UNDP

ISDR
International Strategy for Disaster Reduction

IRP
International Recovery Platform

Guidance Note on Recovery

SHELTER

The Guidance Notes on Recovery: Shelter was developed as collaboration between the International Recovery Platform (IRP) and United Nations Development Programme India (UNDP-India). IRP acknowledges the leading work of George Haddow and Damon Coppola, the consultants who facilitated the development of this Guidance Note, Sanjaya Bhatia, Knowledge Management Officer of IRP (UNISDR), and Liz Maly, the shelter focal person of IRP. In addition, many individuals and agencies contributed to the consultative process of workshops, peer reviews and the sharing of good practices and lessons learned from tools and country specific case studies. For a full list of acknowledgements please see Annex 1.

IRP was conceived at the World Conference on Disaster Reduction (WCDR) in Kobe, Hyogo, Japan in January 2005. As a thematic platform of the International Strategy for Disaster Reduction (ISDR) system, IRP is a key pillar for the implementation of the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters, a global plan for disaster risk reduction for the decade adopted by 168 governments at the WCDR. The key role of IRP is to identify gaps and constraints experienced in post disaster recovery and to serve as a catalyst for the development of tools, resources, and capacity for resilient recovery. IRP aims to be an international source of knowledge on good recovery practice. IRP promotes "Build Back Better" approaches that not only restore what existed previously but also set communities on a better and safer development path and support development of enhanced recovery capacity at regional, national, and sub-national levels with particular focus on high-risk low-capacity countries.

UNDP is the UN's global development network, advocating for change and connecting countries to knowledge, experience and resources to help people build a better life. UNDP does not represent any one approach to development; rather, its commitment is to assist partner governments in finding their own approaches, according to their own unique national circumstances. The goal of the organization is to help improve the lives of the poorest women and men, the marginalized and the disadvantaged. UNDP works in the following areas: Democratic Governance, Poverty Reduction, Crisis Prevention and Recovery, Environment and Energy, HIV and Development.

Cover photo: © Dr. Narafu

Table of Contents

Table of Boxes

Introduction

Purpose

There is currently an abundance of documents, plans and policies that address common issues faced in the mitigation, preparedness and relief phases of natural disaster management. Yet for disaster recovery planners and policy makers, there is no cohesive documented body of knowledge. It is conceded that preventive measures are vital to reducing the more costly efforts of responding to disasters. Nevertheless, in the post disaster situation, the availability of knowledge products reflecting past practices and lessons learned is critical for effective and sustainable recovery. Unquestionably, a wealth of experience and expertise exists within governments and organizations; however the majority of this knowledge is never documented, compiled, nor shared. Filling this knowledge gap is a key objective of the International Recovery Platform and The Guidance Note on Recovery: Shelter, along with its companion booklets, is an initial step in documenting, collecting and sharing disaster recovery experiences and lessons. IRP hopes that this collection of the successes and failures of past experiences in disaster recovery will serve to inform the planning and implementation of future recovery initiatives. The aim is not to recommend actions, but to place before the reader a menu of options.

Audience

The Guidance Note on Recovery: Shelter is primarily intended for use by policymakers, planners, and implementers of local, regional and national government bodies interested or engaged in facilitating a more responsive, sustainable, and risk-reducing recovery process. Yet, IRP recognizes that governments are not the sole actors in disaster recovery and believes that the experiences collected in this document can benefit the many other partners working together to build back better.

Content

The Guidance Note on Recovery: Shelter draws from documented experiences of past and present recovery efforts, collected through a desk review and consultations with relevant experts. These experiences and lessons learned are classified into nine major issues:

1. Shelter Recovery Transitions
2. Site Selection
3. Project Implementation Method
4. Building Design
5. Legal Implications

6. Technical Assistance / Expertise
7. Construction Materials
8. Construction Labor
9. Maintaining Lives, Livelihoods, and Community Character

The materials are presented in the form of cases. The document provides analysis of many of the cases, highlighting key lessons and noting points of caution and clarification. The case study format has been chosen in order to provide a richer description of recovery approaches, thus permitting the reader to draw other lessons or conclusions relative to a particular context.

It is recognized that, while certain activities or projects presented in this Guidance Note have met with success in a given context, there is no guarantee that the same activity will generate similar results across all contexts. Cultural norms, socioeconomic contexts, gender relations and myriad other factors will influence the process and outcome of any planned activity. Therefore, the following case studies are not intended as prescriptive solutions to be applied, but rather as experiences to inspire, to generate contextually relevant ideas, and where appropriate, to adapt and apply.

There exist a number of published documents that recovery planners will find invaluable in building their efforts. It is our intention for this guidance note to complement rather than replace or duplicate these resources. To the extent possible, this document is consistent with these existing publications. Of special mention are two titles that are notable in both their comprehensive coverage of shelter recovery topics and the amount of institutional knowledge and experience held by their authors. The first is "Shelter after Disasters: Strategies for Transitional Settlement and Reconstruction". This document is the result a project of the Shelter Centre and UNOCHA. This publication is a revision of the key guidelines "Shelter after Disaster: Guidelines for Assistance" that was originally published by UNDRO in 1982. This document focuses on immediate relief and early recovery, and as such includes more information on camps and temporary housing. It is available at: http://www.sheltercentre.org/library/Shelter+After+Disaster

The second document is the World Bank title "Safer Homes, Stronger Communities". This is an extensive, comprehensive resource for practitioners, policy makers, and anyone engaged in housing recovery. This document is especially valuable for its clear explanations of the process of securing recovery funding. It includes examples for all topics related to housing recovery. http://www.housingreconstruction.org/

Another resource worth pointing out for its case studies is the IASC Shelter Projects 2008 document. This document profiles an extensive collection of practical experience on a number of shelter reconstruction topics.

Chapter 1

Introduction to Shelter Recovery

Document Purpose

This guide is designed to address four interrelated needs:

1. To present to users a background on the root causes of housing vulnerability according to which disaster-related housing impacts may be traced. Knowledge of vulnerabilities inherent in community and national housing stock is key to planning for future recovery needs, mitigating consequences before a disaster happens, and addressing future vulnerability and risk in the event that disaster-related housing reconstruction is required.
2. To summarize the different types of disaster impacts typically sustained in the housing sector. By understanding these impacts, it is possible to plan for their remedy prior to a disaster, and to mobilize the engines of recovery once a disaster occurs - even prior to the completion of official damage and needs assessments. In this regard, the guide helps to frame the overall scope of work that will be or is faced by housing recovery planners and decision makers.
3. To introduce shelter recovery outcomes according to which recovery in the sector may be measured. These outcomes may be thought of not so much as a roadmap for the journey but rather as the destination to which all efforts strive to achieve. It is through the identification of outcomes that the development of measurable goals and objectives becomes possible.
4. And finally, the primary purpose of this document is to introduce the major issues that will confront decision makers tasked with implementing recovery of family and community shelter, presented in the context of case-based experiences.

Document Scope (Definition of Shelter)

The guidance contained in this document focuses solely upon the provision of long-term shelter as necessitated by disaster-related housing loss.

Shelter in the disaster management context

In base terms, shelter may be regarded as any structure providing protection from harmful external forces, be they related to temperature, precipitation, wind, wildlife, civil

threat, or any other hazard. Oftentimes privacy is termed a second defining characteristic for shelter, but as privacy is clearly not paramount to survival it must be considered a secondary requirement given that it is neither life saving or life sustaining.

Coupled with nutrition and hydration, shelter is a critical response requirement faced by disaster victims. Without shelter, survival becomes difficult. In the earliest phases of disaster response and humanitarian relief, the provision of emergency shelter, whether congregate or otherwise, is of paramount importance.

Shelter in the disaster management context, also called 'emergency shelter,' is a distinct response requirement outside the scope of recovery. It is therefore excluded from this guidance document.

Shelter in the disaster recovery context

Shelter in the recovery context is the function through which individuals and households are provided with, or are facilitated in the self-provision of, housing solutions that are:

- Permanent
- Sustainable
- Hazard resilient
- Culturally acceptable
- Environmentally friendly

Shelter in this regard constitutes the scope of this guidance document. Each of the major issues that typically confront decision-makers who are tasked with providing long-term shelter solutions in the aftermath of a major disaster will be explored along these five key guidelines. This document is not prescriptive in nature, but is rather designed to be informative through the presentation of prevailing knowledge and illustrated with experience.

Document Applicability

This document, like all in this series, has been developed to *inform* the recovery planning (pre- and post-disaster) decision-making process, not to guide it. It is therefore our intention that this document be viewed by the user not as a roadmap but rather a menu of options from which an appropriate response may be selected in order to address one or more recovery-related needs. This document attempts to supplement the World Bank's "A Handbook for Reconstructing after Natural Disasters", which shows the "how to" to the options herein. The materials contained within are driven by and presented in accordance with actual case study material collected and studied from among the many stakeholders involved in shelter sector recovery during the last several decades. Our approach is sensitive to the existence of the unique nature of pre- and post-disaster conditions that present in each individual event, be they hazard-related, economic, governmental, organizational, cultural, or otherwise, and as such this document applies

no judgment or analysis. Our intent is merely to provide users with access to a collective record of experience from which they may draw their own selective conclusions or parallels from among these many chronicles. From these stories, best practices become lessons learned, and obstacles encountered allow future troubles to be averted. In the spirit of George Santayana, this document allows us to remember the past such that we avoid the unnecessary hardships of others[1].

Shelter Vulnerability Factors

Vulnerability is defined as a measure of the propensity of an object, area, individual, group, community, country, or other entity to incur the consequences of a hazard. It is important to always remember that mere *exposure* to a hazard need not translate to disaster – rather it is only when a vulnerability exists – either in structures or systems - that failure occurs. A shelter provides occupants with protection from external forces only to the point at which capacity is exceeded, with increasing capacity demanding stronger materials, more innovative design, and level of planning that is increasingly holistic in nature. Understanding the sources of vulnerability is the key to reducing or even eliminating it, either through pre-disaster mitigation and recovery planning or through the application of risk-reduction measures during post-disaster reconstruction.

The following factors are the key source(s) of vulnerability in the shelter sector:

- Poor, weak or inappropriate building materials

Housing structures must be constructed of materials that are able to withstand the forces of anticipated hazards. Informal housing is typically built with either cheaply-acquired materials that are of poor quality or are improperly made (e.g. concrete blocks with excessively high quantities of sand, or unreinforced concrete), or with materials that are locally acquired but not appropriate for the risk profile of the area (e.g. mud brick). These materials may offer little protection from external pressures that include shaking (i.e. seismicity), wind, fire, loading (e.g. snow loads), among others.

- Inappropriate building design

Building design can increase resilience or vulnerability according to the hazard to which it is exposed. For instance, in seismic areas, buildings with soft-storeys (e.g. 1st floor parking garage), close proximity, or asymmetrical shape are typically more likely to fail in the event of an earthquake. In high wind zones, failure to incorporate construction straps typically leads to roof loss or structural failure. Areas of high snow likelihood must have adequate snow load capacity built into frames and roof structures.

- Insufficient building codes

Building construction codes are based upon known hazard risk, and are typically based

[1] "Those who cannot remember the past are condemned to repeat it." George Santayana, 1905.

upon a minimum standard of safety in recognition of the increased cost of construction with each incremental move towards stringency. Codes that do not appropriately address hazard risk lead to the incorporation of risk into building design. Codes must be regularly updated to match industry innovation, new risk information, and prevailing practice and knowledge of the construction industry.

- Inadequate Code Enforcement

In the absence of adequate enforcement, building codes are of little use. Because of the increased cost of construction associated with more stringent codes, they are all-too-often neglected both by contractors and by the homeowners themselves. Building codes are only effective when there exists a mechanisms to inspect structures as they are built and thereafter, and to impose penalties for those who do not engineer a structure correctly or build it to code. There have been cases where codes were sufficient, but there was a lack of trained inspectors to handle the case load that existed, just as there have been cases where ample staff exists, but a culture of corruption allows buildings to receive proper occupancy permits despite code violations via bribery or other means.

- Poor land use planning

It is often the case that the most desired land is also the most risky. For instance, the slopes of volcanoes and floodplains adjacent to rivers both offer extremely fertile soil. Coastal shores are desired for their aesthetic benefits and their access to fishing. Other times, inappropriate use of land is a matter of ignorance, poverty, or urbanization. Construction near or above seismic faults may occur for decades or even centuries before the existence of the fault is known. Housing that appears along the urban/wildland interface comes as a factor of urban sprawl and an insufficiency of buildable land. And construction on unstable urban hillsides, typically in slums, can be the result of individuals left without any other viable option. Regardless of why construction occurs in these high-risk zones, there may be few mitigation options for the people who reside there. Technological hazards can result in similar effects on vulnerability. Settlements that surround or abut chemical manufacturing plants, airports, or storage tanks and pipelines, tends to be less expensive to purchase, and might even be considered desirable by employees of those facilities looking for easy access to work. However, as has been displayed in the Bhopal tragedy, multiple airline disasters in Quito, Ecuador, and the explosion of LNG storage tanks in Mexico City, for instance, allowing the construction of housing in these areas increases the vulnerability for disaster consequences greatly until risk far outweighs any perceived benefits.

- High-density living

As populations rise, the number of vulnerable people increases. Higher population density can easily translate to an increase in the number of people who are exposed to hazards. With urbanization also comes the marginalization of the poor, who are pushed to the more dangerous, risky parts of urban centers - even to places where construction

may previously have been prohibited. In addition to causing people to move into high-risk areas, urbanization tends to cause groups to live and function in a manner that increases the likelihood that they will become victim to a disaster. Urban populations typically take fewer individual precautions to reduce their risk, including that of the structural vulnerability of their housing. Moving into risky areas does not automatically imply that vulnerability has been increased. However, because it is the poor who are most likely to move to these areas, adherence to risk mitigation concepts is minimal. It should be noted, however, that even in previously populated areas, increased density can result in conditions that increase vulnerability.

- Fatalism / ignorance

Social and cultural vulnerabilities can easily translate to increased risk to housing stock and the occupants that reside within. Individuals who maintain a concept that disasters are 'acts of God' or maintain fatalistic attitudes are much less likely to ensure that their housing structures are built and equipped to withstand hazard-related external forces. Individuals who are unaware of their risk, or the actions they can take to reduce their risk, are even less likely to take action that increases their resilience.

- Dependence on weak infrastructure

Finally, housing that is dependent on weak infrastructure is likely to become inadequate in the event of a disaster, even if the structure of the housing itself is strong and/or unaffected by the event. Residents require a number of services and other community-based needs that are typically considered essential. For instance, children must have schools to attend, homeowners and businesses require access to critical infrastructure (communication, electricity, water, sewerage, transportation, gas, etc), and workers need access to their livelihood. The success of housing structure depends on much more than the stability of that structure alone.

Shelter Impacts and Implications

Housing represents the largest proportion of building stock in almost every community, far outnumbering all other building types combined, inclusive of commercial, industrial, agricultural, religious, educational, and government facilities. Through their destructive forces, disasters are disruptive to all of a community's or a country's housing stock as a factor of building damage, total loss of the structure, or a loss of inhabitability due to external impacts including contamination.

A loss of housing stock is much more than the loss of a building. Each unit of shelter that becomes uninhabitable as a result of a disaster directly translates to an increased burden on the government or emergency services that are tasked with providing for the safety and security of those displaced. Damaged or destroyed housing and the displacement it causes hinders all other aspects of recovery in that displaced residents are typically unable to return to work or otherwise function in their daily lives. Businesses whose employees cannot report to work may fail, markets whose customers are unable to

purchase products will suffer, schools and other community facilities that are not able to resume normal function (because of their secondary function of sheltering victims) cannot provide their services, among other impacts. The psychological impacts brought about by housing loss, especially children, are equally disruptive even long after shelter recovery has occurred.

Housing throughout the affected area will exhibit differing levels of damage and destruction due to its composition, location, elevation, and proximity to the hazard, among other factors. A first priority of government will be to supply housing inspectors able to determine the effect on housing structures according to which recovery planning may be based. In cases where a large number of residential structures lie within the disaster area, there may not exist a sufficient cadre of locally trained and accessible inspectors that can quickly perform this task.

Decision makers faced with shelter recovery planning will encounter a wide range of consequences in the assessment phase that affect housing in direct and indirect ways. These include:

Direct Impacts

Housing damages will range considerably but are often grouped according to the anticipated level of effort required to return the resident back to their home. These categories typically include:

- Affected: Structure is inhabitable with no additional risk to the resident. Oftentimes following earthquakes, it is common to see residents in the affected area whose structures received no damage whatsoever, but who are otherwise too scared to return because they are unable to assess the safety of their home. Their home may even have suffered some cosmetic damage but is nonetheless safe to inhabit. Typically these structures require nothing more than reassurance from a trained architect or structural engineer who can certify the safety of the home.

- Minor Damage: Structure has sustained damage that makes in uninhabitable, but minor temporary repairs can be made to enable the resident to return. For example, houses that may have lost parts of a roof or roof shingles in a cyclone may be able to return home after installing a waterproof tarp. Permanent repairs will be required in the long run, but the habitability of the home reduces the burden on temporary shelter services.

- Major Damage: Structure has sustained damage that will require significant work to repair, and is unsafe to residents in its current state.

- Destroyed: Structure is permanently inhabitable. In these cases, the home cannot be repaired and must be demolished if it is still standing.

Indirect Impact

There are a number of impacts that may affect housing indirectly that, while they do not affect the physical structure of the building in any way, render a home uninhabitable temporarily or permanently. This is typically a matter of three factors:

- Contamination: A structure or the environment surrounding the structure may become contaminated by a chemical, biological, nuclear, or radiological release that renders it temporarily or permanently uninhabitable. For instance, the Chernobyl accident in the former Soviet Union caused the permanent evacuation of areas in Belarus, Ukraine, and Russia, despite that these homes were structurally sound.

- Excessive Risk: Following disasters, new information is learned about risk. This often leads to the designation of risk zones within which there exist homes that might have survived the disaster only slightly damaged or not damaged at all. However, the potential for future risk far exceeds what is considered acceptable, and people cannot return to these structures. This can happen when new faults are discovered, as floodplains grow and/or change, as hillsides become increasing unstable due to a range of factors, among other examples.

- Community Loss or Failure: In very rare instances, governments may determine that the best course of action to reduce risk to residents is to move an entire community. This can occur even if not every structure within a community faces damage or destruction from the hazard in question. However, because a community is the sum of its parts, the viability of the residents outside of this risk zone that live in otherwise safe homes is threatened in that the community that serves their needs will be gone. In such cases, even these untouched homes are therefore impacted by the event and action must be taken to address the needs of the residents.

The loss of or damage to housing has far reaching implications to the displaced residents. Secure housing is, coupled with food and water, the greatest concern for most disaster victims. Victims without housing may lose their livelihoods, face exposure to health, safety, and security risk, and suffer from a complete loss of privacy. As such, the reconstruction of housing has the effect of restoring dignity, safety, security, and economic viability.

Box 1: LENSS Tool

One of the most significant challenges identified by the UN Inter-Agency Steering Committee (IASC) Global Shelter Cluster is the generation of reliable damage and needs assessments for housing and human settlement following a major disaster. In order to standardize and guide the shelter assessment process, UN Habitat, UNHCR, and the IFRC jointly developed an assessment guidance tool called LENSS.

LENSS, or "Local Estimate of Needs for Shelter and Settlement" is a handbook designed to alleviate the difficulties of shelter and settlement needs assessment in the immediate

aftermath of a disaster, prior to the finalization of recovery planning products. An assessment or estimate of the situation is vital to both the disaster response and recovery planning. LENSS suggests what shelter and settlement data assessors should seek, who they should approach, and when to ask and how to report their findings.

This publication reinforces the importance of stakeholder – most significantly the recipient – participation or consultation from the earliest stages of the process.

Source: http://www.sheltercentre.org/sites/default/files/LENSS_Tool_Kit.pdf

Recovery Outcomes

Achieving successful recovery in the shelter sector has been achievable yet extremely challenging for governments charged with managing the impacts of major disasters. Shelter recovery is a highly complex function in large part because of the interactions that exist between the provision and occupancy of repaired and/or reconstructed housing and other recovery sectors (e.g. livelihoods). Added to this is the incredible challenge that pre-existing vulnerability factors are addressed such that future risk is minimized. However, the recovery period presents significant opportunity to improve the conditions of those affected in ways that might not otherwise be possible given legal, financial, or technical ramifications – housing is no exception. These improvements extend not only to disaster risk reduction, but also with regards to economic revitalization, urban improvement, rezoning, modernization, among other factors.

Recovery planning must assume a holistic stance considerate of the wider spectra of recovery functions, rather than considering the construction of each unit or block in isolation. Every decision that guides the housing decision, as addressed in the multitude of issues featured decision carries implications planners must weigh against the possible benefits that might be achieved. All decisions should strive to meet or at least approach a core group of target outcomes, which might include any of the following:

1. **Permanence:** Displaced victims are able to return to or otherwise secure permanent housing
2. **Risk Reduction:** Housing units that are repaired or replaced adequately account for future hazard risk in design, construction, and materials
3. **Viability:** The housing solution is one that ensures access to appropriate wraparound services required by occupants to lead a practical and practicable living (e.g. access to livelihoods; availability of food and water; access to markets, utilities, and transportation; access to religion and religious facilities; existence of a community)
4. **Independence:** Housed victims are able to achieve self-reliance
5. **Cultural Sensitivity:** The culture of the affected population is protected
6. **Community Input and Acceptance:** The wishes of the affected population are heard,

understood, respected, and incorporated

7. **Environmental Soundness**: Housing solutions do not have a negative effect on the natural environment, or address any environmental impacts that are caused
8. **Cost Effectiveness**: Housing solutions should not put governments, communities, or individual residents in crippling financial circumstances
9. **Progressive:** Ongoing long-term development progress is maintained, and long-term community goals are not sacrificed for short-term individual benefits

An overarching goal, which is generally the result of these nine ambitious outcomes, is that the housing solutions adopted provide an overall improvement (over what existed prior to the disaster) to the lives of the people who have been affected. Achieving such requires an intimate understanding of the hopes and goals of the victims themselves, and is therefore something that cannot be so easily determined in the absence of such participation. What is most important is that the housing solution is ***sustainable***. John Norton, an acclaimed shelter expert, describes five key principles behind sustainable housing:

- **Environmental sustainability**: The chosen approach avoids depleting natural resources and contaminating the environment.
- **Technical sustainability**: The requisite skills can be introduced and passed on to others, and the necessary tools are accessible.
- **Financial sustainability**: Money or service exchange can be accessed to pay for the work that needs to be done.
- **Organizational sustainability**: There is a structure to bring together the different stakeholders without, for example, needing to call on outside expertise on each occasion.
- **Social sustainability:** The overall process and product fits within and satisfies the needs of the society.

Obstacles to Shelter Recovery

There are several factors that make recovery more challenging. By understanding these obstacles and having the prescience to recognize them, planners are better able to reduce their negative impact on shelter repair and reconstruction efforts. These obstacles may be pervasive or individual to families, communities, or other groupings, and may affect some of the factors addressed in this book while having no effect on others. Ever disaster, and every effected population, is unique, and as such these are provided merely to provide planners with a general sense of awareness. The shelter-specific recovery obstacles include:

Pressure to Quickly Rebuild or Replace Housing

The greatest obstacle faced by those tasked with shelter recovery is the urge of displaced residents, and the community at large, to rebuild and return to a pre-disaster status (often referred to by victims as "normal.") While there is some understanding of delays in the immediate aftermath of the disaster when victims are accommodated in temporary, often congregate shelter locations, it is in the longer-term recovery phase when victims grow impatient with their state of reduced quality of life. As such, many victims will try to address their housing problems as quickly as and by any means possible simply to put an end to the inconveniences they are experiencing. These sentiments can create tremendous pressure for planners, especially if the public outcry is echoed or even amplified by the news media. The immediacy of victim needs can essentially "force" community leaders and other stakeholders to make difficult recovery decisions that might have benefited greatly from a more thorough assessment or study, including decisions related to disaster mitigation such as buying out or relocating structures in the floodplain, for example. Conversely, the delays in the establishment or update to land use regulations, environmental and historic preservation laws, building codes, and permitting processes, as well as decisions on where, how, and whether homes can be rebuilt, can become an obstacle of their own when each or any of these processes is inefficiently carried out.

Denial of Future Risk to Similar Housing Units

Many people victimized by disasters feel that the answer to the recovery problem is simple—replace what was destroyed. A "lightning never strikes twice" mentality may tell them that they no longer need to worry, since the disaster already occurred. This sentiment may make it difficult to convince people, especially those taking reconstruction matters into their own hands, to incorporate risk reduction options that typically raise both the cost and the technical difficulty of the structure.

Poverty

It is common knowledge that the poor typically bear a greater brunt of the disaster consequences and face much greater difficulty recovering than the wealthy. The leading causes of this include a lower likelihood that pre-disaster mitigation was employed, less access to the resources necessary to bring about recovery, lower use of insurance mechanisms, higher likelihood of living in neighborhoods of high hazard risk, fewer political or social connections to bring about recovery, and less access to the educational background or information that informs the recovery process and drives disaster-resistant reconstruction. Oftentimes, recovery decisions boil down to cost, and faced with alternatives the poor will often take the least costly option even if done so with an assumption of augmented risk. The actual cost of housing repair and reconstruction ultimately most typically rests with or transfers to the homeowners. Many victims will lack the financial resources to rebuild, and will therefore need to turn to outside assistance.

Inequality in Housing Reconstruction

Different groups have different access to recovery resources and technical assistance. These differences may be the result of gender, race, culture, religion, caste, education, or other factors. In almost all instances, some groups will possess the means and know-how to receive their share of what is available, while others will lack these qualities thereby preventing them from accessing an equal share of assistance benefits. Examples of situations where inequity in recovery can occur include:

1. Although the rich may be able to afford to rebuild according to new standards and regulations, the poor may not be able to afford the higher construction costs
2. The poor may not have the time to wait in line for goods and services or have access to information about available goods and services
3. Racism, poverty, or other social discriminations may prevent groups from access to goods and services (e.g. locally hired disaster relief and recovery employees may discriminate against victims and give preferential treatment to some groups over others)
4. Certain groups, such as single women, the elderly, or the disabled, may be subject to cultural norms that prevent them from being able to access goods and services.

