpinned by the extensive aid provided by donor governments, with particular emphasis on aid from Arab countries.

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Case Study Summary 10

Tropical cyclone (winds up to 270 km/hr)

Andhra Pradesh, India - November 1979

Emergency shelter		
Types	Number Provided	Percentage occupancy
Simple shelters using local materials	Unknown	Unknown

Housing reconstruction	
Types	Number built
Wide variety of "low" or "appropriate" technology solutions using timber, mud, thatch	15 000 by January 1982
Some "pukka" (brick/concrete blocks) housing	Unknown

Allocation of roles

Survivors: Improvisation and repair of shelter from cyclone debris.

National/local authorities: "Pukka" housing and community cyclones shelters.

Military: Rescue, clearing roads etc.

Assisting groups (external): Forty voluntary agencies working with Government to built simple shelters. Some (limited) training on housing reconstruction and related issues.

Emergency shelter policy

1. Shelter needs were not 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 built 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).

Population

Pre-disaster: Unknown
Homeless: 250 000
Injured: Unknown but minimal in comparison to numbers killed.
Killed: 30 000

Dwellings

Pre-disaster: Unknown
Damaged and destroyed: 150000 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 access roads, food, household goods, paramedical care. Shelter was not a priority in view of warm climate.

Value of assistance (US dollars)

Unknown

Reconstruction policy

1. The State Government made certain promises to provide "pukka" housing for surviving families in lieu of providing support for traditional types of construction. (The houses to cost about Its. 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 (US Government aid) 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 (Artie).

References

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Case Study Summary 11

Earthquake (Richter 7.3)

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

Emergency shelter		
Type	Number provided	Percentage occupancy
Tents	15 000 (camp- sites)	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	High
Lodging with family and friends	Unknown	High

Housing reconstruction	
Type	Number built
Prefabricated "temporary" housing (pending reconstruction) in El Asnam town	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.

Population

Pre-disaster: 1 000 000 (region)
Homeless: 400 000 (ratio 1: 2.5)
Injured: 8 369 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

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 85 schools indicated the priority need for aseismic 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.

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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. Communtty-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 routes;
- 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 very 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

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[1]

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

Vulnerability: meaning the degree of loss to 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 excepted 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

1 Natural disasters and vulnerability analysis, Report of Expert Group Meeting, UNDRO, 1979.

Appendix D

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Howard, J., and R. Spice, *Plastic Sheeting - Its Use for Emergency Housing and Other Purposes*, OXFAM, Oxford, United Kingdom, 1977

Hugues, Richard, "Guide to Post-Earthquake Building Damage Assessment", *Disasters*, Vol. 5, No. 4, 1981

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.

Krimgold, Frederick, *Pre-Disaster Planning: The Role of International Aid for Pre-Disaster Planning in Developing Countries*, Avdeling for Arkitektur KTH, Stockholm, Sweden, 1974.

Lewis, James, *A Primer of Precautionary Planning for Natural Disasters*, Disaster Research Unit, Bradford University, United Kingdom, 1977.

Mitchell, Maj. William A., and Miner., Timothy H., Environment, *Disaster and Recovery: A Longitudinal Study of the 1970 Gediz Earthquake in Western Turkey*, United States Air Force Academy, Colorado, USA, 1978.

Muir-Wood, Robert, "Hard Times in the Mountains, *New Scientist*, 14 May 1981, pp. 414-417.

Norton, Reggae, "Disasters and Settlements", *Disasters*, vol. 4, No. 3, 1980, pp. 339-347.

Oakley, David, *Transition Housing for Victims of Disaster*. Disaster Assistance Manual, vol 1, Office of Housing, Office of US Foreign Disaster Assistance, Agency for International Development, Washington, D.C., USA,. 1981.

OXFAM, *Field Directors Handbook-Guidelines and Information for Assessing Projects*, OXFAM, Oxford, United Kingdom, 1974, 1980.

Perry, Ronald W., Greene, Marjorie R. and Lindell, Michael K. "Enhancing Evacuation Warning Compliance: Suggestions for Emergency Planning", *Disasters*, Vol. 14, No. 4, 1980, pp. 433-419.

Fussier, E. M., and D. Oakley, *Sri Lanka Cyclone Handbook*, Ministry of Local Government, Housing and Construction, Government of Sri Lanka, 1979.

Stephenson, B. S., *Understanding Earthquake: Relief Guidelines for Private Agencies and Commercial Organizations*, International Disaster Institute, Foxcombe Publications, Farnham, United Kingdom, 1982.

