Part-1

Managing the Transition

A document on construction and maintenance of temporary shelters in post-disaster context

Acknowledgements

We wish to thank ARTES Foundation who did study on "Managing the transition" - a document on temporary shelters on our behalf.

Our Thanks are due to Oxfam Netherlands for supporting the initiative.

Prologue

Disaster often strikes us when we least expect it. But that does not mean we cannot be prepared.

This publication will assist us all greatly to enhance our preparedness, our readiness to respond quickly while doing the right things, when it comes to the construction of temporary shelters for displaced persons.

The publication came about due to the linking of experience and expertise of ARTES Foundation and DHAN Foundation, two leading and renowned development NGOs from India.

This study draws major lessons from the temporary-shelter-construction-and-maintenance part of the Tsunami response during the years 2005 and 2006 in the Indian State of Tamil Nadu.

I was part of this response from the earliest stages onwards, so I can truly value the recommendations that come out of this publication. I witnessed the enormous optimism, many of us were sure that all those displaced by Tsunami would be in permanent homes in a matter of months, maximum half a year. Almost two years on, only 20% of the permanent homes that have to be constructed for those displaced by the Tsunami in Tamil Nadu have actually been completed. And therefore, 80% of the displaced community will remain dependent on temporary shelters for some time to come. And this is not a situation unique to the Tsunami response. Time and again we underestimate the very complex and time consuming process of permanent shelter construction.

In a majority of cases families will not stay in temporary shelters for months but for years. This underscores that we have to take the construction and maintenance of temporary shelters very serious. And that is exactly what Managing The Transition does. It takes us through the entire range of issues that have to be dealt with while getting involved with temporary shelter, all the way from planning through construction to maintenance.

The importance of using local specific materials is emphasised, both because of social acceptance and efficiency. Site selection is being dealt with and the Tamil Nadu experience has shown how important that is, during the monsoon of 2005, 90% of the temporary shelters was affected mainly because the great majority of them is situated in low lying areas. The publication also goes into issues like drainage; waste management; water needs; sanitation; social needs

etc. Moreover, the publication indicates some very useful technical recommendations for construction and the all-important maintenance. With all this, it is rightfully argued, community participation is key to come to successful results.

An interesting dilemma that the study highlights is that development workers and the community in a very short period of time have to provide high quality temporary shelters. In the light of the above mainly the longer duration that the temporary shelters are normally used for my view is that better some extra time is taken with the community to come up with descent shelters in proper places then to go for quick solutions that cause problems that might be regretted for years. Haste makes waste as some might say.

All in all this very interesting publication is a must read for all who are in any way involved in disaster preparedness work, wherever in the world. So please take the time to read the report, to reflect upon its findings and to take these back with you into your daily planning and practice. I certainly will!

Coen van Kessel
OXFAM Nedherlands

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“Managing the Transition” - Lessons learnt

Our country has been experiencing natural calamities at a large scale-the earthquake at Latur, Gujarat, the floods at Orissa, Bihar and Mumbai, cyclones in Andhra Pradesh and the tsunami, the frequency of which has been increasing over the past decade. Until now, the focus has been on reacting to the disaster from its onset. But a paradigm shift in the approach to disaster management has been called for - a pro-active approach that mitigates the impact of disasters by preparing the community for the same.

Importance of documentation for disaster preparedness

Experiences at Gujarat and Tamilnadu have provided us valuable insights for managing large-scale disasters. Invariably, the challenge in the relief stage has been a lack of credible documentation that can guide a process of rehabilitation. Basically what we require are documents suitable for the quick consolidation of efforts of the Government, NGO's and other organizations working in the region. The document, when generated can act as a guide to provide information on the region relating to:

- Topography
- Climate
- Soil type
- Proximity to the coast
- Vulnerability to earthquakes, floods, cyclones, tsunamis etc.
- Density of population
- Living conditions of households
- Social and economic characteristics
- Way of life
- Primary and secondary occupations
- Physical standards of housing
- Skills available in the region
- Level of basic infrastructure
- Availability of water
- Experience of contractors and engineers to be consulted for reconstruction
- Other allied information

The connectivity of the region to neighboring cities and towns, access to markets, other residential and industrial zones and access to emergency services should be ascertained. Creating a data bank like rural yellow pages, digital documentation of property holdings and details of land ownership, database of hospitals operating in the region, schools and government offices in the region is helpful with this regard. It would be an ambitious task in a country like ours to attempt to gather sufficient details in an instant; nonetheless the process has to be initiated.

It is also critical to understand the resilience of the community to manage the transition. Their ability to unite and deal with the disaster is not to be underestimated, because it is this positive spirit that enables their participation and involvement in the rehabilitation process.

It is in this context that “Managing the transition” has become important: the transition from the impact of natural disasters and provision of immediate relief to rebuilding and renewing the community to ensure continuity of life in the region.

Hence for the long-term sustainability of the region it becomes important to formulate disaster preparedness plans for future. Developing the emergency response capacities of the community will mitigate the loss of lives and property and also the cost of responding to the disaster. Information regarding early warning systems must not only be disseminated among the community but also can be made available on the Internet. Experiences, suggestions and guidelines issued by various NGO's working in the region can be made available through publications and the Internet with reliable institutions.

This document "Managing the transition" essentially deals with temporary shelters, their establishment within the constraints of time and budgets, the allied infrastructure, and also the process of upgrading them when the construction of permanent shelters has been delayed for several complex reasons.

The construction of temporary shelters

Assessment of the damage caused by the disaster to houses and rural infrastructure is useful to determine the manner in which the housing reconstruction is to be carried out.

Specifically information needs to be obtained regarding the number of houses that were destroyed, earlier patterns of living of the community (arrangement of the house, proximity to the coast, materials used for construction, quality of construction and physical parameters that increased their vulnerability to the disaster).

Details of the natural features that existed prior to the disaster could be obtained from past documents/photographs etc. Photo documentation of destroyed homes, broken roofs and walls, the debris, the intrinsic relationship between the built and the natural environment is useful at the design stage for rebuilding. Awareness gained of the availability of local and naturally occurring materials could not only reduce the cost of construction but also enable the region to be self-reliant and sustain the use of local and alternative technologies. Retaining earlier patterns of living is thus important to create a sense of belonging for the community.

Reconstruction however, does not include only various types of physical infrastructure. It also includes developing the human potential of communities to attain better standards of living. Discovering the inherent skills and strengths of the community can help to revive livelihoods that have been temporarily dislocated by the disaster.

On one hand, there is a great sense of urgency in providing the disaster-affected communities with temporary shelters that assured basic levels of comfort-the construction of shelters that were permanent would take time. On the other hand, selecting the site to construct permanent shelters is not an easy task. Adequate land is to be made available to suit the social, economic and cultural requirements of the community.

Identifying land requires repeated negotiation with issues of land ownership, adherence to coastal regulations, negotiating with communities that are sometimes unmindful of guidelines. Also, it was necessary in some cases, to shift communities from previous habitats to safer locations but some communities were not entirely receptive to change. While shifting all aspects of social bonding, place of work etc need to be respected from the community's point of view.

Gaining familiarity with the region and earlier patterns of life of communities can help restoration possible to a great extent. In many of the temporary shelters for example, 'thinnai" or small verandah was preserved for the same function it meant to serve in traditional houses. The kitchen is usually kept in the outdoors. Open fire for cooking and the resultant smoke emitted necessitated the use of smokeless choolhas for cooking.

Simple interventions such as these have considerable implications on the standard of living. Temporary shelters can then be constructed based on a design that is developed after consultation with the community. The needs assessment highlights certain dimensions that when introduced could improve the quality of life of the community.

Adequate standards are to be maintained for ventilation, thermal comfort and lighting. Raising awareness about sanitation encourages the use of toilets and bathrooms. In the long run, this is likely to impact positively on the health and hygiene of the population.

Along with the construction of the shelters, toilets and bathrooms must be built on site. Community centers when built foster community spirit that acts like a vital point for formal and informal discussions. The supply of water from nearby water bodies is regulated through the provisioning of hand pumps and taps. Sintex, overhead and underground water tanks are kept at accessible locations.

Although conceptually temporary in nature, the transition stage between immediate relief and building of permanent houses takes much longer than foreseen. Land allocation, at times, delays the process of permanent housing from the anticipated time for construction. Some communities could also abandon temporary shelters. Others continue to live in the provided temporary shelters, but fast deterioration maybe witnessed in these shelters.

Upgrading temporary shelters

The need for upgrading and improving the structure of the shelters arises because of the wear and tear of materials, inadequate protection against the sun and rains and low maintenance. Intense heat could be witnessed in shelters that have roofs made of asbestos/tin sheets. For protection against the heat, a second roof could be reinforced above the existing roof. The height of the plinth can be raised to prevent water from entering the premises (heavy rains were expected in due course of time). The facilities for cooking are enhanced with the provision of smokeless choolhas. Solar lights placed for street lighting and for use in toilets and bathrooms save energy from renewable sources. Shelves for storage, painting of walls, fixing lock/key facility for doors, suspended bamboo mats to create private spaces- are some of the newly proposed elements useful for upgrading shelters. The materials that are used for upgrading shelters are such that when the time comes for communities to move to permanent houses, the elements may be reused. The stage of upgrading thus constitutes a considerable investment that introduces a certain sense of permanency in the built habitat.

SOME SALIENT LESSONS LEARNT

Each of the dimensions in the transition that have been dealt with in the previous chapters teaches us valuable lessons. Lessons learnt from the experiences gained become useful to understand the dynamics involved in the transition that leads to quicker consolidation of effort to rehabilitate disaster-affected regions. These are just some of the salient lessons imbibed and the understanding is continuously evolving with new experiences. In order to make the experiences more broad based some of them have been documented for further refinement over time.

1. Study of pre-disaster life patterns of the community

The way of life of the community is better understood through the study of pre-disaster life patterns of the community. Useful not only from the point of view of the design process but also ensures social continuity of the community. Regular interaction and discussions with the community helps to gain familiarity of the extent of impact due to the disaster and also how an improvement in the living conditions could be achieved. Availability and accessibility of facilities and services that the region did not posses could be generated.

2. Aspects of site selection

Selecting an appropriate site for the construction of temporary shelters is useful both in the physical and the social/cultural sense. The physical characteristics of the site that makes it suited for construction depends on the type of soils and its quality, availability of ground water to satisfy minimum need of water for drinking, cooking and cleaning. Low-lying areas may not be safe for construction.

3. Materials used for construction of temporary shelters

It is important to gain an awareness of locally available materials. Many advantages arise out of the use of materials that are available in the region. On one hand it is cost effective and on the other it helps to maintain a sense of belonging. Local skills may be adept at using these materials and construction becomes easier and takes less time. A database could be created of the materials available, uses and disadvantages, along with a list of suppliers and quality conscious contractors in the region.

4. Provision for adequate drainage and waste management

As a physical intervention, drainage systems are important to prevent flooding of regions that are highly prone to water stagnation. If water is allowed to stagnate in front of the houses, and near the toilets and bathrooms it increases the danger of ground water contamination and the possibility of an epidemic outbreak. As a form of social intervention, developing systems for waste disposal and drainage suited to local conditions takes regard of health and hygiene of the population and also raises awareness leading to the reduced use of plastics. Recycling of wastes with low cost technologies is also an appropriate response.

5. Water needs of the community

Satisfying the water needs of the community means to ensure an equitable distribution of water to each family of the community. Sources could be natural or existing in the site and external sources. Sintex tanks, ground and overhead tanks store water that is supplied through taps and hand pumps. Rationing water to prevent waste is also essential. Solutions for the re-use of water are helpful for sustaining water supply to the regions.

6. Providing electricity in the shelters

Minimum standards of electricity are satisfied with the provision of some lights and a fan in each shelter. Lighting the streets is also important for safety. Solar lights are useful when provided in the common toilets, bathing spaces, streets and the community center.

7. Social needs of the community

The social dimension of managing the transition includes the provision of services that are critical in enhancing the well being of the community. Attention should be given to protecting the needs of the women, children and that of aged people.

Temporarily displaced livelihoods will have to be renewed. Adequate community spaces are important for recreation and also serve as vital points for local governance decision-making processes. Trauma counseling instills greater preparedness and ability to deal with the shock. Health care needs require special attention. Building temporary health centers to meet emergencies is essential during the transition. It was also experienced that a provision store set within the neighborhood of the communities could well take care of the most immediate needs.

8. Design process for temporary shelters

The pre-disaster study forms the basis to evolve the design of the house. Community participation is very important to determine the temporary shelter type to be built and the nature of improvements to be made. This also empowers the community to make changes that suit individual specifications. For thermal comfort and ventilation, the temporary shelter should be built in such a manner that it allows plenty of sun light useful to save electricity during the day and cross ventilation for cooling during the summer.

The materials that are being used to build the shelters should be such that they can be put to use again, when communities relocate to permanent homes. This makes it easier to clear the site for construction of permanent homes, reduces waste and makes the entire task of rebuilding much more economical.

9. Safety standards

Keeping the temporary shelters safe is to keep them safe from fire, heavy winds and rain. The construction of the roofs for example should be such that they do not get lifted away with the wind. The thatch that is usually placed over the tar/tin sheets must be placed at a considerable height from the ground to reduce the risk of fire. To prevent fires in the kitchen, buckets filled with sand can be placed at several locations. Other safety standards include raising the level of the plinth, cementing the floor etc.

10. Role of domesticated animals and other social needs

The role of domesticated animals is to be recognized. For many of the rural communities, income from rearing animals is an additional source of livelihood. Spaces should be made available to avoid animals straying and land is also needed for grazing.

11. Construction through capacity building

For communities to be self- reliant, it was recognized that their skills needed to be empowered. By developing the skills for communities to engage in construction, an alternative livelihood when created increases their potential earning capacity. This reduces the dependence on hired contractors and communities develop confidence and a sense of pride.

12. Systems for proper sanitation

Keeping with the guidelines and standards set by the Government, toilets and bathrooms were constructed. The community themselves experienced a sort of social transformation. The reduced dependence on waste and open lands helped to address the needs for privacy of women and children. Awareness in using the sanitation systems, maintaining proper hygiene conditions was facilitated by several social workers.

13. Disaster preparedness and the community

Institutions such as a disaster mitigation center, created for better preparedness of the community have to be integrated with the daily life of the communities, for example, a stray siren blaring in the village fails to catch the attention of the people. Children going to school can be taught how to handle emergency situations that they are likely to face- how to respond to an alarm without creating undue fear and panic. It is also as important to set proper procedures in the event of a disaster. For example, creating a forum to locate lost family members and friends, establishing rules for governance if breakdown of law and order were to occur, preserving the security of banks and other institutions etc.

Summation:

Briefly, it has thus been seen that this process of reconstruction and revival of living conditions for disaster affected communities is not as straightforward as it may seem. The manner in which interventions are implemented and the time taken for the same is considerably affected by the willingness of the community and the anxieties they expressed. It is important however, to recognize that each of the stages, constructing temporary shelters, upgrading them-eventually leading to the construction of permanent shelters is progressive in nature. Different regions experience each of these stages at different periods of time depending on how the communities respond, the scale of damage, and other regional differences.

CHAPTER 1

1.1 Introduction

One of the critical dimensions in managing the effect of natural disasters and mitigating their impact is the transition between immediate relief and rebuilding of permanent houses. This includes the necessary but difficult task of constructing temporary shelters for the affected community and understanding the social and economic impact of this transition on people's lives.

This report aims to provide information and recommendations that may be useful for the better management and quicker consolidation of the efforts to rehabilitate disaster affected communities. The report lies specifically within the context of the recent tsunami that claimed more than 8000 lives in the southern coast of India (excluding Andaman and Nicobar Islands).

The creation of temporary shelters for natural hazard prone vulnerable populations thus constitutes the core of rehabilitation. Temporary shelters are constructed immediately after the disaster to provide a minimum form of shelter for communities who have lost homes and belongings. **While this phase is conceptually temporary in nature, the fact remains that even a year after the tsunami, many communities still continue to live in 'temporary' shelters and it is for this reason that it becomes more important to understand- how to better manage this transition.**

By recognizing the extent to which the temporary shelter stage in the rehabilitation affects the social and economic development of the community, a process may be evolved for better preparedness and to develop, through a participatory approach, the basic criteria for building the temporary shelters. The sustainability of the reconstruction program depends on the reduced likelihood of the community suffering again from another disaster. Developing the resilience of the community is possible by increasing their emergency response capacities and creating strong but secure linkages between housing and employment.

The government in collaboration with corporate partners, experts and professionals and the NGO's working in the region, can evolve procedures and systems that can safeguard the community in the future. For example, the government reinforces the coast, through the bio- shield concept, for homes being built near the coast to be secure. It can also facilitate through satellite mapping, contours of low-lying areas and vulnerable zones that are at risk to cyclones, floods etc.

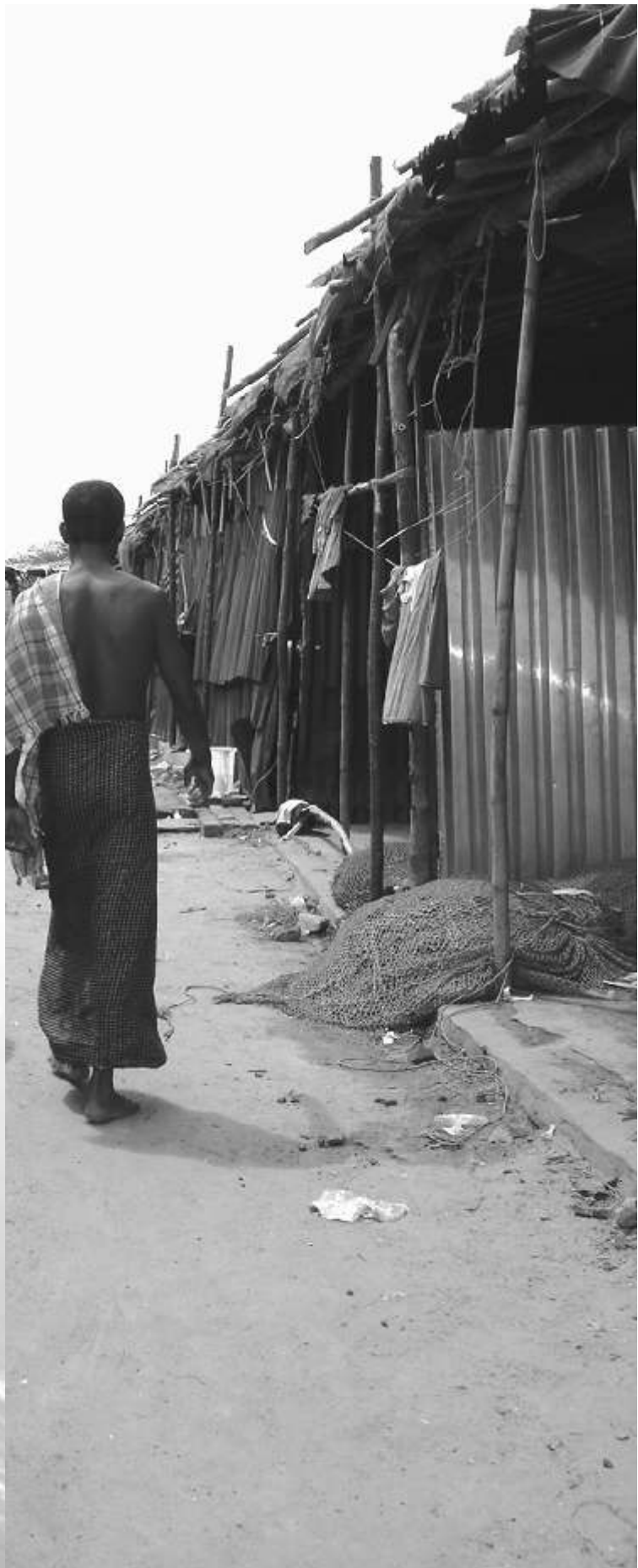
1.2 Objective of the study

The objective of this document is to understand the living conditions of communities in temporary shelters and to collate both data and experiences on managing the transition in the course of disaster preparedness. The document brings into light the challenges that face the process of managing the transition, with a primary focus on the tsunami affected regions in the state of Tamilnadu and Kerala.

