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

- o 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

- o 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)
- o Phase 3—Reconstruction period (3 months onward)

Common failures of assessment

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

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

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

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

The over-estimation of needs by local or national officials in order to receive maximum assistance.

A higher priority being placed on damage surveys than surveys of basic human needs.

A lack of active participation by the surviving community (or even the surviving local administration) in the assessment of needs.

Confusion as to who has the responsibility for making the assessment.

Problems of communicating the assessments of assisting groups.

Lack of definition of the objectives of the assessment (for example, is the assessment of needs aimed at regenerating the self-help process in housing reconstruction, or is it aimed at providing emergency shelters before all other considerations?).

Defining who should make the assessment: the problem of authority and information needs

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

Given this situation, if the government is to maintain full control it will be necessary for assisting groups to accept ultimate governmental authority in the assessment of needs, as in all other relief matters. On the other hand, the government must recognise the value of assisting groups' advice on assessment, since many of these groups will probably have more experience of dis-

aster 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.[9]
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 exclusive preoccupation with immediate relief needs, and to give more thought to reconstruction needs at the outset.

[9] 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 microzoning 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.

Guidelines for the assessment of needs and damage

1. *Pre-disaster planning (preparedness)*

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

(*a*) Identification and mapping of hazardous zones.

(*b*) A description of prevailing building techniques.

(*c*) Mapping of elements at risk.

(*d*) Estimation of housing demand. In the event of the need to reconstruct housing, the scale of demand will be a function of:
- The rate at which the region is being urbanised, and under what conditions;
- The economic profile of the area (incomes, level of employment, skills, the building industry, etc.);
- The demographic profile of the area, especially the rate of population growth and the distribution of age groups;

(*e*) Preparation of a sociological profile of the community. Part of the information produced by the profile should include a description of the "coping mechanisms" by which survivors, institutions and public services respond with assistance and shelter.

(*f*) Description of the building industry. Such information is vital if an outside agency is to formulate a shelter programme well co-ordinated with local procedures and resources.

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

2. *Information needed immediately after the impact of a disaster*

(*a*) The approximate number of housing units that have been destroyed.

(*b*) The approximate number of housing units that are too severely damaged (and in danger of collapse) to provide safe shelter.

(*c*) An assessment of exposure to climate and weather.

(*d*) The capability of the community's social 'coping mechanisms' to provide emergency shelter, i.e. how many survivors can be housed by family or friends, or find refuge in public buildings, etc.

(*e*) The feasibility and likelihood of survivors fashioning their own emergency shelter from salvaged materials.

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

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

(*h*) Accessibility to the disaster sites.

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

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

3. *Information needed for reconstruction*

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

4. *Damage surveys*

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

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

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

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

The affected areas may be difficult to reach;

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

Interviews may distort the information, depending on the interviewer/interviewee relationship;

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

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

Nevertheless, field surveys have some important advantages:

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

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

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

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

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

5. *Checklists for the assessment of needs and damage*

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

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

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

[10] 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.

FIGURE 1

Suggested information requirements for a needs assessment

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

2. Housing data before the disaster
2.1 Tenency 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 .....
2.3 Available resources
1 ..... savings ..... amount
2 ..... monthly savings ..... annual .....
3 ..... building materials that can be salvaged
.....
4 ..... time available for work .....
per week or other .....

3. Conclusions
3.1 Total damaged
1 ..... completed destroyed
2 ..... seriously damaged
3 ..... light damage
4 ..... no apparent damage
3.2 Safety of House
1 ..... inhabitable
2 ..... unsafe but can be repaired
3 ..... unsafe and unrepairable
4 ..... not sure of safety
3.3 Resolve housing on the same site
1 ..... rebuild or repair with owners own resources
2 ..... rebuild or repair with loan
3 ..... rebuild or repair but does not have funds
3.4 Move to another site
1 ..... rent at another site
2 ..... build at another site
3.5 Immediate assistance needed
1 ..... materials for immediate shelter .....
roofing .....
2 ..... site and materials
3 ..... help to clean the site
4 ..... temporary shelter (refugee center)
5 ..... information on how to rebuild safely
6 ..... other .....
3.6 Long-term assistance
1 ..... building materials
2 ..... technical information
3 ..... loan
4 ..... other .....

4. Information for the family
4.1 Evaluation of safety of house
1 ..... good
2 ..... needs repair
3 ..... unsafe without repair
4 ..... unsafe, must abandon the house
5 ..... not sure
6 ..... other
4.2 Your housing plans
.....
(the same as 3.3 or 3.4)
4.3 Assistance requested
.....
(the same as 3.5 or 3.6)

for more information, go to
.....
.....
.....
or call
.....