Taylor, Alan 1, *The Intertect/OXFAM Disaster Management Training Package*, Intertect, Dallas, Texas, USA, 1976.

Whitemore, Claire, *Land for People: Land Tenure for the Very Poor*, OXFAM, United Kingdom, 1981.

3. Annotated Bibliographies

1. Cockrane, A., *A Selected Annotated Bibliography on Natural Hazard*, University of Toronto, Natural Hazards Research Working Papers, 1972, Toronto, Canada.
2. Davis, Ian, *Shelter after Disaster*, Oxford Polytechnic Press, Oxford, United Kingdom, 1978. (One hundred and two references on provisions of shelter and reconstruction planning).
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. Intertect, *Publications from Intertect*. An annotated listing of 76 publications available from Intertect, 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.

5. Oakley, David, *Transition Housing for Victims of Disasters*, Disaster Assistance Manual, vol 1, Office of Housing, Office of US Foreign Disaster Assistance, Agency for International Development, Washington, D.C., USA, 1981. (Unannotated) bibliographies on the following topics: land-use planning: site development; safe housing programme components; earthquake resistant housing; flood damage reduction; programme and project preparation; implementation management.
6. Pan-American Health Organization, *Selected Abstracts from Books and Films*, Emergency Preparedness and Disaster Relief Office, Pan-American Health Organisation, 525 Twenty-third Street NW, Washington, D.C., USA, 20037. An annotated listing of books and films on disaster-related topics, but primarily concerned with medical topics.
7. Rem. Joan Innes, *Planning for People in Natural Disaster*, report on public seminars in 1977/78, North Queensland, Australia, Department of Behavioural Sciences, Townsville, Australia, 1 979. Bibliography (unannotated) on community welfare in natural disaster.
8. School of Research and Traintng in Earthquake Engineering, University Of Roorkee, *Influence of Natural Disasters (Earthquakes) on Educational Facilities*, annotated bibliography, final report for Educational Facilities Division, UNESCO, Paris. University of Roorkee, Roorkee, 247672, India, 1977. Annotated bibliography concerning the following topics: seismic risk; repair and strengthening of buildings; building materials/techniques; building codes; evacuation planning; social factors.

Appendix E

Complementary Studies

Three complementary documents have been published:

Oakley, David, of Padco, Inc., —Disaster Assistance Manual, Volume 1— *Transition Housing for Victims of Disaster.* Mailable from: Office of Housing Office of US Foreign Disaster Assistance Agency for International Development, Washington DC, USA, 1981.

This document is concerned with the formulation of "transitional 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 forth orderly and progressive transition of such project to permanent, improved communities.

Pan-American Health Organisation, *Emergency Health Management after Natural Disaster*, Scientific Publication No- 407, Pan-American Health Organization, Washington, DC, USA, 1981. Available from: Pan-American Health Organization, 525 Twenty-Third Street, NW, Washington, DC, 20037, USA.

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.

United Nations High Commissioner for Refugees (UNHCR), *Handbook for Emergencies*, United Nations High Commissioner for Refugees, Geneva, Switzerland, 1982. Available from; The Emergency Unit, UNHCR, Palais des Nations, CH 1211 Geneva 10, Switzerland.

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

Appendix F

Films and Slide Lectures

1. 16 mm film and video cassette (26 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, 71R, 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, DC., USA, 1982. (For details of hire or purchase contact above address.)

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)

Managua Earthquake. 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 Icelandic town.

3. Slide lectures: tapes slides manual (approximately 20 mint 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 Ressler, No. 4—Making Low-Income Housing Wind Resistant: A Case Study of Andhra Pradesh, India, Everett Ressler and Ian Davis; No.

5—*Emergency Shelter after Disaster,* Ian Davis. Available from Commonwealth Association of Architects, Building Centre, 26 Store Street, London, WC1, UK.

4. Slide lectures: tapes slides manual (approximately 20 mint 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 Coordinator (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

Appropriate Technology

Intermediate Technology Publications Ltd., 9 King Street, Covent Garden, London United Kingdom. A forum for the exchange of ideas among those directly involved in development work. Technical articles, book reviews, readers contributions Quarterly.

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.

Beyond Impact

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

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.

Development Forum

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

Disasters: International Journal of Disaster Studies and Practice.

Pergamon Press, Headington Hill Hall, Oxford 0X3 OBW (United Kingdom). Edited by the staff of the International Disaster Institute. Articles and information on all facets of relief: pre- disaster planning and mitigation, disaster case studies, epidemiology. Good resource for publications and contacts. Quarterly.