The following groups tend to be particularly susceptible to inequity in relief (NHRAIC, 2001):

- Low-income households
- Single parents
- Medically dependent (physical and psychological) or disabled
- Language minority and illiterate
- Elderly
- Homeless and street children
- The marginally housed
- New immigrants and Residents without Legal Status
- Transients, newcomers, and tourists
- Isolated households
- Racial and ethnic minorities
- Children

The Availability and Cost of Building Materials and Labor

Housing reconstruction efforts place significant demands on both materials and labor. Local employment and supply markets are based on non-disaster orders, which represent a fraction of what is required post-disaster. Once reconstruction begins these thin resources may be immediately stretched to their limit, causing a recovery bottleneck that can only be relieved through external sources. Additionally, the high demand on such limited labor and materials can cause a shock to local markets, resulting in a spike in

construction costs. On the other hand, a market glut caused by excessive donation of materials and labor can eliminate all demand for local products and labor and put local companies and laborers out of work. This obstacle is explored in much greater detail in the section entitled Building Materials.

The Loss of or Lack of Buildable Land

Major disasters can drastically alter the landscapes they affect. Rivers can change course, coastlines can change shape, landslide-induced dams can inundate entire cities, and sea-level rises and plate tectonics can cause coastal communities to sink below sea level. These and other processes can claim previously-inhabited land, leaving nowhere for the prior residents to rebuild. Sometimes it is just the inherent risk of rebuilding on the land where houses were destroyed that can result in the loss of land. In either case, new land must be located, and the process by which that is successfully accomplished is a complicated one. Typically, land that is large enough for a community and suitable for habitation has already been claimed. But breaking up communities is rarely a successful option. The section entitled "Site Selection" addresses this obstacle at length.

A Lack of Community Consensus

Recovery, and the planning process that accompanies it, affects whole communities. On the individual level, victims need to determine what is best for them. But on a community level, each of these personal decisions has a wider impact. The decision of several neighbors to abandon their homes, or the refusal of the same to accept a buyout of their home contingent upon relocation, are just two examples of situations that can derail a comprehensive recovery effort. Planners will face the challenge of finding solutions that are palatable to the greater community, and that are able to accommodate even those who are not in agreement with the plans ultimately enacted.

Dependence on Infrastructure and Wraparound Services (That May No Longer Exist)

Recovery of housing involves more than simply rebuilding damaged and destroyed structures. A wide range of opportunities, services, and amenities are what make a group of houses a community. Residents cannot live in a house unless they can earn an income, feed their family, travel freely, communicate with each other, among many other factors described throughout this document. Many, if not most of these factors are addressed in the greater recovery effort – however, coordination between these efforts can be challenging given that the agencies and organizations may have little crossover with each other. Government may prioritize one sector of another, and the pace of recovery between these sectors may vary greatly. For housing recovery to be successful, life must be immediately sustainable in the houses and communities provided.

Chapter 2

Issue 1: Shelter Recovery Transitions

Life safety demands that displaced disaster victims be provided with immediate shelter. The longer victims are displaced from their primary residence, the more challenging that shelter recovery becomes. In the majority of cases, the affected population needs only short term sheltering until the immediate danger has passed – at which point they are able to return home. However, in more catastrophic events, when many homes or even whole communities have been destroyed, housing stock becomes uninhabitable and alternative options need to be explored. To meet the pressing needs of the affected population, response organizations must often make concessions that place immediacy over comfort and convenience, and safety over sustainability. There are a number of solutions that are commonly implemented by which these individuals are provided with shelter from external natural forces, security, and a small manner of peace and stability. Rarely, however, are these solutions able to manage shelter needs for more than a few days or weeks, and decision makers are faced with the problem of transitioning from emergency relief to the short- and/or long-term recovery of victims. Typically, the provision of housing is central to this effort.

While this document does not address the factors or decisions involved in short-term housing, given that its temporary functionality places it beyond the intended scope, the decisions that are made do influence how shelter recovery is conducted and what outcomes might be expected. There exist many factors that must be addressed, and an equal number of decisions that must be made, as communities and countries transition away from the use of temporary shelter options of the emergency phase to more transitional or even permanent solutions. As is true in the event's emergency phase, such decisions are likely to be made in an environment that allows little time for analysis, presents an extreme degree of external pressure, and offers only limited, imperfect information. However, with proper consideration and knowledge of the likely outcome of each option, a variable degree of success forecasting is possible given the particulars of each disaster, country, culture, among other distinguishing characteristics.

A consortium of academic and government practitioners studying shelter planning for catastrophic events defined four distinct phases of shelter for which some overlap does exist. These phases include:

1. Spontaneous Shelter (first 72 hours) - to provide an interim, safe haven while the situation stabilizes.
2. Emergency Shelter (first 60 days) - to provide emergency shelter and feeding to displaced population requiring shelter.
3. Interim Housing (first year and beyond) - to provide temporary housing - safe and secure shelter, water, power, and heating - to displaced disaster victims while efforts are underway to make permanent repairs to dwellings, or to find other suitable permanent housing.
4. Permanent Housing - to provide long-term, permanent housing solutions for disaster victims (CUSEC, 1998).

Sub-Issue: Transitional Shelter Options

In the post-emergency recovery phase, it typically takes months to years for permanent housing to be restored. Even basic repair work can take a significant amount of time if the workload overwhelms local or national capacity. However, victims typically cannot remain in their emergency shelter for long, and therefore may need some form of shelter to bridge the transition between emergency and permanent shelter. There are a number of options from which government or humanitarian organizations can choose. These include:

- No temporary structure provided
- In-Situ Temporary and Transitional Shelter
- Congregate Temporary Shelter (Camps)
- Facility Conversion

Box 2: Transitional Shelter Defined

Transitional Shelter Defined

Transitional Shelter provides a habitable covered living space and a secure, healthy living environment, with privacy and dignity, to those within it, during the period between a conflict or natural disaster and the achievement of a durable shelter solution.

Source: Corsellis & Vitale (2005)

Option: No Temporary Structure Provided

In this option, victims locate and secure their own temporary shelter in existing units. There are a number of options available to victims seeking such alternatives, which include:

- Lodging with friends, neighbors, or relatives

- Renting a house or apartment
- Long term residence at a hotels or motel
- Long term residence in emergency shelter

Box 3: Transitional Shelter Types

The Active Learning Network for Accountability and Performance in Humanitarian Action (ALNAP) lists four categories of transitional housing for disaster victims. These categories differ in terms of the post-disaster applicability of the structure or of its basic building materials and include:

1. **Upgradable Housing**: While being inhabited, the transitional shelter is improved over time to become a permanent shelter. This is achieved through maintenance, extension or by replacing original materials with more durable alternatives.
2. **Reusable**: Following the construction of a permanent housing solution, the transitional shelter is used for a purpose other than housing, such as a shelter for animals, a kitchen, of for storage.
3. **Resellable**: The transitional shelter is inhabited while parallel reconstruction activities are taking place. Once reconstruction is complete, the transitional shelter is dismantled and its materials are used as a resource to sell. Therefore, materials need to be selected for their suitability for resale after the shelter is dismantled.
4. **Recyclable**: The transitional shelter is inhabited while parallel reconstruction activities are taking place. The transitional shelter is gradually dismantled during the reconstruction process, and the materials from the transitional shelter are used in the construction of a durable home.

Source: Shelter Center. 2010. Case Study Number 5. Transitional Shelter: Understanding Transitional Shelter From the Emergency Through Reconstruction and Beyond. ALNAP Innovations. http://www.alnap.org/pool/files/innovationcasestudyno5-shelter.pdf

Even when alternatives are offered, there are situations where displaced victims will prefer to move in temporarily with neighbors, friends, or relatives. When available and feasible, this option can be the easiest for victims to secure, though it can be a burden on the host family and typically leads to overcrowding within the household. Support for this type option is through the provision of other life sustaining support, including food, cash, loans, employment, and other necessary supplies.

Case 1: Conflict in Pakistan, December 2009

Topic: Lodging with friends, neighbors, or relatives

When fighting erupted in the Federally Administered Tribal Areas and North West Frontier Province of Pakistan, approximately 2.5 million people became displaced. The Government of Pakistan and various nongovernmental organizations operating in the area set up 23 camps to provide temporary shelter. However, only 15% of the displaced persons elected to live in the camps. The remaining 85% chose instead to live with relatives or friends. This large number of self-sheltered IDPs was supported through the establishment of 'food hubs' in areas where they were known to have relocated, and through improved access to loans. *Excerpts from Save the Children's Emergency Cash*

Source: Tahir, Shaukat N. 2010. Access to Food, Finances, & Recovery of IDPs. Presented at the 2010 IRP International Recovery Forum, Kobe, Japan.
http://www.recoveryplatform.org/assets/meetings_trainings/irf2010/presentationdata/Recovery%20-%20Access%20to%20Food%20and%20Finances.pdf

Lessons

- IDPs will differ considerably in terms of their ability and desire to find alternate living quarters independent of government-provided shelter
- In situations where IDPs prefer self shelter options, cash and food supplements may be provided to support these efforts

Another very simple yet effective solution to problems of displacement is meeting needs through available rental units. This option is rarely available in rural areas where pre-disaster occupancy nears 100%. However, in urban areas there may be a robust rental market. Likewise, if victims have evacuated to an unaffected urban area outside the affected area, this option typically offers some relief. Rental solutions are easily and effectively supported through the provision of financial assistance (either cash or rental vouchers) and technical assistance (rental location and negotiation services). This type of solution is most advantageous in situations where housing recovery is expected to be brief, as it is immediately available and transitions less complex. For longer periods, however, rental housing can become both cost prohibitive and lead to dependencies if individuals are unable to facilitate the repair or reconstruction of their affected home. The greatest shortcoming of this program is that there is rarely ample vacancy within the affected area to meet all needs, which in turn forces those with unmet needs to either move away from the affected area or find substandard alternatives.

Similar in nature to the use of rental markets is the use of hotels and motels for temporary housing. Like rental units, these are immediately available and much easier to transition out of once the primary unit is repaired or reconstructed. However, this solution is typically very expensive, even when long-term contracts are negotiated with businesses in advance. Support is provided in the form of reimbursement, negotiated

contracts, and assistance in locating vacancies.

Case 2: Hurricane Katrina, Louisiana, USA, 2005

Topic: Rental Units and Hotels/Motels

At the peak of the humanitarian emergency, over 273,000 people in the affected area were living in congregate emergency shelters. Within six weeks, the US Government began transitioning these IDPs out of the emergency shelters and into more appropriate transitional housing solutions. US disaster law permits eligible disaster victims to stay in hotel and motel rooms for temporary shelter when alternatives are not available, and over 85,000 people elected to use this option. The US Government contracted with an organization who coordinated the identification of vacant rooms, assisted victims with placement that best met their preferences, and facilitated the process of reimbursing the businesses where victims where sheltered. This disaster was notable in that it marked the first time that the US Government provided rental assistance for victims able to find temporary housing in vacant units. Recipients were provided with assistance in locating available units not only in the affected area but also throughout the entire country. Contract negotiation assistance (for cost and duration) was likewise negotiated. Each regional (state) government provided information to the national government about the approximate number of evacuees they could accommodate, the date they could begin receiving them, and the location of the receiving point. Transportation assistance was provided when matches were made. All hosting regional governments were provided with reimbursement of their disaster-related costs. At its peak, this program was funding the payment of approximately 67,000 apartment leases throughout the country. This approach allowed victims to locate their own temporary housing away from the affected area, and likewise allowed emergency shelters to quickly resume their regular function (e.g. a school). It also reduced the environmental impact associated with the camp or temporary shelter construction. Residents can find greater privacy and convenience than they might typically enjoy in a mass emergency shelter. Because hotels, motels, and many apartments are already furnished (or can be quickly furnished with victim's property), such costs can be reduced. Unfortunately, lodging victims in these facilities can cause competition with relief workers who stay in hotels or rental units. The costs of these units, which are finite and may be disbursed over wide geographic areas, can be excessive in the absence of pre-established contracts. In situations where aid recipients are not satisfied with their replacement housing, or if the temporary units are more preferable to the victims' homes, they may insist on longer-term support and present a longer-term financial problem for the government or organizations supporting. And because of their wide geographic range, program monitoring can be extremely difficult (including the efforts of NGO providers of humanitarian assistance).

Source: McCarthy, Francis. 2008. FEMA Disaster Housing and Hurricane Katrina: Overview, Analysis, and Congressional Issues. Congressional Research Service. RL34087.

Lessons

- Rental assistance that allows IDPs to relocate into hotels, motels, and other available housing can be an effective solution in the short term.
- Participants in rental assistance programs may require support with housing identification, transportation, and contract negotiation.
- Rental assistance allows victims to temporarily relocate outside the affected areas, and may increase the likelihood that they return once recovery has occurred given that the rental property is not a viable long-term option.
- Rental assistance can allow for more immediate yet dignified shelter.
- The primary challenges associated with rental assistance include rapidly escalating costs that occur when long-term housing options are not available, and the unwillingness to leave on the part of some participants

These options can help or hinder the long-term shelter recovery effort, and must therefore be assessed as a component of long-term shelter recovery planning. The positive impacts of this option on long-term shelter recovery include:

- If the temporary housing unit is located close to the housing reconstruction effort, it will increase the likelihood that the victim participates in their own recovery
- Demolition, debris clearance, and construction are all more easily performed if the victim is not residing In-Situ
- If the victim is able to remain close to their source of livelihood they are more likely to transition successfully into a sustainable permanent housing option.

However, these options can also prevent a negative influence on the long-term shelter recovery process, including:

- Owner-involvement can be more difficult to secure if victims become greatly dispersed over a wide geographic area
- The costs associated with hotel and motel financial support can draw off of funding available for permanent housing if reconstruction efforts drag on indefinitely
- The hotel and motel units may be more preferable than the victims' permanent housing, causing them to be dissatisfied with their recovery outcome

Box 4: Transitional Shelter Information

Two resources provide extensive information about transitional shelters, including assessing options and selecting solutions that most closely meet the needs of the recipient population. These include:

- Transitional Shelter Guidelines (The Shelter Center) http://www.sheltercentre.org/sites/default/files/Transitional%20Shelter%20Guidelines%2009a.pdf
- Transitional Shelter: Understanding Shelter from the Emergency through Reconstruction and Beyond (ALNAP) http://www.alnap.org/pool/files/innovationcasestudyno5-shelter.pdf

Option: In-Situ Temporary Shelter

In certain instances, it is possible for residents of damaged or destroyed housing to reside on their own property through the provision of temporary shelter solutions. This is most commonly facilitated through the provision of tents, though prefabricated or easily assembled solid-walled structures are also utilized regularly with mixed success. If the permanent structure is only moderately damaged, the victim may be able to return home immediately through the provision of minor temporary repairs (e.g. tarps to cover damaged roofs), with more permanent construction occurring later. If the structure is more heavily damaged, the victim will have to find an undisturbed place on or very near to their property where their presence does not interfere with the demolition and reconstruction of the structure.

There are a number of positive implications to long-term shelter recovery associated with this approach, including:

- It is easier for victims to maintain their livelihoods and community networks, which are a critical component of long-term shelter recovery
- Victims are the most likely to be able to participate in the design and reconstruction of their house given their proximity
- There is less disruption to the dynamics of the community because formal and informal social networks may be retained
- The need to identify and acquire additional property (for alternate shelter locations) is minimized

Case 3: Hurricane Mitch, Nicaragua and Honduras, 1998.

Topic: Construction of In-Situ Temporary Shelter

In Nicaragua, the IFRC and USAID constructed traditional In-Situ temporary shelters called 'champas' on victims' properties. Those who were provided with these structures were able to remain in the vicinity of the reconstruction effort and therefore tended to stay more actively involved throughout the entire rebuilding process. The provision of construction skills training was coupled with the construction of champas, thereby allowing beneficiaries increased opportunity to rebuild their own permanent houses (and to further improve the interiors once constructed). They were also able to modify the champa such that it enhanced their new permanent home. In Honduras, many residents actually resided in the structure of their damaged or destroyed home while repair or reconstruction was carried out. In many of these communities, the project resulted in an overall improvement of the standard of living for occupants. For instance, the residents of three settlements in Honduras organized themselves to obtain access to electricity and public transportation. They have also set up a self-managed water project.

Source: IFRC. Rebuilding after Hurricane Mitch: Housing reconstruction in Honduras and Nicaragua: Case Study. International Federation of Red Cross and Red Crescent Societies, 2007. http://www.recoveryplatform.org/assets/submissions/200909010435_honduras_hurricanemitch_shelter.pdf

Lessons

- In-situ temporary shelter can incorporate traditional design
- In-situ temporary shelter helps to ensure victims are more engaged and invested in their own recovery
- If constructed on-site, temporary shelter options can be modified or recycled to improve the quality and function of the permanent structure
- Victims who are actively involved in their recovery may be better positioned to lobby for increased or improved access to wraparound and infrastructure services

Many times, displaced residents are provided with the materials needed to construct their own in-situ temporary shelters. This, in turn, allows them to construct something that is much more durable than a tent or a tarpaulin, and opens the opportunity to teach construction skills that are transferable to the repair or construction of the permanent home. Moreover, the materials that are used in the temporary structure can be recycled in the permanent home.

Case 4: Earthquake, 2006, Yogyakarta, Indonesia

Topic: Community-Driven Transitional Shelter

Following the 2006 earthquake in Yogyakarta and Central Java, the International

Federation of Red Cross and Red Crescent Societies (IFRC) and its local partner devised an early recovery program. The program allowed the community to drive the recovery process, with IFRC acting as facilitator. IFRC created conditions wherein communities could build their own transitional shelters rather than providing them with ready-made solutions. Shelters were constructed of bamboo, resistant to the elements and to seismic activity, and provided safe shelter until such time as the government's permanent housing program was initiated. The shelters supported by the program met Sphere Standards with regard to safety, size, durability, hygiene and, most importantly, the dignity and privacy of the occupants. The project involved training volunteers and sending them to live in and work with the affected communities, and adopting a cash-based rather than a commodity-based approach to assistance. This program was successful in helping community members to learn valuable construction skills, which allowed them to resume their livelihoods much sooner. The project ultimately drew upon and further strengthened the affected communities' own disaster resilience culture as well as their recovery capacity, and the relationships forged between the recovery organizations and the recipients served as entry points for longer-term recovery projects.

IFCR. Supporting community recovery and risk reduction in Yogyakarta: Case Study. International Federation of Red Cross and Red Crescent Societies, 2009.
http://www.preventionweb.net/english/professional/publications/v.php?id=13118

Lessons

- Recipients may be able and willing to construct temporary shelters with traditional, locally available materials, if provided with adequate material and technical support
- Victims can construct temporary shelter that is resistant to hazards
- Technical assistants, volunteer or otherwise, can be collocated with victims in order to provide readily-available access to technical and labor support; for nongovernmental organizations, this can provide long-term access to communities likely to face complex recovery issues, and can help humanitarian organizations to best identify recipients
- A progressive ongoing system for needs analyses that is additive over time helps program planners to adapt to changing situations and head off problems
- The community-led construction process empowers communities to take control of their own recovery and raises awareness of risk and safe building techniques
- Self-help programs can help victims return to work and can restore a sense of "normality" in the community
- Done on a manageable scale and with proper design, cash-based models face

no greater risk or complexity than commodity-based programs

- Training and mentoring programs at the village and district levels canto a high degree of trust between communities and the program, and helped to accurately identifying beneficiaries

Case 5: Earthquake and Tsunami, 2004, Banda Aceh, Indonesia

Topic: Lightweight Temporary Housing Kits

In the aftermath of the December 26 earthquake and subsequent tsunami that struck Banda Aceh, approximately 130,000 were without housing. For those unable to find temporary shelter with friends or relatives, or in military barracks converted into temporary shelter facilities, there existed a range of uncoordinated efforts aimed at providing a fast, easy temporary alternative. Several nongovernmental organizations operating in the affected areas served these victims either by providing kits that allowed victims to build their own temporary shelters, or by providing complete semi-permanent shelters. The primary benefit of the kits and structures was that they allowed victims to reside during the transitional period on their own property. Ultimately, more widespread distribution of transitional shelter kits was initiated by the government in recognition of the success of this program. The "Temporary Shelter Plan of Action" provided victims in need with a transitional consisting of a 25m2 lightweight steel-frame, timber cladding and a metal roof. These structures were designed for easy anchoring and assembly by a small team of people in less than a day. The quality and cost of these shelters was comparable to the quality of shelter many fishermen lived in pre-tsunami and higher quality than much of the housing in mountain villages. Ultimately, the initial intention to house all victims in temporary shelter proved more difficult than anticipated. Also, policy changes that favored permanent housing over transitional housing, which occurred six months after project initiation, resulted in a change in opinion about the interim housing program's value. One of the setbacks of this program's early successes was that the recognition of the time commitment for providing permanent housing caused some recovery organizations to distribute the IFRC transitional shelters in lieu of the permanent housing they had agreed to provide. The cost of these IFRC shelters, which were of better quality than many victims' houses prior to the event, led to financial concerns given that so many received transitional and permanent replacement houses – both of which were an improvement.

Source: da Silva, Jo. 2010. Lessons from Aceh: Key Considerations in Post-Disaster Reconstruction. Arup. Practical Action Publishing Group

Lessons

- Shelter kits are an easy way to support in-situ owner-constructed transitional or temporary shelter

- Major programmatic changes to occur in the early- to mid-range recovery phase can cause widespread public discontent
- Temporary shelter that is of better quality than victims' former permanent housing can result in stalled construction of permanent shelter

However, even when it is possible for victims to remain on-site in a temporary shelter alternative, this option has associated drawbacks. For instance:

- Victims may place themselves at increased risk due to the inherent hazards associated with debris and contamination
- Victims may have little access to wraparound services, including medical care, food, potable water, communications, transportation, and other services
- The provision of life sustaining assistance by emergency services becomes progressively more difficult as the geographic distribution of victims widens due to on-site sheltering
- Victims may prefer to remain in their temporary structures permanently either out of preference or a lack of acceptable alternatives

Case 6: Marmara Earthquake, Turkey, 1999

Topic: Provision and Location of Temporary Shelter

Following the earthquake in Marmara, Turkey, many displaced disaster victims were provided with temporary shelter in congregate facilities while repair and construction efforts were ongoing. However, these settlements, located in the periphery of the affected urban areas, eventually took root and garnered access to community services and utilities. A business infrastructure consisting of markets, stores, and other services moved in to meet the ongoing demand, and likewise became more permanent in form and function. The temporary settlements became more akin to city suburbs, leading to a situation where tearing them down presented immense political ramifications. The result of these developments was a retention, if not an increase, in risk due to the fact that the congregate shelters were never intended nor designed for permanence, and thus stringent hazard resistant design was not employed. Likewise, the settlements were not created with long-term urban planning in mind given the speed of their establishment and the intent to eventually remove them. Secondary consequences included the loss of agricultural functionality of the land, and the introduction of a need for establishment of land rights given that no residents of the settlement owned the property they were not permanently residing upon.

Source: Barakat, Sultan. "Housing Reconstruction after Conflict and Disaster." Humanitarian Practice Network. no. 43, Dec. 03. p.16. http://www.odihpn.org/documents%5Cnetworkpaper043.pdfX

Lessons

- Temporary congregate shelters can become permanent if they become too well connected to infrastructure and other community services
- Temporary congregate shelters that become permanent often result in a net increase in hazard vulnerability

Case 7: Earthquake, Yogyakarta, Indonesia, 2006.

Topic: Provision of Tents for In-Situ Temporary Housing

Following the Yogyakarta earthquake in Java, the Government of Indonesia provided tents to those victims whose houses had been damaged or destroyed. The basis of this measure was to allow them maximized access to their property in order to facilitate as rapid a recovery as possible. However, when program assessors returned to monitor reconstruction progress, they found that many of the victims had constructed their tents within the structure of their damaged or destroyed house rather than elsewhere on their property. This action was the result of a cultural perception of 'house' that led them impelled them to take this action. IN doing so, victims placed themselves at increased risk of injury from the debris itself or from further collapse in the event of an aftershock. To address the situation, government officials sent building inspectors to assess the structural stability of each damaged or destroyed unit in order to ensure that those with unsafe structures were properly informed of the danger they faced.

Source: Subroto, Dr. T. Yoyok Wahyu. 2010. Lessons Learned Focus Group. IRP International Recovery Forum, Kobe, Japan

Lessons

- Tents provide an effective means of allowing victims to remain on their own property and likewise remain engaged in the reconstruction of their homes
- Donor and humanitarian organizations need to understand the influence that cultural preferences and practices will have on the implementation of their recovery assistance programs

From the outset, it should be noted that in-situ temporary shelter is not always wise or even possible. Urban living, especially in high-rise and dense housing structures, is not conducive to the convenience of this option given that little undeveloped space exists on such property - and full demolition of the structure is typically required prior to reconstruction. This option is also unrealistic if ongoing hazard risk remains (e.g. standing floodwaters). If the long-term recovery strategy calls for community relocation, In-Situ temporary housing is only advantageous if it is performed in the new property. And finally, in-situ temporary housing is neither advantageous nor prudent if victims will have little or no access to food, water, or other services, or will face physical security risks.