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

6. *Role of survivors in the assessment of needs*

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

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

7. *Dissemination and sharing of assessment information*

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

FIGURE 2

Damage assessment survey form

Description

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

(*Photo*)

Site

Urban ..... Rural ..... Open ..... Protected .....
If protected, describe: .....
Description of terrain .....
.....

Foundations

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

Walls

Materials used .....
.....
Height and width .....
.....
Reinforcement system .....
.....
Damage description location .....
.....
Evidence of explosion or implosion .....
.....

(*Configuration*)

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 .....

SUMMARY OF POLICY RECOMMENDATIONS

1. *Primary level (local)*

(a) *Pre-disaster*

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

Prepare assessment and survey methodology accordingly.

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

(b) *Post-disaster*

Identify local people who can participate in the execution of field surveys (they need to be literate and capable of learning basic survey and analytical skills).

2. *Secondary and tertiary levels (regional and national*

(a) *Pre-disaster*

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

Develop an assessment procedure that co-ordinates the efforts of all the assisting groups in collecting and sharing information.

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

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

(b) *Post-disaster*

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

TABLE 3

The application of data obtained from damage surveys to various assisting groups

	Information obtained from damage surveys		
	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: (*a*) The supply of essential materials for construction; (*b*) 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: (*a*) Supplying, in particular circumstances, emergency shelter (e.g. tents); (*b*) Allocating funds to survivors; (*c*) 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: (*a*) Whether to provide temporary or emergency shelter; (*b*) Whether to provide building supplies (e.g. roofing materials); (*c*) 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 of there is bilateral aid.
International agencies	As above.	As above.	Relevant for the co-ordination 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.

Key references

COMMITTEE ON INTERNATIONAL DISASTER ASSISTANCE (CIDA), *Assessing International Disaster Needs*, National Academy of Sciences, Washington, D.C., 1979.

TAYLOR, Alan J., "Assessment of Victim Needs", *Disasters and the Small Dwelling*, Pergamon, Oxford, United Kingdom, 1981, pp. 137-144.

STEPHENSON, R.S., *Understanding Earthquake: Relief Guidelines for Private Agencies and Commercial Organisations*, International Disaster Institute, Foxcombe Publications, Farnham, United Kingdom, 1982.

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

HUGHES, Richard, *Guide to Post Earthquake Building Damage Assessment*, Disasters, vol. 5, No. 4, 1982.

CUNY, Frederick C., Scenario for a Housing Improvement Programme in Disaster Prone Areas, *Disasters and the Small Dwelling*, Pergamon, Oxford, United Kingdom, 1981, pp. 117-121.

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

- o Private sector: Manufacturers/contractors
- ● Professionals: Architects/planners/engineers/public health officials
- ● Policy-making administrators: National (tertiary) level
- o 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)
- o *Phase 2*—Rehabilitation period (day 5 to 3 months)
- o *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.

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.