Helping the communities to recuperate from the disaster is a tough challenge. Being one of the largest natural disasters of its kind that has affected the southern coast of India, the tsunami has raised new issues surrounding the process of rehabilitation, relocation, guidelines for construction, coastal regulation, land allocation, restoration of livelihoods etc. Another important objective of this report is also in that it brings into light the focus on security of livelihood, capacity building programs and the program for maintaining and upgrading existing temporary shelters. DHAN Foundation believes in the form of rehabilitation that essentially empowers the community, rather than an approach that leaves regions at continued dependence to external help.

THREE MAIN FOCUS AREAS OF THE REPORT INCLUDES:

1. Construction of temporary shelters
   …Understanding earlier life patterns
   …Basic guidelines for construction
   …Assessment of materials used
   …Evaluating costs of construction
2. Study of existing living conditions in temporary shelters
   …Visual documentation of temporary shelters
   …Establishing physical standards of housing
   …Facilitating social and economic needs of the community
   …Extent to which basic needs have been satisfied
   …Understanding the day to day challenges in the lives of communities



3. Lessons drawn and implications of the study

   …Need for revision of standards- proposal for upgrading shelters

   …Emerging needs and problems

   …Integrating rehabilitation with capacity building program to secure livelihoods

1.3 Methodology of the study

The preliminary phase of this document consisted of field visits to few of the temporary shelters located in the regions of Chennai, Cuddalore, Nagapattinam, Sirkhazhi, Pondicherry and Kanyakumari. Visual images of various aspects of temporary shelters formed the starting point of the report. Interaction by the study team with the community helped to assess in general the emerging needs and problems of the community.

Since the time of the tsunami, a number of positive developments have resulted with the collaboration of the government, NGOs working in the region, organizations and individuals. While all rehabilitation efforts have been much appreciated, the study also revealed that there is need for further improvement.

A needs assessment survey has enabled the study team to identify the interdependent elements in the transition. Each of the elements in the transition has been studied separately in order to better understand the extent to which basic needs and guidelines of the rehabilitation process have been satisfied.

1.4 Post-tsunami rehabilitation program

With the recent tsunami that devastated the coast of Tamilnadu, Kerala and Andhra Pradesh, certain important aspects of disaster preparedness have been raised. The tsunami that struck the southern coast of India on the 26th of December 2004 led to considerable and unfortunate loss of lives and caused extensive damage to property and assets. Houses were destroyed and washed away because of their close proximity to the coast and on account of the physical vulnerabilities of the dwelling units. The communities who inhabit the coastal areas have been directly and hence worst affected by the tsunami.

The greatest damage has been on the fishing community, agricultural communities near the sea coast, other communities living near the sea coast like carpenters etc and the marginalized lesser privileged communities whose dependence on the seas has cost them their livelihoods, which they are gradually regaining.

The construction of temporary shelters aims to establish some sense of order, as the community slowly starts to recover from the disaster. Facilities for drainage, sanitation, transportation, basic infrastructure and coastal protection are to be provided along with the construction of shelters.

The design of the temporary shelters has a considerable impact on the social, economic and cultural dimensions of human life. At the same time, the social and economic requirements of the community, in turn affect the physical standards that are to be developed for housing. The fact about the transition is that in several instances, the reconstruction of permanent shelters may take several years and developing a way of life that gives people a sense of belonging must be facilitated in the stage of transition.

This requires the creation of auxiliary services that is necessary to maintain minimum standards of living. Developing the necessary infrastructure and restoring damaged infrastructure is a combined effort of the government, the community, the NGO's and professionals.

Briefly, this will include

1. Providing safe drinking water to the community and systems that regulate the supply of water.
2. Ensuring that the community has easy access to food distribution centers, ration shops etc.
3. Maintaining appropriate drainage and sanitation systems and seeking solutions for the management of wastes.
4. Facilitating transport to the markets, primary and secondary schools, provision store, places of work; by laying roads and pathways, within and outside the shelters.
5. Creating livelihood opportunities for economic sustenance of the community.
6. Ensuring power supply, safety from fire etc.
7. Attending to the health needs of the community.

8. Raising the general awareness of the community in order to integrate improvements in the indicators of human development within the effort to rehabilitate the community.

To create auxiliary services requires physical space. Foresight must be used to judge whether the site selected for construction of temporary shelters can satisfy, not only the present but also the future needs of the community. The possibility of relocation needs some consideration before a large amount of time, money and material is pooled in to build temporary shelters. Time and cost considerations are critical in the development of safe and comfortable habitats for the affected communities.

1.5 Summary of the report

The following summary has been provided to give a brief overview of the entire process of managing the transition.

The existing conditions of the temporary shelters have been well documented for this purpose. The primary objective of the document is an initial endeavor in developing housing standards for shelter programs in hazard prone vulnerable regions in the country and hence develops an understanding of the relevance of interventions in the form of temporary shelter programs. With the experience of the different stakeholders involved in different areas of the rehabilitation efforts, the document could grow over time and help in the preparation of disaster management plans in specific regions.

This report would specifically cover the following dimensions, the summary of which has been provided below. Subsequent chapters will deal with each of the elements of the transition in detail.

1. **Photo documentation of typical temporary shelters:** The objective of photo documentation has been to visually convey the existing conditions of the temporary shelters.

In a certain way, photos not only reveal characteristics of the way of life in the shelters and their common problems but also lead us to imagine how a day is like, for the children, the women and the men in the community. It would provide some insights for further research and documentation of life in the tsunami affected regions.

2. **Site selection:** Before the construction of the shelters begins, the site on which the temporary shelters are to be built must be decided. Various factors contribute in deciding the appropriate site. The temporary shelters will either be built in locations where the community lived before (and which was damaged by the disaster) or they will be moved to new locations.

3. **An assessment of materials used:** A careful understanding of resources available in the regions also becomes critical since the construction could be easily created with donated money, material and resources but its sustained and continued usage well beyond the recovery stage needs to be examined. For instance in developing systems for water treatment, at times, expensive water desalination plants have been installed and availability of safe water ensured at site. Invariably when the intervention term is over and the NGO moves out of the region, the community is not able to sustain the costs of its continued usage and maintenance. Therefore sustainability is a critical principle in any intervention.

4. **Assessment of construction techniques, costs and durability:** In order to be better prepared, a reference check list of materials and their construction techniques, costs and their labour requirements would be prepared for ready reference and dissemination.

5. **Drainage and waste management:** Issues of drainage and management of wastes are more complex to deal with since it not only involves building the necessary infrastructure but also raising awareness.

   Simple and cost effective methods in dealing with the problem of water stagnation and disposal of wastes need to be sought.

6. **Water needs of the community:** This section explores the availability of water in the regions inhabited by temporary shelters, the accessibility to safe drinking water and choices to increase the supply of water for the future.

7. **Power supply for the temporary shelters:** The supply of electricity is necessary, both at private and public areas. A simple network of power supply is made available in most of the shelters. Alternatives like solar lamps could be explored since invariably the communities are located in remote areas inaccessible to a continued power supply.

8. **Facilitating social needs of the community and recommendations on patterns of living:** The role of the temporary shelters in facilitating the social needs of the community is huge. While pre-disaster life patterns maybe closely maintained, elements that upgrade their quality of life need to be incorporated. A sensitive approach is critical if the community is not to experience these new interventions as impositions on them to confirm to an alien way of life.

9. **Physical patterns of thermal comfort and ventilation:** Inadequate ventilation and absence of thermal comfort have undesirable consequences on public health and safety. Establishing parameters for the same will reflect on the design of the shelters and the materials used.

10. **Setting standards for latrines and toilets and recognizing its social implications:** Rural village communities must be made aware of the need to use clean bathrooms and toilets that is beneficial both for personal hygiene and clean environment. Communities require training, for the proper use of toilets and bathrooms; imparting such knowledge may at times influence entire mind sets of a community that is not familiar with sanitation practices.

11. **Program for upgrading shelters:** A possible upgrading program would be required if the duration of stay in the temporary shelters is longer than envisaged. Different proposals for upgrading should be taken into consideration that fulfills changing needs and revised safety and precautionary standards. The use of renewable energy could also be explored that would enhance the benefits to the community and the environment over a longer time.

12. **Capacity building programs:** The concept of capacity building aims to enhance the skills of the community that opens up wider avenues for employment. The idea is to impart training in all areas of construction, diversify their sources of income and gain vocational skills so that a team of painters, carpenters, masons etc. could be created from within the community, and they can take up the responsibility of constructing permanent homes for themselves.

13. **Disaster preparedness and the community:** A greater degree of disaster preparedness will help to manage better, the transition from disaster to recovery and reduce the time and cost involved in responding to the disaster. When the elements of the transition are well understood, with the cooperation and participation of the community, dealing with the aftermath of the calamity can be less traumatizing.

14. Social factors that impact settlement location and design: This chapter has a brief look at the dimensions in human life that impact and determine the overall quality of life. A study of these dimensions over a period of time is essential to know how interventions to rehabilitate the community have succeeded in their efforts.

CHAPTER 2

DIMENSIONS IN THE TRANSITION

This section provides a summary of all the dimensions that need to be understood for managing better, the transition from immediate relief to recovery. Any intervention that provides temporary shelter programs for marginalized/ disaster affected/dislocated communities can benefit from incorporating the ideas and recommendations that have been evolved through this study.

1. Pre-disaster life patterns of the community

a. Understanding how the community lived before the disaster is necessary.

b. If the newly created temporary shelters closely resemble earlier patterns of living the feeling of belonging and normalcy can be easily created.

c. While keeping certain elements in the lives as constant, recommendations on patterns and way of life is required to upgrade their quality of life.

d. The importance of open spaces when recognized will make social interaction possible.

e. Data needs to be collected on how houses were built and how the space inside and outside the houses were used before the disaster.

f. Knowledge about the perceptions of the community about sanitation and hygiene and the existing state of sanitation and hygiene conditions are essential.

g. Relationship of the community to public services, the market and nearby towns and villages is essential to know the dependent functions that are to be re-created or ensured at the time of construction of temporary shelters.

h. Documenting primary and secondary occupations of the community facilitates decisions regarding restoration of earlier livelihood patterns and creation of alternative livelihoods. For example, restoring the livelihoods of the fishermen after the tsunami meant providing new boats, fishing gear, subsidies and loans for own purchase of equipment.

i. How the community used to obtain and fulfill their needs for food and water is important in knowing how they can be made available in the future and how their availability and accessibility may be secured.

j. Some information about the domestication of animals by the community will not only lead to making special arrangements within the sites for the animals but also to understand how the animals are useful to the people to work in the fields and to provide milk and food.

k. Information about the condition of women and children in the community is used to develop an approach that will lead to their empowerment and development.

2. Aspects of site selection

a. Choosing the site where the temporary shelters will be built is one of the most crucial decisions in managing the transition. Prospects and possibilities for the growth and development of the community depend on the advantages that the site has to offer.

b. Methods and technology can be used to increase the resilience of the site to calamities, if the site is at risk from natural hazards. Construction of bunds, raising the level of the settlement at a considerable height above the sea level, creation of a thick vegetation belt near the sea are some of the methods used to prevent locations from further damage.

c. The community will have sentimental value for the land. Compromising with the community in the case of a possible relocation could be an extremely difficult task.

d. Another critical factor is the ownership of land. Conflicts may occur between landowners and the community. This happens when the land on which the shelters are built are on private spaces that are leased out for a limited term.

e. The site is ideal when placed at a reasonable distance from transport facilities, infrastructure, close proximity to the market, to place of work, to places of worship etc.,

f. The site should have the capacity to expand as the community grows, both in terms of physical space as well as economically.

g. It must fulfill the basic needs of the community for growing food and availability of water.

3. System for drainage in temporary shelters

a. A simple system could be developed.

b. His would however depend on the likelihood of the region receiving heavy rains, quality of the soil etc. For example, the sandy soil in the coastal regions allows the water to soak in easily and it is not very necessary to explicitly develop a drainage system.

c. Laying a strong foundation for the house and a plinth of considerable height reduces the risk of flooding.

d. Soak pits kept near the toilets and the bathrooms can also prevent water from remaining stagnant.

e. On both sides or on one side of the street, gutters can be made of mud or simply carved out of mud. This water is allowed to flow into soak pits or at common collection point.

f. Around common taps/sintex tanks and taps, enclosures can be provided that will not allow the water to remain stagnant. The wastewater needs to be directed to soak pits or nearby low-lying areas.

g. Drainpipes from the kitchen will prevent water from stagnating in front of the houses. This will also keep the streets clean and minimize the spread of water borne diseases.

4. Management of wastes in the temporary shelters

a. Techniques of managing wastes in the temporary shelters are different from those practiced in cities and towns.

b. Awareness levels about the use of plastics and its harm on environment and the health of the community is low.

c. In coastal areas, in many cases, the sea is used as a dumping ground and this has harmful effects on sea life.

d. Construction of toilets and bathrooms also require the construction of septic tanks and the development of a sewer system.

5. Water needs for the temporary shelters

a. All shelters require a regular supply of water, that is easily accessible physically and affordable to the community.

b. Use of toilets and bathrooms largely depends on the availability of water. Taps and water tanks are to be provided close to the latrines.

c. When water cannot be made available on a regular basis, some method of organizing regular supplies needs to be created with proper timings etc.

d. Sharing water can create conflict within the community. The issue of rationing the amount of water than can be used is complex.

e. Storage tanks and pipes need regular inspection. Broken and rusted pipes can lead to a large amount of water being wasted due to leakage.

f. Digging up bore wells and the practice of rainwater harvesting has great potential in regions where the monsoon is more or less predictable.

6. Power supply in the temporary shelters

a. Every shelter is usually provided with one electrical light point, bulb and a switch.

b. People use other appliances with extension cords.

c. In most of the toilets and bathrooms, light bulbs are not fitted. This means that women and children may fear the use of latrines and bathrooms after sunset. The streets also remain dark and dingy.

d. A solution will be the use of solar energy to generate the necessary power in the site.

e. The use of renewable sources of energy has great potential, thus. Even if the costs of installation are high, in the long run, it is a reasonable solution that is long lasting and has value for money.

f. Electrical training can be arranged for the people, so that in case of any problem, they can repair the damage themselves saving time and money.

7. Facilitating the social needs of the community

a. Setting up temporary warehousing/storage and distribution centers to make food available and accessible to the public is essential.

b. Information must be collected to assess food habits and needs of the population. Data on the food resources available in the region must be collected. A possibility in the future is to research on the consumption patterns of the individuals to determine the level of poverty that persists in the vulnerable regions.

c. Health clinics can be kept in place to prevent the spread of epidemics, emergency help for the aged people in the population and regular immunization programs for the children in the community.

d. Trauma counseling for the victims of the disaster is extremely important in the stage of rehabilitation. This also calls for creation of scientific awareness of the hazard and providing information on various aspects of disaster preparedness.

e. The development of community spaces is very important. Interaction between the community both on a formal and informal basis is to be preserved.

f. It is equally important to develop spaces for the children. Child activity centers, crèche, parks etc. are useful in developing the physical and mental development of the children.

g. The temporary shelters should be in close proximity to the food distribution centers, place of work, worship and transport systems. It must have the capability to develop into a self-sufficient village unit.

h. Kitchens are preferred as an extension to the house. In some of the shelters, smokeless choolhas can be slowly encouraged.

8. Capacity building

a. Skills should be developed from within the community to undertake building of transition shelters and its up gradation and maintenance.

b. Periodic assessment of skills can be done by qualified specialists and training programs.

c. Awareness on construction principles by hands on approach should be done.

d. Community in a state of preparedness in facing repairs., etc of their own shelters in the event of emergency.

e. Construction has greater chances of responding to community needs.

f. Sense of ownership, responsibility and pride instilled

g. Community participation is a catalyst to transformation.

h. Resources reach beneficiary as a skill building program.

9. Standards of sanitation and hygiene in temporary shelters

a. Creating awareness for the use of toilets and bathrooms is essential.

b. A large proportion of the communities in the disaster affected regions use wastelands instead for defecation.

c. Gaining the cooperation of the community maybe obtained by raising awareness about the positive effects on health and hygiene.

d. Latrines are to be constructed near water taps and tanks where regular water is available.

e. The doors and walls when made of strong material, and with the facility to be bolted encourage the community to make use of them.

f. Keeping in mind the number of people who are to make use of the toilets and bathrooms, enough number of toilets should be constructed. Making people queue up causes inconvenience and discourages its use.

g. When toilets are well lit, women and children feel much safer to use them. The use of solar lighting will ensure this.

h. Access to the toilets also needs to be clean and safe.

i. Creation of a septic tank and a sewer system follows the construction of the toilets. Contamination can be avoided by placing the sewer system in separation from common water sources.

10. Maintenance and upgrading program for temporary shelters

a. While a large amount of money is being spent on shelters that are only temporary in nature, the fact about the transition is that it may take several years until the communities move into permanent shelters.

b. Regular maintenance and a possible upgrading program maybe required.

c. Sustainable use of materials is encouraged in the process of upgrading shelters. This means that certain elements used in the temporary shelters could be sustained for use in the permanent houses as well.

d. Causes of the failure of non-engineered construction in facing natural hazards are made aware to the community. Through the capacity building programs, community should be taught simple techniques of construction and methods of repairing damages.

11. Setting standards for thermal comfort and ventilation

a. Ventilation for the dwelling unit is a must. Air circulation inside the house increases comfort levels, makes the house airy and free from bad odour, and reduces the chances of dehydration and breathing problems.

b. Leaving some space between the roof and the walls also air lifts the roof during heavy winds. Hence proper support should be provided to held the roof with walls firmly.

c. By providing adequate ventilation the shelters are kept free from excessive heating during the summer.

d. Adequate ventilation through deliberate gaps and windows reduces the use of electricity during the day- i.e. reduced use of fans and lights. Removes the feeling of claustrophobia and ailments due to headaches, nausea etc.

CHAPTER 3

Temporary shelters and the concept of disaster management

One of the aspects of disaster management is the creation of temporary shelters. In order to recognize and develop the significance of this phase of rehabilitation, it is imperative to understand the overall concept of disaster management. The experiences of earthquakes in Lattur & Bhuj, Floods in Orissa and tsunami in South India have raised several issues in disaster mitigation and preparedness that need to be explored in depth in order to create safer living habitats.

While hazards cannot be prevented, better preparedness will ensure that hazards do not get converted into disasters. Disaster response can only provide temporary relief to the affected community. On the other hand, the process of disaster management aims to provide early warning of a natural hazard and to identify an approach to prepare the community for the same.

3.1 Disaster Management[1]

Disaster management involves the networking of the community with policy makers, professionals, financial institutions and NGO's to identify a process of action that should be initiated for a successful reconstruction of housing conditions and revival of livelihoods of the affected communities. The process of managing disasters therefore would have to be reoriented within the overall framework of the Government's policy for regional development. The planning process for managing disaster will include vulnerability mapping, resource mapping, developing early warning systems, response and evacuation strategies, access to emergency services and integrating them with long term development plans.

The objectives of the overall disaster management system is to ensure :

1. A vulnerability analysis mapping will be able to forecast and hence develop an early warning system so that the effect from the hazard can be mitigated and an evacuation-recovery plan can be determined accordingly. Using reliable disaster risk information from hazard mapping and vulnerability, and based on lessons learnt from past experiences, information can be made available to develop strategies and technology that will increase the resilience of the community at risk.
2. Public information is made available to all the regions that have a high probability of being damaged by the disaster, i.e. preparedness plans are to be disseminated to the community. The concerted effort of the government, the NGO's, corporate bodies, community based organizations, educational institutions, hospitals and specialists and professionals, who can lend their expert opinions and experiences, is necessary to devise a plan to prepare a community to manage disaster.
3. Emergency response systems are to be well placed in risk-prone zones and adequate training can be imparted to the local population to educate them about the disaster and its likely effects.

Once these plans are made there must be a mechanism whereby they can be tested for their ability to alert populations and caution them about the disaster. In ensuring that the devised system for preparedness actually works, one must start with simple response strategies, for example, conducting mock fire drills in school, warning and evacuation alarms in high rise buildings and having simple evacuation procedures in educational

[1] For further information on disaster management, some useful websites for further reference has been provided in the appendix.

institutions, public places etc. Without creating undue fears, people must be made aware of the reality of the situation so that they can react quickly but calmly.

With the use of television, the radio, newspapers and the Internet, awareness levels of the public may be raised. Information can be disseminated through the local church, mosque and temple and through the public address systems in the villages. These are the mediums that are used to educate the masses about the likelihood of the disaster, the precautions to be taken and a possible plan for evacuation.