Case 8: Hurricane Katrina, Louisiana, USA, 2005

Topic: Modular or Manufactured Temporary Shelter

At its peak, there were over 273,000 victims in emergency shelters during the emergency phase of this catastrophic event. After six weeks had passed, the national government began closing emergency shelters and moving victims into more suitable temporary housing solutions. Although this ambitious timeframe did result in a more rapid transition out of the emergency phase of the event, it also presented an immediate need for alternative forms of housing. These requirements arose prior to the time victims typically registered for national government disaster assistance, and before any individuals and/or families could be presented with other options for their long-term housing goals. The solution came in the form of manufactured housing units. The US Government traditionally provides such units to victims' needs only when they cannot be met through home repair or available rental units. Travel trailers, another temporary housing option utilized by the US Government, were also used to address displacement. These small mobile units are easily transported behind a small vehicle, and may be easily parked on or at the owner's property. It is only in situations where owner sites are not suitable for placement of manufactured housing or travel trailers that congregate camps are established. Both of these temporary housing options have been used extensively in the response and recovery to major disasters in the United States, and in this particular event the national government purchased and provided to victims a combined total of 145,699 travel trailers and manufactured homes. There are several benefits to using manufactured units, including travel trailers. For instance, they allow the family to remain close to their damaged or destroyed structure, thereby allowing them to facilitate their own recovery. They can be an effective option when there is little space for congregate camps but a fast solution is needed. For the government or organization facilitating recovery, they can be a fraction of the investment required other temporary to permanent solutions (like transitional housing). And because they are easily transportable or easily disassembled, they can be used in multiple events (or sold when the owner moves into their new house). However, because such units are not hazard resistant, they are not suitable for permanent shelter. The danger in their use is that they can inadvertently become permanent if reconstruction programs are not acceptable to victims.

Source: McCarthy, Francis. 2008. FEMA Disaster Housing and Hurricane Katrina: Overview, Analysis, and Congressional Issues. Congressional Research Service. RL34087

Lessons

- Modular and mobile homes can be a rapid mechanism for providing immediate in-situ temporary shelter, especially when congregate shelters are infeasible
- After the initial investment in purchasing them, modular and mobile homes can be used in multiple disaster events

- Modular and mobile homes, which are rarely hazard resistant, can become permanent if longer-term solutions are not provided; moreover, these structures are often designed for short term use only and can become hazardous to occupants' health if used for too long (due to preservatives used in the manufacturing process)

Temporary shelter solutions offer immediate safety and privacy to occupants. However, these options are, as their name suggests, only temporary in nature and must eventually be replaced by something more comfortable, practical, and disaster resilient.

Case 9: Bhuj Earthquake, Gujarat, India, 2001

Topic: In-Situ Transitional Housing

On January 26th, 2001, a magnitude 6.9 earthquake killed approximately 20,000 people and injured an additional 167,000. Over one million were rendered homeless. 7,633 villages were affected, and 450 villages were completely destroyed. 344,000 houses were completely destroyed and 888,000 reported damages. After the earthquake, NGOs and contractors worked with affected villages to provide readymade transitional houses on victims' property. These shelters were provided to allow families more time to overcome their trauma and to allow planners and victims more time to study their reconstruction options. They also provided sufficient safety and security. However, because they were not large enough to meet victims' long-term needs they were not a viable permanent solution. They were constructed using locally available materials (bricks, wood, and tiles), giving the owner the option to recycle the materials for the improvement of their new houses (e.g. converting the transitional structure into a kitchen, storage room, or an additional habitable room.) What was considered a relatively high initial investment in semi-permanent shelters was balanced by the benefit it provided residents with regards to relieving the rush to rebuild. The in-situ location was generally seen as being key to allowing owner participation in the reconstruction effort and for providing an immediate shelter option. However, this option was not always seen as attractive. In some instances, a majority of the villagers turned down offers for semi-permanent shelters from both NGOs and contractors.

Source: Bertolaso, Guido. 2010. Special Report on the L'Aquila Earthquake of 2009. Presented at the IRP International Recovery Forum, Kobe, Japan.
http://www.recoveryplatform.org/assets/meetings_trainings/irf2010/presentationdata/BERTOLASO_DEF.pdf

Lessons

- In-situ transitional housing not only allows for increased owner participation, it is a valuable source of recyclable materials that can be used to improve the permanent structure once it is completed, and can provide more security and safety than temporary shelter options
- Transitional housing allows planners more time to study risk and design more

appropriate long-term housing solutions

- Acceptance of in-situ transitional housing is not universal across the affected population, and as such alternative options need to be available

Option: Congregate Temporary Shelter (Camps)

Congregate shelter options, which can be temporary (as in the case of camps) or transitional (more substantial structures) often carry strong negative connotations. This is largely because it is difficult to provide most of the conveniences and comforts victims may have had in their pre-disaster situation. Additionally, life in a congregate shelter is a dependant one, requiring assistance for virtually all facets of life sustenance. However, camps do have associated benefits as well, and there may be situations where the most sensible solution is for IDPs to either remain in emergency shelters or move into temporary congregate facilities until they are able to transition directly into their repaired, reconstructed, or replaced permanent housing. This approach is valuable in that it helps prevent the creation of permanent settlements as occur in more substantial congregate camps (e.g. camps consisting of modular or mobile homes). Also, it can be much less expensive than other temporary options given the high up-front investment in modular or constructed temporary housing, and the affiliated costs of transporting materials, assembly, and maintenance. However, this option is typically much less palatable to IDPs who must sacrifice privacy, comfort, and convenience. Moreover, the difficulties associated with emergency shelter living decrease the likelihood that recipients will participate in their own recovery.

Case 10: L'Aquila Earthquake, Abruzzo, Italy, 2009

Topic: Direct transition from Emergency to Permanent Housing

The April 6, 2009 earthquake in Abruzzo resulted in the displacement of almost 68,000 people. The Government of Italy immediately began setting up congregate camps using high-quality family-sized tents to house the displaced population, with a peak of 170 camps constructed at the height of the crisis. Rather than transition into temporary housing while permanent structures were repaired or reconstructed, the Government of Italy instead chose to support families in these emergency shelters and attempt to bring about a more rapid transition from emergency to permanent housing. The Government of Italy had previously encountered difficulty in bringing about the transition of victims from modular temporary houses (constructed from shipping containers) into the permanent homes provided, which ultimately resulted in the creation of permanent informal settlements and slums. The tent camps were supported with field kitchens and medical clinics.

Source: Bertolaso, Guido. 2010. Special Report on the L'Aquila Earthquake of 2009. Presented at the IRP International Recovery Forum, Kobe, Japan.
http://www.recoveryplatform.org/assets/meetings_trainings/irf2010/presentationdata/BERTOLASO_DEF.pdf

Lesson

- In some situations, congregate emergency shelters can help to increase the speed with which permanent shelters are constructed

Option: Facility Conversion

Governments facing a shortage of temporary housing may also consider the option of converting a facility to meet residential needs. Emergency shelters and commercial or publicly owned facilities can sometimes be reconfigured to provide households with additional space and privacy by constructing temporary partitions or making other structural changes. Converted facilities may also provide food preparation areas and bathrooms. It may take time to create design plans, obtain permissions from property owners, identify funding, and complete the necessary construction. This option can interfere with the intended use of the facility, but can be a fast way to accommodate homeless IDPs when other accommodations cannot be found. Suitability for conversion is a factor of its ability to support medium- to long-term occupancy. Generally, this translates to adequate access to water and sanitation, and cooking or food distribution facilities.

Case 11: Earthquake and Tsunami, Banda Aceh, Indonesia, 2004

Topic: Direct transition from Emergency to Permanent Housing

In the aftermath of the December 26 earthquake and subsequent tsunami that struck Banda Aceh, about 140,000 people were displaced by the destruction of their permanent homes. To meet immediate needs, the Indonesian government converted military barracks to allow immediate shelter for the affected families during the emergency phase of the event. The assumption of this approach was that these individuals would be able to transition directly into their replacement houses. Ultimately, many of the affected chose to avoid these arrangements in favor of living with friends or relatives, or by attempting to remain on their property while their house was repaired or reconstructed. This miscalculation required the Indonesian government to the re-evaluate their strategy, leading to a subsequent program that provided victims with in-situ temporary shelter instead.

Source: da Silva, Jo. 2010. Lessons from Aceh: Key Considerations in Post-Disaster Reconstruction. Arup. Practical Action Publishing Group.

Lessons

- Large facilities can provide immediate emergency shelter to significant numbers of displaced victims if rapid conversion is possible
- Victims may avoid congregate emergency shelters in favor of relocating with family members or remaining on the site of their damaged or destroyed

housing; victims who remain outside of formal sheltering programs may be more difficult to track and account for in comprehensive recovery planning and programming

Case 12: Hurricane Katrina, Louisiana, USA, 2005

Topic: Facility Conversion

Following Hurricane Katrina, FEMA for the first time used cruise ships as an alternative temporary housing source – an option that has been considered strategically valuable for both island and coastal communities because they offer rapid temporary housing to even more remote locations. FEMA used the US Navy to charter the ships. The ships ultimately housed over 8,000 people and served over two million meals to victims and recovery workers. The use of ships was advantageous in that they offered victims and relief workers private rooms in close proximity to where the long-term recovery operations were being conducted. The on-site feeding facilities made them suitable for both emergency and temporary housing uses. However, housed recovery workers competed for space with evacuated victims wishing to return. Costs were another factor, because use of ships can have high financial implications if contracts are not worked out before the disaster, which ultimately draw off of funding available for long-term recovery.

Source: McCarthy, Francis. 2008. FEMA Disaster Housing and Hurricane Katrina: Overview, Analysis, and Congressional Issues. Congressional Research Service. RL34087.

Lessons

- Vacant cruise ships can offer a fast temporary housing options to coastal communities; these facilities are already equipped for the shelter, feeding, sanitation, and other needs of large populations
- Recovery workers may be in direct competition with victims for temporary housing
- Cruise ships are typically unsuitable for long-term shelter given the associated costs

Victims who are capable of beginning their reconstruction efforts immediately will want to do so as soon as possible. Although the speed at which they are able to commence will impact morale, planners must ensure that vulnerabilities are not repeated. Effectively managing this problem requires the accurate identification of those areas where no significant reengineering is required prior to the commencement of construction, and those for which further evaluation is necessary. In the areas where immediate work is possible, the dependence on temporary housing is reduced and victims are provided with a sense that their recovery is progressing (while other long-term housing recovery planning is addressed elsewhere).

Chapter 3

Issue 2: Site Selection

When establishing post-disaster shelter recovery and reconstruction operations, site selection is the most consequential decision that must be made. No other decision has as profound and lasting an impact on the lives of victims or on the likelihood of long-term project success and sustainability. However, because few other shelter recovery actions can occur before site selection has been made, there exists a great tension between ensuring proper analysis has been made and accelerating the process so that recovery may commence.

Sub-Issue: Inherent Risk of the Existing Site

The first decision that must be made when determining the site of recovery is whether the community can remain in its original location at all, or whether by doing so they would retain an unacceptable level or hazard risk. As described in the introduction to this document, a number of vulnerability factors contribute to the damage or destruction of housing - and physical location is prominent among them. When there exists an inherent hazard risk associated with a specific location, recovery planners must be able to determine whether or not hazard resistant design and construction will be able to overcome these vulnerabilities, or whether there is an ongoing likelihood of subsequent damage or destruction to any structure placed in that location.

This determination is largely a factor of the hazard itself. For some hazards, there may only be some areas within the community for which the risk is too great, while other areas either face no risk or are easily modifiable such that risk is mitigated. In many communities affected by floods, for instance, structures in the low-lying floodplain face the greatest likelihood of ongoing flood risk, and are therefore good candidates for relocation – even if just elsewhere within the same community. However, if an entire community lies below an increasingly unstable slope in mountainous territory, there may be no place immune from an impending landslide event. The risk map is the most effective decision-making tool in determining whether to relocate the entire community or to identify individual houses within the community is through risk mapping.

Case 13: Earthquake and Tsunami, 2004, Banda Aceh, Indonesia

Topic: Risk Mapping and Spatial Planning

The December 26 earthquake and subsequent tsunami that struck Banda Aceh damaged or destroyed communities along over 800 km of coastline. The combined hazards destroyed 130,000 houses and damaged an additional 95,000. A number of hazards, including standing water and mass graves (particularly around Banda Aceh and Meulaboh), and a risk of catastrophic flooding in the future, complicated the site selection process. To determine site suitability, communities engaged in risk mapping to identify all locations that had become unsuitable for future development. The mapping was coupled with disaster risk reduction strategies to create effective land use plans that addressed future tsunami, storm surge or flooding risk. Villages identified buffer zones and the availability of evacuation routes and post-disaster meeting points. For instance, the site assessment in low-lying areas included the identification of nearby hills suitable for protection in the event of future tsunami-related evacuation. Where such geographic features did not exist, planning regulations called for the construction of public buildings that were capable of providing enough protection for the community in such an event. Plot specific assessments were made as well, and investigated structural mitigation options including structural elevation or regarding of the property. In this effort, participatory planning processes were extensively employed in order to develop a shared understanding of site constraints given that those whose property was identified as unsuitable were likely to be dissatisfied with the decision. The assessment also looked at land boundary negotiations, zoning practices (for residential and commercial), and allotments for public space. Sites were assessed for their suitability (social and geo-technical) for schools, health centers, shops, market places, roads and other community features. To assess the site for other services and features, the community capitalized on existing expertise or found partners with the desired capability (e.g. government agencies, humanitarian organizations). Planners did find site assessment to be time intensive and complicated given the technical requirements. Also, it was determined that detailed physical planning was needed for each plot to ensure that the footprint of the house itself and any service or utility improvements would be compatible.

Source: da Silva, Jo. 2010. Lessons from Aceh: Key Considerations in Post-Disaster Reconstruction. Arup. Practical Action Publishing Group.

Lessons

- Community involvement in risk mapping can improve their effectiveness
- Shelter recovery planning should incorporate future land use plans
- Needs assessments must consider boundary negotiations, zoning practices, and set asides for public space
- Long-term shelter needs assessments may be time and resource intensive

Sub-Issue: The Benefits of Staying On Site

Almost without exception, victims will prefer to remain in the community, and on the same property, where they lived prior to the disaster. Location is associated not only with livelihood but also with history, culture, community, family, spirituality, and much more. However, victims' preference is not the only benefit to retaining the existing location. By staying in place, the burden of providing infrastructure and other wraparound services is almost certainly minimized. This includes, among other things, schools, government buildings, utilities, transportation networks, healthcare facilities, transmission lines, sewers, and much, much more. All of these features will have to be recreated at a new site or expanded if the community integrates into another existing community. Relocation also presents the problem of compensation for abandoned land, and establishment of land tenure at the new location. And finally, the cost of relocation almost always eclipses the cost of reconstruction.

However, all of these factors weigh against the risk of repetitive loss and persistent threat to life and limb. It goes without saying that reconstruction in areas with a history of disaster and /or that are bound for subsequent disaster should be avoided. Of course, ample study is required to ensure that the new location does not present its own associated hazards through which ongoing risk is retained.

Case 14: Bhuj Earthquake, Gujarat, India, 2001

Topic: In-Situ Recovery

In the State of Gujarat, there were approximately 344,000 houses destroyed and 888,000 damaged. The Kachch region was hard hit, accounting for about 100,000 of the destroyed homes and 300,000 of those severely damaged. The shelter recovery program sought to reduce vulnerability, build capacity, promote sustainable recovery, demonstrate seismic safety in housing and provide alternative accommodation for the rural displaced. A primary strategy of this project was to give the community a genuine stake and sense of ownership in their own recovery and rebuilding efforts in order to reduce dependency and enable their "innovation and diversity". When presented with reconstruction guidelines, which drew upon the lessons learned of previous earthquakes in India, the recipient communities formed a wide consensus that preferred *in-situ* reconstruction over relocation and the program moved forward in this context (following the earthquake in Latur, UNDP surveys found that while 97% of in-situ housing recipients were satisfied, only 48% of relocated recipients were satisfied). These communities were thus able to take advantage of existing transportation and energy infrastructure, existing water transmission and drainage systems, and wells. They were also able to retain and maintain their nearby fields. Government planners were able to collect the input of community stakeholders through a system of *setus,* which is are village-level centers established for humanitarian relief that feed information up through a centralized hierarchy. A UNDP analysis of the recovery in Gujarat Earthquake also underscores the advantages of rebuilding on site instead of relocation, considered from

the point of view of infrastructure, with an added benefit of residents' satisfaction.

Source: UNDP. "From Relief to Recovery: The GUJARAT Experience." United Nations Development Programme (UNDP), 1991. http://www.recoveryplatform.org/assets/publication/from relief to recovery gujarat.pdf

Lessons

- Community consensus should be a primary factor in determining whether to rebuild in-situ or to relocate
- In-situ reconstruction allows for a reduction in the amount of infrastructure required to support the affected community
- In-situ reconstruction limits the impact on access to livelihoods
- Recovery planners can tap into existing village consultation networks to gain public involvement in the reconstruction process

Sub-Issue: Relocation

When a site assessment determines that relocation is the only or best option, government must first identify and secure viable land, and then undertake what amounts to a comprehensive yet accelerated (urban or rural) development-planning effort. Relocation site suitability assessments are conducted to assess hazard risk, environmental impact, topography, geology, hydrology, soil structure, and several other factors in order to determine the best location and layout of structures, and the housing design and construction materials to ensure safety and sustainability.

Relocation site suitability is but one component of ensuring the success of the relocation effort. The relocated families must also be able to create a working community at their new location, and there are a number of prerequisites for such viability including:

- Access to and availability of appropriate livelihood opportunities (including agricultural land for agrarian communities)
- The provision of training and counseling to provide life and livelihood transitions
- The existence of a community structure and physical layout that residents find agreeable and which alienates no group or household
- The existence of and access to adequate and appropriate cultural and religious facilities
- Physical access to other communities
- Adequate and accessible medical and public health services
- Suitable and sufficient educational facilities

- The ability to ensure and maintain security
- Access to safe and affordable food and drinking water
- Access to affordable standard utility services (power, communications, sanitation)
- The maintenance of existing community, familial, and social networks
- Access to and availability of appropriate livelihood opportunities (including agricultural land for agrarian communities)
- The provision of training and counseling to provide life and livelihood transitions
- The existence of a community structure and physical layout that residents find agreeable and which alienates no group or household
- The existence of and access to adequate and appropriate cultural and religious facilities
- Physical access to other communities
- Adequate and accessible medical and public health services
- Suitable and sufficient educational facilities
- The ability to ensure and maintain security
- Access to safe and affordable food and drinking water
- Access to affordable standard utility services (power, communications, sanitation)
- The maintenance of existing community, familial, and social networks

Case 15: Earthquake and Tsunami, 2004, Banda Aceh, Indonesia

Topic: Standardized Site Assessment Criteria

Following the December 26 earthquake and subsequent tsunami that struck Banda Aceh, there was no standardized formal process established within local or national government for systematically assessing resettlement site development suitability (including for such things as infrastructure development). Variance among implementing agencies' strategies to assess sites resulted in the prevalence of overlooked determinant issues. The singular focus, in most cases, was on individual house construction rather than the viability of a whole community. Throughout Indonesia, several agencies used a simple assessment checklist to create qualitative rankings. However, in Aceh there was limited awareness of the need for surveys and lack of expertise either within agencies or locally to conduct them. Combined with immense pressure being exerted by local government and victims to commence reconstruction, this meant that scientific assessments were systematically avoided. As a result, there were numerous cases of construction occurring on unsuitable land where risk remained or where it was very difficult to provide adequate wraparound services. The prevalence of high water tables and extensive flood risk are two examples of factors

that such assessments would have accounted for, but which severely affected projects in the absence of such studies. In one situation, where a development agency was able to commission adequate topographical and hydrological surveys, flood risk was identified across 16 villages and the resulting houses were constructed in a resilient manner. However, even on fairly large scale resettlement sites geotechnical investigation was uncommon and construction styles were based on significant unverified assumptions. One of the limitations of this approach are that site assessments and surveys carry significant technology and expertise requirements. They must also be coordinated at a regional level, bringing to bear the knowledge and plans of the many participating agencies involved. For these reasons, the affected government is typically the entity best positioned to coordinate the assessment and designation of resettlement land alternatives.

Source: da Silva, Jo. 2010. Lessons from Aceh: Key Considerations in Post-Disaster Reconstruction. Arup. Practical Action Publishing Group

Lessons

- The development and provision of standard site selection criteria, which dictates assessment processes and suitability decisions, will increase speed and efficiency of site selection and reduce variance among implementing agencies' efforts
- Site selection needs to consider not only the viability of the individual home, but also how construction on that site will subsequently affect the community as a whole (including how the site will impact infrastructure access and recovery decisions)
- Pressure from recipients to quickly rebuild may cause implementing agencies or organizations to perform limited site assessments, or to forego them entirely
- The affected government is typically the entity best positioned to coordinate the assessment and designation of resettlement land alternatives

In Housing Reconstruction after Conflict and Disaster, Sultan Barakat states, "One can learn a lot about location selection by observing where displaced people themselves usually settle. Besides physical security, access to economic and employment opportunities is the primary determinant here." He adds, "When the disaster hits rural areas or poor urban areas, people are likely to move closer to cities, and often settle in slum areas surrounding city centres" (Barakat, 2003).

Increasingly, recovery planners are allowing, and even encouraging the relocated community to be a party to relocation planning and operational decisions. Such actions may actually be the only difference between their concession to such a decision and outright refusal to leave. There are a number of obstacles to relocation, and cooperation is typically the only way to resolve them. For instance, it is common for there to exist no

legal basis upon which a population is forced from their privately owned land, and as such, an incentive programs is needed to make the option more attractive. The affected population is best able to communicate what that means to them as individuals, or as a group. One of the most popular options in this case is the housing buyout, wherein victims are given fair market value for their property, which is in turn converted to a green space or other non-residential use. Government must consider the additive cost of repetitive disaster assistance over the one time, albeit initially higher, cost of relocation. Relocated individuals feel that they received just compensation and know they will be better able to avoid the same risk in their new home.

Box 5: Examples of Successfully-Relocated Communities

- Chernobyl, Ukraine — nuclear accident (1986)
- Wurang and Babi Islands, Indonesia — earthquake and tsunami (1992)
- Valdez, Alaska, USA — earthquake (1967)
- Valmeyer, Mississippi, USA—flood (1993)
- Gediz, Turkey — earthquake (1970)
- Dagara, India — earthquake (2001)

There are conflicting drivers behind the determination of distance between the abandoned site and the new (relocation) site. Generally speaking, despite that the risk as geographically based and it is common for greater distances to provide greater protection (though certainly not always), the relocation site should be as close to the abandoned location as possible given the availability of viable land and the desired reduction in risk. If temporary or transitional housing is constructed at this new permanent site rather than a subsequent (third) temporary location or at the original location, the recovery effort may benefit in terms of residents being able to begin their transition much sooner and the increased reconstruction capacity as recipients will contribute in their own recovery.

When resettlement is chosen, even when a very high percentage of the community has been affected (in the case of the Bhuj Earthquake in Gujarat, a threshold of 70% was used), there will be individuals whose homes were not destroyed but who must now relocate to a new community they may see as inferior to their existing one. These individuals, however, become equal victims in the event of relocation, and must therefore be provided with equal access to disaster recovery assistance funding and programs.

Case 16: Earthquakes, August and November 1999, Kocaeli and Marmara Turkey

Topic: Resettlement

On August 17 and November 12th of 1999, earthquakes measuring 7.4 and 7.2 on the

Richter scale, respectively, struck Turkey East of Istanbul. Approximately 43,000 buildings were damaged, with 84 % of the damages affecting houses. The Government of Turkey enacted a permanent housing strategy that involved the construction of several mass housing projects, and the provision of housing credits with low interest rates to recipients. The government, in partnership with local and international agencies and NGOs, provided displaced victims with immediate temporary shelters. More than 130 tent cities, totaling over 100,000 tents combined, were set up to provide emergency shelter, and thousands of prefabricated homes were constructed within one year to meet remaining demand. The long-term reconstruction effort resulted in the provision of new homes in these communities for victims whose homes could not be rebuilt, as well as to owners of houses located in land expropriated for community relocation regardless of the earthquake's impact to those homes. Recipients had to satisfy three basic requirements: 1) prove ownership of the old home; 2) prove catastrophic damage or destruction; and 3) prove ability to pay the relatively small credit fees. The agency tasked with the design, construction and rehabilitation activities, the General Directorate of Construction Affairs, was also responsible for the management of the construction of infrastructure and wraparound projects to service the new housing settlements created. An observed shortcoming of this approach was that new homes were only provided to owners of badly damaged or destroyed houses in communities where relocation did not occur, causing some tension. Also, little was done to address the fact that victims who rented or who did not have a title for their house could not receive a new house. Because of this, low income families and rental unit tenants essentially 'fell through the cracks.'

Source: Arslan, Hakan and Alper Unlu. 2008. The Role of NGOs in the Context of Post Disaster Housing in Turkey. Istanbul Technical University.

Lessons

- Long-term housing reconstruction plans will need to consider a menu of possible options given the differences in each community's and each household's circumstances
- Eligibility requirements help to standardize assistance, but should not be so inflexible as to prevent assistance to atypical yet otherwise eligible cases
- Shelter assistance programs should not limit their benefits only to those with the greatest damage, as households with minor to moderate damage may require funding, supplies, or other assistance to repair their home to a status that allows for permanent habitation; this will also help to reduce tension between recipients
- Housing assistance programs should be designed to accommodate not only homeowners, but renters and those who do not have legal documentation for their home as well

Planners must remain cognizant of the fact that beneficiaries will likely prefer to stay in or near their former destroyed homes rather than in their new offsite locations. When livelihoods are attached to the former location, the family breadwinner – most often the male head of household – may spend the bulk of their time working and residing in the former community while the rest of the family lives in the new location. This type of arrangement increases the risk that the entire effort fails and the community members either become despondent or move back to their original high-risk settlement.