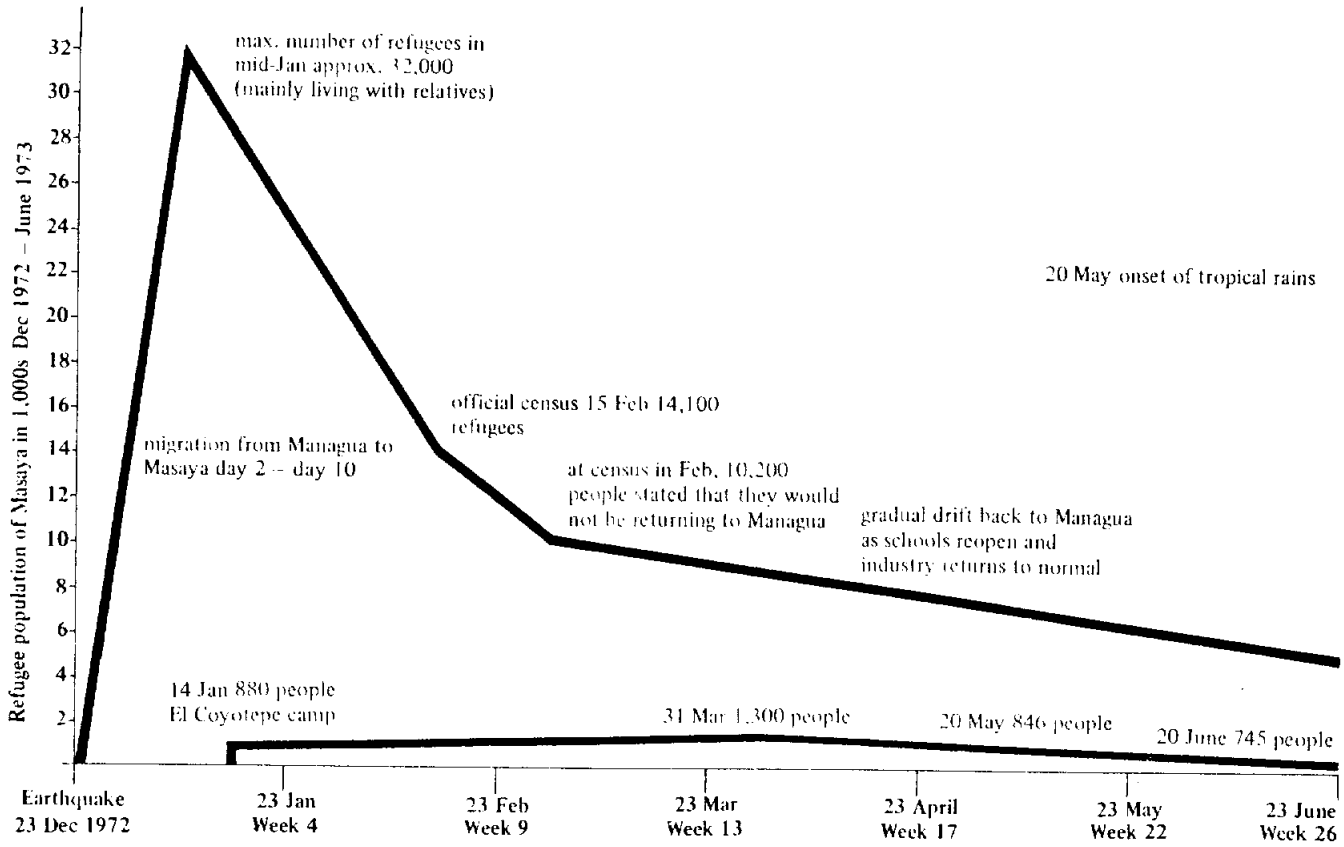
Cordon surrounding the prohibited zone following the enforced evacuation of Managua, Nicaragua, in December 1972.

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

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

CHART 2

Comparative movement of population following Managua earthquake, 1972



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

Policy guideline

(See chart 2)

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

HAAS, J. E., H. C. COCKRANE and D. C. EDDY, *The Consequences of Large-scale Evacuation following Disasters: The Darwin, Australia Cyclone Disaster of 25 December 1974*, Natural Hazards Research Working Paper No. 27, July 1976.

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[11]

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

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

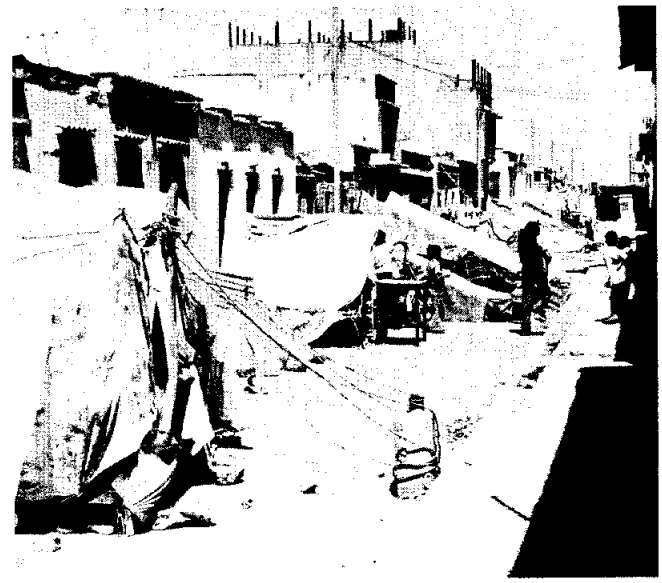
That universal, prefabricated (and preconceived) shelter systems are desirable and feasible;

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

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

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

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



(Credit: UNDRO)

Within 24 hours of the 1976 Guatemala earthquake, thousands of families moved into streets, public parks, or open spaces. They improvised emergency shelters from plastic streets, earthquake rubble, linen, etc. The authorities assisted the process with the provision of water supply tanks, and by digging latrine trenches.