Disaster Management

Joint Assistance Centre (a voluntary action group for disaster assistance), Adhyatma Sadhna Kendra Mehrauli, New Delhi 110030 India. Highlights infor-

mation emerging from India and S.E. Asia on all aspects of disaster mitigation and relief/reconstruction management Quarterly.

Disaster Preparedness in the Americas

Pan-American Health Organization (PAHO), Emergency Preparedness and Relief Coordination Unit 525 23rd Street NW, Washington, D.C. 20037, USA. Newsletter giving information on PATIO, WHO, and other UN Agencies. Reviews publications, journals and newsletters on disasters. Good resource. Monthly.

Invention Intelligence

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

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.

Soundings 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.

TAICH News

Technical Assistance Information Clearing House, 200 Park Avenue South, New York, New York 10003, USA. This Newsletter is an excellent source of information on US overseas development assistance projects, contacts and publications, forthcoming meetings and conferences. Quarterly.

TRANET Newsletter

TRANET (Transnational Network for Appropriate/Alternative Technologies), P.O Box 567, Rangeley, Maine 04970, USA Publishes lists of appropriate technology centres, low-cost and self- help housing groups, citizen planning, forthcoming meetings and workshops. Good resource for contacts and information about other organizations; fair resource for publications. Quarterly.

UNDRO News

Office of the United Nations Disaster Relief Coordinator, 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.

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.

VITA News

Volunteers in Technical Assistance Inc., 3706 Rhode Island Avenue, Mt Rainier, Maryland 20822, USA. Articles on international information exchange technology transfer/diffusion, rural development programmes, appropriate technology, recent publications, networks and contacts. Good reference. Quarterly.

Appendix H

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

Sources of Information on Disaster Related Subjects

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

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

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

Centre de Recherche sur L'Epidémiologie des Desastres Ecole de Sante Publique
Unite d'epidemiologie
Universite catholique de Louvain
Clos Chapelle-aux-Champs, 30
B-1200 Bruxelles
Belgium

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

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

Rotterdam 3
Netherlands

International Disaster Institute (1DI) Dr. Frances D'Souza
85 Marylebone High Street
London W1M 3DE
United Kingdom

*International Institute of Seismology and Earthquake
Engineering Building Research Institute Ministry of Construction
3-28-8 Hyakunin-cho Shinjuku-ku, Tokyo
Japan

International Society on Disaster Medicine
10-12 Chemin de Surville
1213 Petit-Lancy
Geneva
Switzerland

International Tsunami Information Center (MC)
P.O. Box 50027
Honolulu, Hawaii 96850
USA

*Intertect
Frederick C. Cuny P.O. Box 10502
Dallas, Texas 75207
USA

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

*Joint Assistance Centre
Adhyatma Sadhna Kendra Mehrauli
New Delhi 110030
India

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

*Middle East Technical University
Earthquake Engineering Research Institute
Ankara
Turkey

Munchener Ruckversicherungs-Gesellschaft
Koniginstrasse 107
D-8000 Munchen 40
Federal Republic of Germany

*National Building Research Station
Director, Small Buildings Under Earthquake Stress Programme
Roorkee
North India

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

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

*National Information Service for Earthquake Engineering EERC, 415 RFS
47th Street and Hoffman Boulevard
Richmond, California 94804
USA

National Science Foundation Dr. Frederick Krimgold
Earthquake Hazard Mitigation
18000 Street N.W.
Washington DC 20550
USA

*Office of the United Nations Disaster Relief Coordinator (UNDRO)
Palais des Nations
CH-1211 Geneva 10
Switzerland

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

*Oxford Polytechnic
Disasters and Settlements Unit (DSU)
Headington, Oxford OX3 OBP
UK

*UNNAYAN
Jai Sen
36/IA Garcha Road
Calcutta 700 019
India

*United Nations Centre for Human Settlements (UNCHS) Kenyatta
Conference Centre
P.O. Box 30030
Nairobi
Kenya

United Nations Development Programme (UNDP) One, UN Plan
New York, NY 10017
USA

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

*United Nations Regional Housing Center
Nirman Bhawan, Maulana Azad Road
New Delhi 110011
India

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

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

University of Minnesota
Underground Space Center
11 Mines and Metallurgy Building 221 Church Street SE
Minneapolis, Minnesota 55455
USA

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

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

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

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

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

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