The benefits of being well prepared for the disaster is to reduce the risk of social and economic disruption that follows from the onset of the disaster. The investment in preparedness would undoubtedly curtail the large amount of resources spent on research and technology by countries in the event of large scale disasters.

3.2 Process of Rebuilding

Relief, Rehabilitation and Reconstruction

The broad objective of setting up a pro-active process for relief, rehabilitation and reconstruction are to minimize the loss of lives and damage to property and resources because of natural or man-made disasters. As one experiences the impact of large-scale disasters, the three phases may be broadly described in terms of relief, rehabilitation and reconstruction.

Each stage has its own characteristic in the sense that **Relief** largely deals with first aid, rescue, emergency support, clearing of debris, setting up forums to locate lost ones, identify families and ensure quick supplies of appropriate food and clothing, medicines and other essential services. The onset of the disaster is a time of uncertainty for all the people who have been directly affected. While some have lost their friends and relatives, others have lost their entire homes and belongings. To respond immediately and to provide emergency help to the affected community is the primary function served by relief efforts. Response during relief comes mainly from the NGO's Government and from the community themselves.

Rehabilitation broadly is identified with the stage wherein the community is provided housing in temporary shelters. A certain sense of order is established during this stage when the community gradually begins to come to terms with the tragedy. Most often communities at this stage require support from NGO's and community-based organizations to facilitate their recovery. It is also critical during this stage to ensure that the community takes ownership of its recovery process. The support and acceptance of the community can favour the successful implementation of the intervention.

The social and economic development of the community will depend on the restoration of necessary infrastructure. The physical standards of housing should hence compliment the social/economic needs of the community. The physical dimension of managing the transition includes the creation of temporary housing facilities and the development of infrastructure and this forms the core of the rehabilitation stage. The process of rehabilitation has a longer time frame than relief and it should help the community to more or less recover completely from the disaster. Thus the basic elements in the rehabilitation stage includes :

1. Construction of temporary shelters and recognizing their social and economic impact.
2. Satisfying the welfare needs of the community.
3. Providing alternate options to secure livelihoods.
4. Up gradation of shelters to promote capacity building.
5. Addressing issues such as waste management, drainage and availability of public utilities.
6. Understanding the dynamics of possible relocation.

The transition between the aftermath of the disaster and complete recovery is the most crucial, because this sets the stage for further progress of the community. The transition has to be managed in such a way that the community is able to take ownership of its resources and capabilities and rebuild its economy to achieve better standards of living.

Reconstruction is the final stage that sets the platform for recovery after a disaster is the provision of permanent housing facilities and common infrastructure. The success of the capacity building programs will be seen when the community takes on the task of building homes for itself.

3.3 Managing the transition and its implications on long term development

Developing countries with limited resources and capabilities are generally badly affected by man-made and natural disasters. This is because; in developing countries the impact of the disaster on lives and property can be associated with increase in the depth of poverty, widening inequalities in wealth and income and also have long-term consequences on economic and human development. The number of human lives lost to disasters only increases on account of rapid urbanization, population growth and environmental degradation. Both the rate of urbanization and population growth determines the density of population and a high density of population means that the scale of impact of the disaster is even greater, because it places a larger number of people at risk.

Needless to say, natural disasters of large magnitude considerably impact development and result in large losses, which require consorted collective effort to restore normalcy. Use of the media and various types of literacy campaigns will raise caution and awareness to the community on precautionary and safety measures that will place the community at reduced risk from man-made and natural hazards. The transition therefore from the impact of a large calamity to the rebuilding stage therefore deeply impacts and influences the entire development of the region and has an impact for several decades on the ecosystems of the region. Integrating disaster mitigation with long-term development is critical to the recovery process.

CHAPTER 4

Photo documentation of living conditions in the temporary shelters

View of a group of temporary shelters that have been built using tar sheets for the roofs and the walls,thatch and bamboo/casuarina

View from the road to a group of temporary shelters

Use of open spaces for Drying fish, drying clothes and other activities.

Individual temporary shelters

Shelter made with tar sheet.

Space between the shelters is used for storing water, drying clothes etc.

Layers of thatch are placed over the tar sheet roofs to prevent excessive heating.

Children staying in temporary shelters

Boys playing in the street.

Eating meals at the child care center

The community gathers in front of the television

Members of the community

Members of the community interacting with one another in front of their temporary shelters

Women gather on the road

Men playing cards inside a shelter

Inside temporary shelters

Inside a temporary shelter.

Inadequate storage space in the shelters. Some households are able to afford a shelf and a bed.

Television is a form of recreation

Essential features of temporary shelters

The community center where regular interaction and recreation eliminates the feeling of social exclusion and helps to mobilize the community

The kitchen is an extension to the main shelter. There is risk of fire in the kitchen extensions that are made of thatch

The child care/activity center encourages both the physical and mental activity of the children.

CHAPTER 5

5.1 Pre-disaster living conditions and patterns of the community

The most important element in managing the transition is the construction of temporary shelters that provide housing for the displaced people. Considerations for re-building will depend on the pre-disaster life patterns of the community.

1. Natural conditions of previous locations have to be reexamined. The process of rehabilitation strives to achieve familiarity with the surroundings. Data needs to be collected on how the houses were built, how spaces inside and outside the houses were used. How did the dwelling unit look like? What were the typical features inside the shelter? What were the common characteristics of the house that made them particularly vulnerable to the disaster? How were houses designed with respect to each other? Answers to these questions need to be obtained from the community.
2. In some instances the traditional space around the house is not provided in the temporary shelters and conflicts result because of problems in sharing common spaces.
3. Arrangements for critical services like food, water, electricity and transport should be made available to the community? The chapter on aspects of site selection also explores the relationship to essential services like public distribution system, provision store, community center, healthcare facilities, transport, place of work etc.
4. Information on the total number of people and number of families for whom temporary shelter facilities have to be built, average size of a family etc., need to be collected.
5. What was the situation of the community before the disaster? What was the earning capacity of the members of the household? What were the primary and secondary livelihoods of the community? Information on livelihood patterns of the community is important in that it helps to produce ideas about alternative livelihoods for the future. Also studies of the migration trends have to be collected that may be useful to induce an economic resurgence
6. Relationship between families in a community is also critical: new social conflicts must also be avoided, for instance common drains from the kitchen flowing from one shelter to another has been a source of continuous conflict in some communities. Since the drain of one home passes in front of the next and if by chance a contractor has got his drain slopes wrong it leads to water stagnation in front of houses and in the middle of the streets.

7. Climatic responses to life patterns are again, forces that impact the design of the temporary shelters. Proneness of site to floods, heavy winds, humidity, heat etc. will induce the necessary changes in the site where homes are constructed.

8. Importance of livestock must be recognized. Or we find strange situations like cattle meandering through narrow streets and walking into shelter rooms or knocking down kitchen utensils etc. The community at times may not able to find solutions to keep animals secured near the house because of lack of space. It is important to identify the role of domesticated animals for the community. Income from livestock may be used to offset the loss of income from fishing, farming etc.

9. Information must be collected on the dependence of the community on water sources and problems in the availability of water (this includes information on how much distance women have to travel to reach water sources, regularity of supply etc.) Singular water sources can also be a cause of conflict if the traditional pattern was to fetch water from a pond. The community may not be familiar with waiting in queues and rationing of water for daily use and are hence inconvenienced by the system of water collection. Such changes in design and delivery of essential services can deeply impact the harmony of a recovering community.

10. The gender relationships, participation and position of women in the community, perceptions on sanitation and hygiene, education aspirations must be explored. At the same time, it has been experienced that when the community takes responsibility and participates in its own recovery, such a reconstruction is sustainable in the long run.

At the same time, it has been experienced that when the community takes responsibility and participates in its own recovery, such a reconstruction is sustainable in the long run.

5.1.1 Case study

Understanding how individuals and communities lived before the disaster is essential. To illustrate how a study of the pre-disaster housing typologies affects the plan for reconstruction, the features of a traditional dwelling unit (that was destroyed by the tsunami) have been described below. A pictorial view of the dwelling unit, its relationship with its immediate surroundings and its zoning pattern has been provided in the appendix. Some of the features of the housing unit that formed the basis of enquiry are:

1. Being made of mud, thatch and other locally available materials, this dwelling unit could naturally be most prone to being completely destroyed by a natural disaster.
2. The techniques and materials used for construction are most often poor.
3. Facilities for drainage, sanitation and waste disposal are likely to be poorly developed.
4. The idea of toilets and bathrooms does not exist, attached or otherwise. Wastelands are used instead, but for the woman and the child, gong to the toilet or taking a bath is a painstaking task. There is fear for their personal safety and they have no privacy in its usage.
5. An important feature of the houses prior to the disaster is the extent to which the dwelling units blend with the natural environment. The built up area of the house is usually very small as compared to the compound surrounding the house. Although the urban way of life has slowly started influencing the villages, the essential set up of a village is such that use is made of the open spaces as much as possible.
6. The trees mark the territories and boundaries of the public and private zones.
7. The house as such occupies only a small portion of the compound. The women use backspaces to rest in the evening and the trees provide plenty of shade and act as a gathering point.

5.2 Relevance Of Documenting Pre-Disaster Life Patterns

Data collection, documentation of existing life patterns and the study of the various aspects of the standard of living of the community before the disaster are useful in that it helps one to know the extent to which the reconstruction has to be carried out. Reestablishing earlier patterns of life as soon as possible creates a feeling of normalcy and a sense of security for the community. People who have been affected by the disaster cannot be expected to have a drastic change in their ways and means of living. Recommendations on patterns of living can be made and are necessary to up grade their quality of life, but cannot be imposed on them.

Since their earlier life patterns have been temporarily dislocated, a participatory approach will help to understand that while these life patterns have to be respected, it must be incorporated with the changes that improve the quality of their lives. This again means that while pre-disaster patterns of living may continue to exist, the community must be made aware of the need to be adaptive to changes that will certainly upgrade their standard of living. The development of these human settlements is hence looked up as an opportunity to bring about a positive change in the living conditions of the direct and the indirect beneficiaries. An understanding of the pattern of life of the community prior to the disaster and the social issues that impact habitats is thus essential.

Social interaction is the lifeline of a village life. Formal gatherings during panchayat meetings and festivals and informal community gathering in the evenings keep the community together.

The kitchen is usually seen as an extension to the house, made of thatch, mud and other locally available materials. Firewood is used for cooking and the concept of smoke-less choolas does not exist. There is a large risk due to fire and hazards on health because of smoke. Collecting firewood, which is a responsibility of the women is not an easy task.

Gaining some knowledge of the pre-disaster living patterns has large implications on the decisions involved in the reconstruction process. With this understanding decisions regarding the zoning pattern of the house, materials used for construction, construction of the kitchen as an extension of the house, etc. can be made.

The sociological aspect of the use of open space is critical. Perceptions may be dramatically different to the use of open space between urban and rural communities. With most of the common household activities being experienced in the open space around the home, several rural communities experience an inseparable need of open spaces and the built house.

This relationship that is shared with the natural environment is sometimes ignored at the time of construction. One must concentrate on giving the community as much of the common space as possible. For instance several families expressed the discomfort in living in temporary shelters due to the lack of open space around, though they were relatively comfortable with the single room size of the shelter unit. Development of communal spaces is of great importance to the community.

Thus the importance of sustained social interaction should fit into the process of Constructing temporary shelters.

CHAPTER 6

6 Aspects of site selection

The most important decision that has to be made before the actual construction begins is that of selecting the site on which the temporary shelters have to be built. Two choices are available.

6.1 Construction of temporary shelters in the same location, i.e. where the community was living at the time of the disaster. No attempt is made to actually re-locate them, once the temporary shelters are built; ways by which the temporary shelters can be transformed into shelters that are permanent are sought. Reconstruction will be carried out on at the specific sites where such houses were situated before being damaged by the tsunami disaster, i.e. in their old locations.

- Having lived there for years together, the affected village or community would rather continue living there, if site conditions permit them to develop safe human settlements.
- Everyone is familiar with the surroundings and the nature of services and functions that is within reach to them, and people do have sentimental attachment for their plot of land.
- Once the affected region is cleared of all the debris, conditions are created whereby the community can reside permanently. These will include making the site earthquake resistant, elevating the settlement above the sea level, stabilizing sand dunes and developing vegetation belt that will reduce the pressure of winds and cyclones.

Creating vegetation belt along coast will help reduce soil erosion and wind speed during floods and cyclones.

6.2 Construction of temporary shelter at new locations.

- Sometimes the old site (i.e. where the community was living at the time of the disaster) may not be safe for construction of shelters. It may be at risk from natural hazards in the future.
- The construction of additional features that pertain to safety norms might be too expensive. This will occur in circumstances when physical damages to the site are permanent or when the site is no longer safe and cannot prevent a calamity from destroying it again.

However the decision of whether or not they must be moved will depend on a host of other factors and not just on the choice of the concerned individuals. The choice between the two processes is a difficult one but has to be made with the following criteria in mind.

6.2.1 Low lying lands

A site that is low lying is not safe for construction. Precautions have to be taken before construction begins or else, the site will face the risk of flooding. Areas where adequate drainage facilities cannot be created, or soil conditions do not permit raising the level of the land, should not be considered as an appropriate site. The site chosen for the shelter should be such that adequate drainage facilities can be created easily that could withstand the force of incessant rains. Areas where facilities for drainage cannot be made are not considered suitable for living; A soil test will reveal the quality of the soil for the purpose of construction.

6.2.2 Availability of water

Water, being one of the most basic requirements should be available on site, this must include safe water that is used for drinking, cooking and also for washing, cleaning etc. The minimum amount of water required per person per day is 55 litres. In most of the densely populated shelters, not even half this required amount is available on site. People have to travel long distances to obtain just a few buckets of water that has to be shared between all the members of the household. If water is not available regularly, then this will require families to collect water and save for use over a long period.

If natural water bodies exist near the site and wells or tanks cannot adequately store water, then it cannot be used to create housing facilities. One of the reasons for the non-use of toilets and bathrooms is lack of water; ensuring a regular supple of water will improve sanitation practices and discourage the use of wastelands for defecation.

6.3 Proximity to goods and services

Prior to the establishment of the temporary shelters, an enquiry must be made with regard to its proximity to the place of work, wholesale and retail markets, food distribution center, village community center, school, transport systems and basic health care facilities. The settlements should be kept close to support services (e.g. bus stop), institutions (e.g. primary and secondary school) and markets and not be in alienation. A settlement that secures access to shops/congregation spots/play area/toilets/community spaces and drinking water supply will then function as a self-sufficient village unit.

6.4 Welfare needs of the community

One of the important aspects of site selection is an enquiry into how satisfied the community will be to continue living in the same location or to move to a new location. People may be sentimentally attached to the land and be unwilling to give up their rights on it. Another problem occurs in deciding the terms and conditions with respect to the ownership of land. Some of the problems and challenges that are likely to arise include:

- In what way are the beneficiaries going to be compensated for giving up the land if they are to move to other locations?
- Will land be distributed equally among the beneficiaries or should it be distributed according to size of family, size of previous land holdings etc.? Land records might not exist at all or might have been lost after the disaster.
- What legal/formal processes are involved in allocating land? What are the factors affecting land valuation?
- Should plot allocation be made prior to the building of shelters?
- How does one deal with people who fear going back to the disaster zone or simply reluctant to relocate?

6.5 Growth and development of the community

The proposed site for the community should be such that it is well connected to urban centers, educational institutions and place of work. Developing areas close to factories and industries is of advantage to the community. At the same time, opportunities that give better access to health and education create more opportunities for secure employment. This leads to better housing and living conditions in the future.

6.6 Infrastructure

Basic infrastructure includes roads, drainage, garbage disposal system, sewage facilities, water supply and street lighting. If the proposed site allows for the development of all of the above facilities, within a reasonable span of time and at an economical rate, it will permit the setting up of an economically viable and socially acceptable village layout.

6.7 Construction

The materials and process of construction should be well suited to the natural conditions existing in the site as well as the prospects for future improvement. It is important to ensure that the shelters are constructed in such a way that alterations and extensions are possible at a later date. Spacing at the front and the rear of the houses will allow future expansion, for example, an additional room can be created by lateral expansion of the dwelling unit.

6.8 Safety

Site should not be prone to new hazards- whether man-made or natural. This includes floods, technical hazards, forest fires, chemical leakage, landslides, earthquakes etc. The probability of another disaster may be predicted with a reasonable level of accuracy.

6.9 Aspects of land ownership

A critical factor in temporary relocation has been ownership of land especially when it is scarce. For instance building temporary shelters on good land has invariable meant locating new sites for the community resulting in their relocation. At times, the temporary shelters have been built on private lands that have been leased for a period of say less than six months. When the term for the lease is over, re-locating them to new sites for the construction of permanent shelters becomes

essential. Any delay in construction of permanent shelters forcing the community to stay for a longer duration in temporary shelters. This is the time when conflicts arise between landowners and the community which might lead to social unrest in the site.

6.10 Land and topography

In several instances, marginalized communities get relegated to very low lying lands and face the onslaught of flooding and heavy cyclones within the temporary shelters that can have a devastating impact. For such low lying lands if relocation is inevitable certain clear preparedness strategies have to be created with respect to safety of families and processes of evacuation, safety of belongings and reworking the larger drainage patterns in the region through the creation of bunds or drains leading to lakes or ponds. The building of wells or soak pits can also mitigate flooding within the plot provided that the plot does not continue to receive water from neighboring regions.

Relocation will depend on the proneness of the site to disasters, previous history of disasters that have struck the area and also factors such as proximity to place of work (e.g. agricultural fields), availability of water for domestic and construction use and conditions of the soil. A participatory approach to rehabilitation must be followed since it is known that some beneficiaries abandon newly developed sites to head back to previous locations.

It is for this reason that selecting the site for the location of the temporary shelters and its significance to the long-term growth and development of the community must be recognized.

CHAPTER 7

7. Systems for drainage in temporary shelters

It has been seen that in many of the temporary shelters, the system for drainage is not very effective. In many of the regions occupied by temporary shelters, pools of water lie stagnant near the kitchens, in front of toilets and bathrooms, and in the streets because arrangements have not been made to drain out the water. This magnifies the risk of flooding during the rainy season.

The five main problems that are commonly seen with regard to the network of drainage in temporary settlements are:

7.1 Drains from the kitchen

No proper channel exists from the kitchen to drain out the water to nearby ponds or lakes. Water is simply left to dry out naturally and water stagnant streets are a common sight. Inevitably, this also contributes to quarrels within the community when water flowing from one kitchen enters neighboring regions or lies in front of nearby houses.

7.2 Usage of wastelands causing water stagnation

Deficient drainage arrangements also exist in wastelands that are being used by the community for bathing purposes or for defecation. The community might be initially hesitant to accept the use of toilets and bathrooms and continue using wastelands. Solid and liquid wastes that lie uncollected for weeks and possibly months together poses a potential threat to the health of the community and the environment.

7.3 Drains from toilets and bathrooms

Inadequate drainage from the bathrooms and toilets also exists in some shelters. Used water is a breeding ground for mosquitoes and other infectious germs. For temporary shelters that are located in sandy regions, water let out into the sand naturally tends to evaporate, but in regions where flooding is likely, it is useful to provide pipes that are connected from the toilets and bathrooms and either led into gutters, septic tanks or into water treatment plants. When awareness has successfully created positive responses for the use of latrines and bathrooms, sanitation systems must be supported by appropriate solutions for drainage to guarantee its continued usage.

7.4 Drains around common water supply sources

The immediate vicinity around hand pumps, sintex tanks and taps are other areas where water remains stagnant. It is useful to provide small enclosures around taps and pumps and let out the water into specifically assigned collection cum drainage points.

7.5 Street drainage

A general assessment of the overall network of drainage also reveals that a simple, but cost effective solution is what is required to be developed. Gutters that are dug on the sides of the streets are usually carved out of mud. While better solutions may be available, this is probably the simplest and least expensive option that is seen in most of the temporary shelters. Concrete gutters that lead into the main drains and into water treatment plants or nearby lakes offer better protection than naturally carved out gutters, from where water has a tendency to overflow during the monsoon. Mud and silt restrict the movement of water, thereby flooding streets and houses.

To avoid dirty water lying in front of the houses, appropriate drainage systems need to be developed.

When there are no proper drains from the toilets, access to the toilets is blocked.

No gutters have been created on the street shown below, and hence rainwater remains stagnant. This not only causes inconvenience in moving from place to place, but there is a large risk of water flowing into the shelters.