That imported emergency shelter can be provided rapidly and cheaply;

That temporary housing is not a cost factor in the total[12] reconstruction programme, and will be demolished after a limited period;

That large sites with concentrations of temporary housing are an acceptable and effective solution for the community.

2. *Timing* (see table 4). Timing of the delivery of emergency shelter is crucial, for its usefulness is confined to the actual emergency phase, which may last only a few days. Late delivery may actually impede the recovery of housing rehabilitation and reconstruction. Due to the logistical difficulty (if not impossibility) of transporting, distributing and assembling imported emergency shelters within the critical few days of the emergency phase itself, such shelter rarely plays a significant role.[13] Moreover, the evidence suggests that survivors have the resourcefulness to improvise their own emergency shelter needs, at least for a limited period. Lastly, it should not be forgotten that the relief and reconstruction phases often start simultaneously, all of which points to *the need for new and less conventional approaches to emergency shelter provision after disaster.* To achieve maximum effectiveness, therefore, assisting groups should reserve a proportion of their resources for the phases beyond the immediate emergency period.

TABLE 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	•	•	•

3. *Quantities of units produced.* Assisting groups have frequently set a higher priority on supplying shelter units than on contributing to the self-help process, although there are signs that this attitude may be changing. They have also been apt to overestimate emergency shelter needs for the following reasons:

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

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

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

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

The desire to give "visible" aid;

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:

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

Its potentially harmful social consequences;

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

Climatic variations;

Variations in cultural values and house forms;

Variations in family size;

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

Local capacity to improvise shelter;

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

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

Problems of appropriate technology: assembly, skills, materials etc.

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

6. *Performance.* Evidence about the performance of emergency shelters has not come from surveys conducted by the assisting groups themselves, but from independant 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

[12] 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.

[13] The evidence contained in the case study summary sheets in appendix A consistently bear out this contention.

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 acceptibility of such designs, but cultural rejection is rarely the most important factor in a family's refusal of a shelter. Recent research has shown that far more significant to the occupant is its relationship to land tenure, its security, its proximity to employment, and its access to services and utilities.[14]

10. *"Indigenous" emergency shelters.* Recently, several assisting groups have attempted to build standard emergency shelters, using indigenous materials designed in such a way that the performance of the structure would be improved. These programmes, too, have shown little success. Their rate of failure seems tied to deficiencies of 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.[15] The result is that emergency shelter is not systematically the first priority of survivors. As this study emphasizes, the priorities are for land, infrastructure, income (employment), and early access to the means of reconstruction.

3.6 SHELTER STRATEGIES

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

Audience

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

Time Phases

- o *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)
- o *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:

Tents;
Imported designs and units;
Standard designs incorporating indigenous materials;
Temporary housing;
The distribution of materials;
Core housing;
Hazard-resistant housing;
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:

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

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

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

They can be erected rapidly and easily;

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

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

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

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

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

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

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

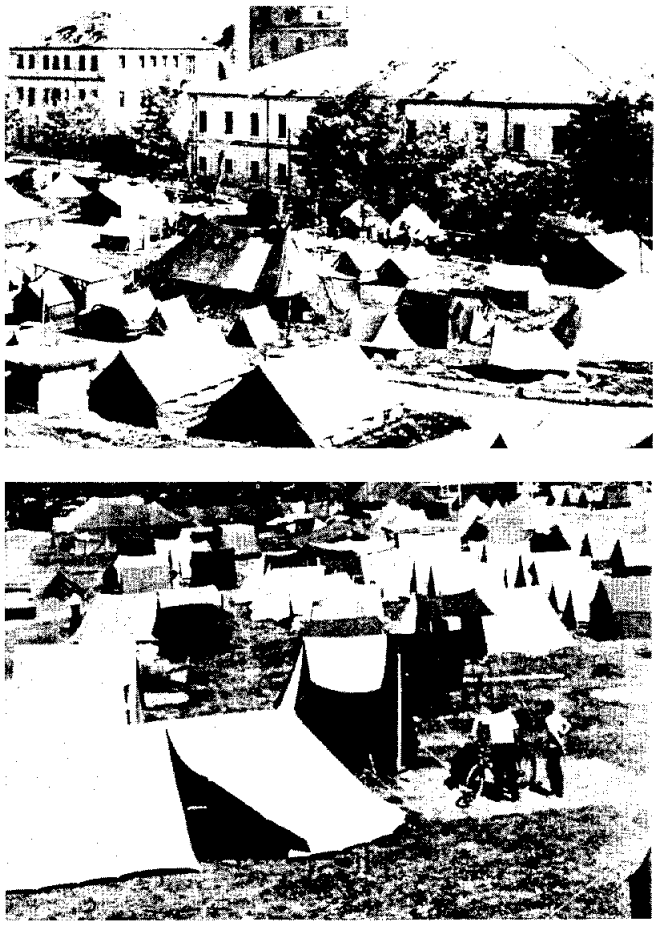
They are frequently too small for a family's needs, and are impossible to extend;