Case 17: Tsunami, 2004, Tamil Nadu, India

Topic: Community Relocation

On December 26th 2004 a severe earthquake hit northern Sumatra causing one of the most powerful tsunamis in recorded history. The death toll in India exceeded 10,000 people, and material losses and damages were estimated to be over $1B. Over 85% of losses in India occurred in Tamil Nadu, where approximately 135,000 houses were damaged or destroyed. The Government of India invited many humanitarian agencies to participate in the reconstruction effort, which would involve rebuilding as many houses as were lost using multi-hazard resistant design and materials. To fully reduce the physical risk from the tsunami hazard, the program sought to resettle all affected people a safe distance from the sea, but also to upgrade housing considered inadequate as an added incentive. Nongovernmental organizations were given the opportunity to 'adopt' one or more affected coastal villages for reconstruction. Fortunately, project administrators were able to recognize fairly early in the project's implementation that a massive resettlement of coastal communities in Tamil Nadu was neither feasible for, nor desired by, recipients. Fishing constitutes over 80% of the affected people's livelihood, and as such they resisted an effort that they aptly perceived to be an irreparable hardship. In recognition, the government allowed in-situ reconstruction and explored alternative mitigation methods to prevent the retention of risk. This experience led planners to deduce that, for recipients, the importance of livelihoods exceeds any concern for ongoing hazard risk. Proper use of mitigation technologies and effective hazard identification and response training can help to significantly reduce these obstacles facing in-situ reconstruction efforts. This program also highlighted the cost benefit that can be gained through in-situ reconstruction which helps to offset some of the mitigation costs that occur. In this case, the original plan called for new homes for all residents, regardless of the condition of their original home, because of the blanket relocation. However, when in-situ reconstruction was instead called for, the aid agencies did not readjust their plans for reconstructing all houses but rather demolished many undamaged housing in order to provide a new structure. Such costs could have been avoided with proper community consultation and/or planning.

Source: Barenstein, Jennifer, and Daniel Pettet. 2007. Post-disaster housing reconstruction Current trends and sustainable alternatives for tsunami-affected communities in coastal Tamil Nadu. http://www.isaac.supsi.ch/isaac/Gestione%20edifici/Informazione/post-

disaster%20housing%20reconstruction.pdf

Lessons

- Where hazard risk is spread throughout an entire community, relocation may be the only option that effectively reduces future vulnerability to a similar event
- Community resettlement may be undesirable to those impacted, and therefore infeasible
- The importance of livelihoods protection outweighs concerns about risk, and as such alternate in-situ mitigation options may need to be explored in lieu of relocating a high risk community; the reduction in costs associated with relocation can help to offset the costs associated with mitigation

Case 18: Floods, 2000/2001, Mozambique

Topic: Community Resettlement

In 2000 and 2001, Mozambique was affected by record flooding. In the earlier of these two events, 700 people were killed, 650,000 were displaced, and 4.5 million were affected. The latter flood event affected an additional 500,000 people, of which 223,000 were displaced. Once initiated, recovery was conducted in the context of an ongoing national reconstruction and development effort that had begun following the end of hostilities in 1992. As such, the Mozambique government's recovery objectives and strategies to address both flood events involved the rapid transition from relief to recovery. In total, over 40,000 families were resettled to less flood-prone areas. While the reasoning for this action was likely justified, the approach taken was found to have been much more suitable in incidents resulting from complex humanitarian emergencies. For instance, a community survey found that beneficiaries were often poorly informed about what recovery plans and activities would entail, and few if any community members had any concept of the comprehensive recovery strategy. This in turn led to a general sense of powerlessness and dependency among victims, and there was little to no resistance against a resettlement that ultimately resulted in significant hardship due to the great distances recipients had to walk to access their farmland. Many families adjusted to this hardship by either refusing to move (and maintaining their homes in the floodplain), or living in the resettled areas but building temporary shelter near the farms during peak agricultural work periods. Even when their new houses were more spacious and offered greater privacy, recipients complained that the move caused them to have to reinvent their livelihoods and that it had disrupted family and social dynamics (especially when males found jobs in the city and only returned on the weekends). This experience highlighted the fact that community participation in recovery cannot be limited to rudimentary levels. While recipients were able to contribute labor to the effort, their participation in the decision making process was almost nonexistent. Another lesson learned in this event was that resettled families are

much more likely to be accepted and absorbed into communities where land availability is not an issue. However, when populations are resettled into communities where land availability is limited, resettled populations will face difficulty in finding viable farming land that will make their presence sustainable. The only alternative in this instance was sharecropping. On the positive side, recipients typically found their housing stock to be improved over what they owned prior to the disaster event. However, there was no standard plan for house construction among the many NGOs involved, nor was there a system to guide oversight. In some communities, recipients were given materials and cash for labor, while in others; contractors were hired directly by the organizations. As a result, standards varied considerably.

Source: World Bank. "Learning Lessons from Disaster Recovery: The Case of Mozambique." World Bank, 2005. http://www.recoveryplatform.org/outfile.php?id=46

Lessons

- Recovery can be integrated into ongoing development planning and efforts
- Housing recovery planning following natural disasters and complex humanitarian emergencies may require very different strategies
- Communication is required to ensure that housing recovery beneficiaries understand what is available to them
- Livelihoods must be maintained or replaced in the event of resettlement; in the case of agricultural and fishing communities, this may not be possible
- Community participation cannot be limited to rudimentary levels
- resettled families are much more likely to be accepted and absorbed into communities where land availability is not an issue

In the publication *Relocation or Rebuilding in the Same Area - An Important fact for Decision Making for Post-Disaster Housing Projects*, Nese Dikmen lists several of the most influential factors behind community relocation project failures, specifically as they related to the experience of the Government of Turkey. These factors included (Dikmen, n/d):

- Inadequate time for assessments before decisions were made
- A lack of participation by recipients in the early decision-making process, and subsequently in the housing design and construction processes
- Inadequate criteria used to identify viable relocation sites
- A lack of interdisciplinary consideration and cooperation during the site-selection process
- Poor consideration of recipient lives and lifestyles

Case 19: Earthquake and Tsunami, 2004, Banda Aceh, Indonesia

Topic: Resettlement

The December 26 earthquake and subsequent tsunami that struck Banda Aceh caused significant (total in some cases) devastation to coastal communities. Over 800 km of coastline was affected. Given the scale of destruction, the difficulty in reaching the affected areas, and the pre-existing poverty caused by nearly 30-years of armed conflict, the reconstruction effort was especially challenging. The combined earthquake and tsunami was devastating to housing stock in Aceh. Official estimates showed 130,000 were completely destroyed, and an additional 95,000 were damaged but repairable. The government enacted a policy that encouraged families to return to, and rebuild upon, their own land. However, because the disaster left some communities' land permanently submerged, many families had no choice but to resettle because their land no longer existed. Coupled with other families whose land had become unsafe for other reasons, or who did not own land or housing before the tsunami, approximately 25,000 households were identified as good candidates for relocation. Relocation, which was voluntarily, required resettlement on land purchased by communities themselves or through government support. Some families were able to relocate themselves on agricultural land, but a number of problems prevented more widespread use of this option (including proximity to hazards and/or a lack of access to infrastructure). To facilitate this project, the Government of Indonesia purchased 700 hectares of land of which 500 were allocated for the relocation of homeowners and 200 hectares were allocated for renters and squatters. A resettlement plan was prepared for these areas and the national government agreed to provide access roads, public facilities and livelihood assistance with housing being provided. In general, communities preferred to remain in-situ in order to maintain access to social networks, livelihoods, healthcare, and education. The national government had to take over site selection when it became apparent that land identification and construction capacity shortfalls were causing significant delays. In some cases, it was found that the relocation sites were located too far away to allow continuation of existing livelihoods. Other significant challenges arose at the relocation sites, including potable water shortages, land certification hurdles, and transportation shortfalls, for example. As a result, some organizations refused to resettle their beneficiaries to these areas. Reconstruction organizations expressed concern that social cohesion would be a key issue in resettlement areas when they consisted not of whole communities, but rather households from different communities throughout the affected area.

Source: da Silva, Jo. 2010. Lessons from Aceh: Key Considerations in Post-Disaster Reconstruction. Arup. Practical Action Publishing Group.

Lessons

- Geologic changes to land, including changes in elevation, can make in-situ reconstruction impossible, change transportation patterns, and reduce the

amount of viable land in the community, among other effects

- Relocation may be a better option for those whose land is no longer viable, or those who do not own a home
- Alternative coordination mechanisms, inclusive of the national government taking over site selection processes, may be necessary if land identification, construction capacity shortfalls, and other factors result in significant delays
- Aid organizations may be unwilling to relocate their beneficiaries to sites selected by the government or outside organizations if these selections are made without their consultation

Case 20: Earthquake, Bam, Iran, 2003

Topic: Relocation

Following the earthquake in Bam, which killed over 30,000 people and injured 20,000, there were several villages for which seismic risk was assessed to be too great to reconstruct in-situ. The Government of Iran had already gained a significant knowledge base from which to assess relocation viability given that many villages were relocated in the aftermath of the Iran-Iraq war. Their strategy in carrying out relocations was to make every available effort to keep victims as close to their land as possible, avoiding any such movement unless absolutely necessary. However, in Lorestan Province it became necessary to relocate two communities where seismic risk was too great to safely mitigate. In order to accommodate the affected communities, new villages were built in an alternate location but were constructed such that they were visually, structurally, and in as much as feasibly possible, the same as the former village. Government planners used photographs, maps, and local knowledge to recreate the communities, even planting trees where they stood in the former settlement. The result was that the villagers felt immediately comfortable in their new surroundings and the effort has been deemed a success. This effort showed the importance of community structure and layout to the relocated population. The Iranian approach that states relocation should not be performed unless absolutely necessary likely helped reduce victim hardship in the aftermath of the earthquake event.

Source: Joodi, Majid. 2010. Lessons Learned Focus Group. IRP International Recovery Forum, Kobe, Japan.

Lessons

- Relocation site selection should focus on keeping recipients as close to their land as is possible given risk reduction goals
- Recreating the visual and structural layout of the former community within the new community can help increase acceptability among recipients

Chapter 4

Issue 3: Project Implementation Method

It is often said that how things are done is as important, sometimes more important, than what is done. This could not be more true for the reconstruction of the most intimate, personal components of a person's life – their home.

Each constructed shelter represents an individual project, and coupled together these hundreds, thousands, and even millions of homes constitute much larger housing reconstruction programs. Project implementation in the context of this guidance note is defined as the process of managing the construction project. This includes a number of different decision points addressed in much greater detail in other sections of this document, inclusive of the structural design, the selection of materials, and the source of labor and technical expertise. At the programmatic level, there are a handful of approaches through which implementation responsibility may be assigned, ranging from full government implementation on one side to allowing individuals to bring about their own recovery devoid of outside help on the other. While examples of these two extremes can be found, in reality most project implementation efforts are driven by a mix of different stakeholders.

There is a growing consensus among development and recovery planners that the participation of the benefactors of a recovery program, and of the communities where they reside, is vital to recovery program success. However, the technical ability or operational capacity of these communities to assume all responsibilities associated with shelter recovery – including design, materials, and labor - will likely fall short. Governments, NGOs, and other recovery stakeholders must therefore find a balance between supporting the community to the greatest extent possible and being fully prescriptive. This point of balance is unique to every scenario and cannot therefore be easily assigned in this guidance. As emphasized in *Responding to Urban Disasters,*

> *"…participatory approaches to recovery can tap the wealth of knowledge and experience in civil society organizations to design and implement disaster-response programmes that both meet current needs and effectively reduce future risks. However, many recovery strategies are based on a strategy of 'assistance' rather than 'participation'. Dind (2006) contrasts examples of these two models in the response to Hurricane Stan which heavily damaged the town*

> *of Tapachula in Chiapas, Mexico in 2005. A government-backed rebuilding programme used construction companies from outside the region, and focused on reconstructing houses at a large scale with centralised decision-making and limited opportunities for affected households to influence the reconstruction. Caritas-Mexico, in contrast, undertook several smaller projects that put the residents in charge of managing the reconstruction of their homes and strengthened community networks and solidarity in addition to rebuilding houses. Such participatory approaches can help to balance the challenges of scale and quality, using a broader set of community resources and enhancing capacities and resilience" (ALNAP and Provention Consortium, 2003).*

Sultan Barakat further stresses the importance of putting some, if not all of the project implementation responsibility in the hands of the local community in stating that, "finding ways to involve legitimate sources of local authority in any reconstruction programme is likely to be crucial, since exclusion risks a hostile reaction. It may be necessary to organize these community leaders into some form of committee." (Barakat, 2003). Barakat cites an the 1985 Mexico City Earthquake as an example of a spontaneous occurrence of such participation through the forming of 'Renovation Councils' that consisted of elected representatives for each reconstruction or rehabilitation site. These quasi-official groups provided the added benefit of a forum through which community members could voice their concerns and preferences to the implementing authorities.

The many forms of implementation can be summarized according to four general categories, including:

- Owner/Community-Driven Project Implementation
- Government/Donor/NGO-Driven Project Implementation
- Contractor-Driven Project Implementation
- Hybrid (mixed between any or all of the above) Implementation

In a typical owner-driven implementation scheme, displaced victims are provided with the financial support required to support their own housing recovery. They may also be provided with varying degrees of technical support (e.g. training in hazard resistant building design and construction), supplies, and equipment. However, in a truly owner-driven system, the owners themselves are charged with construction (even if they choose to hire contractors to do the actual labor). Of course, this approach is most effective when the community and its members are able or enabled to adequately handle the construction work required (Barenstein, 2006, and Barakat, 2003). For this to occur, there must exist available labor, simple building design, very low pressure to finish quickly, and a community sense of self-reliance.

Case 21: Earthquake, Pakistan, 2005

Topic: Owner-Driven Implementation

The 2005 earthquake in Pakistan destroyed or damaged 600,000 houses across 30,000 square kilometers of land, leaving 3.5 million homeless in over 4,000 villages. To address the monumental task of rebuilding housing infrastructure, the Government of Pakistan funded a $2 billion program that put the task of rebuilding in the hands of the owners themselves. Families were provided with $2,800 if their house was destroyed, and $1,200 if it only required repairs. Funds were disbursed in installments, with each successive payment dependent upon an inspection that verified the application of hazard resistant construction methods and materials. The government worked closely with the United Nations, the World Bank (and other International Financial Institutions), the military of Pakistan, and scores of NGOs operating in the area, to develop a program of technical assistance that would ensure aid recipients were able to carry out the home-building and repair projects in such a way as to prevent repeat failures in a future seismic event. For the most highly-skilled needs, such as steel work and specialty masonry, training was provided to local contractors and artisans who could better meet those needs. This approach led to the loss of some funding when donors were unwilling to support an owner-driven support, but it is felt by those involved that the reduction in construction costs, and the long-term benefit of a trained and empowered population, more than made up for the losses.

Source: UN-HABITAT. Twenty First Session of the Governing Council 16-20 April 2007, Nairobi, Kenya Field Report: Building back better in Pakistan.
http://www.recoveryplatform.org/assets/submissions/200909010544_pakistanearthquakeshelterunhabitat2007.pdf

Lessons

- Housing programs should allow multiple levels of benefits to match the needs of individual victims, thereby increasing the reach of the program and better ensuring that each victim's needs are adequately addressed
- Owner-driven implementation must be supported by the availability of technical assistance that ensures risk reduction
- Even in owner-driven reconstruction, there will be needs that demand such specified skill or specialized equipment that the contract or other outside assistance is required

The primary advantages of owner inclusion include:

- Lower project costs
- Higher rates of satisfaction
- Earlier occupancy (even before the structure is completed in some instances)

- Higher occupancy rates.

In owner-driven implementation, the recipients themselves can drive the selection of building materials and design, which allows them to incorporate their preferences and requirements as needed. The self-help nature of the approach can also restore community pride and address some of the psychosocial impacts that have occurred. Finally, in the case of cash for work programs, it can help to keep many community members (including housing recipients) employed during the recovery phase.

With adequate financial and technical assistance, self-built houses are likely to be more sustainable. People, if given an option, tend to choose building materials and techniques that are familiar to them. Accordingly, they may be in a better position to provide for future additions and repairs. Finally an owner-driven approach may contribute to preserve the local cultural heritage and vernacular housing style, which is instrumental for the preservation of a community's cultural identity. In particular in relation to the devastating experience of a disaster, it is important to give people some sense of continuity (Oliver 1987).

There are obvious risks associated with an implementation approach that places a significant amount of responsibility in the hands of owners. For instance, there must exist a minimum degree of knowledge about project management and technical knowledge required to enable the project to progress from commencement to completion. More vulnerable communities may not have the knowledge or the time to handle what is required. Disaster victims as a general class typically lack the time between facilitating other areas of recovery and addressing their primary livelihood concerns to conduct an effort as comprehensive as the construction of a house (including supervision). If traditional construction design and practice is the source of risk, and owners are intent on rebuilding in the same manner, this approach can actually preserve high levels of risk. Finally, in urban settings where buildings are multi-story (low- and high-rise) structures, the complexity involved in project implementation will be much too great to hand over wholesale to victims.

Case 22: Earthquakes, Nahrin, Afghanistan, 2002

Topic: Owner-Driven Implementation

The Government of Afghanistan and several NGOs responding to the disaster elected to implement an owner-driven approach to housing reconstruction. The involved agencies and organizations provided technical assistance (including information about hazard-resistant design), supervision, and materials (wooden beams for roofs). People were given the resources and knowledge with which to construct their own homes in accordance with earthquake-resistant design, which included the making of bricks and gathering of stones. However, once actual implementation began, there were a number of households that were unable to perform the necessary tasks associated with materials acquisition or creation. Other victims were unable to manage the time

constraints imposed by other life activities, leaving them no time to manage the rebuilding of their permanent home. In vulnerable households, most notably those with no adult males, construction was almost impossible. As the cold season approached, victims began to worry about their safety in winter's cold weather, and began to quickly construct their homes using traditional methods that resulted in the risk that existed prior to the event.

Source: ALNAP, 2003

Lessons

- Not all homeowners will be capable of managing their own recovery under an owner-driven reconstruction approach, whether due to technical or physical capacity, or availability of time
- Factors relative to climate must be incorporated into owner-driven shelter reconstruction in terms of ensuring that owners are able to facilitate recovery before weather or temperature changes cause them to rush or abandon their efforts

Participation of the greater community in the implementation process is equally important. The most effective means of garnering community participation (and subsequent buy-in) is through the identification and inclusion of both community leaders and the leaders or representatives of the more vulnerable community members. Communities are diverse, and unlike direct owner participation, community-driven management of a shelter recovery program can easily perpetuate existing social biases. The vulnerable may become even more marginalized given the power community leaders may have over their fate in such a fragile time.

Public consultation aimed at creating community or individual input has been shown to significantly increase the likelihood that the community and its members are satisfied with the project outcome. A shelter reconstruction guide created by ALNAP proclaims that,

> *"Public consultation is […] especially critical in post-disaster decision-making to ensure public ownership of the recovery plan and to anticipate and raise critical issues before decisions are agreed. The greater the range of participants, the greater the opportunity for public officials to educate a wider array of stakeholders about poorly understood problems and potential solutions. Consultation also gives community members an opportunity to contribute their local knowledge and capacities, and can help to address governance weaknesses. Ongoing community feedback ensures a better fit between recovery plans and community decision-making, helping communities to avoid the cycles of complacency and weak governance. Community involvement can also directly address the differences in interests among community groups that often trap poor and vulnerable residents*

in risk-prone environments" (ALNAP and Proventium Consortium, 2003).

There are many means by which community member involvement in recovery is achieved. The capacity of the community to participate and effect positive change is greatly strengthened if these same individuals were involved in community development planning prior to the disaster onset – but such involvement is not a requirement. The key to success is in assessing the limits of individual and community capacity and then supplementing as required with outside technical assistance.

Case 23: Earthquake and Tsunami, Aceh, Indonesia, 2004.

Topic: Community-Led Implementation

The coordination of housing reconstruction program implementation was led by a community leader in two adjacent fishing villages in Aceh Besar. An especially-resourceful village chief assumed control of the coordination of the reconstruction efforts across the two villages, chairing meetings attended by international and local NGOs who expressed interest to implement reconstruction projects locally. The meetings helped to emphasize the need for coordination and cooperation, to avoid duplication, and ensure that no organization makes exclusive claims to the villages. The meeting conveyed to donors and NGOs the villagers' priorities. Individual projects in the housing reconstruction effort were tendered out to the respective organizations by the communities themselves. The community leader also planned and led a three-day workshop with a local NGO to design a blueprint for the reconstruction of the villages. Community members could use these meetings to voice complaints and concerns. Ultimately, the members of these two communities were among the first to return to sites of their previous homes. They built 42 houses within a few months. Except for the zinc-roofs, which were provided by an NGO, the other materials and the construction work were managed by the villagers themselves. Instead of passively waiting for outsiders to meet their needs, these villages took things into their own hands.

Source: World Bank, Rebuilding a Better Aceh and Nias. 2005. http://go.worldbank.org/ANVLSEH9A0

Lessons

- In cases where community leadership is strong and capable, it may be preferable to allow coordination to occur at this level
- Community leaders are not only a reliable and accurate source of information that is highly relevant to reconstruction planning efforts, they also help to increase the likelihood of buy-in on the part of aid recipients

Case 24: Bhuj Earthquake, Gujarat, India, 2001

Topic: Owner-Driven Implementation

In the initial weeks following the Bhuj earthquake, the Government of India planned a

housing reconstruction program that focused on relocation, similar in scope to program used in the 1993 Maharashtra earthquake. The citizens of Gujarat were so opposed to any form of relocation that they protested successfully to have the government change its intended course. In response, the government adopted an owner-driven reconstruction plan. This World Bank funded effort included the provision of financial and technical assistance and subsidized construction materials with the goal of enabling victims to rebuild their own homes. The Government of India held over 150 public consultation meetings in order to garner citizen input on the larger urban planning issues. Ultimately the program was an overwhelming success. Almost three-quarters (72%) of villages took advantage of the opportunity to drive their own recovery, and thus rebuilt over 197,000 houses (or 87% of all destroyed homes) in this manner. At the time, this was the largest housing reconstruction program ever undertaken.

Source: Barenstein, Jennifer Duyne. "Housing Reconstruction in post-earthquake Gujarat: A Comparative Analysis." Humanitarian Practice Network no. 54. http://www.odihpn.org/documents%5Cnetworkpaper054.pdf; Balachandran, B.R. 2006. The Reconstruction of Bhuj. http://info.worldbank.org/etools/docs/library/114715/istanbul03/docs/istanbul03/07bala3-n%5B1%5D.pdf

Lessons

- Failure to include recipients in the decision process behind relocation can result in considerable backlash
- With proper financial, technical, and equipment-related support, owner-driven construction can support even the largest reconstruction efforts

Case 25: Earthquake and Tsunami, 2004, Banda Aceh, Indonesia

Topic: Owner-/Community-Driven Construction

The December 26 earthquake and subsequent tsunami that struck Banda Aceh caused significant devastation in coastal communities that was near-total in places. Over 800 km of coastline was destroyed. The reconstruction effort was especially challenging given the scale of destruction, the difficulty in reaching the affected areas, and the pre-existing poverty caused by nearly 30-years of armed conflict. The combined earthquake and tsunami dramatically impacted housing stock in Aceh. Official estimates showed 130,000 new houses were needed, and about 95,000 were damaged but repairable. In Aceh, many of the governmental and nongovernmental agencies involved in housing recovery initiated self- or community-led programs. It was felt that, given the nature of the affected communities, this was the most effective means to generate program ownership and to reestablish damaged community networks. The basis of this approach was that the implementing agency provided cash transfers, materials, training and technical expertise as needed to enable households to design and construct their new houses and settlements on their own. While this worked very well in some communities, in those communities where there existed weak social networks or limited

building skills, efforts were not as successful. This was notably true in situations where designs were complex. Several agencies incorrectly assumed the population would have sufficient construction capabilities and underestimated the lack of materials and skills available locally. The result was that these agencies struggled with poor quality construction and ever-extending construction schedules. Ultimately, these problems were alleviated with the addition of a large number of facilitators that were able to provide necessary training, supervision and quality control. Community expectations and priorities also had to be managed very carefully. Although shelter was their main priority those affected by the tsunami also had to re-establish their lives and livelihoods, balancing participation in the reconstruction process with growing food, fishing, earning cash and looking after their families. This slowed construction, particularly at certain times of the year such as harvest or Ramadan. Underlying tensions from the conflict also meant that in some areas it was difficult to promote community build, or share resources (warehousing, materials, labor) between communities - even in neighboring villages. As time went on it also became more difficult to engage people in this type of cooperative build process when other agencies were employing contractors to build houses. The primary advantage that emerged from these owner-driven experiences in Aceh was that they helped to jump-start the early recovery process. Reconstruction started quickly, avoiding lengthy procurement processes. Participants stated that they felt a sense of ownership that overshadowed any delays that may have occurred. This helped them overcome psychosocial trauma they may have suffered, and allowed them to rebuild their lives sooner than had they lingered in barracks, tents or with host families away from their villages.

Source: da Silva, Jo. 2010. Lessons from Aceh: Key Considerations in Post-Disaster Reconstruction. Arup. Practical Action Publishing Group

Lessons

- When disaster damages to housing stock are of a monumental scale, owner or community-driven mechanisms may be the only way to accomplish the work required
- Communities with weak social networks or where community members have limited building skills will show lower rates of success, especially when complex designs are promoted
- Competing demands of individuals will slow the owner-driven process
- Social, ethnic, or other tensions will inhibit community cooperation on building efforts and sharing of resources and equipment
- Owner-driven programs promote psychosocial recovery

Many governments tasked with managing a disaster response have acted on the immediate assumption that the fastest and easiest means of bringing about recovery in

the shelter sector is to either take full control of implementation or to put it in the hands of a professional construction contractor. The accuracy of these assumptions have been mixed, but it is generally more favorable only in situations where the affected population has very little knowledge, ability, or motivation to take on such a project (or where the increased role of the owner would cause them to suffer more significantly in the long-term). However, when an affected population is able to bring about their own recovery, or wants to have a say in how their recovery is framed, neglecting their input generally leads to unfavorable end results.