To avoid flooding in between houses, sand bags have been rested against the walls of the shelters. Raising the level of the house with a plinth or creation of drains can reduce the risk of flooding.

The path to the toilets is stagnant with water. An appropriate solution is to raise the plinth level of the toilet and also to pipe the used water into septic tanks located behind the toilets.

In order to reduce the potential risk of faulty drainage systems, the following suggestions are recommended*.

- Streets could be made to slope either on one side or on both sides. A better alternative would be to fit the sides of the streets with concrete gutters that will lead to a lake, pond or soak pit that can filter the collected water as ground water.
- Streets that can be hardened or possibly tarred is also an effective solution to prevent water stagnation, provided drains exist to let out the water.
- When toilets and bathrooms are constructed at a considerable height from the ground level, there is a reduced likelihood for the water to seep in. Concrete enclosures that are fitted with pipes or outlets lead the used water into soak pits.
- Discouraging the use of wastelands for bathing/washing or defecation is also recommended. Unused tracts of land must be kept free from waste- both solid and liquid.
- Designated areas for small groups of people could also be provided: for example a bathroom or a toilet for a couple of families on a sharing basis. This will encourage the community to develop some sense of ownership in maintaining public infrastructure.
- Reasonable spaces between the houses will prevent the problem of flooding in the space between the houses.

* Refer the drawing in the appendix - 'Proposed' drainage system

- Fitting enclosures around common taps is useful to address the problem of water lying around taps, sintex tanks, hand pumps etc. This not only reduces the inconvenience when queuing up but also keeps the immediate surrounding clean.

Providing enclosures around the taps will ensure that used water is drained out and directed into soak pits.

Toilets have been constructed with a plinth that will reduce the possibility of water stagnating in front of them. During heavy rains, flooding of waters into the toilets is also minimized.

Part-2

Managing the Transition

A document on construction and maintenance of temporary shelters in post-disaster context

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CHAPTER 8

8. Management of wastes in the temporary shelters

Management of wastes in temporary shelters can be divided into two categories:

1. Solid waste disposal
2. Liquid waste disposal

8.1 Solid waste disposal

Increasing use of plastic has raised concern among the communities, NGO's and the government to set up organized system for garbage disposal. Plastics and other wastes are seen mixed with water lying stagnant in the middle of the streets. The water is also a feeding ground for animals and birds. In some of the shelters, wastes may be seen accumulated for days and weeks together. Some members of the community burn the wastes and some communities who live near the coast also have the habit of using the sea for dumping the waste and this has negative consequences on the sea life.

An understanding of the ecological systems in the locations of the temporary shelters is useful in developing a technique to manage and dispose off wastes.

There is a need for creating an alternative system for garbage disposal that is different from cities and towns. In cities, garbage trucks/vans collect the garbage that is dumped in several locations. In many cases, segregation of wastes is also practiced in several dumping grounds.

8.1.1 Some of the solutions to manage solid wastes are:

1. Raising awareness among the community on the importance of separating plastics from other wastes.
2. An effort to ban the use of plastics may be too ambitious a task, a judicious use of plastics however can be attempted.
3. Treatment of organic waste is a possibility; the community when provided with such solutions will be discouraged to burn wastes.

1 The appendix provides some useful websites on waste management, particularly relevant to rural based shelters and coastal regions.

In this temporary settlement unit, although the streets are kept clean, garbage is thrown into gutters that are meant to drain out rainwater. Water collected here cannot flow easily into designated sewers.

Toxics from plastics pose health hazards for domestic animals and humans. Water sources are likely to get clogged with garbage and ground water sources are at risk of being contaminated.

8.2 Liquid waste disposal

Issues

1. In many of the temporary shelters, there are no proper channel from the kitchen to drain out the wastewater and this used water is drained in the middle of the streets.
2. Leaky septic tanks increases the risk of water contamination.
3. Broken pipes and damaged septic tanks are common in some of the shelters.

The pipe leading from the toilets to the septic tank is broken (below). The sewer may overflow into the sand and pollute the surroundings.

The area behind this group of shelters has stagnant dirty water accumulated with garbage

Solutions for better management of liquid wastes

Water from the toilets can be directed to septic tanks that are also connected to the main sewer in the neighborhood. The septic tanks when kept at separation from the common water source, and cleaned regularly is useful for the proper disposal of wastes.

At regular intervals, spraying of mosquito repellents near toilets and bathrooms where water is likely to collect can reduce the harmful effects of liquid waste lying stagnant.

Soak pits kept near the latrines and bathrooms can also prevent water from remaining stagnant. The community can be made aware of the dangers of wastes- both solid and liquid lying uncollected in unused tracts of land.

CHAPTER 9

9. Water needs of the community

All the houses in the temporary settlements units require easy physical and regular access to both safe drinking water as well as water that can be used for washing, bathing and cleaning.

Some of the common problems (seen in the temporary shelters) related to the use and the availability of water are :

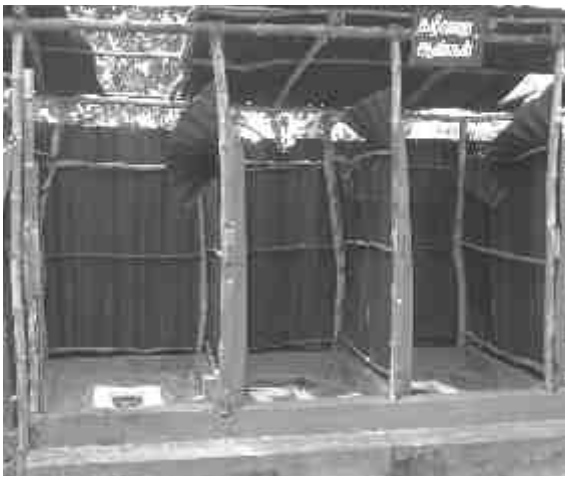
1. In the absence of a piped water source and when there are a few canals running alongside the shelters, people prefer using them for cleaning and washing.
2. Water is collected in many pots and buckets that take up much space inside and outside the shelters. For some parts of the year when water is available only once or twice during the week, it will require one to save enough water to last the whole week.

Uncertainty in the availability of water makes the community to store water in pots and buckets that occupy space inside the shelters.

The quality of the water is in some cases, very poor. Communities may need to take special care to treat and clean the water before use.

3. The quality of water available in the region may not be good enough, for cooking and drinking purposes.
4. Availability of water on a regular basis is important for the continued use of toilets and bathrooms. In some cases, the non-availability of water through the taps located close to the toilets and bathrooms has shifted all these activities from the place provided.
5. Sharing water from common sources is a source of conflict.

The choices for supplying water in the regions occupied by temporary shelters can be made from the following three options, and all of which are currently in practice.



Toilets remain unused because water is not available on a regular basis

Option one

Placing sintex tanks at various points in the locality, all or most of which are kept at walking distance from each other. But, its use however depends on the regularity of water being refilled before they become empty.

There is a small risk that the taps of the tanks could be broken, either because of vandals or of neglect in proper use.

Lorries and trucks that carry water from reservoirs, water desalination plants, nearby lakes etc, refill this water. This again calls for the creation of tar roads that will give easy physical access for the trucks that have to reach the village at proper time. When water cannot be made available everyday, some method of organizing regular water supplies must be made, with proper timing etc.

Sintex tanks supply water for this group of shelters

Trucks carry water into regions that do not have an assured supply of water.
Sintex tanks are refilled at regular intervals that guarantee water for the community

Option two

Providing water through **hand pumps** is another option to make water available in the temporary shelters. This is possible in regions where the level of the water table is high. Ground water can be easily pumped out through the hand pumps kept at several locations.

Rationing the use of water is a complex issue

- Sharing water from common sources can be a source of conflict between the members of the community.
- If water is not available on a regular basis, the supply of water must be regulated with proper timings so that the community is prepared for any potential water shortage and they are able to collect and save water during that period.
- In some regions, the quality of water is suited for bathing, cleaning and cooking as well. In places, where the quality of water is poor, it must be boiled well before use for drinking and cooking.

Hand pumps are common in regions that have plenty of ground water

Option three

Another option is also to use the ground water and to store them in overhead tanks. Using an electric motor, water can be pumped into overhead tanks and supplied through taps.

CHAPTER 10

10. Power supply in the temporary shelters

A necessity in all the temporary shelters is the supply of electricity. Adequate lighting is to be provided inside each shelter, at the entrance to the shelter, in the streets, in the toilets and bathrooms, in community halls and other common gathering spots. Hence, efforts were made to ensure that each shelter has at least one electric bulb, a fan, tube light and a switchboard. The use of other appliances depends on the choices of the residents; many of the households do possess a television of their own. Other appliances are made use of with extension cords. The community center, provided with adequate lights, a common television and radio enables more interaction between the communities.

Supply of electricity at the community center is necessary because it is a meeting point for the community. Fans, lights and plug points are made available in most of the centers. Seen above, the presence of a television brings the community together.

Inside a shelter: There is a fan, a tube light and a bulb. The switchboard provided has an extra plug point that residents use for the television, radio transistor, etc.

However, electric wiring is sometimes seen hanging outside homes and this increases the risk of short circuits.

Electric wiring installed safely reduces the risk of short circuits, electrocution etc. Wires that hang to the floor / ground can cause accidents; children are especially at risk as they play dangerously close, unaware of the consequences of an accident

The street shown above is not well lit. Children play outside; men and women gather in front of the houses late in the evening. There is not enough light for women to cook or for children to play/study.

Some of the suggestions for improvement are:[1]

1. The frequency of power cuts can be minimized and a system that will cut the power supply during times of heavy rains/winds to avoid electrocution may be kept in place.
2. Emergency lights can be placed as a reserve in public spaces that commonly serve as gathering spots.
3. Checking the load bearing capacity of supply points is useful because it is seen that in many cases, overload is common because large number of appliances are used simultaneously using extension cords.
4. Use of solar energy is worth considering;
   - The use of solar energy is a better alternative and only a few temporary shelters have been installed with the same.
   - Great potential lies in tapping solar energy for lighting the street.
   - Although the cost of installation can be high, the use of solar energy will help reduce the use of non-renewable fuels, and is an economically viable solution in the long run.
   - The solar lamps and cells can be easily dismantled for use when the community builds permanent shelters or moves into new locations.
5. Poor lighting/no lighting discourages the use of individual latrines and bathrooms. The proposed use of solar lamps is particularly intended to increase the usage of bathrooms and toilets. This creates a mechanism whereby the lights automatically turn on after sunset and turn off at sunrise. The streets otherwise remain dark and dingy, when bulbs are not fitted/replaced.
6. For the community to take responsibility for the maintenance of public utility services training could be provided to the community, so that in the case of damage, repair can be done easily without having to rely on external help or incur costs on repair.

[1] For further information on sustainable forms of energy/solar lighting and related products, address of some useful web pages have been provided in the appendix.

CHAPTER 11

Enhancing the social conditions in the temporary shelters

The social dimensions of managing the transition include the provisioning of services that are critical in enhancing the well being of the community.

11.1 Security of food

Communities that are highly prone to natural disasters are at great risk of being potentially food insecure. Guaranteeing security to food not only includes making food such as rice, vegetables and pulses available, but also making them easily accessible (physically and economically) to the public. This would require setting up of temporary storage/warehousing facilities and ensuring their timely arrival at the distribution centers. Local food habits, quality and quantity of the constituents of the regular diet of the community must be kept in mind before such food is made available through the various collection agencies. The Public Distribution System (PDS) operates its fair price shops and provides subsidized food to the poor. Families that have been identified as 'Below Poverty Line' are entitled to ration cards that give them access to reasonably priced food crops, pulses and other food/non-food items. Economically backward individuals can only rely upon the fair price shops to obtain the food they need, at a price they can afford.

Prior to the disaster, physical access to the fair price shops/nearby wholesale or retail markets would have existed, because of transportation links primarily established by the community. What the disaster results in is a dislocation of such services critical to the life and health of the community. In order to re-establish physical links, temporary distribution facilities are to be established.

- Facilities that store food materials might have been partially/completely damaged, gaining physical access to the shelters may take some time until adequate infrastructure is in place for relief to reach disaster affected zones.
- Farmlands and fertile soils may be have completely or partially destroyed. Reviving lost livelihoods is also important to communities that depend on farming and other agricultural activities.

The temporary loss of employment and habitats thus creates the fear of food insecurity.

11.2 Health needs of the community

Provision should be made for delivering basic health care facilities. This should include immunization programs and regular health check ups to contain the spread of infectious diseases.

The negative consequences of the tsunami on the mortality of the populations occurs through the following ways

1. Contaminated water sources.
2. Stress and trauma related effects on health.
3. Deficit food supply.
4. Reduced economic access to health services.
5. Failure of emergency service that responds to special needs of the population.

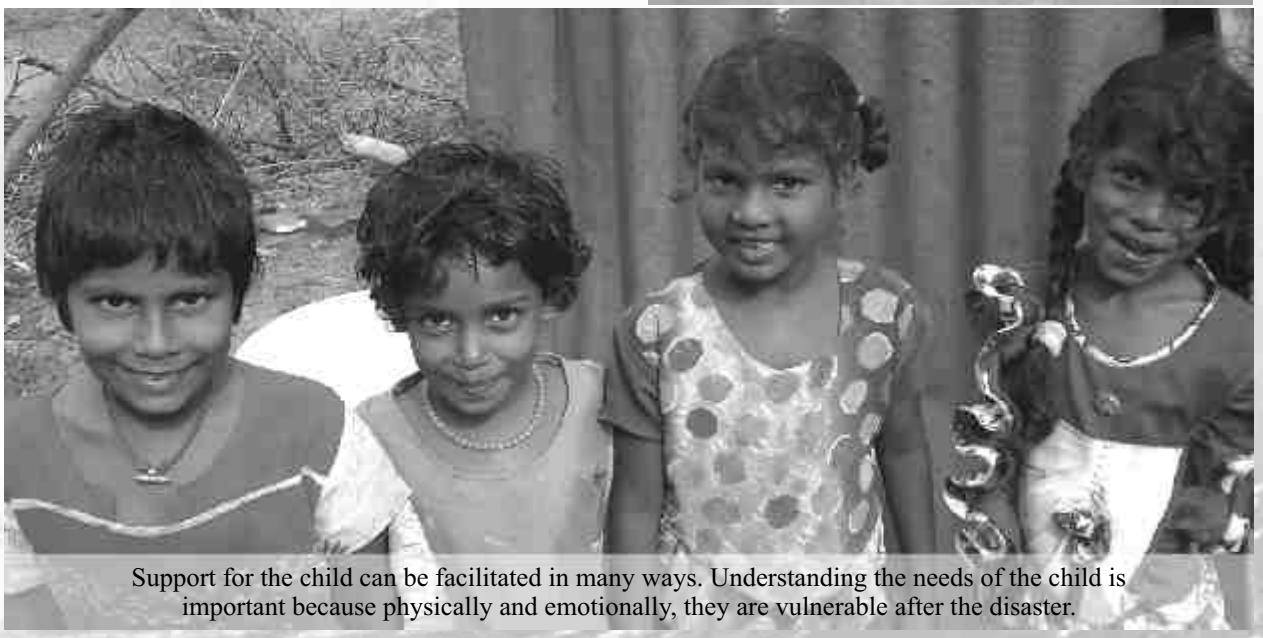
Stagnant and dirty water is a thriving ground for mosquitoes and diseases such as typhoid; cholera and dengue fever are easily spread through water. Immediate cleansing of water tanks, spraying mosquito repellents in water stagnant areas and provision of adequate drainage facilities are a few but important ways of halting the spread of water borne diseases.

Data on various health indicators of all the people staying in the temporary shelters has not been developed. A database must be made of the health risk that the community face, so as to direct the much-needed medical attention to these settlements.

11.3Needs of the children in the community

The period immediately following the disaster is one that is very hard to cope, especially for the children in the community. Developing a play area is of great significance to the children, while encouraging both physical and mental activity of the children; they can handle better, the trauma of the disaster and the relocation.

Programs specifically targeted for the well being of the children include day care centers, crèche facility, children's activity center and playgrounds. The implication here is that, it is important to make available the space, needed for children's activities in the sites that locate the temporary shelters.



Support for the child can be facilitated in many ways. Understanding the needs of the child is important because physically and emotionally, they are vulnerable after the disaster.

Child activity center

Eating meals at the child care center

Ensuring that the children get back to school builds self-confidence in them and eases away the pain of feeling homeless and helpless.

- For many families who have lost their entire savings and belongings, the need to put the child back to school may not be top priority. Just to get enough money to feed themselves, they are employed as laborers in factories, farms etc.
- Children find it ever more difficult to handle the sudden change in their day to day activities immediately after the disaster primarily because they now live in unfamiliar surroundings and have probably not attended school for months after the tsunami.

Encouraging both the physical and mental activity of the children will help to handle better, the trauma of the disaster and the relocation.

Support for the child should be facilitated through establishing childcare centers in all the temporary settlement units and play areas for the children should be developed close to the community halls.

11.4 Elderly people in the population

The age structure of the population is an important consideration because if there are a large proportion of aged people in the population, services that are rendered have to be suited to their needs. Local hospitals may not be able to deal with the kind of emergency services that is required for this section of the population whose health deteriorates rapidly.

The relationship between the aged people and the children of the community also leads to an understanding of the vulnerable sections of the population. When both the parents of the children in the community are out for work, aged people are left to take care of the children. Relocating the temporary shelters, need for establishment of health centers, designing the shelter will depend on factors like size of the family, age structure of the population etc.

Elements in the design of the temporary shelters that specifically cater to the needs of the old people in the population are not noticeable in most of the shelters.

The design of the temporary shelters could be improvised to suit the needs of the elderly people in the population, and those who are physically incapable of performing daily tasks. For example, the construction of toilets and bathrooms should take into account of the fact that, the use of Indian toilets is a strenuous task for the old people. One suggestion is to keep the latrines and bathrooms within walking distance from the temporary shelters and another, made for the convenient use of the toilets by the aged people is the creation of 'grab bars' that are fixed on either side of the toilets. The drawing for the grab bars has been provided in the appendix.

11.5 Needs of the women in the community

Any kind of development intervention aimed at increasing the quality of lives of the people needs to pay attention to women. Primary responsibility of the women includes cooking, cleaning and taking care of the children. The sanitary and health needs of the women are not fully addressed. In most situations, the decision-making power lies with the men. The women in the community support services and tasks that is auxiliary to the primary livelihoods of the men. For example in fishing community the women are largely involved in taking the fish to the market and making sale.

The use of toilets and bathrooms by the women depends to a great extent on the provision of adequate lighting. Since houses do not have attached facility for toilets, they can be located in such a manner that women and children can gain safe and private access for its use.

11.5.1 The household kitchen

In most of the temporary dwelling units, the kitchen is separated from the main living space. This is not only because of a lack of space, but more importantly to reduce the risk of fire. Smoke and heat have a detrimental impact on the health of the community and the environment. Firewood is used as the fuel for cooking. Families also collect enough firewood that will be dried and stored for use in the kitchen.

Non-Use of smokeless choolhas

Although there are cases, where the kitchens are not provided with any enclosures. The choolhas are simply rested on the ground in front of the house.

By extending the roof of the house by 4-5 feet, a kitchen facility is in place, with an enclosure made up of corrugated GI sheets, the use of which reduces the risk of fire. The use of smokeless choolhas could be encouraged.

11.6 Trauma Counseling

Post disaster rehabilitation must also address issues on rendering psychosocial support counseling for the affected communities of the disaster. People should not only be made aware of the reality they face, but also what needs to be done about it hence. Helping people deal with the shock of the disaster, the loss of family, friends, loss of homes and belongings is a tremendous task because the stress and grief following the disaster, develops into a feeling that all is lost.

Scientific awareness on the causes of such disaster could also instill greater preparedness and ability to deal with the shock.

11.7 Community gathering spaces

An enquiry into the importance of developing social infrastructure reveals that community spaces are important for several reasons:

1. The community center is an important gathering point, providing a television here gives an opportunity for the community to get together during news hour and for entertainment.
2. Recognizing formal and informal community spaces is important for the social mobilization of the community. Regular interaction between the members eliminates the feeling of social exclusion- not only are various issues raised, common problems are discussed and information disseminated easily.
3. Use of open space means that residents are not always confined to their homes all the time. Ideally, the settlement can be located within walking distance from a large open ground. This is where the local leaders hold discussions and meetings. Issues that are commonly raised during such occasions range from resolution of personal conflicts to deciding action plans pertaining to development of infrastructure and other facilities that are in demand by the local population.
4. The grounds will also serve as a congregation spot to celebrate religious festivals and other occasions. The residents are also encouraged to plant trees around the premises and hence develop them into 'breathing spaces' that enable community interaction and recreation.