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

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

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

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



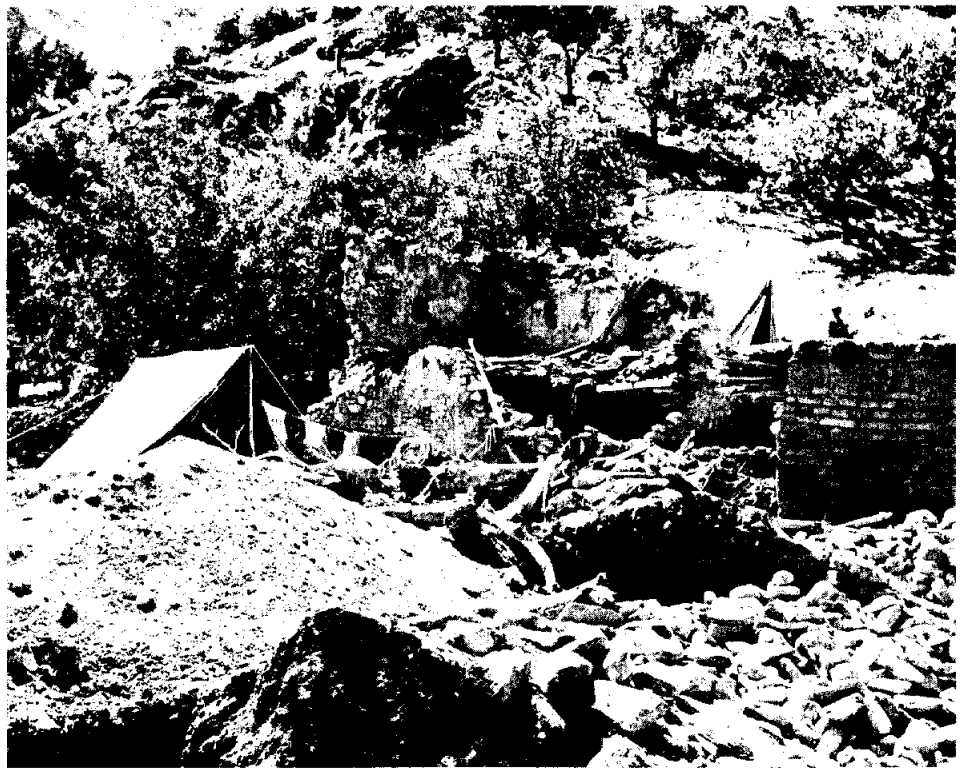
(*Credit:* Skopje Resurgent, *UN, 1970*)

Emergency campsites in Skopje, Yugoslavia, following the 1963 earthquake. Approximately 4,500 tents were erected and were used for 3-4 months, although occupancy was never sufficient to fill all tents.

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 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.

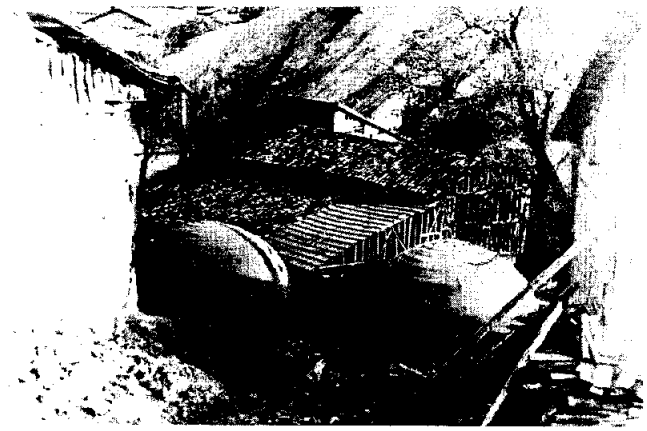
In cases where there is a risk of climatic exposure, the provision of improted shelter often receives a fairly high priority. In these cases the emergency shelter is basically a humanitarian consideration. The long-term impact of the units is not considered, and questions of cost-effectiveness normally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



(*Credit: UNDRO*)

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

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



(*Credit: Michael Menzies*)

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 two other occasions: Chimbote, Peru 1970, and Nicaragua 1972.) This photograph shows how one family has taken their igloos from the site and has carried them to a farm, probably for use as stables, or animal houses.