Governments that have the capacity to manage large-scale public works projects are most likely to assume program implementation themselves. Their involvement may range from developing the shelter recovery plan but having a contractor perform the actual construction work, to taking on every aspect of rebuilding. Most instances where a government-driven approach has been applied have incorporated some degree of community participation in the planning process, in recognition of the increased likelihood of recipient satisfaction at the end of the recovery period.

Case 26: Indian Ocean Tsunami, Andaman and Nicobar Islands, India, 2004

Topic: Government-Led Implementation

Following the 2004 tsunami, the Government of India initiated a project to reconstruct 9714 damaged and destroyed houses in the 11 affected islands of the Andaman and Nicobar island chains. This effort was almost entirely government led, and included very little if any community or owner involvement in planning and implementation. The effort involved the replacement of traditional homes with prefabricated structures. Prior to implementation, few recipients were able to see, let along comment, on the type of replacement housing or the materials used. Many homes and communities were relocated, and communities had little involvement in the selection of community and housing plot locations. Several communities expressed concern that their relocation sites present an extreme hardship with regard to accessing their agriculture or fishing livelihoods. Some tribal communities went as far as to proclaim that any alternate location would be unacceptable. As of 2009, five years after the disaster, an independent found that less than 1 percent of the more than 40,000 homeless victims had moved into their permanent structures.

Source: Rawal, Vivek, Rajendra Desai, and Dharmesh Jadeja. Assessing Post-Tsunami Housing Reconstruction in Andaman & Nicobar Islands: A PEOPLE'S PERSPECTIVE. Books for change, Bangalore: 2006. http://www.recoveryplatform.org/assets/publication/Tsunami Recovery/Critical analysis Housing reconstruction- Andaman - Tsunami.pdf, Macan-Markar, Marwaan. 2009. Tsunami Reconstruction Hit by Corruption, Apathy. Inter Presse Service. December 26.

Lessons

- Shelter recipients may refuse to move into permanent structures at alternate or relocated sites if they are completely left out of the decision-making process

Case 27: Great Hanshin Earthquake, Kobe, Japan, 1995

Topic: Government-Driven Reconstruction

The earthquake destroyed thousands of housing units in the city of Kobe. At the time of the earthquake, Japan and the Hanshin region were in the midst of a recession, and a lack of private recovery resources necessitated a top-down, government-led, reconstruction planning and implementation process. To jump-start the planning and policy development process, the Government of Japan implemented a two-month reconstruction moratorium. The municipal and regional governments worked to coordinate their recovery plans and to prioritize projects to stabilize the economy and attract new businesses. Seventeen priority restoration districts were initially established and large urban redevelopment and land readjustment projects were identified within these districts. Local authorities eventually recognized a total of 30 priority restoration districts, including some that had been established before the earthquake. Consensus on recovery plans was garnered through negotiation with neighborhood groups conducted by government-funded planners. The City of Kobe's Housing Restoration Plan was issued only months after the earthquake, and called for a 3-year effort to construct 82,000 units of mixed use (including public housing (16,000); rental housing (6,900); redevelopment-related housing (4,000); semi-public housing (13,500); and private housing (31,600)). Actual numbers of housing units constructed was actually more than double this number, with over 169,000 housing starts registered by 2001 due to an unforeseen residential density increase. A majority of funds were provided directly by the Government of Japan. Assessment of the moratorium showed that it was enacted at such an early point in the recovery as to be done so without ample knowledge of damages and impacts. However, Japan was able to benefit from the lessons of previous development and reconstruction efforts, such as land readjustment and urban redevelopment used extensively in previous decades to modernize land ownership patterns and facilitate WWII rebuilding. Complex ownership patterns, compounded by land readjustment processes and lack of private resources, fueled an on-going, reactive, housing policy (particularly for cooperative housing and condominium projects).

Source: Johnson, Laurie. 2000. Kobe and Northridge Reconstruction: A Look at Outcomes of Varying Public and Private Reconstruction Financing Models. EuroConference on Global Change and Catastrophic Risk Management. Austria. http://www.iiasa.ac.at/Research/RMS/july2000/Papers/johnson_housing0401.pdf
Risk Management Solutions. 2005. 1995 Kobe Earthquake 10-Year Retrospective. http://www.rms.com/Publications/KobeRetro.pdf

Lessons

- Economic conditions and the availability of external resources will heavily influence reconstruction mechanisms (e.g. owner-driven vs. government-driven) selected
- Housing reconstruction plans should coordinate with economic and other

recovery efforts underway

- Government agencies at all levels need to ensure that their recovery and reconstruction plans are compatible and aligned

Case 28: Tsunami, Sri Lanka, 2004

Topic: Donor-Driven Implementation

In the aftermath of the Tsunami, a 100-meter housing development buffer zone was established on the coastlines to prevent reconstruction in the highest risk areas. In one particular region several donor agencies were given the authority to conduct housing reconstruction in areas where relocation would occur. Under this program, all affected families were entitled to receive a house that was built by the donor agency in accordance with standards set by the Government of Sri Lanka. These donor agencies intended to provide each new settlement with an internal common infrastructure, while the Government of Sri Lanka would provide these services to the boundary of the relocation site. The beneficiary would remain the legal owner of his/her property within the buffer zone and receive a full title to the property in the resettlement site. Unfortunately, disagreements over the size of the buffer zone caused many delays in the initiation of the donor-funded reconstruction, and several of the donor agencies left without having spent their promised project funds. The buffer zone was changed, without input or consultation of the recipients, and eligibility was reversed for some of the recipients whose property was no longer in a resettlement-designated area. Few understood why these changes had happened, or even that they had happened at all, and all faced continuing temporary shelter. Ultimately the Government of Sri Lanka had to intervene and provide additional funding to support those who were no longer eligible for the donor-driven projects. A post-project assessment found that some of these donor driven houses are still unoccupied because owners never intended to move away from their original lands. The absence of a technical quality control system in the donor-driven housing program was problematic in that it resulted in inferior quality houses. Some of those houses were demolished and reconstructed, wasting both time and money.

Source: Nissanka, 2008, Government of Sri Lanka and Development Partners. Sri Lanka: Post Tsunami Recovery and Reconstruction.

Lessons

- Risk-reduction goals need to be coordinated between all providers of humanitarian assistance, and communicated in an effective manner that avoids confusion
- Changes to shelter reconstruction programs can translate into longer stays in temporary housing for recipients

- Inadequate quality control mechanisms can lead to substandard construction that requires demolition

The contractor-driven approach assigns the task of managing the overall reconstruction plan and efforts to a professional construction company. The company or companies select the housing design, construction materials, and expertise and labor (which are most often imported from outside the target community). The perceived benefits of such an approach are that it can bring about a very fast reconstruction with the least amount of effort expended on the part of the affected government or the victims themselves (Twigg 2002). Through the work of a construction contractor, a large number of houses, typically with standard specifications, can be built quickly using staff with established technical expertise and skills. The benefits of such an option cannot be overlooked in the context of an affected community lacking the knowledge or capacity to rebuild their houses in a hazard-resistant manner, or where there is no enabling tradition of self-reliance. However, most houses (about 95%) worldwide are built with significant input of the owners themselves (Oliver, 1987).

Assessments of contractor-driven housing reconstruction programs have identified a number of associated drawbacks and risks. For instance, large-scale contracted construction tends to adopt a 'one-size-fits-all' approach, which means that the specific housing needs of individual communities are not met and diversity within the community is not taken into consideration (Barakat, 2003). These projects have also been found to be blind to the culture and preferences of recipients, and may include the use of materials that are poorly-suited to the climate of the affected area, or which are very difficult for the homeowners to replace in the future. Contractor-led projects are primarily driven by profit, and without proper oversight the quality of the finished product can substandard if contractors attempt to increase their profit margins through the use of substandard materials and construction methods. As is true with the government-driven approach, the use of contractors may promote a dependency relationship with the housing recipients who could otherwise have learned valuable construction skills if given such leeway. Without adequate construction skills among recipients, the sustainability of the project is decreased.

Case 29: Bhuj Earthquake, Gujarat, India, 2001

Topic: Contractor-Driven Approach

On January 26th, 2001, a magnitude 6.9 earthquake killed approximately 20,000 people and injured an additional 167,000. Over one million were rendered homeless. 7,633 villages were affected, and 450 villages were completely destroyed. 344,000 houses were completely destroyed and 888,000 reported damages. Many of the NGOs that became involved in housing reconstruction in Gujarat adopted a contractor-driven approach to manage their housing programs. In one instance, contractors were hired to rebuild victim's houses in-situ. The program involved the reconstruction of 3000 homes.

The contractor offered three different housing sizes, as determined by the plot size. For each of these sizes there were three or four different designs owners could choose from. A demonstration of models was provided in the village schools, allowing villagers to voice their input into the final selection. By allowing the victims to feel a part of the process, post-recovery owner satisfaction was greatly increased. Contractors were also able to utilize low-cost construction techniques, such as reusing old doors, window shutters and frames that survived the earthquake. The program was not without its problems, of course. Some homeowners questioned the quality of the materials used. The program was also biased against communities that were less accessible, more spread out, or of lower income classes because contractors were reluctant to take on those projects. However, what is of most significant note is that, despite the individual satisfaction held by each homeowner, because no community-level consultations were made there was a loss of community character. A post-project assessment found that most people were happy that their new house was in the same location. In fact, several homeowners were able to upgrade their house through this program which increased their satisfaction. However, it was found that there are inherent difficulties in controlling contractors which can lead to poor construction quality. Even when a Village Committee was set up to supervise efforts, contractor supervision proved difficult. There were even occasions when the contractor designs were incompatible with the properties. This, and other related problems, were chiefly the result of contractors lacking sufficient contextual knowledge (e.g. geographic, socio-economic and agro-ecological).

Source: Barenstein, Jennifer. 2005. A Comparative Analysis of Six Housing Reconstruction Approaches in Post-Earthquake Gujarat. Scuola Universitaria Profesionale della Svizzera Italiana.
http://www.odi.org.uk/hpg/meetings/SUPSI.pdf

Lessons

- Recipients can feel involved in a contractor-driven reconstruction process if they are provided with a range of housing options from which they may choose
- Recycling of materials from the former house can drastically reduce the cost of construction
- Contractor-driven construction can place isolated communities at a disadvantage if they systematically avoid them or provide them with fewer opportunities to interface with the program
- Failure to consult with shelter recovery recipients can result in a total loss of community character

There are ways in which components of each of the above-mentioned implementation methods may be combined to create what is, in essence, hybrid implementation. In hybrid implementation, strengths may be maximized while weaknesses avoided. For instance, the members of a community may be willing to supervise the construction of

their households but unable to do the actual work themselves. There may also exist situations where general government oversight is required to ensure that hazard resistant construction is conducted, but the owners wish to do all of the actual design and construction themselves. The benefits of hybrid programs are great, but most important is the existence of an opportunity for all stakeholders to feel a genuine part of the effort for their concerns to be met.

Case 30: Earthquake, Bam, Iran, 2003.

Topic: Hybrid Implementation

Over 60,000 people lost their homes during the 2003 earthquake in Bam. To manage the temporary shelter needs of victims, a mix of congregate camps and on-site shelters were provided, using a range of different construction types. To address permanent shelter, however, the Government of Iran set up a steering committee to drive housing reconstruction policy headed by the Minister of Housing and Urban Development but inclusive of all stakeholders (including citizens and NGOs). This committee adopted a reconstruction approach that favored in-situ reconstruction and utilized a mix of resources and capabilities drawn from the government, contractors, and the owners themselves. The Government was tasked with enabling reconstruction through the provision of grants and loans, technical support, construction plans, resources, and special support for vulnerable populations. Citizens were tasked with managing the construction itself (including the selection of the building style and the interior appointments), and supervising the work completed. A housing recovery center called the "Technical Services, Materials Exhibition and Housing Samples Complex" was set up in a location central to the affected. Citizens in need of a new home could visit the facility and in a single facility secure grants or loans to finance their recovery, select from a range of different housing styles, acquire the necessary construction materials, and meet with and hire a contractor to conduct the work required. This process emphasized household preferences in all phases of reconstruction, but also ensured that experts in seismic resistant construction were involved in the process to ensure long-term risk reduction. Of particular note was that the program sought to (and successfully did) streamline the decision-making processes in order to avoid delays in reconstruction associated with required paperwork.

Source: Joodi, Majid. 2010. Bam Earthquake of 2003. Presented at the IRP International Recovery Forum 2010. Kobe, Japan. http://www.recoveryplatform.org/resources/meetings_and_trainings/514/irf2010, and Fallahi, Alireza. 2007. Lessons Learned from the Housing Reconstruction Following the Bam Earthquake in Iran. Australian Journal of Emergency Management. February. http://www.ema.gov.au/www/emaweb/rwpattach.nsf/VAP/%283273BD3F76A7A5DEDAE36942A54D7D90%29~AJEM_Feb07_LessonsLearned.pdf/$file/AJEM_Feb07_LessonsLearned.pdf.

Lessons

- Displaced victims that are provided with adequate materials, funding, technical assistance, and access to contractors can be very effective at managing their

own shelter recovery projects

- Creating a one-stop shop where recipients have access to all of the resources required to rebuild their house can simplify the recovery process considerably and increase the effectiveness of the work conducted by owners themselves
- Implementation can benefit from a combination of owner-, government-, and contractor-driven methods that draw upon the strengths of each

Case 31: The Maharashtara Earthquake, Maharashtra, India, 1993

Topic: Hybrid Implementation

On September 1993, an earthquake struck the Indian state of Maharashtra, killing about 8,000 people and damaging some 230,000 houses in Latur, Osmanabad and 11 other districts. With the help of the World Bank, the government of Maharashtra created the Maharashtra Emergency Earthquake Rehabilitation Program (MEERP). The MEERP divided communities into two categories: those that needed to be relocated (the 52 villages that sustained the worst damage) and those that needed their homes to be reconstructed, repaired or strengthened, but on the same site. The latter category comprised around 1,500 villages and some 190,000 families. In the relocation sites, engineering consultants and contractors organized housing construction (except for a few smaller villages where construction was handled by donor organizations and NGOs.) While the beneficiaries were not directly involved in construction, they were heavily engaged in the decision-making stages, including the selection of beneficiaries, the identification of relocation sites, the layout of the village, the design of houses and the provision of amenities. Final decisions were taken in plenary meetings of the whole village. During the construction stage, only the village-level committee and community participation consultants were involved with the project management unit. Once the construction was completed, houses were allotted to beneficiaries in an open consultation with the entire village. In communities slated for reconstruction or repair, homeowners took on the responsibility of repairing, retrofitting and strengthening their houses, with materials and financial and technical assistance provided by the government. The project management unit opened a bank account for each of the 190,000 eligible homeowners, who received coupons for construction materials. A junior engineer appointed at the village level provided technical assistance to ensure that the houses were earthquake resistant. Each village formed a beneficiary committee to work with the project management unit. In most villages, these committees consisted of women's self-help groups. Training programs were organized in villages with large numbers of beneficiaries, where residents were informed of their entitlements and the processes to be followed. After 18 months, the program was in full swing. With such a large number of villages and beneficiaries involved, it took on the dimensions of a housing movement, renewing the housing stock in the entire area. As the MEERP progressed and results materialized, community participation became increasingly

accepted as an effective method for resolving problems during the reconstruction process. It also had a positive effect on communities insofar as involving local people helped them to overcome their trauma. In addition to housing work some agencies also tackled social issues, such as schooling. Over time, the MEERP became a people's project. The participatory process opened many informal channels of communication between ordinary people and the government. Beneficiaries became aware of their entitlements and worked hard within the process to secure them. Individuals who felt that their grievances were not addressed appropriately at local level approached the district authorities and the government in Mumbai.

Source: Barakat, Sultan. "Housing Reconstruction after Conflict and Disaster." Humanitarian Practice Network. no. 43, Dec. 03. p.16. http://www.odihpn.org/documents%5Cnetworkpaper043.pdfX

Lessons

- Even if owners are not involved in the reconstruction of permanent housing solutions, their involvement in the planning and decision making processes will increase the program's efficacy and the acceptance of the end product (including site selections and other legal and ownership issues)
- Beneficiary committees made up of community stakeholders can be an effective means of determining eligibility and selection of the assistance that is provided
- Construction training programs that are made available to those who need them can greatly increase the ability of owners to perform their own construction work

Chapter 5

Issue 4 : Building Design

Building design is one of several key components behind housing reconstruction effectiveness, acceptance, and sustainability. Building design serves a number of purposes, each of which is influences the short-term viability and long-term prospects of the housing reconstruction effort. Design determines each of the following:

- Appearance
- Layout
- Function
- Disaster resilience
- Adaptability to climate
- Suitability to geography, geology, and hydrology

Each of these factors must be addressed if the house is to be amenable to the aesthetic preferences of the owner, suitable to the lifestyle of the occupants, and resilient to the hazards that are likely to impact it. Design can also influence the efficiency of the house, and help to improve the overall nature of the household and the community in which it is built. On the other hand, poor choices in any of the categories are likely to prevent the house from ever being used, or from surviving the next disaster event if they are in fact occupied.

Sub-Issue: Hazard-Resistant Design

Shelter recovery programs must ensure that all units produced are constructed in a manner that accounts for known risk. Oftentimes, the anticipated hazard risk is reevaluated in the aftermath of a disaster, and building (construction) codes are correspondingly made more stringent to address these changes. Housing design is, after all, the cornerstone of the "Build Back Better" philosophy, and as such post-disaster recovery efforts demand ample study by qualified engineers. Efforts that neglect this step and rebuild to previous standards will do little to reduce future risk.

There are a number of challenges associated with achieving hazard resistant design, including:

- As hazard resistance increases, construction cost often follows accordingly. Homeowners may need financial assistance to support their risk-reduction efforts. Otherwise, they may find it impossible to take such action despite their recognition of its value.
- Hazard resistant design demands construction-related technical expertise and training that exceeds what is normally held by local laborers – especially in the instance where the owner themselves are rebuilding or repairing their own houses. It may be necessary to provide extensive training to ensure that laborers are capable of delivering final products that conform to that which is described in the design.
- Hazard resistant construction can require materials that are either prohibitively expensive, not locally available, that change the appearance of the house such that it is no longer culturally acceptable, or any combination of these factors. Design needs to address these concerns if at all possible by relying on local products in every feasible instance. Plans drawn from foreign efforts may need to be adapted such that the appearance and/or functional preferences of the affected population are addressed by the new design.
- Hazard resistant structures may be more difficult and/or more expensive to maintain in the long run. Owners may require training to prepare them for upkeep responsibilities and may need material or financial support in the future to address situations where repair can compromise the integrity of the structure.
- Structures built to more stringent standards can raise their value beyond the means of the victims who once lived in them, effectively pricing them out of the community. Resistant design must conform to the affordability of the housing it is replacing.

One of the greatest challenges to ensuring hazard resistant design is ensuring that pre-existing and quickly repaired or reconstructed houses – namely those constructed before new construction regulations were issued – are brought into conformity with new construction codes. Neglecting these two categories of housing stock can retain risk in the affected area as the likelihood remains for future events of similar or greater magnitude. Moreover, those pre-existing structures that survived the event may have been compromised, even if they did not fail, and thus be vulnerable to future events of lower magnitude than the initial event.

Case 32: Earthquake, Yogyakarta and Central Java Indonesia, 2006

Topic: Hazard Resistant Design

Many lives were lost in this event because housing design did not address the seismic event that occurred. This loss of infrastructure came despite the fact that earthquake resistant building codes were introduced more than 30-years earlier (but were not

widely applied). After the earthquake, the Government of Indonesia sought to address this risk through increasing the use of hazard resistant design in houses that being reconstructed in Yogyakarta. During the reconstruction period, a government-sponsored training program called The Community Empowerment Program focused on raising awareness of earthquake resistant building methods among those involved in construction efforts. The goal was to increase the capacity of the local laborers and contracted construction workers to build back in a manner that addressed similar risk in the future. This program allowed people interested in rebuilding their own houses to do so in a resistant manner even if they had no other formal construction training. The community supported these training sessions and workshops. As a result of this program, the pace of recovery increased, and the cost was minimized due to a reduction in contract labor needs. The training further helped to ensure that houses built in the future that were not part of a housing recovery effort would be more likely to be based on a design that incorporated hazard resilience. Community members were organized into groups of ten to fifteen families, and each group selected three people to serve as a leader, a secretary and a treasurer. These individuals attended the trainings and then transferred their knowledge to the remainder of the group, thereby allowing greater participation in a more limited number of training sessions. Together, the members of this group worked as a unit that constructed the houses of each of the ten to fifteen members.

Source: Satyarno, Iman, Socialization and Training of Earthquake Resistant House to the Construction Workers in Trimulyo Village, Jetis Sub District, Bantul District, Yogyakarta, from the Recovery Status Report: The Yogyakarta and Central Java Earthquake 2006 Department of Architecture and Planning UGM, 2009 International Recovery Platform http://www.recoveryplatform.org

Lessons

- Owner-driven construction may need to be supported by a training program that facilitates hazard-resistant design and construction
- Community training programs can increase the pace of recovery and minimize its cost
- Owners organized into synergistic groups may be better prepared to address a wider range of recovery issues, and may better facilitate each other's recovery

Case 33: Earthquake, Bam, Iran, 2003

Topic: Technical Input to Housing Designs

Over 60,000 people lost their homes during the 2003 earthquake in Bam. To manage the temporary shelter needs of victims, a mix of congregate camps and on-site shelters were provided, using a range of different construction types. To address permanent shelter, however, the Government of Iran set up a steering committee to drive housing reconstruction policy headed by the Minister of Housing and Urban Development but

inclusive of all stakeholders (including citizens and NGOs). This committee adopted a reconstruction approach that favored in-situ reconstruction and utilized a mix of resources and capabilities drawn from the government, contractors, and the owners themselves. The Government was tasked with enabling reconstruction through the provision of grants and loans, technical support, construction plans, resources, and special support for vulnerable populations. Citizens were tasked with managing the construction itself (including the selection of the building style and the interior appointments), and supervising the work completed. A housing recovery center called the "Technical Services, Materials Exhibition and Housing Samples Complex" was set up in a location central to the affected. Citizens in need of a new home could visit the facility and in a single facility secure grants or loans to finance their recovery, select from a range of different housing styles, acquire the necessary construction materials, and meet with and hire a contractor to conduct the work required. This process emphasized household preferences in all phases of reconstruction, but also ensured that experts in seismic resistant construction were involved in the process to ensure long-term risk reduction. Of particular note was that the program sought to (and successfully did) streamline the decision-making processes in order to avoid delays in reconstruction associated with required paperwork.

Source: Joodi, Majid. 2010. Bam Earthquake of 2003. Presented at the IRP International Recovery Forum 2010. Kobe, Japan. http://www.recoveryplatform.org/resources/meetings_and_trainings/514/irf2010, and Fallahi, Alireza. 2007. Lessons Learned from the Housing Reconstruction Following the Bam Earthquake in Iran. Australian Journal of Emergency Management. February. http://www.ema.gov.au/www/emaweb/rwpattach.nsf/VAP/%283273BD3F76A7A5DEDAE36942A54D7D90%29~AJEM_Feb07_LessonsLearned.pdf/$file/AJEM_Feb07_LessonsLearned.pdf.

Lessons

- Reconstruction policy, not only planning, should be driven by a representative group of stakeholders
- Shelter reconstruction programs should accommodate the needs of vulnerable populations through the provision of necessary support
- Streamlined decision-making processes will help minimize construction delays

Case 34: Earthquake, Pakistan, 2005.

Topic: Awareness of Hazard Resistant Design

The Pakistan Earthquake Reconstruction and Rehabilitation Authority (ERRA) instituted an owner-driven housing reconstruction approach following the 2005 earthquake. ERRA wished to ensure that seismic risk was reduced in the homes that were funded by the project, and therefore launched a massive public information campaign to create awareness amongst beneficiaries and to bring about behavioral changes aimed at building a culture of compliance. Selected communication channels for the developed

messages included electronic and print media, as well as through road shows throughout the affected areas. During this campaign over 600,000 posters and brochures were distributed, in addition to the activities of local campaigns and supplementary material formulated and disseminated by partner organizations. The public education campaign also focused on non-compliance issues, with the help of its implementing partners and partner organizations. A sustained campaign exists to determine why people fail to apply compliant construction techniques. To ensure the sustainability of the compliance message, it is being instituted into academic curricula. The effort has found that some of the most common factors behind noncompliance include:

- ERRA guidelines were not received at the time of construction.
- Changes in design and construction advice was not understood and created confusion.
- Beneficiaries tried but were not able to reconstruct as per ERRA guidelines – as they found the information provided difficult to understand.
- Beneficiaries did not attempt to reconstruct as per ERRA guidelines.

In the first three reasons, where there is a will to construct a seismically-resistant house, interventions can be made to 'fix' the problems. For this purpose, the ERRA tasked the National Engineering Services of Pakistan (NESPAK) and its implementing partners to assist in formulating a Compliance Catalogue. The first version of the Catalogue was recently launched and contains various types of non-compliance, and measures needed to make the houses compliant explained through simple language and use of pictures and graphs. The original version of the document, it was discovered, had been hard for people to follow and understand.

Source: Government of Pakistan. 2007. Principles, Themes, and Lessons Learnt: Design and Implementation of ERRA's Rural housing Programme. Earthquake Reconstruction and Rehabilitation Authority

Lessons

- Two-way communication between owners and government agencies tasked with reconstruction is critical to ensuring that risk reduction measures are applied in owner-driven reconstruction efforts
- Public education efforts may be required to ensure that recipients understand benefits available to them
- Instituting risk-reduction lessons into the curriculum helps to ensure the sustainability of risk reduction efforts
- A 'Compliance Catalog' can help simplify how risk reduction is achieved, and ensure that all recipients understand what is required of them

Sub-Issue: Appearance and Function

Building design must be cognizant of local building traditions concerning appearance and culture, and the applicability for locally-available materials. As hazard resistant design tends to prescribe a more standard housing type (oftentimes because these designs have been developed outside the affected area), they cannot be applied without adaptation.