Creation of a temporary settlement unit must be able to preserve the social identity of the villagers

by developing good communal spaces and designing the reconstruction that bears some resemblance to earlier patterns of community life. People will hence; develop a sense of belonging with the new settlement.

The community center is an important element in planning for disaster preparedness and mitigation. Along with popular plans and programs, announcements can be made forecasting weather conditions in the region; and a possible warning to the community in the likely event of a major natural hazard.

Members of the community gather outside the community center in the evening

Fishermen repairing their nets and relaxing over a cricket game at the community center

Women gather on the road in the evening.

After the day's work, fishermen gather for a game of cards at the open spaces in front of the shelters.

11.8 Social disruption in the event of a calamity

During times of crisis, some people turn to desperate measures to keep themselves alive and well. Theft and crime to obtain food, money is not uncommon. An association is likely to be found between levels of poverty, loss of employment, increases in crime rates, all of which are likely to be correlated positively with a crisis situation following the tsunami.

11.9 The local provision store

Closer proximity of the community to a local provision store and understanding its relevance to the community has been indicated in the section-aspects of site selection.

When temporary shelters have been constructed for the community, one factor that influences the 'settling down' process for the community is the existence of basic facilities that are easily accessible to the community. This includes regular supply of water through a known water source, a doctor, health clinic, ration shops, the bus stop, schools, place of work and the local provision store, among others.

In some of the locations where temporary shelters were built, some of the communities actually abandoned the site because articles for daily consumption were not available to them through a local provision store. The existence of a provision store on the other hand, makes the stay more convenient.

Following the disaster, many in the community displayed an entrepreneurial skill and played an important role in setting up a store. In some of the regions occupied by temporary shelters, few members have converted one temporary shelter into a provision store.

Basic articles for daily consumption are sold at an affordable price for the members. Some of the items sold include, water, foodstuffs, snacks, soap, detergent, kerosene etc. Shops, which had facility for refrigeration, also sold ice cream, milk, curd etc.,

A provision store established by a member from within the community can facilitate the settling down process. Availability and accessibility to basic amenities and services is necessary for a minimum standard of living.

11.10 Role of domesticated animals for the community

To recognize the importance of domestic animals to the lives of communities in temporary shelters is important. For many families in the community, income from rearing livestock provides a secondary source of income that is useful to offset any unprecedented declines in income from primary occupations.

Domesticated animals need to be secured safely and at close proximity to the shelters

The implication of recognizing this role of animals is that of creating an environment that is suitable for animals to be reared in the site of the temporary shelters.

In many of the shelters, goats and cows are seen wandering around the streets and there is a possibility of these animals destroying shelters, or feeding on lands that do not belong to the community. Sometimes, poultry and cows go missing and they stray into other houses.

Adequate spacing provided in front of the houses can safely secure animals in front of the houses of their owners. Another solution is to specifically demarcate spaces in the wastelands for use by cattle.

11.11 Securing vehicles owned by the community

Members of the community do possess vehicles for transport such as bicycles and two wheeler motor vehicles. Because of lack of space to park and secure them, they are kept indoors. A second reason for leaving them inside the shelters, during the night and when not in use, is the fear of theft.

The provision of a stand for the parking of bikes, scooters and cycles is recommended.

The main living space of the house is packed with belongings. Most of the vessels, dishes and boxes are simply left on the floor. The cycle is also left indoors because of lack of facility to park it outside and for fear of theft. The bike is also seen parked inside the house in the temporary shelter above.

11.12 Standardization versus identity

Construction of all the shelters that feature in a single site confirm to specific set standards. This suggests uniform application of the design for all the houses that comprise a village unit. However, the design is such that it allows for changes that can be brought about by the families in the future to accommodate difference in individual tastes and preferences. Painting the doors themselves and applying different designs on them, decorating their walls, making a kitchen garden are small changes that give identity to a house and sets them apart from the others. Allowing for variations of this kind gives a sense of ownership to all the members in the community.

Decorating the immediate surroundings of the dwelling unit, establishes an identity to one's home. Few make use of rangoli, door markings and kolam as a form of expression. Shells from the sea pasted on the steps of the house are the distinguishing character that sets apart the house from the rest.

CHAPTER 12

12. Physical parameters for thermal comfort and ventilation

The basic materials that are used for the construction of the temporary shelters include tar sheets, galvanized iron (GI) sheet, aluminium sheet and thatch. Assessing the use of the above materials and the technique used for the construction of temporary shelters is useful to establish standards for thermal comfort and ventilation for example, the disadvantage with the use of tar sheets is that it absorbs much heat during the summer. Climatic influence is a major consideration in the use of materials for hot humid regions such as Chennai.

Tin sheets are conductors of heat. By extending the roof towards the entrance of the house, a provision for shade is created.

Since most of the temporary shelters do not have windows, allowing a small gap between the roof and the wall can provide some amount of light and ventilation

Keeping this gap also allows cross ventilation that is very useful to prevent the roof from being lifted off during heavy rains and winds.

Air circulation inside the house increases comfort levels, keeps the **house free from bad odour**. Discomfort has negative consequences on the health of the community, dehydration; the feeling of claustrophobia, and ailments due to headaches and nausea, breathing problems could result in the absence of minimum thermal conditions. Adequate ventilation also reduces the use of electricity during the day.

Providing **thatch** over the roof reduces the extent to which the walls and the roofs conduct heat and provides **some degree of cooling**. Thatch can also be used to cover the gap provided for ventilation. This will also provide adequate shade for the temporary shelter and reduce the menace of mosquitoes. In brief, the use of thatch,

1. Reduces the amount of heat transferred into the shelters through the gap.
2. It increases the air circulation in the shelters.
3. Covers the gap and helps maintains some privacy for the residents.
4. Provides protection against rains and winds.

A new method for ventilation that could be explored is the **use of bamboo flaps** that can be opened or closed when necessary. During rains, the flaps can be closed to prevent water from seeping into the houses. Closing the flaps as and when required also gives privacy to the residents. The flaps can be kept open during the day to allow for air circulation and to naturally light the shelters and it can be closed off during rains and to reduce the menace of mosquitoes.

The gap between the roof and the wall of the shelter ventilates the shelter and brings in natural light during the day

The gap should however be protected in a way that birds such as crows etc. do not get inside. Covering the gap with a net does this

Thatch used both for the roofs and to cover the gap provides some amount of cooling. Nevertheless there is a risk of fire, the prevention of which requires taking precautionary measures.

CHAPTER 13

13. Sanitation and Hygiene- Standards for latrines and bathrooms

Establishment of basic standards for latrines and bathrooms has been achieved with some degree of success in many of the temporary shelters. The section of the population that is not familiar with the use of toilets and bathrooms need to be made aware of the impact of such physical interventions in controlling the spread of diseases and in maintaining hygiene. When the mindset of the community is not very adaptable to change and there is hesitation among the community to switch to better, safer and easier options for sanitation and hygiene, obtaining the willingness and co-operation of the people must be done sensitively without hurting the sentiments of the community.

The awareness program should also spark an interest in the community to be environmentally friendly and to adopt habits that keep the surroundings clean and beautiful. In many of the temporary shelters, many problems are associated with the use and maintenance of latrines and bathrooms.

13.1 Some aspects that contributed to the failure of common toilets and bathrooms are as follows :

- Water is not available on a regular basis and hence toilets remain unused both during the day and during the night. The communities may continue using wastelands as defecation areas.
- Toilets are not kept within a reasonable distance from the house. This could prohibit women and children from using them after sunset.
- Many a time, the lights do not function or lights not provided and hence the toilets remain unused after sunset.
- In some of the shelters, the men and women's toilets are kept very close to one another and this discourages the women from freely using them. Constructing toilets for men and women that are well apart and that are not visible from each other is essential.
- Materials that are used in the toilets/bathrooms are sometimes taken away, used inside the houses or sold.
- Many of the communities are not accustomed to using toilets; raising awareness should complement the program of building the toilets and bathrooms.
- Sufficient number of toilets are to be constructed; constructing very few can also lead to their disuse.
- Materials used are also important determinants of the level of usage. Fragile materials that are prone to break create insecurity and loss of privacy.

Deciding the location of the toilet is critical since it has to be within reach for everyone in the community and yet, retain a sense of privacy. (from the individual dwelling units)

Walls and doors of toilets and bathrooms should be sturdy and must have facility to be locked when in use. Heavy winds can easily blow away the walls and in some cases, doors are missing altogether.

The bathing spaces provided below are not really useful for the purpose it is meant to serve because there are no walls around the individual bathrooms.

Other problems that are seen in some of the shelters include:

1. Water lying stagnant behind the toilets becomes breeding ground for mosquitoes and also cause bad odour in the vicinity.
2. Creating clean and safe access is necessary.
3. Stagnant water lying behind the toilets is breeding grounds for mosquitoes. The construction of toilets and bathrooms need to be simultaneous with the creation of the creation of adequate drainage and liquid waste disposal techniques.

13.2 Solutions for improving sanitation and hygiene systems in temporary shelters

- Providing **solar lights** may be an alternative solution to ensure adequate lighting for the toilets at all times of the day, which is not dependent on the electricity situation in the region.
- Communities are not inspired to maintain the toilets and bathrooms because of the lack of feeling of ownership. Toilets and bathrooms dedicated to four or five families have been found to work. Some of these toilets have **lock and key facility** to prevent bad use by anonymous people, outsiders, miscreants etc.
- Imparting such information as part of the school curriculum can do **increase awareness** about health and hygiene among school going children.
- More solutions of **using less water** have to be explored as technological alternatives. This not only reduces the risk of groundwater contamination but also recognizes the fact that sourcing water is a difficult task for far-flung communities. People also do not have the economic access to buy water for daily use.
- The government needs to initiate **guidelines** for the construction of toilets and bathrooms in the coastal regions where ground water is high and soil is porous.
- Solutions like **growing plants** which can take away the bad odour, may also be explored.
- Walls for toilets are to be **durable** and sturdier for the safety of the women and the children.
- **Gutters** created behind the toilets are useful to drain out the used water into the main sewer. The surroundings if, kept clean can also discourage the community from continuing to use wastelands for defecation and bathing.

The picture is an example of the best practices in maintaining proper sanitation and hygiene. The access to the toilets are kept clean because they are cemented, doors are sturdy and have the facility to be locked when in use.

However, it seems that it is not used regularly. There are two reasons for this

1. Water is not available at all times of the day
2. Lack of awareness and enthusiasm of the community to switch to newly introduced standards for sanitation.

The task of sanitation and hygiene is exteremly critical when large popoulations are temporarily grouped in shelters. Risk of epidemics is high. Contamination of ground water, and other aspects have to be closely monitored. Hand pumps for water need to be at a sufficient distance from the toilets and washing areas, with sufficient drainage facility.

Imposing rules on how to sanitise and clean the surroundings fail, but when done with the cooperation of the community, there is greater success when ideas are sought from within. Several institutions today have done significant research in sanitation and personal hygiene, and along with the exisiting realities of the situation, low cost solutions can be brought about to upgrade this dimension of shelters (including Gandhi Ashram etc.)

As a long term project, solid waste management and water recycling may also be explored and considered. The link between solid waste management and the agricultural sector may provide another avenue for the generation of enterprenuerial livelihoods.

While the task appears complex, through systematic intervention of a participatory community process these aspects can be assmilitated. Several communities in the region have on their own accord over time welcomed these practices. These community issues can well be documented and presented as best practices so as to show that the region is capable of being self reliant.

CHAPTER 14

14. Maintenance and upgrading Temporary shelters

The need for maintaining, improving and upgrading temporary shelters arises because in many instances communities continue living in temporary shelters for periods longer than envisaged. To avoid any deterioration in the living conditions of the communities in the shelters, a program for upgrading the shelters has been proposed in the following sections. This will help one to understand the complexities in developing shelter programs and the significant role that the factor of time and cost play in the effort to rehabilitate disaster affected communities.

A schematic program for upgrading shelters that are temporary, economically viable and sustainable is useful by ensuring that the elements and resources can be put to use in the permanent houses as well. The fact is that a large amount of money is being spent on the creation of shelter facilities that are only temporary in nature. (An estimation of the cost of upgrading shelters has been provided in the appendix). The elements in the temporary shelters are sometimes thrown away or sold to junk dealers.

Upgrading aims to preserve the elements in the temporary shelters in such a way that larger expenditures guarantee prolonged use of materials. The idea of sustainability is of considerable importance for regions where resources are scarce, where physical infrastructure is not well developed and environmental degradation poses a threat.

14.1 Need for upgrading temporary shelters

a To offer better protection to the existing state of the temporary shelters, mainly because of wear and tear of materials and to improve the living conditions of the communities until they secure permanent housing facilities.

b To incorporate sustainability in the use of materials.

c To accommodate emerging needs of the community.

14.1.a To offer better protection to the existing state of the temporary shelters and to improve the living conditions of communities living in the temporary shelters (until they secure permanent housing facilities)

After the temporary shelters have been built, problems of wear and tear due to the nature of the materials used is common. Regular maintenance is required and cannot be neglected since it will be some time, until permanent shelter facilities have been provided to the community.

Some of the common problems that exists in the temporary shelters are:

1. Flooring not done properly and the soil is left exposed. This increases the risk of flooding. The result of inadequate flooring causes the floor to be damp.
2. No plinth around the house or a plinth that is too low increases the risk of water seeping into the house. The level of the house when raised higher than the ground level will reduce this risk.
3. Poor maintenance leaves damaged doors without being repaired. Doors are an important aspect of safety.
4. For the tar sheets to be able to protect the shelters during times of rains and heavy winds, they have to be continuously re-enforced. Torn and rusted sheets need to be replaced as soon as possible.
5. In most or all of the shelters, cooking utensils, buckets, pots, pans take up a lot of space inside. Things appear to fill up entire walls on either side. Clothes are hung using rope tied down from the roof. Temporary overhead shelves are also used for the same.

6. Doors and roofs of toilets and bathrooms also need to be regularly maintained. When they are left without being repaired, the women especially, are forced into a difficult situation because they do not have a sense of security.

14.1.b. To Incorporate sustainability in the use of materials

Spending huge resources and investment for a few months on temporary shelters may not justify their requirement. Elements used in the shelters should be such that if they are maintained well, they can be used over a period of time.

A good example in the repeated use of materials is the use of shelves that are made with bamboo/stone/brick and built at a considerable height from the ground. The shelves not only protect belongings and personal items from stagnant water and flooding but can also be re-used when the residents are shifted from the temporary to the permanent shelters.

The use of solar lighting may be explored in some of the shelters that experience frequent power cuts. In the same way, solar lights that are used for the toilets and for street lighting can also be easily shifted from site to site. At times entire structures made with bamboo frames are dismantled and rebuilt elsewhere.

It is seen that in many of the sites that earlier served as temporary shelters, all the materials have been completely left behind. Materials that are used to build the shelters and those used inside the homes should serve long use to the community. The process of upgrading shelters not only serves to add new physical elements in the temporary shelters but with the optimism that they can be easily dismantled and taken to permanent shelters.

14.1.c Emerging needs of the community

Based on interaction with the community, photo documentation of existing conditions of the shelters, complaints and suggestions of the community, some of the emerging needs are:

1. Facility for storage (using brick shelves)
2. Reduce the risk of fire and smoke in the kitchen (with the use of smokeless choolhas)
3. Need for safety and privacy (this is facilitated by the use of doors)
4. Reduce the dependence on electricity generated from non-renewable sources of energy (Use of solar lighting)

To illustrate how the newly developed concept in the process of upgrading shelters has satisfied one or more of the above needs, two example are provided below:

1. Storage capacity

In water stagnant areas, and in homes where dampness is a common occurrence, residents have to take care to safeguard their belongings. Overhead shelves tied with rope are used to keep belongings above ground level. Families have restricted use of the floor space, and in the case where the floors are left barren; there is a large risk of water flooding. To satisfy the needs of the communities for storage, shelves have been introduced as a new element.

2. Smokeless choolhas

The use of smokeless choolhas is not widespread. The choolhas that emit smoke into the shelters not only pollute the interiors but also causes discomfort for the women and those inside the houses. An important dimension in the upgrading program is the construction of smokeless choolhas. Smoke does not fill up the interiors of the shelters because of the provision of a chimney like arrangement that lets out the smoke over the roof of the shelters.

14.2 Dimensions in the proposed upgrading program[3]

Changes in the design of the shelters and various elements in the upgrading program, a few of which have been proposed, can be introduced after some enquiry on the physical conditions of existing temporary shelters. The fact is that in many cases, the reconstruction of shelters that are permanent will take some time and there is a need to improve the existing living conditions of the

[3]Refer to the following three drawings in the appendix-
1. Plinth and floor details
2. Roof details and
3. Proposed elements in upgrading temporary shelters

communities living in the temporary shelters. Based on recommendations and suggestions received from the communities themselves and other problems that have emerged after the construction, a plan for upgrading has been proposed.

14.2.1. Shelves for storage

Shelves that are made of stone/bricks may be provided for each dwelling unit. The shelves are built in such a way that they are at a considerable height from the ground. The shelves can be re-used when the residents shift from the temporary to the permanent shelters. In the case of water flooding the inside of the shelters during heavy rains, the shelves are able to protect the belongings and items that have been safely kept in the shelves.

14.2.2 Bamboo partitions to segregate spaces

Inside a temporary shelter, no demarcations are made to separate the living room and the bedroom or other rooms because of lack of space. Except for the main door that marks the entry to the house, there exists no private space. If a private room were to exist within the shelter, it not only gives the woman some privacy but also serve as a place to store valuables.

At the time of the construction, a simple solution can help to segregate spaces based on gender considerations. A 'room' can be made using movable bamboo and covered with thatch that serves as a partition. The 'partition' can be made by the residents themselves, a suggestion is that the women in the house can partake in the making of these partitions/screens. They can be moved around the house and also reused. It has a huge social impact also in that it takes into account the personal needs of the women. Advantages include personalization of internal spaces, i.e. choice is left to the resident in its use.

14.2.3. Stone slabs for flooring

To protect the houses from being damped and to reduce the risk of flooding inside the houses, flooring can be made using broken bricks and cemented. A floor that is not left barren or exposed will provide good protection against water seeping into the premises.

14.2.4. Use of renewable source of energy

The advantages in using energy from renewable sources such as wind and sun can be explored. The solar energy can be tapped for solar lights that may be used for the streets and the toilets and bathrooms. Although the cost of installation is high, its advantages are that it saves time, trouble and inconvenience of changing the lights every now and then. In the case of toilets and bathrooms, which have to be lit after sunset, the use of solar lamps is very useful. Streetlights will automatically turn on at sunset and keep the streets safe and brightly lit. This can be sustained over time because they can be removed and shifted from site to site, and its long-term use ensured.

14.2.5. Protection from fire

Accidents and deaths due to fire hazards in temporary settlements are common. One reason for this is the use of thatched roofs in most of the houses. Tin/tar sheets are also recommended for the walls and the roofs but cause discomfort due to excessive heating during the summer.

Precautionary measures also need to be adopted to prevent accidents that occur in the kitchens and due to short circuits/electricity sparks during rains. The other reasons for fire have been during celebrations and fireworks. Several shelters in Chennai as well as Nagapattinam built after tsunami were gutted down due to devastating fires during festivals by inadvertent crackers etc. Sensitizing the affected communities in this regard becomes essential for fire safety.

- An improvement with this regard is the establishment of fire engine services close to the settlement sites.
- There are also clearly marked areas that hold sand filled buckets in case of a fire emergency. A typical street in a temporary shelter settlement consists of sand buckets that are seen hanging on either side.
- Water tanks that store water for the dry season may also be used to put off less threatening fires. These water tanks may also be used to store water that is not of good quality (e.g. clean sea water that is salty) for fire fighting.
- Use of smokeless choolhas also reduces the risk of thatched houses catching fire
- Burning of garbage must be discouraged in the streets and the wastelands. This also reduces pollution and respiratory illnesses.

14.2.6. Safe access

Paved roads provide safe and quick transportation linkages to the place of work and urban centers. Such roads are important for say, the local fishermen and village based industries to be well connected to urban and national markets. In the case where roads cannot be paved, the 'kutcha' roads can be hardened.