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

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

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

(*c*) In practice, few donor-designed emergency shelters serve the purpose for which they were intended, i.e. life support or protection from the elements. The uses to which the survivors have put the units have normally been of a secondary type, i.e. storage, with the families themselves living in adjacent, improvised shelters, built at a fraction of the cost of the donor shelter.

Adjacent to the El Coyotepe campsite in Masaya, Nicaragua, following the 1972 earthquake the West German Red Cross donated 500 polyurethane igloos. Although such units only take two hours to fabricate, it took 148 days for the first igloo to be occupied due to logistical problems as well as difficulty in obtaining a site with approval to build. Approximately 30 per cent of the igloos were occupied despite the fact that there were no rent charges.

Basilicata/Campania earthquake, southern Italy, 1980. Six months after this earthquake a wide variety of temporary accommodation had been provided. The upper photograph indicates aluminium and stretched plastic sheet housing donated by the Provincial Government of Alberta, Canada. The Commune of St Angelo de Lombardi decided to use the units as accommodation for a school to teach craftsmen how to repair the sculptures and works of art destroyed in the earthquake.

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

The lower photograph 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 long-term loan pending the building of temporary housing.

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

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

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

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

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

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

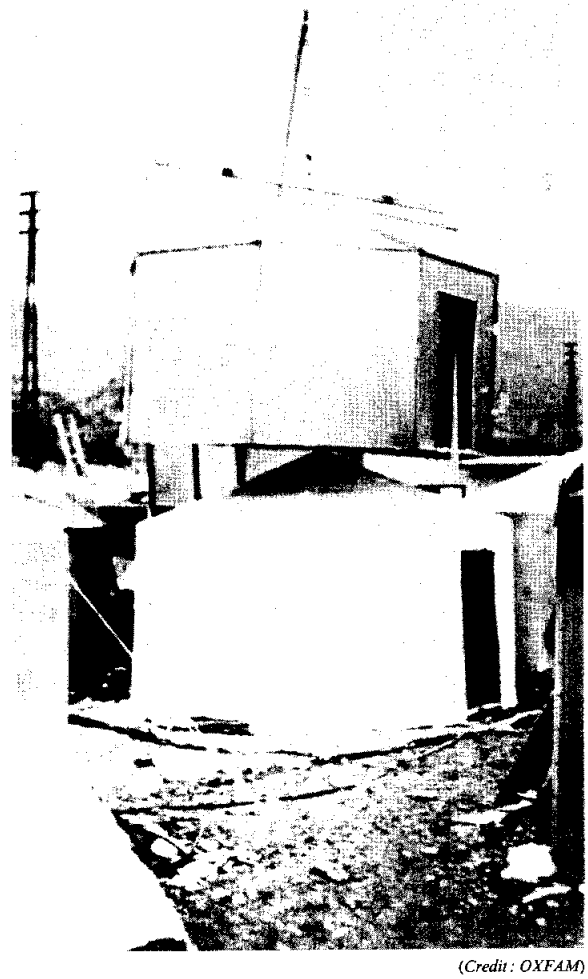
[16] In Nicaragua the Bayer/Red Cross polyurethane igloos were not in use until 138 days after the earthquake of 1972.

(Credit : OXFAM)

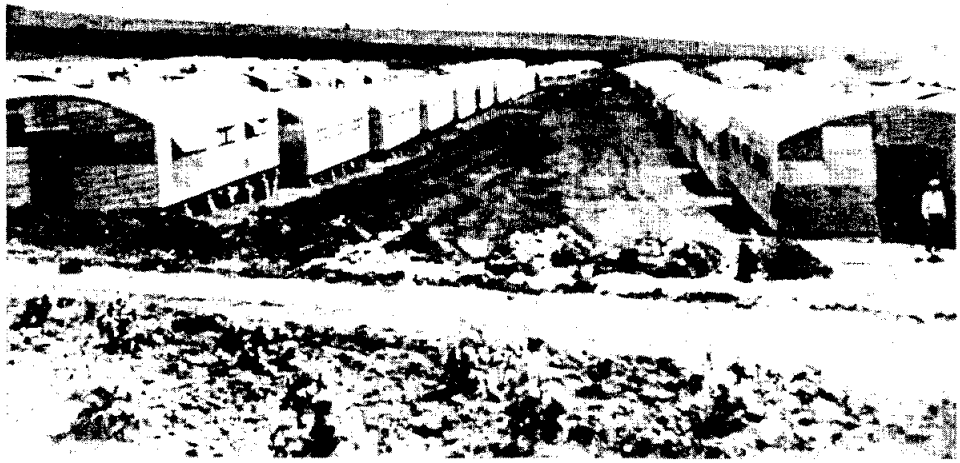
Following the Lice earthquake in eastern Turkey in 1975, OXFAM, a voluntary agency, used their polyurethane house for the first and only time.