Case 35: Earthquake, Dinar, Turkey, 1995

Topic: Selection of Housing Design

Dinar is a sparsely populated rural Turkish agricultural city that was struck by a 6.1 magnitude earthquake on October 1st, 1995. The event destroyed or permanently damaged 1,228 houses, moderately damaged 990, and caused minor damage to 1,558. Prior to the earthquake, housing structures in Dinar ranged from 1 to 5 stories. Almost all 5-story buildings were destroyed. Government housing reconstruction efforts were quickly implemented and completed within one year. Construction was government-driven, and did not account for the wants or needs of the intended recipients. Rather, designs were selected and built without any stakeholder input. Many families were placed in housing types with designs that were drastically different than what they had previously owned or occupied. For instance, residents of spacious one or two story buildings were placed in multi-story high-density buildings – many having had no previous experience with apartment life. The apartments provided insufficient space residents' their social and cultural lifestyles, were too small to fit large families, and the floor plans could not be modified or expanded. In the villages, only one style of house was built, consisting of a single story and a detached storeroom in a small garden. It was found that survivors attempted to meet their needs by building additions and changing the structure of the house, thereby compromising its structural integrity. Post-recovery assessment found that housing design must accommodate the recipient's background, requirements and preferences if it is to be acceptable to them. Because it represents a major change in community character and individual preference, building height should match that which recipients previously occupied. Aesthetics were found to be very important to housing recipients, including such things as elevation, layout and number of windows and balconies. Planners must accommodate family structure, and understand such things as the average family size. And because families typically plan for future expansion, provided units should allow for such growth. In this vein, it was determined in the Turkish experience that building density must be acceptable to resident or they will find it unacceptable (i.e., people in single family homes may be unhappy if their new housing is in an apartment building or condominium.) If a particular building type suffered extreme impact, as the four story buildings did in this case, that should be avoided as possible to minimize anxiety. Regardless of the design selected, residents must be confident in the ability of the new structure to provide for their safety beyond what existed in the damaged or destroyed former structure.

Source: Enginoz, Evron Burak. N/d. A Model for Post Disaster Reconstruction: The Case Study in Dinar/Turkey. Kultar University of Istanbul. http://www.grif.umontreal.ca/pages/ENGINOZ_Evren%20Burak.pdf

Lessons

- Reconstructed housing should be similar in structural makeup (e.g. of a similar number of stories, incorporating similar density patterns) to what is being replaced
- Replacement housing should account for anticipated increases in family sizes, as well as their cultural preferences
- Variety in housing type across a single community will increase acceptability
- Attempts by owners to change the structure of replacement housing may compromise its integrity

Case 36: Earthquake, Yogyakarta, Indonesia, 2006

Topic: Appearance

A number of different housing design approaches were attempted by the various organizations working in housing recovery in Yogyakarta following the earthquake. In an attempt to cut project costs, increase sustainability and hazard resilience, improve (modernize) appearance, and address environmental concerns, monolithic dome houses were installed by the NGO Domes for the World Foundation in the village of New Ngelepen. These structures were considered advantageous because:

- Monolithic Domes use half as much concrete and steel as traditional buildings.
- The curved shape of the dome makes it resistant to wind and storm damage.
- During earthquakes, Monolithic Domes move with the ground instead of collapsing.
- Monolithic Domes cannot be damaged by fire, rot, or insects.
- The thermal mass of the concrete walls makes Monolithic Domes energy-efficient.

The homes cost only $1,500 to construct, making them a highly cost-effective option. However, they were very different from what the local population was accustomed to, and as such they initially rejected them outright. Recipients found the shape and appearance attractive, but they questioned whether it fit with their culture, and did not believe it to be suitable in a tropical climate. Initially, very little consultation had been conducted to assess the suitability of the homes, and it involve recipients in the decision to select the dome design. After the domes were constructed, the donor worked with recipients to modify the domes such that they were more acceptable, including the addition of outside gardens, an external kitchen, awnings, and other minor changes. This

was effective in gaining the support of the affected population.

Source: Ikaputra. 2008. People Response to Localize the Imported Culture. Presented at the 14th World Conference on Earthquake Engineering. http://static.monolithic.com/pdfs/dftw/Ikaputra.pdf.; Subroto, T. Yoyok Wahyu. 2010. Yogyakarta Earthquake 2006: Lessons Learnt Through the Recovery Process. Presented at the International Recovery Forum, 2010. Kobe, Japan.

Lessons

- Housing designs that are drastically different to what is being replaced may meet strong resistance, even if they are more efficient, more spacious, better appointed, or more cost effective to maintain
- Housing design preferences, especially those based on culture, must be incorporated into recovery planning efforts

Case 37: Earthquake, Pakistan, 2005

Topic: Appearance

The Pakistan Earthquake Reconstruction and Rehabilitation Authority (ERRA) instituted an owner-driven housing reconstruction approach, yet wished to ensure that seismic risk was reduced in the homes that were funded by the project. Given the technical requirements associated with hazard-resistant construction standards, housing design presented a challenge in that options for appearance were initially limited. The ERRA hired a reputable national engineering firm, National Engineering Services of Pakistan (NESPAK), to come up with design solutions in conformity with cultural preferences, climate, terrain and safety features. The ERRA recognized that the new designs would be greeted with some skepticism by the population, and there would be instances where it would be genuinely difficult for people to reconstruct their houses according to the approved design. Therefore, ERRA kept the bar for seismic compliance high, which allowed for some margin of relaxation. The process of developing design options, which could then be shared with affected people, in the first instance entailed conducting multi-stakeholder consultations with various non-governmental organizations (NGOs), international organizations, international financial institutions, and other stakeholders. After a series of exhaustive sessions and review of various recommendations by a panel of national and international experts, an initial design menu based on brick, stone and block masonry was formulated and approved. Since the design menu was envisioned as being dynamic and open to modifications based on needs and ground realities, additional designs were also added later on to include timber design option and RCC (reinforced cement concrete) or confined masonry design option. The recent addition of BHATTAR (timber reinforced masonry using dry stone and no mortar) design has brought many previously non-complaint houses in the affected districts into compliance.

Source: Government of Pakistan. 2007. Principles, Themes, and Lessons Learnt: Design and Implementation of ERRA's Rural housing Programme. Earthquake Reconstruction and Rehabilitation Authority.

Lesson

- A menu of building designs that allows recipients to determine the appearance of their house increases the likelihood that they are satisfied with what is provided

Examples of manuals and guides that have been published to explain specific building processes, and to teach people how to use these techniques to make buildings that will be safe in the case of disaster, include:

Box 6: Examples of manuals and guides on building process

- UNDP India. 2008. *Manual on Hazard-Resistant Construction in India*. Gujarat: UNDP India and NCPDP. http://data.undp.org.in/dmweb/pub/Manual-Hazard-Resistant-Construction-in-India.pdf (Includes illustrated practical solutions covering earthquake, cyclone, and flood situations for various technologies.)
- ADPC. 2005. "Handbook on Design and Construction of Housing for Flood-Prone Rural Areas of Bangladesh." Dhaka: ADPC. http://www.adpc.net/AUDMP/library/housinghandbook/handbook_complete-b.pdf. (Focuses solutions for various construction technologies exposed to flooding.)
- CDMP. 2001. "Hazard-Resistant Construction." Caribbean Disaster Mitigation Project. http://www.oas.org/CDMP/document/papers/parker94.htm. Papanikolaou, Aikaterini and Fabio
- Taucer. 2004. "Review of Non-Engineered Houses in Latin America with References to Building Practices and Self Construction Projects." European Commission Joint Research Center. http://elsa.jrc.ec.europa.eu/showdoc.php?object_id=26
- Kuriakose, Benny. *Post tsunami Reconstruction Manual for Supervisors and Project Staff.* South Indian Federation of Fishermen Societies (SIFFS), Kerala, India, 2006. http://www.recoveryplatform.org/assets/publication/TsunamiRecovery/posttsunamiConstructionManualindia.pdf
- UN-HABITAT. 2003–2005. Building Materials and Construction Technologies: Annotated UN-HABITAT Bibliography. Nairobi: UN-HABITAT. http://www.unhabitat.org/pmss/getPage.asp?page=bookView&book=1087.
- UNDP India. 2008. Manual on Hazard-Resistant Construction in India. Gujarat: UNDP India and NCPDP. http://data.undp.org.in/dmweb/pub/Manual-Hazard-Resistant-Construction-in-India.pdf (Includes illustrated practical solutions covering earthquake, cyclone, and flood situations for various technologies.)
- Earthquake Engineering Research Institute (EERI)/International Association of Seismology and Physics of the Earth's Interior (IASPEI). 2006. "International norm for seismic safety programs." Draft paper of the working group of the International

Association of Earthquake Engineering (IAEE) and the International Association of Seismology and Physics of the Earth's Interior. http://www.iitk.ac.in/nicee/skj/Norms_for_Seismic_Safety_Programs-2-23-06.pdf.

- Patel, Dinesh Bhudia, Devraj Bhanderi Patel, and Khimji Pindoria. 2001. "Repair and strengthening guide for earthquake-damaged low-rise domestic buildings in Gujarat, India." Gujarat Relief Engineering Advice Team (GREAT). http://awas.up.nic.in/linkfile/Disaster/Retrofitting%20Low%20rise%20houses.pdf.
- Minke, Gernot. 2001. Construction Manual for Earthquake-Resistant Houses Built of Earth." Eshborn: Building Advisory Service and Information Network at GTZ GmbH. http://www.basin.info/publications/books/ManualMinke.pdf.
- Arya, A. S. et al. 2004. Guidelines for Earthquake Resistant Non-Engineered Construction." Kanpur: National Information Center of Earthquake Engineering:. http://www.nicee.org/IAEE_English.php
- Blondet, Marcial, Gladys Villa Garcia M., and Svetlana Brzev. 2003. Earthquake-Resistant Construction of Adobe Buildings: A Tutorial. Oakland: Earthquake Engineering Research Institute. http://www.preventionweb.net/english/professional/trainings-events/edu-materials/v.php?id=7354
- Szakats, Gregory A. J. Improving the Earthquake Resistance of Small Buildings, Houses and Community Infrastructure. 2006. http://www.recoveryplatform.org/assets/submissions/200909020327_improving_seismic_resistance_of_buildins_in_aceh_build_back_better.pdf (The booklet presents a series of recommendations for improving the earthquake resistance of houses, small buildings and other structures. It was originally prepared to inform work in Banda Aceh after the tsunami.)
- A handbook for earthquake safe housing Peru. http://www.sheltercentre.org/sites/default/files/PA_EarthquakeResistantHousingPeru.pdf
- Retrofitting: Patel, Dinesh Bhudia, Devraj Bhanderi Patel, and Khimji Pindoria. 2001. "Repair and strengthening guide for earthquake-damaged low-rise domestic buildings in Gujarat, India." Gujarat Relief Engineering Advice Team (GREAT). http://awas.up.nic.in/linkfile/Disaster/Retrofitting%20Low%20rise%20houses.pdf.
- Tremblay, Rober, Michel Bruneau, Masayoshi Nakashima, Helmut G.L. Prion, Andre Filiatrault, and Ron Devall. "Seismic Design of Steel Buildings: Lessons from the 1995 Hyogo-ken Nanbu Earthquake." *Canadian Journal of Civil Engineering.* Vol. 23, 1996. http://www.recoveryplatform.org/assets/submissions/200909010520_japan_earthquake_shelter.pdf (Compares past and current seismic design provisions of steel structures in Japan with Canadian requirements, and describes the performance of

steel frame structures during the 1995 Hyogo ken Nanbu earthquake.)

- Bruneau, Michel and Koji Yoshimura. "Damage to Masonry Buildings Caused by the 1995 Hyogo-ken Nanbu (Kobe, Japan) Earthquake." *Canadian Journal of Civil Engineering.* Vol. 23, 1996. **Error! Hyperlink reference not valid.** (Although the damage to masonry buildings was minimal compared to damage suffered by other types of buildings, this document regarding damage to masonry construction is part of a larger multipaper work regarding building damage after the Kobe Earthquake.)
- CDMP. 2001. "Hazard-Resistant Construction." Caribbean Disaster Mitigation Project. http://www.oas.org/CDMP/document/papers/parker94.htm.
- Papanikolaou, Aikaterini and Fabio Taucer. 2004. "Review of Non-Engineered Houses in Latin America with References to Building Practices and Self Construction Projects." European Commission Joint Research Center. http://elsa.jrc.ec.europa.eu/showdoc.php?object_id=26

Hazard resistant design is characterized as engineered or non-engineered. Non-engineered buildings are informally constructed by individuals lacking formal construction training. They are typically built in a spontaneous, unplanned manner using traditional tools and materials and devoid of intervention from qualified architects and engineers. Without outside technical assistance, untrained owners or local builders may have no option but to proceed in such a fashion. Many non-engineered structures are considered 'vernacular', which refers to the fact that they utilize locally available materials and following local tradition and culture. Sometimes non-engineered buildings are meant to look as if they are engineered wood or masonry buildings, but in fact they are highly vulnerable to any external forces (wind, water, seismicity, or other). This kind of structure is often used when a local culture begins to value 'modernization' or perceived progress, but no local technical knowledge or sufficient personal wealth exists to allow for such.

Non-engineered vernacular structures can be hazard resistant if those constructing them apply skillful craftsmanship that has evolved over time to address known hazards, and use traditional technology and materials developed in response to the presence of hazards. Vernacular design in areas with historical seismic activity tends to incorporate resistant design features. For instance, some traditional houses may be circular or made with lightweight wood. Teddy Boen writes, "In past earthquakes, these traditional buildings generally have a good record of performance. The pattern of human settlements and traditional methods and materials for traditional buildings on regional basis embody the accumulated traditional wisdom, experience, skill, and craftsmanship evolved through the ages. Some of the buildings which have existed for centuries have withstood the onslaughts of strong earthquakes." (Boen, N/d.) It is possible to assess this form of construction for new risk information that has been attained in the aftermath of the hazard, and ensure that new construction using such styles are done so in a manner

that is safe given known risk. However, because the materials and expertise required to build hazard resistant vernacular housing may not be readily available in the aftermath of a disaster (where builders and materials are in great demand), there is a greater likelihood that structures built in this style will be of substandard quality.

Engineered building designs are those that guide the construction of buildings able to withstand external forces according to prevailing codes. This form of construction must be conducted or guided by trained professionals. Oftentimes these structures may look quite a bit different from what the local population is accustomed, or they may have a layout that is not conducive to the lifestyle of the affected residents. However, it is possible to apply engineered construction methods while maintaining a vernacular look (appearance and materials). A lack of participation of the affected population leading to inappropriate design is a common source of dissatisfaction with recovery housing. These problems include such things as too little or too much floor space, wall divisions that make little or no sense given the housing use, placement and shape of kitchen facilities, among many others.

Where people are traditionally involved in building their own dwellings, owner-driven housing supported by government or NGOs has been shown to have a number of advantages over contractor-driven housing, and leads to higher levels of beneficiary satisfaction. Given adequate financial and technical support, many households "have the capacity to construct houses that are more likely to respond to their needs and preferences than houses provided by outside agencies" (Duyne Barenstein 2006). The provision of technical assistance through one-stop centers or information kiosks has also significantly aided owner-builders in drawing up plans, integrating risk-reduction features, estimating construction costs and supervising construction labor (Fallahi 2007; Ghafory-Ashtiany and Hosseini 2008).

Case 38: Bhuj Earthquake, Gujarat, India, 2001

Topic: Resistant Design

The 6.9 magnitude Bhuj Earthquake rendered over one million people homeless, affected 7,633 villages, and completely destroyed 450 villages. 344,000 houses were completely destroyed and 888,000 reported damages. The Government of India used an owner-driven approach to reconstruction housing, financed by the government and assisted through the provision of technical assistance. Drawing from previous housing reconstruction efforts, UNDP worked to empower people to build their own homes as a way to pin accountability and responsibility and instill self-reliance. Once given the technical knowledge on seismic safety applications, these owner-built houses helped owners to institutionalize hazard resistant construction within the village, which in turn allowed individuals to experiment with different approaches and technologies to produce structures that were not only safe but also best met their needs as individuals. Involving the community in design also helped cater to their specific agricultural needs, which included grain storage, cattle-rearing, and milk processing. With agreement on

these parameters, the Abhiyan-UNDP shelter strategy had the following key elements:

- Build the capacity of local masons to construct seismically safe houses;
- Develop local entrepreneurship to service local recovery;
- Demonstrate best practices in owner-driven housing that can be emulated by development institutions and the Government on a large scale;
- Integrate innovative approaches (such as rooftop water harvesting features to mitigate the effects of drought, use local materials to revitalize the local economy and reduce costs) to address multi-hazard scenarios.

The UNDP shelter design program worked in consultation with the Indian Institute of Technology, Bangalore, and Auroville, Pondicherry. Designers drew from the lessons of NUNV engineers in Latur and from the traditional Kachch style of construction to ensure that people were able to use their lessons to construct structures that were amenable. Mindful that reconstruction should be an owner-driven process, with people given a choice of designs and building materials, the program built model houses at its premises in Bhuj that were used to train people in seismically safe technology, create awareness among village communities of the options available, and enable NGOs and others to access, learn and adapt these methods. The demonstration houses served an important public purpose in a setting where government housing assistance is in many instances being disbursed without engineers and masons trained in building seismically safe houses being in place in every village.

Source: UNDP. "From Relief to Recovery: The Gujarat Experience." United Nations Development Programme (UNDP), 1991. http://www.recoveryplatform.org/assets/publication/from relief to recovery gujarat.pdf

Lesson

- Owner-driven housing construction that is guided by hazard-resistant design can help to institute of culture of hazard resilience that persists beyond the project

Case 39: Tsunami, Tamil Nadu, India, 2004

Topic: Blending of Technologies

Taking the lessons learned from the Orissa Cyclone, UNDP India incorporated the lessons learned following the tsunami events of 2004 and began combining different design options and practices. This included, for instance, the incorporation of different technology options in housing design, engineered cyclone shelters, and the training and employment of women as construction laborers. There were various professionals in India promoting cost-effective, environmentally friendly construction technologies, and others promoting disaster-resilient construction practices. Since 2000, UNDP has been investigating ways to combine both of these goals and establish an innovative cost-effective disaster-resilient housing design. Through this, they were able to create

vernacular architecture styles and local traditional aspects within construction.

Source: Anindya Sarkar, Architect - Planner and ED, Development Professionals' Forum

Lesson

- Combining the lessons of previous disaster recovery efforts can have a significant impact on the cost and effectiveness of the recovery effort

Case 40: Hurricane Katrina, Louisiana, USA, 2005.

Topic: Housing Design

At its peak, there were over 273,000 people in emergency shelters following the event. Six weeks later, the national government began the process of closing emergency shelters and moving victims into more suitable temporary housing solutions. Many families and individuals had to quickly find housing alternatives. Although charting such an ambitious goal did speed up the emptying of the shelters, it also meant that alternative forms of housing were needed prior to the registration for assistance with the National government, and before any individuals and/or families could be presented with other options for their long term housing goals. The US Government traditionally uses manufactured housing to meet the needs of disaster victims when needs cannot be met through home repair or available rental units. Manufactured houses are typically place in-situ, which allows the owner to either rebuild their former home, or remove the rubble and re-site the manufactured housing on the former slab site. Manufactured housing requires a significant up-front investment, and as such they are typically used to meet longer-term disaster housing needs. Post-recovery assessment found that this approach can be used in both temporary and permanent construction solutions. At project's end, the in-situ units can easily be sold to the owner if they so desire. However, a major obstacle is that debris must often be removed before the unit is installed. There have also been health problems associated with the materials used in manufactured housing, which become a problem during prolonged use. Fortunately, creative new approaches to manufactured housing are gradually improving the suitability of these structures for long-term permanent housing recovery.

Source: McCarthy, Francis. 2008. FEMA Disaster Housing and Hurricane Katrina: Overview, Analysis, and Congressional Issues. Congressional Research Service. RL34087

Lessons

- Debris can present a major obstacle to in-situ temporary housing options
- Manufactured housing that is hazard resistant and of preferable design and appearance to the recipient can present a viable option that allows for transition from a temporary to a permanent solution

Case 41: Tsunami, 2004, Tamil Nadu, India

Topic: Owner Input in Housing Design, Maintaining Culture

On December 26th 2004 a severe earthquake hit northern Sumatra causing one of the most powerful tsunamis in recorded history. India saw an official death toll greater than 10,000 people, and material losses and damages estimated over $1B – making it was one of the countries most severely affected by the tsunami. Over 85% of losses in India occurred in Tamil Nadu, where approximately 135,000 houses were damaged or destroyed. The Government of India invited humanitarian agencies to build multi-hazard resistant houses to replace what was lost or was considered 'inadequate'. The program also sought to upgrade housing from traditional housing styles using locally-available materials to units considered more modern using industrially-produced construction materials. In this vein, undamaged traditional houses were demolished to make way for new, modern homes. A post-recovery assessment found that more attention paid to the socio-cultural and environmental implications of replacing traditional housing by government and NGO officials could have prevented dissatisfaction among the recipient population. Tamil Nadu coastal housing is culturally-driven and highly ritualized. Such things as materials, orientation, size, color scheme, shape, and even the number of doors and windows, have distinct meaning to occupants, often dictated by astrologers. Size and construction are typically indicative of the residents' social and economic status in the community. One of the key lessons learned was that modern construction is not sustainable if occupants do not have the means to provide maintenance, and can even lead to increased risk in the future. Moreover, there was no increase, and often a significant decrease, in satisfaction among those whose homes were undamaged but demolished to upgrade to more modern design. Reasons to preserve the pre-disaster built environment include protection of history and cultural identity, environmental protection, cost effectiveness, and greater likelihood of acceptance.

Source: Barenstein, Jennifer, and Daniel Pettet. 2007. Post-disaster housing reconstruction Current trends and sustainable alternatives for tsunami-affected communities in coastal Tamil Nadu. http://www.isaac.supsi.ch/isaac/Gestione%20edifici/Informazione/post-disaster%20housing%20reconstruction.pdf

Lessons

- Attention paid to the socio-cultural and environmental implications of replacing traditional housing can prevent dissatisfaction among the recipient population
- Such things as materials, orientation, size, color scheme, shape, and even the number of doors and windows, can have distinct meaning to occupants
- Modern construction is not sustainable if occupants do not have the means to provide maintenance, and can even lead to increased risk in the future
- There may be little increase, and oftentimes a significant decrease, in

satisfaction among those whose homes are undamaged but demolished to upgrade to more modern design

- Reasons to preserve the pre-disaster built environment include protection of history and cultural identity, environmental protection, cost effectiveness, and greater likelihood of acceptance

Chapter 6

Issue 5 : Legal Implications

Housing reconstruction occurs within the existing or changing legal framework of the affected area. As such, housing design, ownership (including proof of ownership), land rights, building codes, permitting, land use regulations, and more, are influenced by the laws of a country, which can either improve or serve as obstacles to the reconstruction efforts.

There is growing recognition of the opportunities that exist in the post-disaster period for a community to enhance its risk- and disaster-related statutory authority. During the protracted recovery phase, when the disaster is still affecting victims or is fresh in their memory, governments typically enjoy much greater success in enacting legislation and policy decisions that help the community to increase resilience and decrease vulnerabilities. There are a number of reasons why this 'window of opportunity' occurs, most significantly that the community may be willing to agree to new building codes, zoning, and environmental policies despite that they might result in higher building costs or taxes given that the freshness of the event places it high on their agenda. The same agenda elevation occurs with lawmakers who might otherwise be nervous to pass legislation that the public might find unpalatable or expensive.

This section focuses on the legal implications that *influence* or otherwise affect recovery.

Sub-Issue: Land Use Ordinances and Construction Codes

Regulation of land use and construction quality are two of the most effective methods of limiting future risk to housing stock if adequately implemented, monitored, and enforced. Land use regulations may help to prevent reconstruction on areas that previously had been found unsafe but upon which structures had already been built and could not legally be removed. Construction codes are one of the most simple and effective hazard risk reduction mechanisms that exist to protect housing stock from disasters, yet are also one of the most difficult measures to effectively apply and enforce. In any disaster where housing stock has been damaged or destroyed on a widespread scale, construction codes must be assessed and addressed. Construction codes that may have been adequate to meet prior assumptions of risk will have proven themselves lacking by the very existence of disaster damages. Code shortcomings are either the result of

design flaws, a lack of inspection capacity, a lack of or weak enforcement mechanisms, or corrupt inspection practices. Any and all of the areas found to be at fault can be addressed to ensure shelter recovery does not retain existing hazard vulnerabilities.

Case 42: Great Hanshin Earthquake, Kobe, Japan, 1995

Topic: Construction Codes

The 1995 earthquake was the first test of building codes instituted in Japan in 1981. The structures built to this newer code generally performed well. Code changes enacted in the early 1980s prohibited the use of non-ductile reinforced concrete structures in favor of ductile reinforced concrete structures. These newer structures provided greater flexibility, allowing structures to withstand the strong ground shaking levels experienced in Kobe. The 1995 earthquake also illustrated several structural shortcomings which Japan's central government and engineering community moved quickly to address, adopting several new laws and key code amendments in the first years after the earthquake. Design standards to prevent soft story failures were reviewed and revised. Moreover, the detailing, material strength, and hardware requirements, as well as the foundation and shear wall design for wooden buildings have also been significantly improved. To enhance overall construction quality, interim construction inspections are now required for all new buildings, in addition to the construction completion inspections that were enforced prior to 1998. Additionally, all pre-1981 buildings in public use must have a seismic evaluation and retrofits are required if needed.