Roads that are tarred are useful in creating good transportation and communication linkages

14.2.7. Safety from construction materials

Nails, sharp bamboo, tin sheets not properly secured on roofs, or roofs improperly secured can also be a source of danger to a community. Simple processes of ensuring that each family undertakes an inspection of its own shelter to secure them with ropes etc could be inculcated. At times it is important that infrastructure work is not left dangerously incomplete, like the digging of water tanks, wells, drains etc.

The community center shown above is in a dilapidated state. The tar sheet walls are missing and the frames are tearing apart. Children are likely to get hurt.

14.2.8. Safety of location

Building temporary shelters in haste close to the edge of fast moving traffic on the highways can also be risky both to the community as well as the commuters. Precaution should also be taken when building the shelters next to back waters rivers or close to bridges or unmanned railway lines etc.

14.2.9. Personal security of the residents

Doors are important. Thieving is possible at all times of the day, and especially during the night. Mechanisms to safeguard their belongings such as bank lockers and sturdy cupboards are not available to them. So other systems must be in place that will reduce the possibilities of stealing and loss of valuables.

- Streets should be well light to increase visibility. Narrow streets that are unguarded must be especially kept bright after sunset.
- In some of the shelters, people prefer sleeping outside and this makes homes with bad locking/no locking at risk.
- To incorporate this dimension into the process of upgradation, painted doors with lock and key facility is useful.

14.3Problems in upgrading/repairing and maintaining temporary shelters

14.3.1 Lack of space

The creation of temporary shelters has to satisfy both conditions of safety as well as of comfort. The process of improving/repairing shelters takes time and has to be done step by step. To create auxiliary services requires physical space. Lack of spacing sometimes restricts the extent to which temporary shelters can be upgraded and the nature of changes that can be made.

14.3.2 Element of time

The construction of temporary shelters for the community has to be done within a minimum span of time. People whose homes have been left damaged cannot be left homeless for a long time. This could mean for example building 150,000 shelters in about 15 days. This is almost close to impossible. The factor of time and cost should not act as constraints to the development of safe and comfortable habitats for the affected community, yet the temporary shelters require regular maintenance, repair and upgrading until permanent shelters have been provided.

14.3.3. Poor understanding of the calamity

An assessment of the region in terms of extent and area of the damage usually precedes the making of a plan for rehabilitation. The events that led to the disaster has to be carefully followed up step by step to help planners and architects educate themselves about the calamity and decide what appropriate action must be taken. Poor assessment results in a situation where immediate needs are not properly attended to and hence the people are left to fend for themselves.

CHAPTER 15

15. Capacity building program (for maintaining and upgrading temporary shelters) for sustaining livelihoods

The ways and means by which members of the community earn a living reflect on their standard of living. The damaging effect of a large disaster is a temporary loss of such livelihoods.

1. Coastal communities mainly depend on the sea for their livelihoods. The recent tsunami and the floods that destroyed human settlements near the coast resulted in a loss of employment for the fishermen. Boats, nets and other fishing equipments were lost or completely damaged. This led to loss in income for months after the disaster.
2. Communities who were engaged in agricultural activities also suffered when the impact on farmlands destroyed harvests. Raw materials, farm implements, seeds and agricultural machinery were damaged.
3. Some families depend on income from rearing livestock. The lives of cattle and poultry may have been lost after the disaster, and families have lost earnings that are needed to rear livestock.
4. In rural villages, many households engage in work that is performed inside the homes. This is the case with weaving, carpet making, jute making and other handicrafts. Absence of a place of work leaves families desperate for work, immediately after the disaster.
5. Families that have lost earning members of their family in the disaster have to start looking out for opportunities to work. Some members of the household who were previously unemployed, will also, desperately start looking for work to support themselves.

Coastal communities that were dependent on the sea for their livelihoods not only require reconstructed homes but also adequate 'safety nets' to regain large losses in income

Creating opportunities for capacity building for both the men and the women is important. While men venture out to the sea, the women wait for their safe return, collect the fish and market. Uncertainty in livelihoods, such as that in fishing, will affect both men and women.

For economically backward individuals, being unemployed for, as little as a few days will mean a hand to mouth existence or worse, starvation. Mounting debts will further aggravate their concerns for a safe and secure livelihood. There is a need to identify and promote alternative and sustainable livelihood opportunities for such communities to improve their standard of living

Capacity building may be seen as an educational employment program initiated at the grass roots level, which not only provides employment, but also enhances their skill base that helps them secure higher wages. The program aims to create within the community a category of labor that is skilled.

This means that men and women in the community should be directly involved in the process of upgrading their own homes. Some of the elements in upgrading homes (as mentioned in the previous section) include cement flooring, roofing the house, creating the kitchen extension, making doors, painting the walls, introducing solar lighting etc. Imparting training in masonry, carpentry, painting, plumbing, electrical wirings and fittings, repair and maintenance etc. may develop the skills for construction. Building the skills and capacities of the community also makes the community understand the basic requirements of building safe homes and how to integrate indigenous materials and methods with recently developed technology for housing.

Raising awareness of the community about the concept of sustainability is important. To develop a sense of belonging with their dwelling units and make them responsible for their own homes, the community themselves should be participating in the task of upgrading the shelters. This involves integrating capacity building with the process of upgrading the shelters.

This will ensure that the community takes good care of their shelters and common spaces, damages are regularly attended to and that materials such as doors, windows, shelves etc. are taken care of, removed and re-used when people move into new locations or into shelters that are permanent.

The program for upgrading, maintaining and repairing temporary shelters should not be viewed in isolation. The shelter to housing program should not only serve the present needs of the community, but over a period of time, lead to the development of stronger and safer shelters on a permanent basis.

15.1. Benefits of capacity building

The community maintains and improves the existing state of temporary shelters with little external assistance.

- This makes them independent and self-reliant. It integrates the task of building homes with the task of providing employments for the communities. The housing conditions reflect on the standard of living of the household.
- The transformation of traditional dwelling units into more durable structures is a significant improvement in welfare. As long as it was the traditional mud house the community built it themselves, but when the need for the use of materials such as concrete and for creating electricity and plumbing facilities arose, the community became dependant on unscrupulous low quality rural contractors.
- The capacity building program will give the community the power back to build their homes and hence reduce its dependence on external help.
- The farmers or fishermen for example cannot work during all parts of the year, seasons exists during which fishermen cannot venture out into the sea because of adverse weather conditions and farmers cannot engage in farming activity (during the dry season): construction work on a part time basis guarantees some income, during uncertain times.
- In many underdeveloped regions it is often seen that the provision of materials, raw materials, machinery etc. to the community does not have a long lasting effect. It is common to find instances where some have simply sold the raw materials that have been provided to them, in preference for cash.

15.2. Training program

Qualified engineers should be involved to develop skills for construction. In the beginning of the training program, one may experience a total lack

of awareness from the part of the community, with regard to construction practices. So at every stage, civil engineers and others must be present at site to continuously deliver instructions to the workmen.

- Trainees should be taught about the techniques and the way to improve the quality of the shelter.
- Trainees should not only be able to understand various aspects of disaster mitigation but they are able to earn a temporary means of living from the wages they get by getting involved with the construction.
- The training program should also focus on ways of maintaining the shelters in the future.
- Permanent damages to the house result from minor damages that are left unattended. Repairing the small damages is also imparted in the capacity building program.

Initiating the concept of capacity building is only a possibility. It will become reality only when discussions with the community lead to an understanding that the community will co-operate. Initially, only a few people may express their willingness to participate. They may be hesitant to offer their full support because they are unsure of what they should expect from the training that has been offered.

First, the community must be made aware of the materials that have been proposed for use in upgrading. Familiarity with the use of new materials like concrete etc. can be created, and the community is also taught to use toilets/bathrooms and made to understand systems for drainage, sewer, and waste management. The best way to learn is by practice. All the materials and construction tools will be assembled on site and work on construction will begin.

While continuance of existing livelihoods is desirable by a large section of the locals, training them for alternative forms of employment such as construction work gives them a temporary means of livelihood. This period of uncertainty will last until all resources have been fully capacitated for their safe return to secure employments.

The responsibility of upgrading the temporary shelters should be best left to the beneficiaries themselves. This will also make them accountable to take good care of their dwelling unit. The feeling of living in a home will replace the feeling of being in an unfamiliar surrounding. Thus directly involving the men and women in the construction of their homes gives them a sense of ownership. This will economize the use of funds in the rebuilding process and also make such funds available for the development of community spaces. Having received an on-the-job training of this kind, communities have better opportunities to gain suitable employment.

CHAPTER 16

16. General assessment of materials used

The materials that are used to build the temporary shelter include, bison board, stabilized mud block, thatch, Ferro cement, corrugated Galvanized Iron sheets, fly ash bricks, bamboo, casuarinas, hollow clay blocks, exposed brick, steel etc. the assessment of these materials is made according to the following broad considerations:

1. Workmanship
2. Thermal conditions
3. Aesthetic value
4. Transportation
5. Cost
6. Availability
7. Construction techniques
8. Uses and disadvantages
9. Durability

1. Bison board

- No skilled laborers are required for construction
- Transportation is economical if brought in bulk
- Availability is greater in the cities
- Economical and feasible
- Construction is easy
- It is durable and hence long lasting
- Easy to dismantle
- Does not offer thermal comfort, but does so when sandwiched with thermocol or glass wool etc.

2. Tin sheet

- Construction requires skilled laborers
- Transportation does not affect the cost considerations because of its easy availability
- Cheaper and more cost efficient
- Tin materials get rusted and becomes damaged
- Rusted sheets are dangerous and they cause harm to health and environment
- They are resistant to fire
- Conducts a lot of heat therefore the whole interior gets heated up and makes it very difficult to live in hot humid regions like Chennai

3. Stabilized mud block

- Local labor can be used, but some training is required.
- Transportation should be done carefully to prevent breakage
- Easily available
- It is a low cost material
- It is not durable as it gets washed away during the rainy season
- This can be prevented to some extent by insulation
- Construction is quick and easy
- Mud has the property of making the surroundings and interiors cool and thus provide thermal comfort
- Requires regular maintenance and upkeep though low cost
- Locally available earth must be suitable for production of blocks or else it is not an advisable option

4. Casuarinas

- Used in the construction of frame work
- Easily available
- But, catches fire easily
- Can also be used for partitions
- A naturally availably material
- Economical and environmental friendly

5. Hollow clay block

- Used in construction of partitions
- Surface of clay blocs are made glazed in a variety of colors
- Efficient in preventing passage of sound
- It does not shrink during the summer and is fire resistant
- Offers thermal comfort
- Main advantage is that it does not allow water to seep in
- Economically priced
- Easily available
- Construction is easy

6. Filler slab

- Used for roofing by placing terracotta tiles as filler material in-between concrete slab
- Amount of concrete used is less
- Good thermal comfort
- Requires skilled labor force and care in constructing
- Initial labor costs are higher than conventional concrete slabs but can be reduced as the labor assimilates the construction process.

7. Ferro cement block

- Construction can be done quickly
- Thickness of the panels is less
- Hence, it absorbs more heat
- Most often used as panels, therefore the joints have to be sealed carefully in order to avoid future cracking and leakage, especially in Ferro cement roofing systems.

8. Brick Cavity wall

- Offers thermal comfort
- Uses less brick through the rat trap bonding method
- Existing labor may not conversant with this technique and therefore need training to acquire these skills
- Cost efficient since it uses less material
- Care has to be taken in fixing the electrical service and drainage lines since breaking this wall can weaken the building.

9. Thatch roof

- Easily available
- Light weight
- Not fire resistant requires further research to develop fire resistant thatch
- And offers little protection during heavy rains/winds and cyclones
- It has to be mended repeatedly
- Traditionally used material

10. Exposed brick

- Needs no plastering
- More prone to dampness and surface scaling
- In the interiors it can be maintained with plastering
- Thermally comfortable
- Water proofing is required

11. Bamboo

- Light weight
- It is naturally available
- Easy to transport
- Where available in plenty, it provides economy in its use
- Easy to construct
- Used to make furniture, roofs, walls and framework
- It is aesthetically appealing
- If cut vertically, it can be used as partitions
- Has good tensile strength and can be used instead of steel reinforcement in coastal areas where steel is prone to rust.

CHAPTER 17

17. The community and disaster preparedness

The concept of preparedness includes

1. Collaborating a team of experts that includes geologists, atmospheric scientists, environmentalists and others who can develop a system for early warning in the unfortunate but likely event of a natural disaster.
2. Collecting data about regions that are highly prone to disasters such as earthquakes, floods, drought etc. This leads to the creation of a vulnerability analysis mapping, which will grade regions according to the level of threat, that each faces from a hazard.
3. Maintaining a resource book of all the NGO's working in the region, educational institutions, hospitals and other essential services that can be contacted in the event of an emergency and can help with the evacuation and relief efforts.
4. Creating a communication network between the police personnel, the army, navy and the air force and local leaders who can contact one another and disseminate absolutely essential information in the event of an emergency.
5. Making an emergency evacuation plan[#] for the people in regions that lie directly in the path of the disaster and using public address systems, the radio and the television to create awareness about the disaster and the precautions to be taken. Installing public address systems to disseminate emergency warnings, local news etc at short notice is very useful in that these systems can also be used at a later date to spread information about distribution of relief materials, announcement of important news relevant to the community, creating voter awareness etc.
6. Collecting critical data in the region that includes demographic characteristics of the population, food habits of the community, primary and secondary livelihoods of both men and women, standards of living of the population, health statistics of the community, level of physical development of the region in terms of availability of natural resources, quality of the soil and water. This will affect the nature and quantity of relief materials to be collected and made available.
7. Obtaining accurate information of the above parameters will not only help in deciding the nature and quantity of materials that should be made available to the region but also how to gain accessibility to the region.
8. Grouping a team of constructors, civil engineers, architects and town planners who can plan out the need for specific items of physical infrastructure that should be in place for quick access to disaster affected zones.
9. Creating a data bank for:
    a. Food resources available in the region
    b. Medical facilities available- lists of a team of doctors, nurses and hospitals who are willing to lend their support during the emergency. The likelihood of a disease outbreak must be predicted so that vaccines can be made within reach.
    c. Safe buildings and open spaces that may be used as a medical emergency unit, temporary shelter facility, food distribution center etc.
    d. Water resources- Data regarding the sources of water that the people in the region rely on, quality of water and potential for mobile water desalination-purification plants to be set at short notice.
    e. Sanitation and hygiene standards in the region- i.e. whether people have access to the use of toilets, and what the typical standards of hygiene and health care are.

[#] Websites of a few suppliers of disaster preparedness kits have been provided in the appendix.

10. Imparting knowledge and scientific awareness of the calamity amongst school going children in their geography curriculum and teach them basics of emergency response without generating any undue fears.
11. Generating long term plans for the socio-economic development of the community by linking disaster mitigation to securing livelihoods of the vulnerable population. The development of vegetation in the coastal belts for example, not only help in protecting the coasts but also preserve the ecological balance in the region.
12. Compulsory training of fire service and police personnel to suitably respond to the disruption that results in the event of a calamity.
13. Preparing plans for reconstruction:
    a. This includes, making a general enquiry into data on land holding, and planning alternative sites for transition shelters for emergency.
    b. Also the collection of records of the building byelaws in the regions and procedures for construction, construction permit procedures, labour laws etc.
    c. Preparing physical plans of house types for reconstruction with foundation designs and costs and also creating a data bank of other requirements like school designs, banks, post offices etc.
    d. Guidelines for constructing buildings that offer resistance to floods, earthquakes and cyclones must be readily available.
14. Using various methods of data collection, create a data set on all the families living in a particular region. When a head count of the population is available, data can be periodically updated and information is immediately available about the whereabouts of the population. Documentation of the age-structure and density of the population can help investigators to arrive at precise estimation of the loss of lives, number of orphans, missing persons etc.

When a considerable amount of research has been carried out to identify disaster prone regions and the physical, social and economic nature of their vulnerabilities, with the use of information systems and technology, a step by step manual can be delivered to the local population and relief teams. Apart from minimizing the loss of human and animal lives, the time and cost of dealing with the aftermath of the disaster is also reduced.

CHAPTER 18

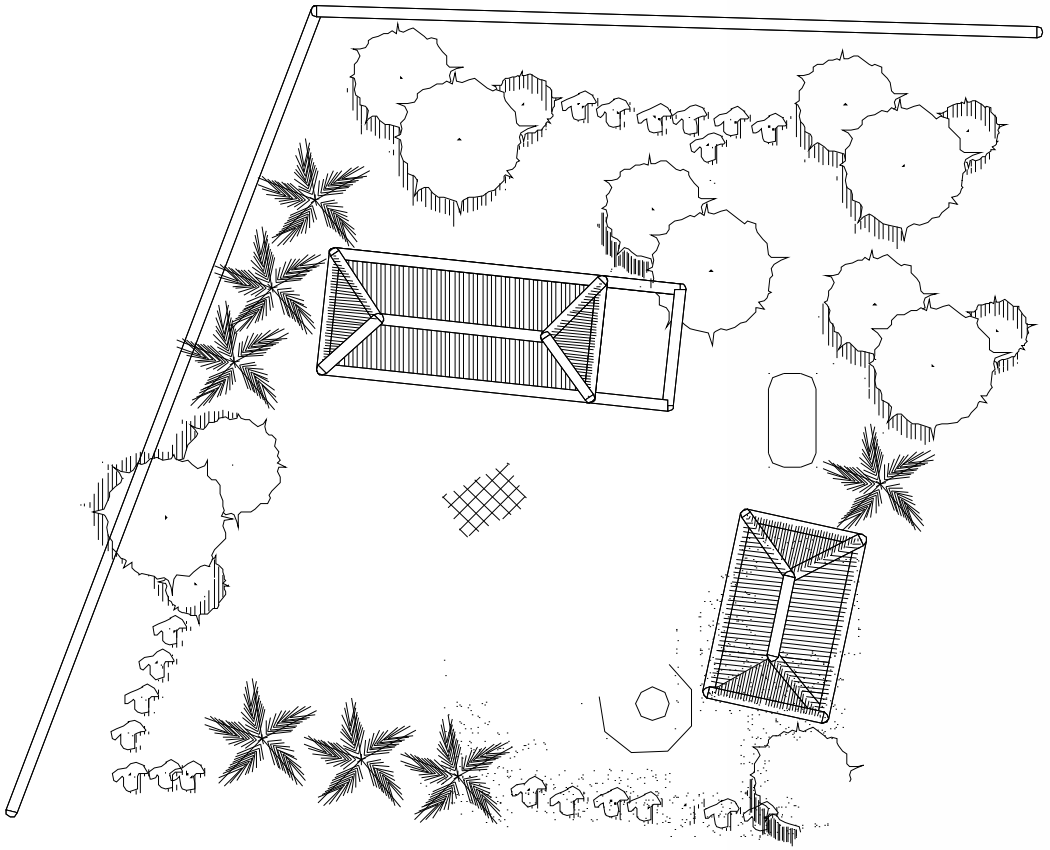
18. Social factors that impact settlement location and design

An understanding of the socio-economic characteristics of the population that are vulnerable and affected by natural disasters, lead us to believe that the affected communities are in general, economically disadvantaged and economically backward individuals, whose lack of capabilities and entitlements take them further and further down the ladder to development. The indicators of human development of this section of the population will probably match poorly against the average levels of human development that exists in the country.

By collecting data on various aspects of their living conditions, an understanding is possible of the relationships between the socio-economic variables that determine their quality of life. Data may be collected for the following variables:

1. Population with sex ratio
2. Average size of the family, age structure of the population.
3. Health indicators for the population- Data on infant mortality rate, maternal mortality rate, average age of marriage.
4. Statistics on education- schooling conditions, drop out rate, literacy levels of the population and number of people unemployed
5. Position of women in the community- Number of working women, primary and secondary responsibilities of the women
6. Employment statistics- average earnings of men and women, main sources of employment (fishing/construction/government employees etc.)
7. Access to amenities-percentage of people who get access to water and toilet facility, distance of the household from the nearest water source, type of dwelling unit etc.
8. Access to goods and services- Percentage of people who rely on the fair price shops for food, nearness to transport facilities etc.
9. Statistics on consumption- Constituents of expenditure on consumption, monthly expenditure on consumption, saving patterns, etc.

Once the data is obtained, a study of all the variable may reveal some patterns that will be of use to realize how strongly each of the variables affect the other. Knowing whether the variable are positively or negatively related to one another will help to understand how a change in policy or development intervention will cause change to the quality of life of the communities. A study of the various indicators of human development over a period of time will reveal how the community has been benefited from, and responded to, the rehabilitation efforts and its contribution to raise the standard of living of the people.