The units were made by an operator standing inside an aluminium mould (with his own air supply), and spraying the foam onto the mould. Four hundred and sixty-three units were produced.

(Credit : OXFAM)



(Credit : OXFAM)



(*Credit:* Skopje Resurgent, *UN, 1970*)

Quonset huts provided in Skopje by the US Army. These houses are still occupied, nearly 20 years later, by the local population of gypsies.

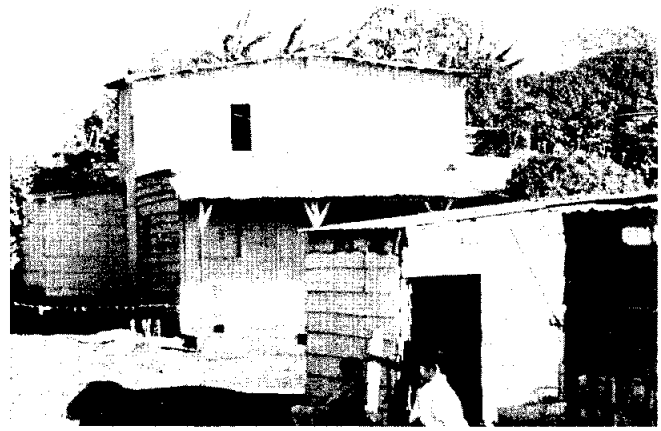
designs making better structural use of these materials[17]. While there is little doubt that the structural performance of traditional buildings can be greatly improved, many programmes of this type have been unacceptable to the local people, and have therefore also been a disappointment to the agencies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

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

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

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

In Managua the US Government spent $3 million to build 11,000 "temporary" shelters: "Las Americas". One year after the disaster, occupancy was only 35 per cent. This was due to an overestimate of shelter needs and a failure to provide adequate services, including electricity, piped water to homes, adequate sanitation and shops and schools. The lack of surfaced roads presented problems, as did the distance and lack of bus services to reach central markets—the source of livelihood for many and the only place to purchase cheap food. However, once these services were provided occupancy began to rise.



"Las Americas"—the modification of shelters: one particularly enterprising house owner adapted his house by adding a porch and a second storey.

[17] In 1974 the Office of Foreign Disaster Assistance of the United States Government financed over 11,000 temporary houses in Managua, Nicaragua, made from locally produced timber and corrugated iron sheeting.

the proper time to cut it; how to recognize whether it has been cured properly; how to treat it for different climatic conditions; and what materials to use with it, etc.).

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

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

Prefabricated housing built by the Turkish Government at Lice following the earthquake of September 1975. 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.

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.

(*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:

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

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

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

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:

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.

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.

Congregate purchasing. Another measure might be called "congregate purchasing", necessary to control prices of the manufacturer or wholesaler. Assisting groups could pool their resources and seek competitive bidding from suppliers or manufacturers of materials. It is most likely that they would get more favourable prices than if they were in competition with each other for the same materials.

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

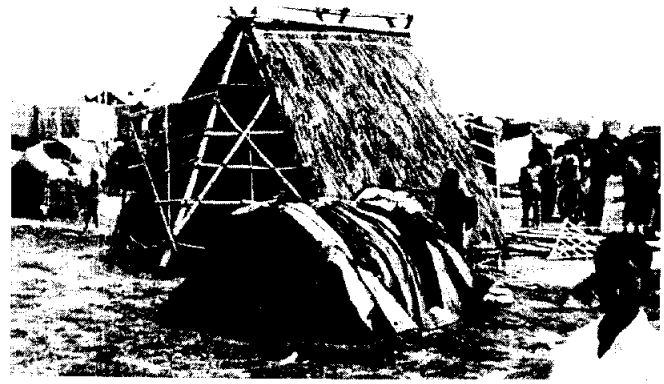
6. *Core housing.* A simple, low-cost frame or solid core is provided and can be used as an emergency shelter or temporary structure. The core is designed to be permanent and more hazard-resistant. Over a period of years the occupants are expected to fill in the walls with whatever materials are available.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

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

Providing such advice in time;

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

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



(Credit : Oxfam)

The "A-frame" thatched housing in the Tondi Bustee refugee camp, Bangladesh.