Source: Source: Risk Management Solutions. 2005. 1995 Kobe Earthquake 10-Year Retrospective. http://www.rms.com/Publications/KobeRetro.pdf

Lessons

- Government must identify the weaknesses in existing construction codes that lead to failure
- Government must revise construction codes to improve the resilience of reconstructed housing
- Government must require structures out of code compliance to retrofit for hazard resistance

Case 43: Earthquake and Tsunami, 2004, Banda Aceh, Indonesia

Topic: Understanding Codes and Laws

In order to ensure more widespread understanding of and compliance with resistant construction standards and Indonesian laws in the aftermath of the earthquake and tsunami events, the United Nations Humanitarian Information Center (UNHIC) produced a Shelter Data Pack. This resource was developed to meet the informational needs of owners, NGOs, local governments, contractors, and anyone else working in shelter

recovery. The Pack included:

- A list of NGOs working on shelter
- Guidelines on community land mapping and village planning
- The Building Code for Aceh
- A list of preferred material suppliers and a pricelist.

UN-Habitat, in partnership with BRR, also developed guidelines on various topics including:

- Land mapping
- Pricing indicators
- Equitable rights
- Options for renters and squatters and community-empowered resettlement

Source: da Silva, Jo. 2010. Lessons from Aceh: Key Considerations in Post-Disaster Reconstruction. Arup. Practical Action Publishing Group.

Lessons

- Multiple guidelines prescribed by a program can cause confusion as to what has been deemed appropriate
- Programs should provide clarity about which codes and standards should apply in which situations

Sub-Issue: Land and Property Ownership

With only few exceptions, shelter recovery and housing reconstruction programs require an establishment of eligibility by recipients. Without such requirements of eligibility, governments, donors, and nongovernmental organizations would find an ever-growing pool of individuals and households seeking benefits. While eligibility is always unique to the disaster and the program, in most cases the requirement is that the recipient have lived in a house that is now damaged or destroyed because of the event, and that they are able to prove ownership of the structure and the land upon which it had been built. However, there are a number of reasons why home and land ownership may not be possible. These may include:

- Owner has lost, or never received records of ownership
- Owner's records destroyed in the event
- Municipal records of ownership destroyed in the disaster
- Owner lived in an informal settlement and never had rights to their property

- Records exist, but do not reflect reality
- Land was owned communally
- The owner is deceased, and there it is unclear what surviving relative now owns the property
- The owned land no longer exists (land loss occurs as a result of many hazards, including earthquakes, landslides, floods, tsunamis, volcanic eruptions, sinkholes, and more).

To address questions of land rights and property ownership, there are three primary options that may be called upon. These include:

- Community-based councils rely upon the collective memory of community members and their leadership to determine who owned which properties, where and how large each plot was, to where the boundaries of the plot extended, and the physical area of the plot (community-driven adjudication)
- Locating and reprinting deeds and other legal records, if they have been kept in a redundant fashion by the local or other government
- Making standard, equal land allotments irrespective of prior claims of ownership in order to establish eligibility

Land ownership is key in both in-situ and relocation efforts. When in-situ construction is conducted, it is important that there be no question of land rights to avoid a situation where there is dispute over who owns the replacement housing after the structure is built. When relocation is an issue, recipients will often demand that they be compensated with a plot in the new site that is proportional to their ownership in the abandoned area. Jo Da Silva writes that:

> *"Legal certification of land is a pre-requisite to reconstruction yet the system for certification pre-disaster may not have been comprehensive and key documents on land titles or local knowledge may have been lost as a result of the disaster. Land tenure arrangements vary from country to country and land may have been owned individually, communally or by the government. Establishing land titles based on both existing records and community-driven processes is a time consuming process but critical to longer-term sustainable development. Inheritance rights need to be considered as does certification for adjacent communities so as not to exacerbate differences in land values. Specific consideration must also be given to the rights of tenants or informal dwellers that were not previously land owners" (Da Silva, 2010.)*

Sub-Issue: Community Driven Adjudication

While land deeds are precise measurements of property rights that are certified and maintained by government, they are not the only source of information about land

ownership. The collective memory of a community, accumulated over decades and generations, can help to establish ownership as the community moves forward in their recovery. Individuals and neighbors remember such things as distances from landmarks that help them to recreate the records that were destroyed. This process is called community driven adjudication, or community mapping. Those involved in the process form consensus on the location and size of a plot, and determine the individual or the family that had the rights to that plot. These delineations are drawn into basic sketches, and are ultimately transferred into advanced cartographic resources using GPS plotting. With the endorsement of the community, the new maps and land deeds become legally binding, and ownership is reestablished. Legal titles may be recreated using whatever legal mechanism exists within the country. Such practices need to be standardized across an entire reconstruction program area to ensure that no beneficiaries lose out as a result of bias, corruption, or mismanagement. Standardization also makes national acceptance of the new deeds much easier to establish.

Outside assistance to support the community-driven adjudication process at the community level, from government agencies or NGOs, can come in the form of:

- Facilitating community agreement on ownership and boundary demarcation
- Facilitating community-based dispute resolution
- Independent monitoring of land reconstruction
- Strengthening community institutions and decision-making processes with special attention to the rights of women, children and orphans.

Case 44: Earthquake and Tsunami, 2004, Banda Aceh, Indonesia

Topic: Land Mapping / Titles

The December 26 earthquake and subsequent tsunami that struck Banda Aceh destroyed not only the built environment but also personal identification documents, land boundary markers and almost all records of land ownership. 300,000 land parcels were and it is estimated that less than 25% of these were secured by title deeds. The majority of unregistered private land in the tsunami-affected areas was held in traditional customary legal arrangements either by individuals or the community. Eighty-percent of all land documents were lost in the tsunami, including all cadastral maps. Much of the physical evidence of property boundaries was also destroyed and many people who held this knowledge died in the tsunami. After the event land was one of the few things that the survivors still owned and almost immediately they marked out boundaries to the plots where their houses once stood. However, a more comprehensive system for establishing land title was required and the Indonesian government, in partnership with the World Bank, set up the Reconstruction of Land Administration Systems in Aceh and Nias (RALAS). Starting in August 2005, this involved a process of 'community-driven adjudication' and land titling through the National Land

Administration Agency (BPN). The RALAS program was thorough, but very slow, and reconstruction proceeded based on the agreement of ownership reached through community mapping, in anticipation of land certificates being issued. Assisted by humanitarian agencies, affected communities undertook community land mapping. This included preparing inventories of landowners (and heirs) and marking the boundaries of land parcels. Agencies initially recorded this information in sketches, which were then converted to digital files by agencies using Global Positioning System (GPS) coordinates. Survivors and community leaders signed the map to certify that it was correct. In remote locations many households did not have land certification prior to the tsunami so legal certification was a significant form of assistance and welcomed by many communities. The process was complicated by land disputes among community members or returning family members, opportunistic land-grabbers and uncertain inheritance rights but on the whole proved effective. Once the community had reached agreement on land ownership and plot boundaries BPN provided professional mapping and issued land ownership certification.

Inheritance claims became a significant issue due to the large number of fatalities and the number of family members claiming inheritance rights. Special attention had to be paid to the rights of women, children and orphans. Under both customary (adat) and Islamic (sharia) law women could inherit property but there was concern as to the extent this occurred in practice. BRR estimated that over 2,000 children were orphaned by the tsunami. Their inheritance and guardianship are governed by sharia law, so mobile courts were set up to protect their rights, and prevent them losing land to which they were entitled. On the whole this program was successful but initially people found the system difficult to understand. It was also criticized for not being proactive in identifying orphans and slow because of the number of witnesses required. In general land parcels with titles are worth more than those without. Thus in the short term it was anticipated that land titling in the tsunami affected areas would raise the values of land parcels above those in non-affected areas. To mitigate medium-term land market distortions, the RALAS program intended to provide titles for 300,000 land parcels adjacent to tsunami-affected areas, in addition to the 300,000 parcels in affected areas. However, as a result of administrative delays in Jakarta by mid-2006 they had only surveyed around 53,000 land parcels and issued 2,608 land certificates.

Source: Oxfam International, 2006.; World Bank, Rebuilding a Better Aceh and Nias. 2005. http://go.worldbank.org/ANVLSEH9A0 Reconstruction in Banda Aceh-stock taking.pdf.

Lessons

- Nontraditional land ownership may present challenges to housing reconstruction eligibility and legal decisions
- Community—driven adjudication can help increase the acceptability of land ownership decisions that are made in the absence of legal documentation

- Housing reconstruction programs should formalize titling where no such system exists, or where a high number of properties are owned through traditional non-legal means
- Land disputes, inheritance claims, and the absence of community members (who are not present at the time of adjudication) can complicate the community-driven adjudication process

When housing reconstruction programs are based upon proof of ownership, and no mechanism exists to establish or reestablish deeds lost in the disaster or nonexistent prior to the event (for any of the reasons listed above), there always remains a high likelihood that many of the individuals in this predicament will face hardship in proving eligibility or even homelessness if they are pushed out of their former informal settlement. This is especially true for vulnerable groups, namely women or children who cannot own property but are suddenly widowed/orphaned, or the marginalized poor who were living in high-risk informal settlements prior to the event.

Case 45: Bhuj Earthquake, Gujarat, India, 2001

Topic: Legal Documentation of Ownership

On January 26th, 2001, a magnitude of 6.9 earthquake killed approximately 20,000 people and injured an additional 167,000. Over one million were rendered homeless. 7,633 villages were affected, and 450 villages were completely destroyed. 344,000 houses were completely destroyed and 888,000 reported damages. The Government of India used an owner-driven approach to reconstruct housing, financed by the government and assisted through the provision of technical assistance. Whereas this project was seen as an overwhelming success, problems arose in many poor villages, or in cases where the disaster victim was poor, because many numerous poor households did not have their houses formally registered and therefore had no proof of ownership. Because the government compensation programs were guided by assessed values of homes and not as a factor of victimization, these households were not entitled to any financial compensation. One of the more positive aspects of this program was that victims were provided with direct funding to facilitate their own recovery, which empowered them to make decisions based upon their own preferences.

Source: Barenstein, Jennifer. 2005. A Comparative Analysis of Six Housing Reconstruction Approaches in Post-Earthquake Gujarat. Scuola Universitaria Profesionale della Svizzera Italiana.
http://www.odi.org.uk/hpg/meetings/SUPSI.pdf

Lessons

- Housing reconstruction programs based on title or certificate of ownership inadvertently discriminate against the poorest disaster victims who cannot establish eligibility

Case 46: Earthquake and Tsunami, 2004, Banda Aceh, Indonesia

Topic: Establishing Land Rights and Ownership

After the December 26 earthquake and tsunami over 800 km of coastline was destroyed. The reconstruction effort was especially challenging given the scale of destruction, the difficulty in reaching the affected areas, and the pre-existing poverty caused by nearly 30-years of armed conflict. The combined earthquake and tsunami dramatically impacted housing stock in Aceh. Official estimates showed 130,000 new houses were needed, and about 95,000 were damaged but repairable. Housing reconstruction efforts were hampered by the fact that land rights and holding mechanisms were primarily informal in nature, and most houses in Aceh were unregistered. Prior to the tsunami, only five to ten percent of all land ownership was registered under the National Land Registry or *Badan Pertanahan Nasional* (BPN) in Jakarta. As such, once the water receded there was no official documentation of property rights and houses victims could use to prove their eligibility for assistance. Furthermore, entire portions of land disappeared in many areas and settlements were left with no distinguishing characteristics. Following the disaster, a system was needed to establish land rights before construction could commence. Because land rights and ownership were contained within the collective memory and knowledge of the community, a system of verbal documentation of the location of houses was created in collaboration with community members. Mapping exercises were undertaken by a large number of organizations to determine people's claims about housing location and to relocate individuals and families to the correct area. A post-recovery assessment found that the community was able to come to consensus about land rights, rather than individuals falsifying their claims to a central government body. The efforts of the program were able to solve some, but not all, of the land rights problems associated with Internally Displaced Persons (IDPs).

Source: Bringle, Tara Panek and Lisa Pacholek. 2008. Case Study: Post Emergency Housing Finance for the Poor; Aceh, Indonesia. Development Innovations Group. July 31

Lessons

- Collective community memory can serve as a viable alternative to paper-based land rights mechanisms when documents are lost in the disaster
- Land rights establishment programs will not accommodate those whose land is no longer buildable or which no longer exists

Issue 6 : Technical Assistance / Expertise

Chapter 7

There is an incredibly great amount of expertise required to bring about recovery of community shelter. While homebuilding knowledge is pervasive in most communities, the lessons passed from generation to generation, and between local laborers and artisans, may be based upon engineering and practices that led to the risk that caused the disaster to be so destructive. In order to reduce future risk, and to ensure that houses are built in a safe and sustainable manner, there must be enough access to individuals with the technical knowledge, or the training to transfer that knowledge, such that every structure built is somehow affected.

Throughout this document the importance of owner participation in the process has been highlighted. Whether the owner and the community is able to perform any of these tasks and activities is highly dependent on the complexity of the plans that are selected, the risk reduction mechanisms employed, and the capacity for knowledge transfer that exists.

There are tradeoffs between providing technical assistance on individual projects versus training the affected population to conduct and oversee the projects themselves. Provision of technical assistance has as its greatest benefit the speed with which projects may be initiated. There is also a greater likelihood that the expert providing oversight and technical assistance will have been properly trained and certified in the required skills. However, the greatest obstacles to this form of assistance come in the limited resources of trained experts, and the cost of hiring and maintaining these individuals throughout the rebuilding effort. As such, despite that it can take a tremendous upfront commitment of time and energy to train the owners or community members in hazard resistant design and construction, the benefits of these lessons can grow exponentially as the knowledge becomes institutionalized within the community. Empowering local communities to perform this form of construction themselves also has the benefit of enabling beneficiaries to maintain their reconstructed homes, and increases the likelihood that houses constructed in the community irrespective of the reconstruction effort (years in the future as populations increase, for example) will apply hazard resistant design and technology.

Case 47: Bhuj Earthquake, Gujarat, India, 2001

Topic: Construction Technical Expertise

On January 26th, 2001, a magnitude 6.9 earthquake killed approximately 20,000 people and injured an additional 167,000. Over one million were rendered homeless. 7,633 villages were affected, and 450 villages were completely destroyed. 344,000 houses were completely destroyed and 888,000 reported damages. To address housing structural vulnerability, the Government of India initiated an effort to train 29,000 local masons and more than 6,000 engineers in resilient design and construction technique. Additionally, to promote public confidence in the durability of new housing, the government provided four shake table demonstrations where sample units were publicly tested for earthquake resilience. In addition to experienced masons, newcomers who used to work as unskilled laborers in building construction required training in safer construction practices. A registration process that standardized knowledge assessment was developed. Code enforcement was improved as well. A post-recovery assessment found that while these efforts were able to ensure the incorporation of earthquake resilient design in construction, little was done to address cyclone risk – primarily because adequate building materials were unavailable. While there is awareness of the value of safer construction, implementation is dependent on the availability of financial and land resources.

Source: Price, Gareth; Mihir Bhatt. 2009. The Role of the Affected State in Humanitarian Action: A Case Study on India. Humanitarian Policy Group. Overseas Development Institute. London.

Lessons

- Programs that train local construction laborers in resistant design increase the sustainability of hazard risk reduction mechanisms incorporated into recovery housing design
- Visual demonstration of the benefits of hazard resistant design help to increase public acceptance of the measures
- Standardization of hazard resistant construction training and certifications allows for increased likelihood that risk reduction will be achieved
- Hazard resistant design must include all hazards that face the structure, not just the single hazard that resulted in the precipitating disaster

One approach to reconstruction in which community plays a main role is the 'building yard' method. The philosophy behind this reconstruction approach is that the members of affected communities differ in their capability to rebuild their own houses by themselves or through the use contracted local builders. Outside help in this manner should be used only to facilitate the process by making sure that building materials and skills are locally available at affordable prices, or free of charge. This approach is best

implemented in rural and suburban areas, where people are traditionally most likely to build their own homes as a matter of course. The focus is on developing the production and distribution of building materials; improving the quality of the materials; and training local builders. It is particularly valuable in hazard areas where building materials and construction techniques have proved to be the main source of vulnerability, for instance in earthquake zones (Barakat, 2003)

Case 48: Earthquake, Yemen, 1982

Topic: Building Yard

The Dhamar Building Education Project was initiated by Oxfam, Concern and Redd Barna (Save The Children Norway). The decision by these agencies to become involved in building education was made on the basis of their knowledge of local communities and cultures, acquired during relief assistance programs following the 1982 earthquake. The project was distinctive in that it was conceived as a process, rather than a product oriented program. The aim of the project was to promote a set of simple technical messages to local builders, who could then incorporate these techniques into their normal construction activities, with a view to assisting in the reconstruction of safer houses. The improvements taught were based on an analysis of the damage and on investigation of existing construction methods. Overall, the training methods used were considered effective and made people more aware of bad construction and vulnerability. Many buildings incorporated improvements, and there was an impact on the quality and safety of the building stock. However, the overall effect of the program was limited, for a number of reasons. Training did not improve the likelihood of employment, and it was difficult for builders to find sustained work. Most people could not afford to rebuild with new improvements, and many were not rebuilding, but were waiting for government sponsored, contractor-built housing, promised 15 months earlier. Post-recovery assessment found that a parallel program of financing building improvements would have improved the impact of the project. Even minimum improvements were too expensive for most. Also, coordination between 'large' governmental reconstruction program and the building education program would have helped to address people's expectations. Finally, accountability should be with the communities themselves, which provided practically everything (finance, material and labour) except for training costs.

Source: Barakat, Sultan. "Housing Reconstruction after Conflict and Disaster." Humanitarian Practice Network no. 43, Dec. 03 p.16.

Lessons

- Providing a one-stop resource where owners and construction laborers may go to acquire necessary hazard-resistant construction skills can increase the reach of such measures and increase the human resources available to implement them

- Training may not improve employment prospects for the long term
- Risk reduction measures must be accompanied by equivalent funding mechanisms to ensure that recipients can afford to implement them
- Coordination between 'large' governmental reconstruction program and construction education programs can help to address people's expectations
- Accountability should lie with the communities themselves

Programs enabling or facilitating owner-driven or hybrid forms of housing recovery program implementation must be prepared to bring the technical assistance to the owners and laborers where they live and work. Training sessions can be conducted in the villages, or even at the construction sites themselves if enough human resources exist.

Case 49: Lebanon, July War 2006

Topic: Project Management and Technical Assistance

A European Commission Humanitarian Aid (ECHO) funded project was implemented by UN-HABITAT in cooperation with the Danish Refugee Council (DRC). The project addressed conflict-related destruction of tens of thousands of housing units in Southern Lebanon and Bekaa. The project, which lasted 6 months, sought to provide housing repair and reconstruction assistance to 1,000 affected homeowners. Project management and coordination efforts were conducted using a novel 'mobile approach', which allowed a much more efficient response. Three mobile reconstruction units, which were vans converted into mobile offices, were outfitted with necessary technical equipment and staffed by engineers, surveyors and architects to provide immediate reconstruction assistance to affected homeowners. A post-recovery assessment found that mobile units allowed for faster, more efficient response. These units also allowed for greater reach of technical experts, who were able to bring all necessary equipment and documentation from site to site as required.

Source: UNHABITAT. 2007. Lebanon Updates. Vol. 1, No. 1. December.
http://www.unhabitat.org/pmss/getElectronicVersion.aspx?nr=2543&alt=1

Lessons

- A mobile approach to technical assistance can help to reach a much wider portion of the affected population, and provide a faster, more efficient response

Train the trainer programs can be used to greatly expand the reach of training programs facilitated by construction experts. Through these programs, village leaders or highly capable members of the community take the technical expertise and expand it throughout their community.

Case 50: Earthquake, Yogyakarta, Indonesia, 2006

Topic: Community Empowerment

Many of the homes destroyed in the 2006 Yogyakarta earthquake were not constructed with earthquake resistant design. To reduce the risk of future risk, the National government instituted a program called Community Empowerment Program (CEP) aimed at empower people to reconstruct their own houses using resistant design and materials. The community was given trainings through workshops that provided basic knowledge about earthquake-resistant construction. To simplify coordination and expand reach, communities were divided into groups of ten to fifteen families. Each group chose three representatives (a leader, a secretary and a treasurer). The leader attended trainings or workshops, and then transferred these lessons to the remaining members of the group who worked together to reconstruct the houses as a unit. The program ultimately trained over 1,100 people who further trained others within their groups. After-action reports found that this approach speeds the reconstruction process and reduces labor costs significantly. The community found incredible value in the fact that community members were able to maintain their homes (and build new hazard-resistant homes in the future). Individuals who were construction workers prior to the event were given training in disaster-resistant design to increase the reach of the program, and ensure that they did not repeat the pre-disaster mistakes that led to vulnerability.

Source: Satyarno, Iman, Socialization and Training of Earthquake Resistant House to the Construction Workers in Trimulyo Village, Jetis Sub District, Bantul District, Yogyakarta, from the Recovery Status Report: The Yogyakarta and Central Java Earthquake 2006 Department of Architecture and Planning UGM, 2009. International Recovery Platform

Lessons

- Community recovery projects that group homeowners into small units of 10 to 15 members can speed the construction process and expand the reach of training programs significantly (in that one participant in training can equate to many more receiving the message)
- Training programs can include seasoned construction workers in order to ensure that hazardous construction methods of the past are no longer repeated
- Training programs can help to build enthusiasm within the community, which in turn increased recovery success
- There may be cases where construction workers will not participate in training for fear of losing their salary while training occurs
- Behavior changes related to poor construction design are difficult to bring about
- Owners should be able to afford increased costs of resilient designs

Technical expertise is not only required in building, but also in pre- and post-construction assessment and inspection. Homeowners of damaged structures need to know if they can repair their home, or if doing so they would retain the original hazard vulnerability or place themselves at undue risk due to structural instability caused by the damage. During construction and after the house is completed, inspection can help to ensure that the intended outcome of risk reduction, and a standard level of stability and safety, have been achieved.

Case 51: Hurricane Dean, 2008, Jamaica

Topic: Technical Expertise

The Jamaica Red Cross used government construction specialists to conduct assessments following this hurricane to determine the housing reconstruction effort required. This process was learned following Hurricane Ivan in Granada and transferred through the work of the Red Cross system. This use of technical experts added value and accuracy to the shelter assessments, and the technical expertise strengthened the process of beneficiary identification. The program demonstrated to local communities that a robust process for decision making was in place, in which social needs and technical factors were considered side by side.

Source: IFRC. Rebuilding homes and livelihoods in Jamaica after Hurricane Dean: Case Study: IFRC, 2008. http://www.recoveryplatform.org/resources/publications/152/rebuilding_homes_and_livelihoods_in_jamaica_after_hurricane_dean

Lessons

- This use of technical experts can add value and accuracy to shelter assessments
- Technical experts can strengthen the process of beneficiary identification

Chapter 8

Issue 7 : Construction Materials

Closely coupled with the importance of housing design selection comes the selection of building materials. Building material differences can affect the pace, cost, and sustainability of the reconstruction project, and therefore must be assessed according to a range of key factors. The materials ultimately selected will affect not only the quality of the housing constructed, but also its appearance, and function, the ease and speed with which laborers can work with it, the ability of the local workforce to participate in reconstruction efforts, and the ability of the local market to support construction efforts, among other things. There are seven principal categories, through which building materials may be analyzed for suitability, including:

1. **Quality:** Materials that are of poor quality may not last very long or perform well under the stresses of a future hazard event. Poor quality materials can result from contractors or owners cutting costs, from poorly-trained laborers (for instance, with the mixing of concrete or making of blocks), from profiteering on the part of suppliers, and other reasons. Materials should correspond to the hazard resilience dictated in the prevailing construction codes.
2. **Cost:** Building materials must be evaluated according to a cost-benefit analysis that weighs the perceived benefit of each material against the financial impact on the overall housing reconstruction program. Oftentimes the cheapest options are also the most appropriate and offer the greatest benefits, such as with materials recycling. For the victims, donated materials are, understandably, the lowest cost materials, but this benefit must always be weighed against any other disadvantages that might result.

Case 52: Earthquake and Tsunami, 2004, Banda Aceh, Indonesia

Topic: Materials Cost

Immediately following the event, shelter construction materials were distributed to victims (including toolkits, cement and wheel barrows) in order to allow them to return to their villages to make housing repairs or begin constructing transitional shelters on their own land. There was very limited supply of local materials and larger organizations

with procurement and logistics capability were able to more readily source materials nationally and internationally. The donated materials helped speed up the early recovery process because victims able to return home found it easier to rebuild livelihoods and social support networks. Construction materials distribution helped to build trust within the community and to establish partnerships that that became invaluable to later recovery programs. Most of the donated materials were a component of an overall assistance program aimed at reconstructing damaged and destroyed houses. However, some agencies found they did not have the technical expertise to correctly specify structural grade or durable timber and resorted to using what was locally available, including illegally logged poor quality hardwood and untreated softwoods. The opportunity to provide assistance by supporting manufacturing of construction materials (e.g. blocks) or building elements (e.g. doors and windows) was mostly overlooked.

Source: da Silva, Jo. 2010. Lessons from Aceh: Key Considerations in Post-Disaster Reconstruction. Arup. Practical Action Publishing Group.