OPEN SPACES ARE SIGNIFICANT IN A TRADITIONAL SETTLEMENT

UNIT

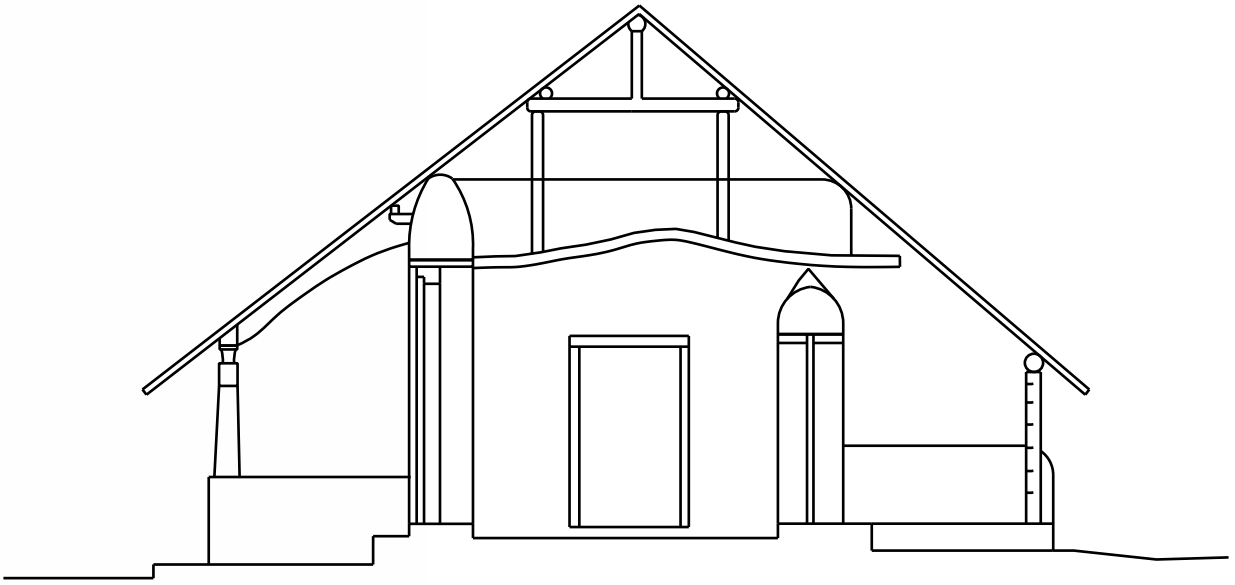
> Trees mark the 'walls' of the house

>facility for storing firewood is made outside the house

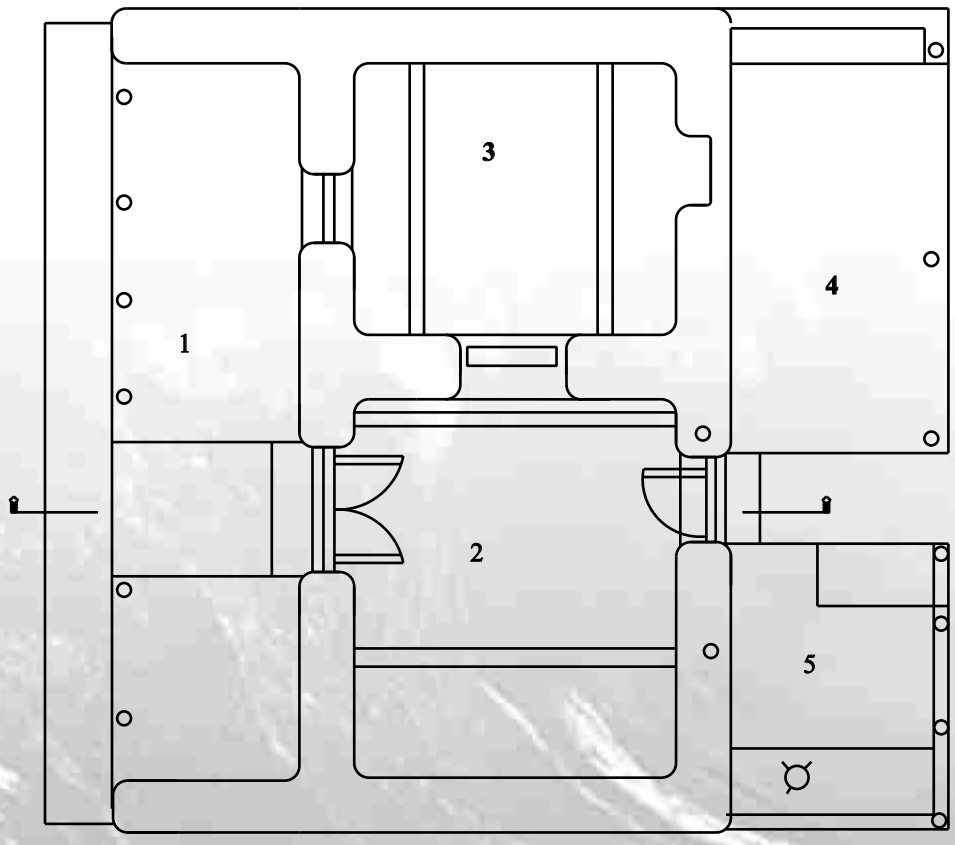
>kitchens are located outside

THE DWELLING UNIT OCCUPIES ONLY A SMALL SECTION OF THE ENTIRE COMPOUND

EXISTING STRUCTURE OF A DWELLING UNIT



SECTION



1-THINNAI

2-ROOM1

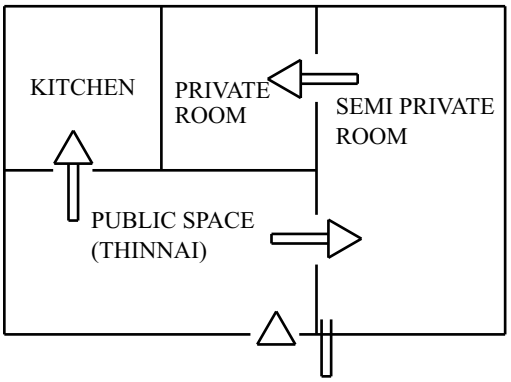
3-ROOM2

4-BACKYARD

5-KITCHEN

PLAN

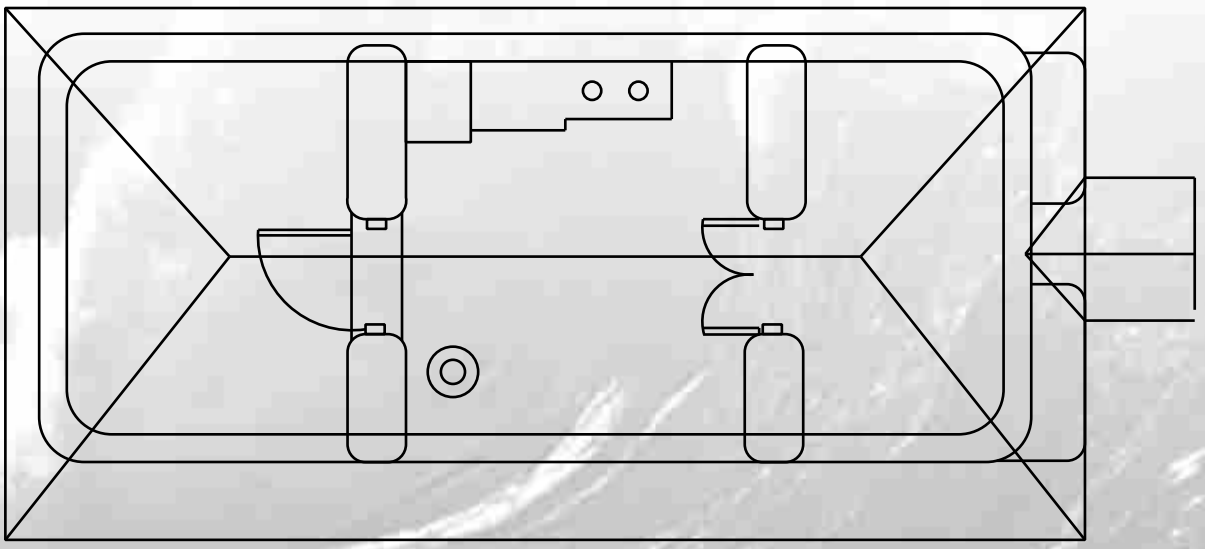
ZONING OF INDIVIDUAL DWELLING UNIT



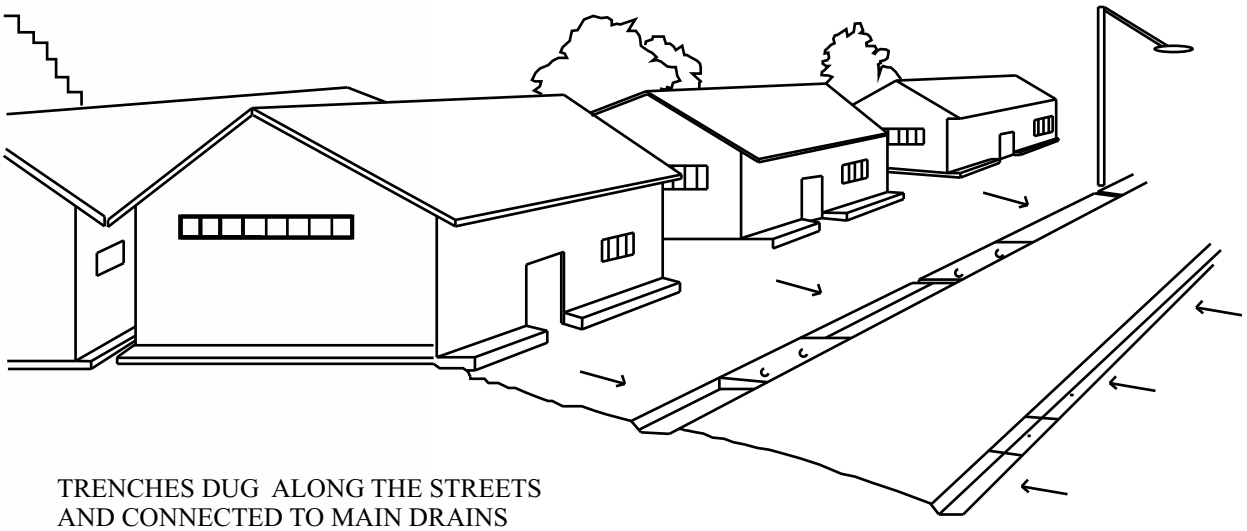
PUBLIC ZONE
open welcoming space in
front used for evening gettogether

SEMI PUBLIC
multi purpose room and main
living space

PRIVATE ZONE
the inner room used for
storing the belongings, also used as
changing room and essential for
womens privacy.

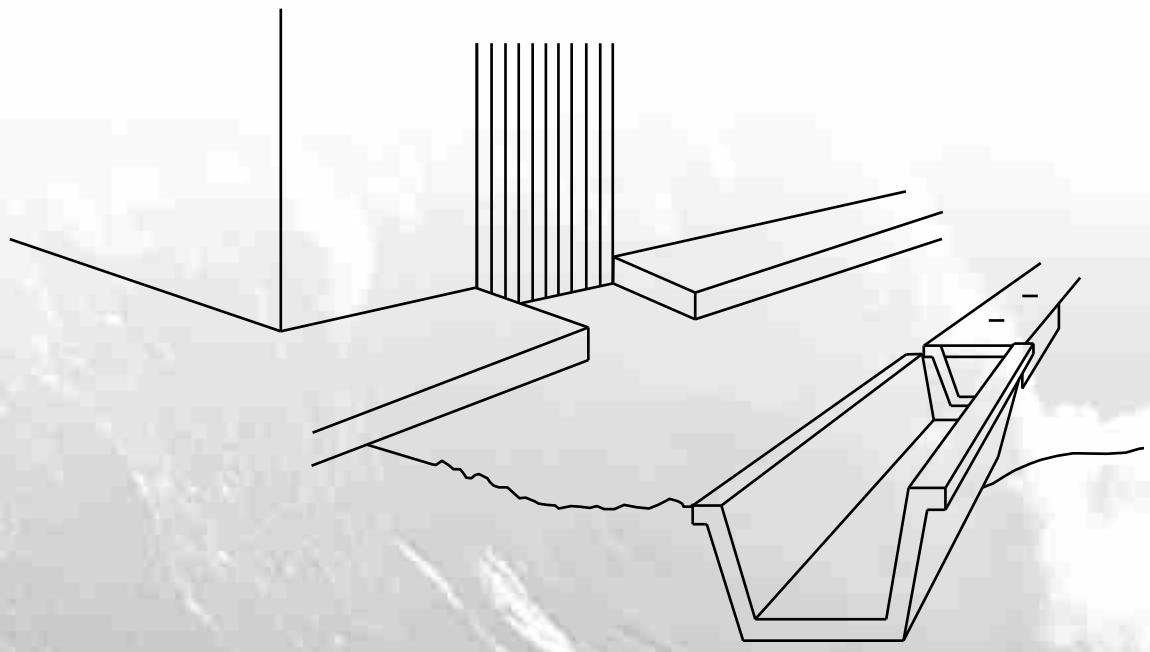


DRAINAGE DETAILS

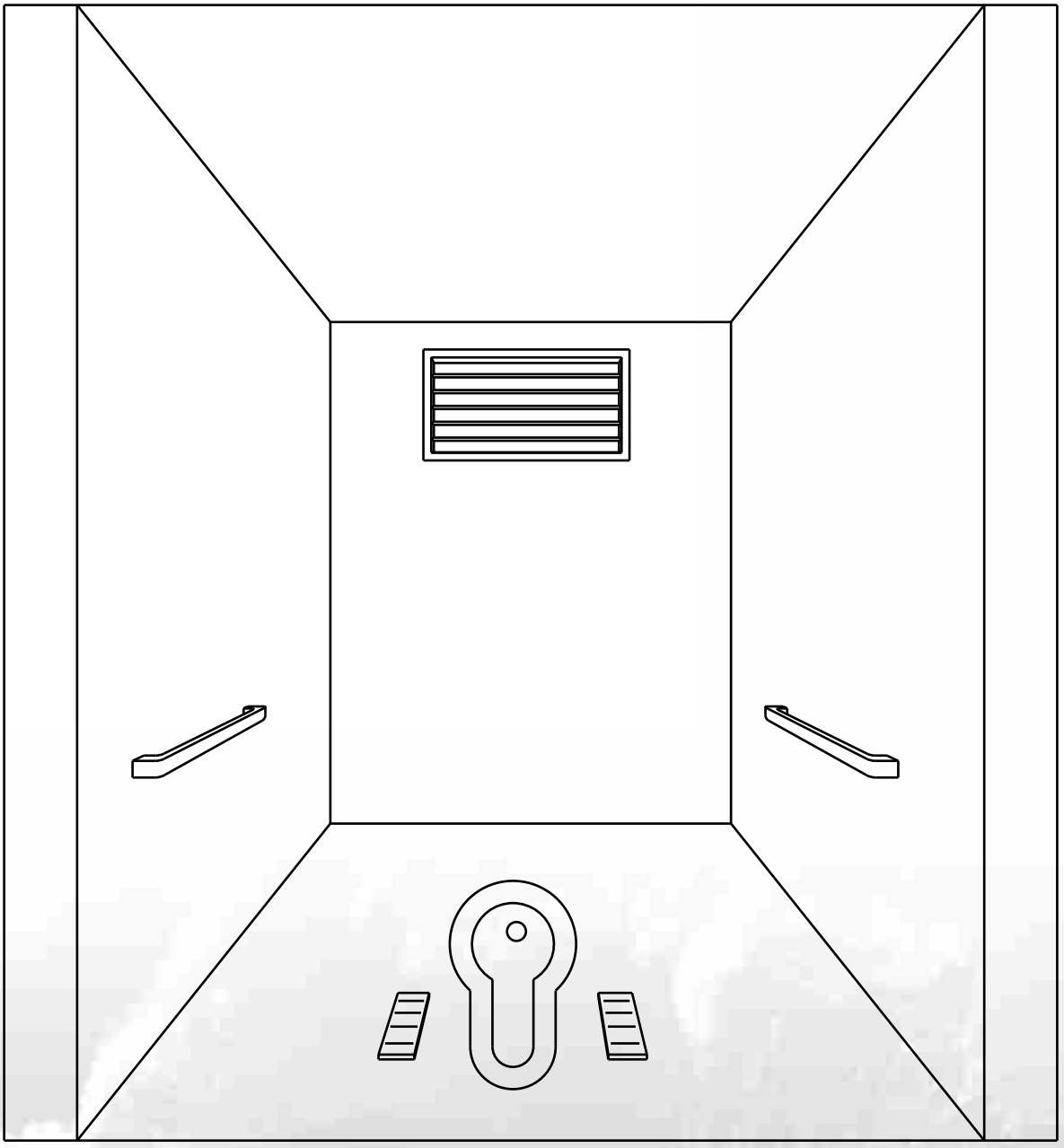


TRENCHES DUG ALONG THE STREETS
AND CONNECTED TO MAIN DRAINS

THIS
IS AN EFFECTIVE SOLUTION TO
PREVENT FLOODING

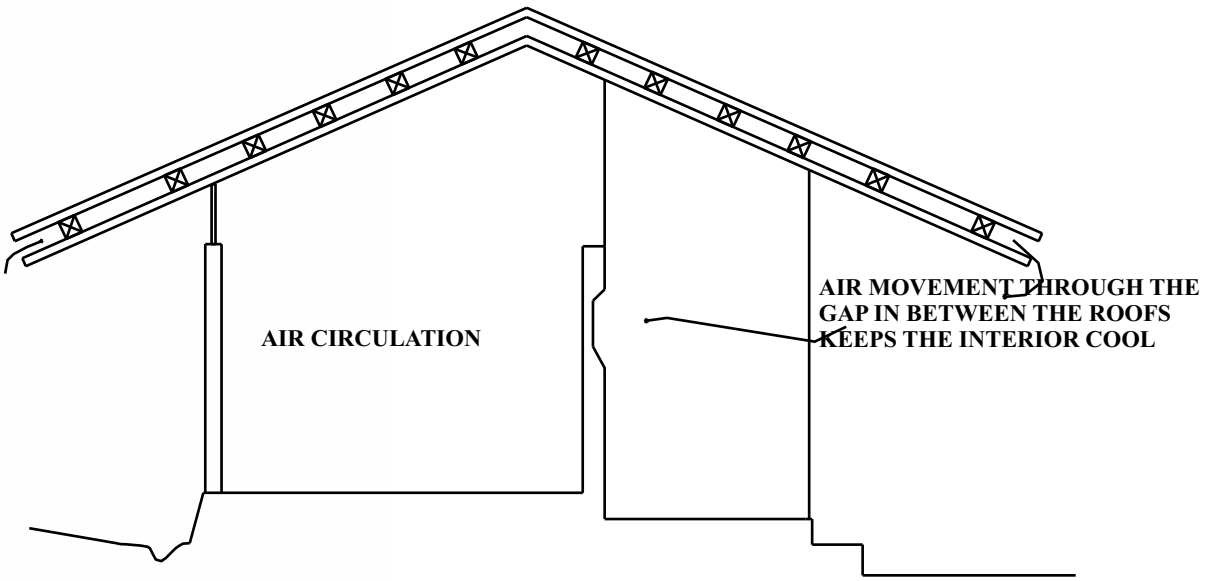


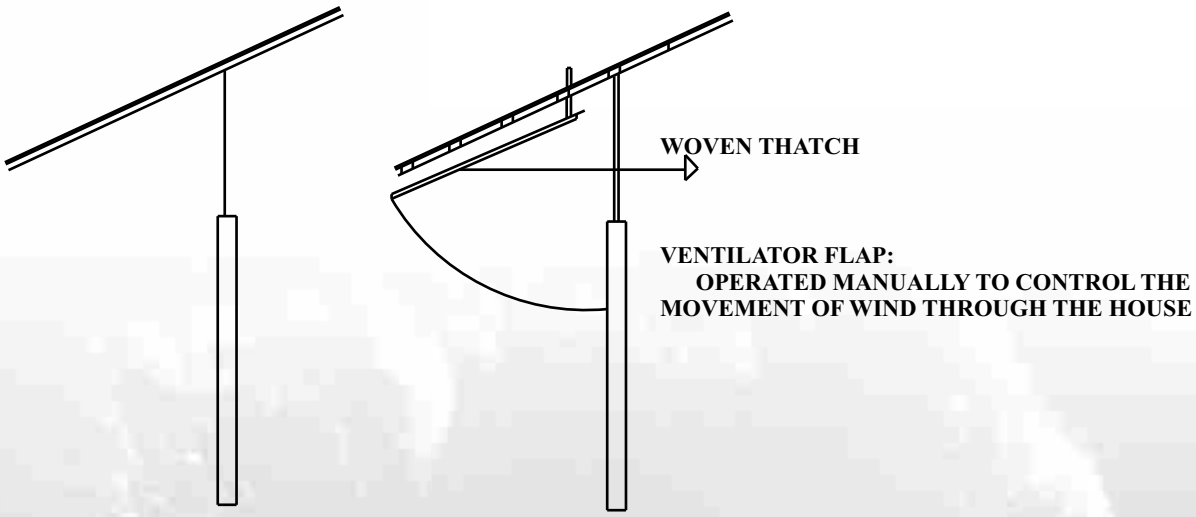
GRAB BARS IN TOILETS



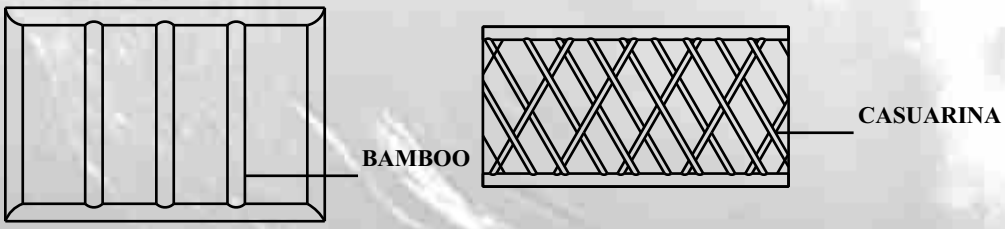
> GRAB BARS CAN BE PROVIDED ON TWO SIDES.
> THIS IS FOR THE CONVENEINCE OF OLD PEOPLE
> THE BARS PLACED AT A HEIGHT OF 1 METRE IS IDEAL