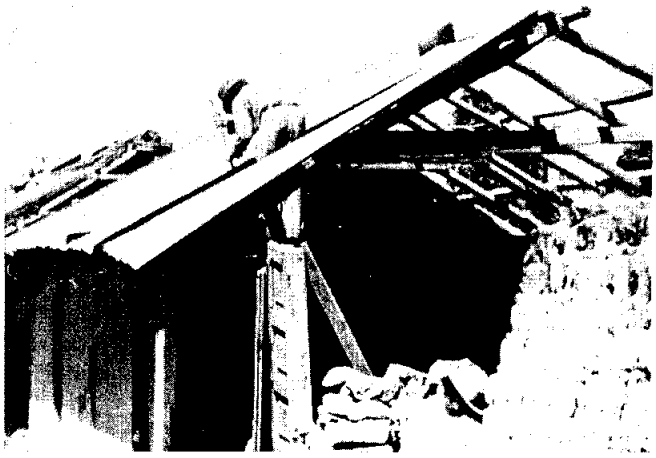
Making proposals that are economical and culturally acceptable.

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

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

The advantages of using this approach are as follows:

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



These photographs were taken within a week of the Guatemalan earthquake of 1976. They indicate reconstruction activity already in progress.

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

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;

It uses and builds upon the existing housing process and the skills which exist in the community.

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

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

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

Policy guidelines

Policies to avoid

1. Determining shelter needs for survivors based on the roles and perceptions of assisting groups alone.
2. Designing, manufacturing and stockpiling prefabricated emergency shelter units (other than tents), as this solution is too costly and a waste of resources for developing countries.
3. Assuming that there will be a direct correlation between numbers of houses damaged or destroyed, and numbers of families needing emergency shelter.
4. In the case of earthquake disasters, neglecting the emergency shelter needs of families who fear to occupy 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[18]. 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[19].
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.

[18] 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.

[19] 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.

Key References

CUNY, Frederick C., *Strategies and Approaches for the Provision of Emergency Shelter and Post-Disaster Housing,* Intertect (with funding from USAID), Dallas, Texas, USA, 1975.

DAVIS, Ian, *Shelter after Disaster,* Oxford Polytechnic Press, Oxford, United Kingdom, 1978.

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

Slide Lecture Series: *Human Settlements and Disasters.* Slide Lecture, Part 5, *Emergency Shelter after Disaster,* Ian Davis. Slide Lecture Series available from Commonwealth Association of Architects, Building Centre, 26 Store Street, London WC1, United Kingdom.

HOWARD, Jim, and Robert MISTER "Lessons learnt by OXFAM from their experience of shelter provision, 1970-1978", *Disasters and the Small Dwelling,* Pergamon, Oxford, United Kingdom, 1981, pp. 159-167.

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

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, April 1981.

HOWARD, J., and R. SPICE, *Plastic Sheeting: Its use for Emergency Housing and Other Purposes,* OXFAM, Oxford, United Kingdom, 1977.

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.

Contingency 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. asymetrical 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 stom surge, flooding and high winds

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

2. *Protection options.* The authorities have several options open to them:

To build cyclone shelters for the local population (and possibly for their livestock);

To devise comprehensive contingency plans for the evacuation of the affected population (these plans will need to include the building of all-weather roads);

To relocate people living in the most vulnerable areas.

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

Key references

FOSTER, Harold D., *Disaster Planning: The Preservation of Life and Property,* Springer-Verlag, New York, 1980. Chapters on: Risk and comprehensive planning; Development and the spatial distribution of risk; Safety by design; Predicting and preventing disasters; Disaster warning systems; Disaster plans; Construction and reconstruction.

AMBRASEYS, N. N., "Earthquake Hazard and Emergency Planning", *Build International,* Jan./Feb. 1972, p. 38.

KRIMGOLD, Frederick, *Pre-Disaster Planning: The Role of International Aid for Pre-Disaster Planning in Developing Countries,* Avdelningeu for — Arkektur KTH, Stockholm, Sweden, 1974.

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

UNDRO (UNITED NATIONS OFFICE OF THE DISASTER RELIEF CO-ORDINATOR), *Disaster Prevention and Mitigation,* vol. 5, "Landuse Aspects", Geneva, 1977; vol. 8, "Sanitation Aspects", Geneva, 1982.