PHYSICAL CONDITIONS FOR VENTILATION AND THERMAL COMFORT





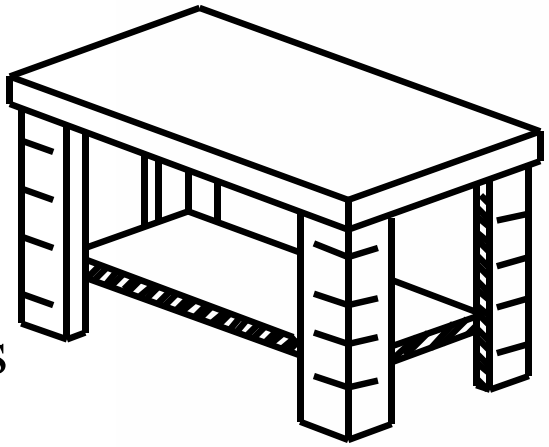
WINDOWS



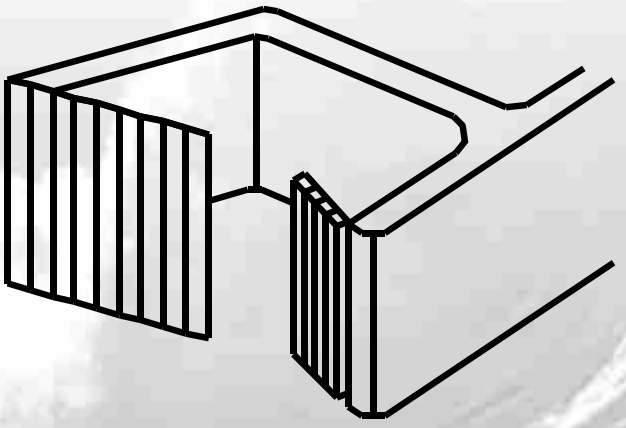
Proposed elements in upgrading temporary shelters

SHELF

>used to store things at a considerable height(1m)above the ground
>very effective during floods
.uses mud mortar which is easily available and can be reused
>cost between Rs400-Rs700



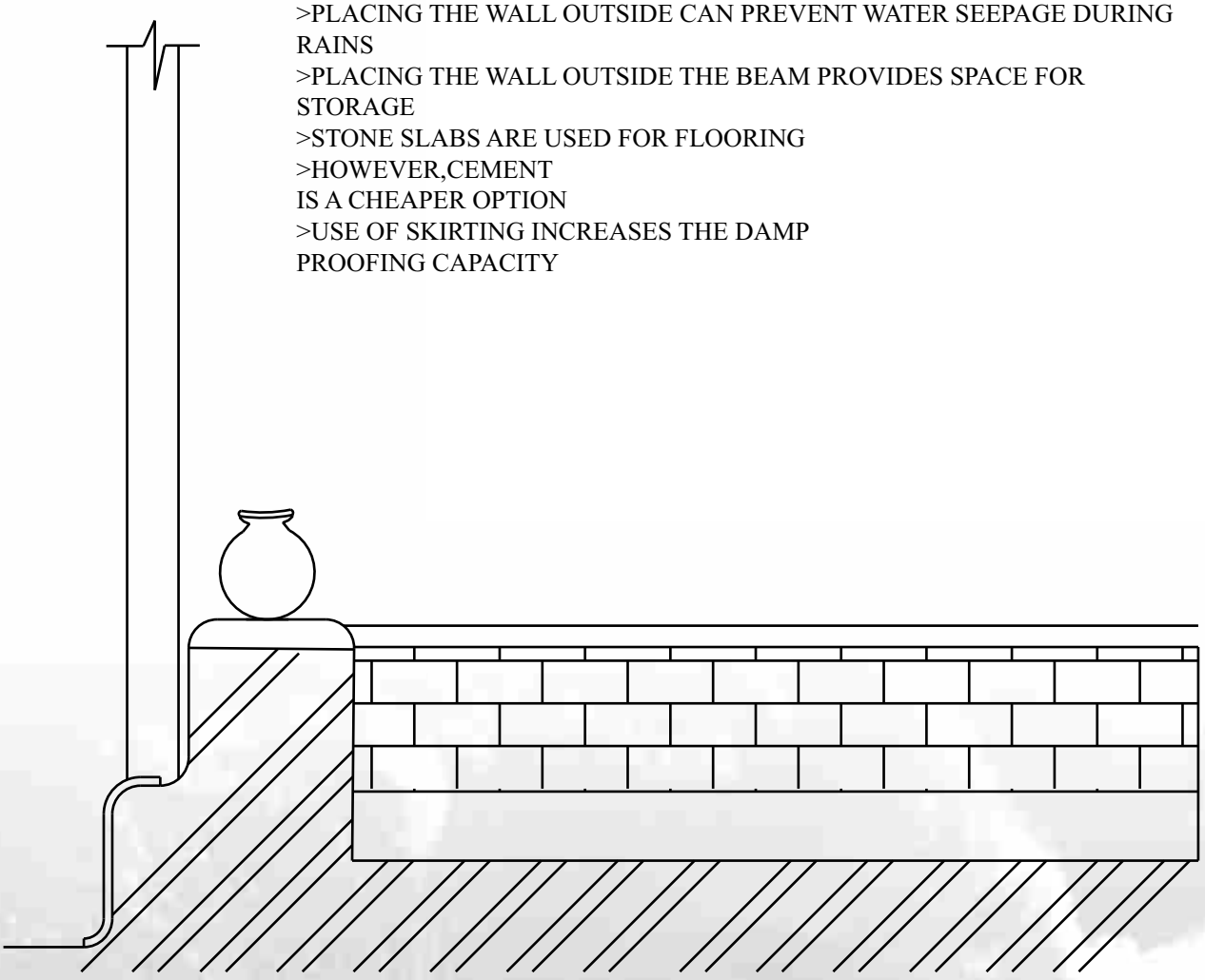
BAMBOO PARTITION



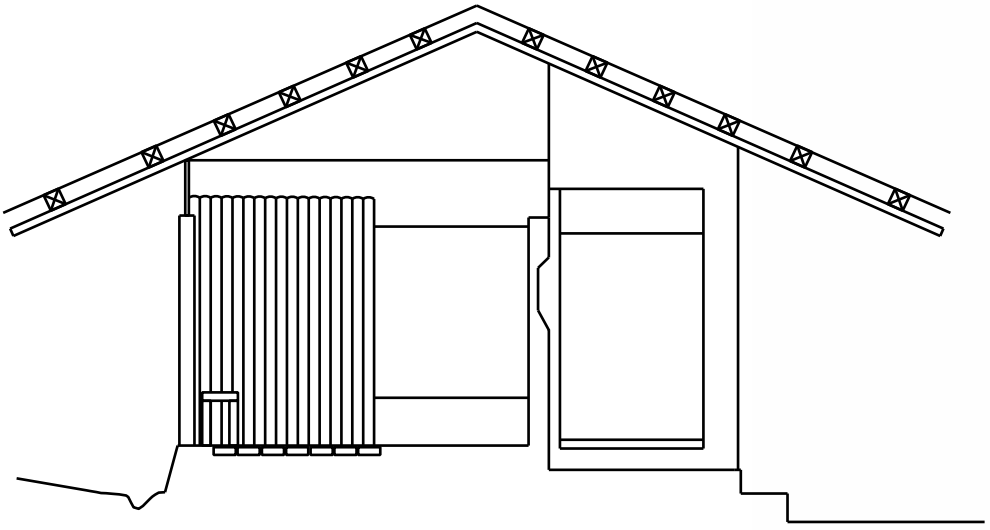
>bamboo partition used for creation of private spaces
>can be used as changing room for women,safe keeping,and for resting

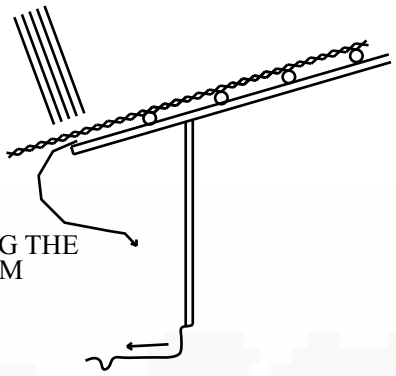
PLINTH AND FLOOR DETAILS

>PLACING THE WALL OUTSIDE CAN PREVENT WATER SEEPAGE DURING RAINS
>PLACING THE WALL OUTSIDE THE BEAM PROVIDES SPACE FOR STORAGE
>STONE SLABS ARE USED FOR FLOORING
>HOWEVER,CEMENT
IS A CHEAPER OPTION
>USE OF SKIRTING INCREASES THE DAMP PROOFING CAPACITY

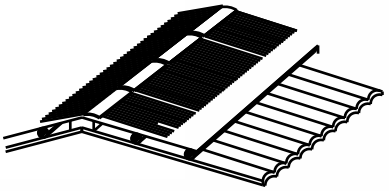


ROOF DETAILS

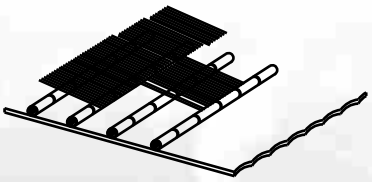




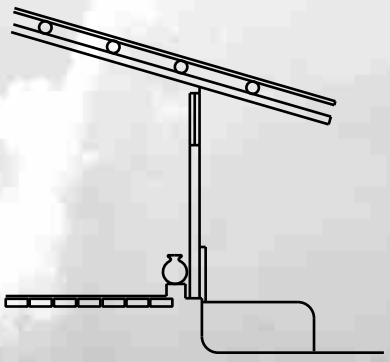
PROTECTING THE HOUSE FROM RAIN



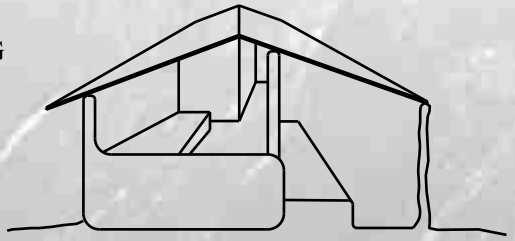
GAP BETWEEN TIN SHEET AND THATCH



THATCH SHEETS TO BE FIRMLY TIED TO THE FORM WORK



EXTRA SPACES CREATED USING ROOF OVERHANG



Annexure - 2

ESTIMATED COSTS OF TEMPORARY SHELTER IMPROVEMENT (Program for upgrading temporary shelters)

Elements		Cost
1.	Cudappah stone shelves	Rs. 550/-
2.	Bamboo screens	Rs. 400/-
3.	Extended kitchen	Rs. 2000/-
4.	Fire protection buckets	Rs. 1000/-
5.	Painting walls	Rs.500/- per shelter
6.	Door repair	Rs.550/- per shelter
7.	Second roof for shade	Rs. 40/- per sq.ft
8.	Plinth	Rs. 2500/- per shelter

Annexure - 3

Important websites for further information/research

Websites that provide information on specific topics are provided in this section. The websites that have been provided here are only a few examples of the range of information that is available for further research on selected topics from the Internet.

For more information on disaster management/disaster preparedness, visit:

1. http://www.ukabc.org/TamilNadupostTsunami.pdf
   Towards Post Tsunami Livelihood Security for Fishing Communities in Tamil Nadu
   A Preliminary Proposal From Concerned Citizens (7 January 2005)
2. http://www.who.int/mediacentre/news/releases/2005/pr30_searo/en/index.html
   Tsunami recovery process focuses on long-term health capacity development, 24 JUNE 2005 | NEW DELHI, WHO, Media center
3. http://www.gdrc.org/oceans/tsunami_coastal-guidelines.html#one
   Guiding principles for post tsunami- relief and reconstruction prepared by the United Nations Environment Programme, UNEP-GPA
4. http://www.ndmindia.nic.in/
   Home page of the National Disaster Management Division, Government of India
5. http://www.ndmindia.nic.in/Tsunami2004/Strategy%20Paper%20on%20Tsunami.pdf
   Preventive/Protection and mitigation from risk of tsunami, A Strategy paper.
   Government of India (2005)
   Ministry of Home affairs
6. http://www.ndmindia.nic.in/EQProjects/Disaster%20Management%20in%20India%20-%20A%20Status%20Report%20-%20August%202004.pdf
   Disaster Management in India, A status report (August 2004)
   Government of India, Ministry of Home affairs, National Disaster Management Division
7. http://www.usaid.gov/in/newsroom/speeches/dec26_5.htm
   USAID Focuses on Disaster Preparedness in Tamil Nadu, Statement by Mr. Christopher Wurst at Tsunami Commemoration, Cuddalore on December 26th 2005.
8. http://www.southasiadisasters.net/index.htm
   Website of the All India Disaster Mitigation Institute
9. http://www.ndmindia.nic.in/Mitigation/mitigationhome.html
   For information on Disaster mitigation in India
10. www.emprep.com
    Disaster Preparedness kit suppliers

11.http://www.nationalsecurity.gov.au/agd/EMA/rwpattach.nsf/VAP/(63F21BC6A4528BAE4CED2F9930C45677)~EMASchools-4.pdf/$file/EMASchools-4.pdf

EMA's School education- 'What should you do in the event of a tsunami'- Australian Government's Attorney General's Department.

12. www.redesupply.com

Suppliers of disaster Preparedness kits

13. www.americanredcross.org/services/hss and

www.americanredcross.org/services/disaster

Disaster preparedness kit contents

14. http://www.tn.gov.in/tsunami/

Government Information cell- Disaster Management and Mitigation Department, Government of Tamil Nadu

15. http://www.ndmindia.nic.in/WCDRDOCS/knowledge-manageme.pdf'

Knowledge management in Disaster risk reduction'- The Indian approach, Government of India, Department of Home affairs, National disaster management division (Prepared under GOI-UNDP Disaster Risk Management Programme)

16. http://www.ndmindia.nic.in/EQProjects/goiundp2.0.pdf

'Community Based Disaster Reduction and Recovery

Through Participation of Communities and Local Self Governments'

Disaster Risk Management Programme

[2002-07]

National Disaster Management Division

Ministry of Home Affairs, Government of India

17. http://www.gujaratindia.com/Policies/Policy2.pdf

Gujarat State Disaster Management Policy

Prepared by Gujarat State Disaster Management Authority

18. http://www.nidm.net/DM_act2005.pdf

The national disaster management act 2005 (which came into force on 23rd December 2005), published in the Gazette of India Extraordinary, by the Ministry of Law and Justice, Government of India.

19. http://www.bmtpc.org/disaster.htm

'Disaster mitigation and vulnerability atlas of India: A Paradigm shift from post-disaster relief to pre-disaster pro-active approach', Building Materials & Technology Promotion Council, Ministry of Urban Development and Poverty Alleviation, Govt. of India

20. http://www.sthjournal.org/241/chand.pdf

'Classification of tsunami hazard along the southern coast of India: An initiative to safeguard the coastal environment from similar debacle'Prepared by N. Chandrasekar, S. Saravanan, J. Loveson Immanuel, M. Rajamanickam Centre for GeoTechnology, School of Technology, Manonmaniam Sundaranar University, Tirunelveli 627 012, India G.V. Rajamanickam, Department of Disaster Management, School of Civil Engineering, SASTRA Deemed University, Thanjavur 613 402, India

For more information on use of renewable sources of energy/solar lighting, visit the following websites.

1. www.selco-india.com

   SELCO-Solar Electric Light Company- Providers of environmental sustainable electricity, solar lighting products of all types made available by SELCO, India.

2. http://www.tatabpsolar.com/

   Tata BP Solar India Private Limited. Also visit their products gallery at: www.tata.com/tata_bp_solar/articles/20010426_solar_shops.htm

3. http://energy.sourceguides.com/index.shtml

   The source for renewable energy is an online guide to renewable energy businesses and organization worldwide

4. http://www.solarbuzz.com/CompanyListings/India2.htmCompany listings by state of Indian solar energy organizations available here

5. http://presidentofindia.nic.in/scripts/independencedetail.jsp?id=6

   The President of India, addresses to the nation, on the eve of the 59th year of independence, on 'energy dependence'

6. www.solarlighting.com

   Information on solar lighting, solar water pumps, solar water treatments and solar home systems

7. www.eco-web.com

   The global directory for Environmental technology- The GREEN PAGES

8. www.geda.org.in/solar/so_solar_street.htm

   For information on and products for street lighting

For more information on the effect of natural disasters on the health of the affected communities, visit

1. http://w3.whosea.org/LinkFiles/Moving_Beyond_the_Tsunami-The_WHO_Story_WHOTsunami_COMPLETE.pdf

   http://w3.whosea.org/en/Section23/Section1108/Section1835/section2053.htm

   "Moving beyond the tsunami", the WHO Story,

   World Health Organization, Regional Office for South East Asia (2005)

2. http://www.bt.cdc.gov/

   Home page of the Center for Disease Prevention and Control

3. www.annals.edu.sg/pdf/34VolNo10200511/V34N10p625.pdf

   'Tsunami's in South Asia: What is the risk of post-tsunami infectious disease outbreaks?' a review article by A Wilder Smith. Annals academy of medicine, November 2005, Vol.34, No.10

For more information on management of wastes visit,

1. "Re-thinking waste management", by Sanjay.K.Gupta

   www.indiatogether.org/2004/apr/env-rethink.htm

2. Indian center for plastic in the environment's website

   www.icpenviro.org and www.envis-icpe/resourceconservation.html

3. For waste disposal methods: advantages and disadvantages

   www.gdrc.org/vem/waste/disposal.html

4. "Sustainable solid waste management in developing countries", by Hishashi Ogawa (WHO western Pacific Regional Environmental Health Center). Paper presented at KualaLumpur, Malaysia.

   www.gdrc.org/vem/waste/swm.fogawa1.htm

5. For a comprehensive and updated database of leading Indian waste management manufacturers/exporters

   www.tradeindia.com/Exporters_Manufacturers/Indianexporters/Environment_and_Pollution/Waste_management

DHAN Foundation
18, Pillaiyar Koil Street,
S.S. Colony, Madurai - 625 016.
Tamil Nadu, INDIA
Tel: +91-452 - 2610794, 2610805
Fax: +91-452 - 2602247
Email: dhan@md3.vsnl.net.in
Website: http://www.dhan.org

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