Lessons

- Local materials may be in short supply following a major disaster
- Materials distribution can help organizations gain access to affected communities
- NGOs and other humanitarian organizations may lack the technical expertise required to select appropriate materials
- Opportunities to promote sustainable local production of materials should not be overlooked

3. **Appropriateness:** Construction materials must be appropriate for the climate where the houses are constructed, and the hazard resistance desired. First, the materials must be able to best manage the atmospheric temperature for inhabitants. For instance, in hot climates, residents may prefer a thatch roof instead of a concrete roof because the former allows heat to escape. The same roof, however, might collapse if affected by a heavy winter snow load, and would not be appropriate in a cold climate. The average humidity and precipitation types and rates heavily influence which materials are appropriate, given the rate at which some materials deteriorate under harsh conditions. Some materials have inherent properties that make them more suitable for certain hazard types – such as flexibility or rigidity, impermeability, heat resistance, among others. Materials must be able to withstand insects and other vermin endemic to the affected area. Finally, because the materials themselves contribute heavily to the aesthetics and the function of the house, they must accommodate the culture and desires of the occupants who expect a certain style and function.

Case 53: Earthquake and Tsunami, 2004, Andoman and Nicobar Islands, India

Topic: Appropriateness of Materials

Even though many traditional houses in the Andaman and Nicobar Islands had successfully withstood seismicity in the past, and the communities indicated that they preferred the traditional style for their function and appearance, the Government of India elected to construct houses using pre-fabricated materials. These structures had to be imported from mainland India, through contractors, at an apparently exorbitant average cost of approx. Rs 10 lakh per unit. Once they arrived, people immediately rejected them, and their anger manifested in protests against the Government. The Government of India determined that a change in the housing type, including that which relates to the construction materials, would not provide any sustainable solution to local communities. In this instance, materials such as steel, bamboo board and aero-con blocks and panels were used despite a complete lack of local availability. All, therefore, had to be purchased from outside the affected area. The procurement of sand and aggregates also became difficult given the quantities that were required. Ultimately, the affected population utilized timber-based materials because of its availability, its perceived performance.

Source: Rawal, Vivek, Rajendra Desai, and Dharmesh Jadeja. 2006. Assessing Post-Tsunami Housing Reconstruction in Andaman & Nicobar Islands: A PEOPLE'S PERSPECTIVE. Books for change, Bangalore. http://www.recoveryplatform.org/assets/publication/Tsunami Recovery/Critical analysis Housing reconstruction- Andaman - Tsunami.pdf

Lessons

- Imported materials often carry excessive costs that do not carry significant enough benefits to justify their use
- Affected populations may reject imported materials if they are not appropriate for their preferences, cultural or otherwise

4. **Local knowledge of Materials:** The technical knowledge required to work with different materials varies greatly. Unless a comprehensive training campaign is incorporated into a program that advocates or mandates the use of a new material, such provisions may lead to project delays or a retention in risk (from improperly-constructed houses.) Utilizing locally available or familiar materials, on the other hand, helps to support local markets and ensure that local labor is empowered to participate in the recovery effort.

Case 54: Bhuj Earthquake, Gujarat, India, 2001

Topic: Local Knowledge of Materials

On January 26th, 2001, a magnitude 6.9 earthquake killed approximately 20,000 people and injured an additional 167,000. Over one million were rendered homeless. Because

citizens resisted relocation and/or a government-driven top-down approach to housing reconstruction, an owner-driven approach was used. The majority of those who reconstructed their house using this approach used construction materials with which they were already familiar, such as bricks, stones, and wood. Because of this, many of them were able to reuse a significant amount of the rubble from their old houses. Also, because most houses were reconstructed in-situ following vernacular designs and spatial arrangements, the materials were highly appropriate and helped the village to maintain its traditional character. Some people however also introduced innovations, such as flat roofs reflecting the changing tastes and preferences and a selective adoption of new designs, building technologies and construction materials. Such diversity not only reflected variations in local values and aesthetics, but also variations in housing requirements. Direct funding to victims for reconstruction increased the likelihood that local materials were be used, and that materials were recycled. Moreover, the in-situ construction method, using vernacular design, increased the use of locally familiar materials that in turn increased the retention of community character.

Source: Barenstein, Jennifer. 2005. A Comparative Analysis of Six Housing Reconstruction Approaches in Post-Earthquake Gujarat. Scuola Universitaria Profesionale della Svizzera Italiana. http://www.odi.org.uk/hpg/meetings/SUPSI.pdf

Lessons

- Use of materials that owners are familiar with can help to promote building sustainability, and increase the chance that recycling of materials occurs
- Local materials use significantly improves the chances that community character is maintained
- Communities may be highly receptive to new building styles and new building designs in the reconstruction of disaster damaged housing; however, their consultation in the selection process is vital given variances in preference
- Direct funding to owners increased the likelihood of local materials use

5. **Local Availability:** Programs that rely upon materials that are not locally available create an atmosphere of dependence among victims. Communities will have more difficulty meeting supply needs, and local markets will become marginalized. In the longer-term, the community will become dependent on imports of materials to maintain and repair structures that are built as a part of the recovery effort.

Case 55: Earthquake in Bhuj, Gujarat, India, 2001

Topic: Locally Available Materials

One large-scale community-based housing reconstruction project conducted in Gujarat focused on localized production of building materials. The CRS housing reconstruction program began with the training of thirty teams of local laborers in the production of

locally appropriate compressed earth blocks. These individuals were also trained in the appropriate construction techniques through which these blocks should be used. As a result of these trainings, there was a large-scale localized production effort involving five hundred local staff. Working full-time on the effort, these staff were able to produce enough compressed earth bricks to support the construction of 200 housing units per month. This project was highly cost-effective given that houses made of compressed earth blocks are typically 40–50% less expensive than houses constructed with load-bearing cement block or reinforced concrete frames. To address safety concerns, the program worked in consultation with the Indian Bureau of Standards to develop a standard for compressed earth blocks. The housing units constructed with these locally-produced materials thus met the government's earthquake resistance standards, were in keeping with the local housing style and allowed families to tailor houses to their individual needs, creating what was considered to be a diverse and more interesting living environment.

Source: Barakat, Sultan. "Housing Reconstruction after Conflict and Disaster." Humanitarian Practice Network no. 43, Dec. 03 p.16.

Lessons

- Training the affected population to produce construction materials no only helps to retain community character, it can also provide a much needed source of employment
- Local production of building materials can drastically reduce the costs of construction
- Construction standards need to be applied and monitored when local production of materials is utilized

Case 56: Earthquake and Tsunami, 2004, Banda Aceh, Indonesia

Topic: Availability

Because of the scope and scale of housing reconstruction required, construction material availability became problematic. Eventually, most agencies were unable to obtain the quantities nor the desired quality from legitimate local sources. As a result, the pace of recovery efforts, and the quality of the resultant buildings, suffered. A shortage of strong coordination mechanisms ultimately led to instances of illegal logging of poor quality timber in the affected areas, and high rates of inflation for construction materials costs caused by bulk purchasing through national and international supply chains. It was typically the smaller agencies that sourced locally (leading to illegal acquisition) and the larger agencies that caused inflation effects. In late 2005 coordination mechanisms were imposed and these effects were significantly reduced.

Source: da Silva, Jo. 2010. Lessons from Aceh: Key Considerations in Post-Disaster Reconstruction. Arup. Practical Action Publishing Group

Lessons

- Large-scale housing reconstruction efforts will likely exhaust locally-available building materials
- Materials shortages will impact the pace of recovery
- Shortages of locally-available materials may lead to illegal production or acquisition of building materials
- Coordination mechanisms may be instituted to reduce market shock

6. **Impact on Local Markets:** The selection of materials to support a housing reconstruction effort almost always impacts local markets, though there are a number of factors that determine whether this impact is positive or negative. When local materials are chosen, the local economy can benefit greatly from the injection of income. However, if supply is unable to meet demand, prices will skyrocket causing what is known as a positive demand shock, and subsequently, an increase in construction costs. If foreign materials are chosen, the local markets may become marginalized and eventually see their inventory become irrelevant.

Case 57: Earthquake and Tsunami, Aceh, Indonesia, 2004

Topic: Impact on Local Markets

When housing reconstruction in Aceh began, the cost of construction materials on the local market quickly rose. Steel, cement, bricks, wood, sand, aggregate and stone all became scarce, and thus expensive, given that they were needed not only in housing but also in the reconstruction of infrastructure. Moreover, there existed the possibility of the local population turning to scarce wood resources in the Sumatran forests. Uplink Banda Aceh, an NGO involved in housing reconstruction, mobilized a logistics team that worked to ship construction materials of the same kind and quality from elsewhere in Indonesia (including Jakarta and Southern Sumatra), to reduce prices and help the local merchants to restock their supplies. Local suppliers participated by letting the organization use their warehouse space. The organization was able to reduce the construction costs across the 3,000 houses they built by millions of dollars without having to rely on materials that would not be available locally once the effort was concluded, and did little to impact the income of the local sources of such materials.

Source: "byPeople" HOUSING IN ASIA Newsletter of the Asian Coalition for Housing Rights Number 16, August 2005

Lessons

- Materials shortages or increases in materials prices may lead homeowners to

acquire these materials through illegal, unsustainable, or environmentally-damaging means

- Professional logistics technical services may be required to match construction materials supply and demand

7. **Environmental Impact of the Materials:** When a great number of houses are required in a short period of time, the demand for materials is exceptionally high in comparison to normal times. This demand can lead to severe environmental impacts. The use of wood can lead to clear cutting of fragile forests. The use of bricks can result in atmospheric pollution given the wood and coal fires required to heat the ovens.

Case 58: Multiple Hurricanes, 2008, Cuba.

Topic: Environmental Impact

Hurricanes Gustav, Ike, and Poloma struck in succession in 1984, causing widespread damage (approximately $10 billion). In the Cuban coastal town Los Palacios 84% of the homes were damaged. In several communities, including Los Palacios, a process of creating and using "eco-materials" has helped bring about shelter recovery by addressing several of the obstacles that exist. Eco-material construction uses local resources, which are turned into construction materials at a low cost, using local labor and performed within the community. Eco materials use very little energy, thereby bringing costs down further. The project is managed by CIDEM (Cuban institute for Research and Development). To carry out the project, program management moves in quickly following a disaster to set up mini-factories using low-tech machinery. The local population is tapped to do much of the labor involved in producing the materials. In Los Palacios, a mini-factory was set up that consists of five workers operating a simple device that uses vibrations to create blocks made from local gravel, sand and cement. The factory produces about 1,200 blocks a day, which is enough to build one house. Bricks are dried in the sun, and families transport them to their land (which is usually fairly close) for use in reconstruction. The Cuban government provides technical expertise to conduct oversight, and victims are given paid leave in order to rebuild their houses. An after-action report found that these types of programs are labor intensive, which has the benefit of providing local employment and owner participation. Also, it was found to drastically reduce transportation and energy costs. The greatest benefits are that the materials are local, and environmental impacts are minimized.

Source: Darlington, Shasta. 2010. Cuba's Disaster-Hit Homes Get Eco-Friendly Rebuilt. CNN. http://edition.cnn.com/2010/WORLD/americas/04/09/eco.cuba.homes/index.html

Lessons

- Ecologically-friendly materials and materials production methods can reduce the likelihood that reconstruction takes a negative toll on the environment of

the affected area

- Eco-materials production programs are labor intensive, which has the benefit of providing local employment and owner participation
- Eco-materials programs can reduce transportation and energy costs associated with reconstruction

Case 59: Hurricane, Honduras and Nicaragua, 1998

Topic: Environmental Concerns

Environmental concerns were incorporated into the housing reconstruction planning efforts following hurricane Mitch. Materials incorporated into design were selected with the goal that their purchased would maximize the positive impact on local micro-industries and cooperatives, but minimize additional environmental stresses. For instance, wood was excluded from construction, except in the champas, because of both environmental and cost reasons. Wood was not cost effective in comparison to masonry options, and moreover, wood contributed greatly to the deforestation that had aggravated flooding and landslides in the first place.

Source: IFRC. Rebuilding after Hurricane Mitch: Housing Reconstruction in Honduras and Nicaragua: Case Study. International. Federation of Red Cross and Red Crescent Societies, 2007

Lessons

- Materials that are neither cost effective nor present an environmentally-friendly outcome should be avoided

The local population can be a key resource in the determination of building materials. However, the local population may not understand the impact of the event on the capacity to acquire those materials, or the effect of the significantly increased demand on markets or the environment. This interaction will, however, shed significant light on the ability of local construction laborers to work with different material types.

Sub-Issue: Temporary Housing Materials

Despite that temporary housing will eventually be replaced by permanent housing, the selection in materials can have a profound effect on the lives of occupants during the time that they reside within the temporary structure. The selection in temporary housing materials can determine the privacy, comfort, safety, and security of residents, as well as affect the form and function of the structure. This factor is most important in those circumstances where it is anticipated or expected that the temporary facility will be transitioned into, or incorporated into the permanent structure, and will therefore have a long-term impact on the sustainability and hazard resilience of the structure.

Case 60: Volcanic Eruption, Goma, Democratic Republic of Congo, 2002

Topic: Transitional Housing Materials

The Nyiragongo eruption in Goma in January 2002 destroyed 15,000 houses in two days. A housing solution was developed which could be rapidly deployed and erected, but which would be robust enough to be durable. The dimensions of the housing unit and its components were based on the standard sizes available in the marketplace, so that materials could be sourced locally. The minimum size of the shelter was determined by family size. Since cooking takes place outside, the shelter did not have to be large enough to accommodate a kitchen. The housing units were designed to be more stable and robust than typical shelter solutions because there was little flat land to build them on. It was also intended that families would be able to take down their houses and move them to the location of their original homes once the areas covered with lava had recovered. Initially, beneficiaries complained that the plastic sheeting provided for the walls offered little privacy. However, many families used the sheeting as a backing upon which to attach other materials. People salvaged metal sheets and timber cladding to make more durable walls; others arranged bush sticks vertically on top of the plastic sheeting. Floors were covered with clay bricks or lava rock shingle. Within the lifetime of the program, 69% of families had upgraded their homes. The first of the transitional housing units were erected six weeks after the eruption; by the end of September, 11,307 had been put up.

Source Barakat, Sultan. "Housing Reconstruction after Conflict and Disaster" Humanitarian Practice Network no. 43, Dec. 03. p.17

Lessons

- Transitional housing materials that are initially rejected by the recipient population may be modified such that they are ultimately acceptable
- Transitional housing materials can provide a valuable resource to recipients once the permanent structure is complete

Case 61: Volcanic Eruption, Montserrat, 1995

Topic: Transitional Housing Materials

After the volcanic eruption on Montserrat, 90% of the population was evacuated and ultimately relocated. Many found emergency shelter in public buildings, but as it became apparent that there was no immediate solution to the housing shortage, and that public buildings could not provide adequate shelter in the medium term, prefabricated housing was brought to the island. Although the housing units could be erected quickly and addressed the primary objective of ameliorating conditions in the temporary public shelters, they were of poor quality; once occupied, ongoing repairs were necessary. Oversights had been made during the ordering process, so some components had to be

ordered specially, which caused delays and raised costs. Prefabricated components were also used to produce modular housing. The finished units matched expectations, but the venture was of limited success because the technology was inappropriate and suppliers, over which there was no control, failed to implement quality-control checks. Consequently, some components were heavily corroded when they arrived, and the entire stock of wall panels had to be replaced because of a manufacturing defect. The high-tech system proved difficult for the local contractors to master, so the aim of providing housing rapidly was not met.

Source: Barakat, Sultan. "Housing Reconstruction after Conflict and Disaster" Humanitarian Practice Network no. 43, Dec. 03

Lessons

- Quality control mechanisms are required to ensure that prefabricated transitional housing materials are of high enough quality to meet the needs of the affected population
- Materials acquisition systems need to be appropriate for the capabilities of the affected population

Case 62: Hurricane Mitch, Honduras and Nicaragua, 1998

Topic: Transitional Housing Materials

The International Federation of Red Cross and Red Crescent Societies in collaboration with the United States Agency for International Development (USAID) provided the hurricane-affected population with temporary on-site shelters called champas. Most of the materials used in the construction of these champas were recyclable, and the beneficiaries were eventually able to reuse them to create interior partitions in their new permanent houses. They were also able to create porches and enclosed cooking areas using these materials.

Source: IFRC. Rebuilding after Hurricane Mitch: Housing reconstruction in Honduras and Nicaragua: Case Study. International Federation of Red Cross and Red Crescent Societies, 2007.

Lesson

- Transitional materials can provide a great resource to housing recipients who wish to upgrade their permanent housing units

Case 63: Earthquake, Guatemala, 1976

Topic: Transitional Housing Materials

Transitional shelters were constructed using metal roofing sheets, which helped to provide additional protection for residents during the construction of long-term housing.

These metal sheets were eventually used in the permanent home when the time came to transition from one to the other. This reduced the material cost of the permanent house and reduced the amount of waste that resulted from the decommissioning of the transitional houses.

Source: International Federation of Red Cross and Red Crescent Societies (IFRC), United Nations Human Settlements Programme (UN-HABITAT) "IASC Emergency Shelter Cluster: Shelter Projects 2008." UN HABITAT, 2008. http://www.disasterassessment.org/documents/IASC_shelter_projects_2008.pdf

Lesson

- Transitional housing materials can be selected such that risk-reduction is enhanced in the interim period between the disaster and the provision of permanent housing units

Sub-Issue: Reusing or recycling materials

Recycling of materials found in damaged or destroyed houses (debris or the carcass of the house), when appropriate, can present a number of benefits to a reconstruction project. Recycled materials:

- Are immediately available
- Help to minimize the environmental impact of reconstruction
- Help to retain some of the emotional ties people may have with their home
- Reduce the amount of debris that needs to be cleared to make way for construction or removed from the affected area altogether
- Reduce the cost of construction materials

There are some inherent problems associated with recycled materials, however, including:

- Residents may have negative associations or superstitions associated with the materials
- The quality of the materials may be what led to the structural weakness in the first place
- The recycled materials may not be appropriate for the style and/or design of the new structure
- There may actually be an increase in the cost of construction if it is more expensive to reprocess the material that to pay for its removal and purchase new materials
- Recycling rarely makes sense if the community must relocate away from the

affected area

The decision to recycle debris must be made early in the reconstruction effort as residents and communities will begin clearing the material as soon as they can to begin making room for their replacement structures. Recycled material typically requires a significant amount of processing, so lead-time is necessary for the construction laborers.

Case 64: Earthquake, Yogyakarta, Indonesia, 2006

Topic: Recycled Materials

In the housing recovery effort in Yogyakarta following the earthquake, brick masonry from damaged and destroyed structures was used extensively to make cast-in-place concrete for the permanent structures. In doing this, construction costs were significantly reduced. Crushing of the brick masonry wall rubble was performed using both manual and mechanical means. Through the process, brick rubble was crushed into fine aggregate required in the mixing of mortar and concrete. The manual process was performed through the use of a simple hammer, while the mechanical process required the use of a mobile stone crusher. Using the mechanical device, 1 stone crusher operator and 6 support workers could create 15 cubic meters of aggregate each day, relying only on 0.6 liters of oil per cubic meter. Several stone crushers were deployed throughout the affected area, and rubble crushing was conducted extensively.

Source: Satyarno, Iman, "The Application of Recycled Brick Masonry Wall Rubble for the Post 27 May 2006 Yogyakarta Earthquake Reconstruction," from the Recovery Status Report: The Yogyakarta and Central Java Earthquake 2006. International Recovery Platform and Department of Architecture and Planning and UGM, 2009.

Lesson

- Brick masonry wall rubble is a good source of materials for use as aggregate in concrete used to build permanent replacement housing

Box 7: Sources of building materials

Ideas on the sourcing of certified timber and other raw materials and strategies on the sound use of wood are presented by the World Wildlife Fund (WWF) at:

http://www.unece.org/trade/timber/docs/sem1/papers/r36Rainey.pdf#search='sourcing%20of%20certified%20timber

Chapter 9

Issue 8 : Construction Labor

The demands for rapid recovery of housing infrastructure, such that affected families may return to permanent shelter solutions, is outstanding. Personnel are needed for design, demolition, cleanup, manufacturing of materials, structural repair, construction, supervision, inspection, ancillary support (e.g. meals and lodging support), and much more. Each of these includes a mix of skilled and unskilled laborers and/or volunteers, technical experts, and managers. Without ample personnel, a community may find itself in a situation where it has enough funding and materials to rebuild, but it lacks the personnel to support the workload.

The most important personnel source is the affected region itself. These individuals, whether they were personally affected by the disaster or not, have the most vested interest in the outcome of the recovery effort and are most in tune with the community's character. Many of these people are likely to be in need of immediate employment. As recovery efforts often require long-term commitments, locally hired workers are more likely to be able to commit to the full course of the reconstruction effort, and are less likely to suffer from recovery and reconstruction "burn-out". Using workers from the local economy also has the added benefit of ensuring that more recovery funding stays within the community, which in turn helps to spur long-term economic recovery. At the same time, wages must be set competitively but not set at a level so high as to draw workers out of other jobs, therefore destabilizing any remaining balance in the local workforce.

There are three mechanisms by which local labor is typically compensated.

1. **Food for Work**: Food for work programs provide food aid for victims in exchange for reconstruction and repair labor. The basic tenet of the program is that victims are provided with a much-needed resource (food), while at the same time the community directly benefits from the work that is conducted by the aid recipients. These programs, when successful, are effective in reducing the sentiment among victims that they are merely begging for handouts, and it helps recovery planners to increase the feeling among victims that they have an active stake in how their community recovers. Food aid programs must be designed such that they do not benefit individuals in good health and physical condition over those who are unable to work, nor should they negatively impact local markets.

2. **Cash for Work**: Like food for work programs, cash for work programs provide financial assistance to survivors of disaster events. These programs help to bridge the period between the disaster and the recovery of livelihoods when victims are able to begin earning an income in their former profession.
3. **Owner labor**: Homeowners and residents can be provided with the materials and technical assistance required to rebuild their home, thereby significantly decreasing the construction costs of recovery housing units. Owner labor schemes are rarely supplemented with a cash or food income, given that the owner is benefiting by the recovery effort itself.

Case 65: El Salvador Earthquakes - January/February 2001

Topic: Owner Provided Labor

A government-driven housing reconstruction effort in the Municipality of Santa Elena in Usulutan was developed in order to meet a shortage of 325 housing units (to house 1,625 total beneficiaries). The construction labor needs were met jointly through the employment of the owners themselves where appropriate, and by contracted laborers in all other instances. Owners provided auxiliary unskilled labor in the following tasks:

- Digging foundations
- Digging latrines and pits
- Carrying materials
- Preparing and carrying concrete and mix
- Preparing material for roof structure.

Skilled laborers were hired to handle more critical or complex tasks, including:

- Concrete block laying
- Assembling of structural reinforcements
- Installation of metallic structures (e.g. doors, windows, roof and covering structures)
- Installation of pre-fabricated columns

The participation of owners was logged through the use of attendance control cards. Cards were administered and verified by an independent NGO (World Vision El Salvador). Owner labor effectively reduced costs by 4%, thereby expanding the reach of the program. A post-recovery assessment found that the use of owner/beneficiary labor increased project productivity and reach. It also decreased project costs overall. However, it was found that owners/beneficiaries are best utilized for unskilled labor. To expand the benefit of the program, construction training can include non-construction lessons such as legal advice.

Source: World Vision. 2002. El Salvador Housing Reconstruction Program. Final Report. November 31. http://pdf.usaid.gov/pdf_docs/PDABX280.pdf

Lessons

- The use of owner labor can provide a modest decrease in construction costs, which in turn increases the reach of reconstruction funding available
- Owners/beneficiaries are best used for unskilled labor
- Training can extend the reach of programs relying on owner labor

Case 66: Earthquake and Tsunami, 2004, Banda Aceh, Indonesia

Topic: Availability of Materials and Skilled Labor

Major shortages of local skilled labor during the reconstruction effort that followed the December 26th tsunami were not recognized until after the effort began in earnest. As such, there arose a number of significant and unexpected implementation difficulties. In attempting to redress these deficiencies, many agencies found they were unable to identify local partners that could provide technical expertise, and were thus forced to place greater reliance on recruited staff and international consultants. This outsourcing (of skilled labor) resulted in severe impact on budgets, because the outsourced labor was much more costly. And while numerous contracting firms established themselves in the aftermath of the tsunami, there existed no process to certify skills or competency so outcomes using these resources were mixed. For instance, some agencies were forced to terminate agreements mid-contract due to poor workmanship that were bleeding budgets. There were also labor shortfalls in the public works department, other key ministries, and local government, which in turn caused severe delays with land identification, site clearance and utilities connections.

Source: da Silva, Jo. 2010. Lessons from Aceh: Key Considerations in Post-Disaster Reconstruction. Arup. Practical Action Publishing Group

Lessons

- Housing reconstruction agencies may find they are unable to identify local partners that could provide technical expertise, and may thus be forced to place greater reliance on recruited staff and international consultants
- Outsourcing of labor can strain recovery program budgets

Case 67: Earthquake, El Salvador, 2001

Topic: Food for Work

The January 13, 2001 earthquake that struck El Salvador severely affected Lamaria municipality in the country's west. About 3000 homes were completely destroyed in Lamaria, and 13,440 people were affected. A project called La Hermandad headed by a European Red Cross agency took over management of temporary shelter. The project sought to create a ''model community'' for 300 poor and homeless families with the objective to lay the physical basis of a new semi-rural housing development. The selection of the construction site was done in coordination with Lamaria's mayor's office. In May–June 2001, La Hermandad was presented to potential project beneficiaries (50 eligible families) as a participatory housing reconstruction project, namely a ''food for work'' project. The majority of selected beneficiaries were living in temporary shelters. The main selection criteria were as follows: families must earn no more than two minimum salaries and never have owned a house or a plot of land. Some were of rural origin, others from town; some had experience in masonry construction, many did not. Overall, beneficiaries' input in project design was limited, even if project leaders said that the beneficiaries had been involved in project design at the earliest stage. In fact, their input was limited to endorsing the housing design proposed by the NGO but with one extra demand: to add a wall around each individual plot of land. The project logic was as follows.

Each family would receive an 80m2 brick house (brick is a housing material produced in the area, culturally more appreciated than cement blocks) on a 200m2 plot. Houses were identical and consisted of two 20m2 ''bedrooms'' and a 40m2 ''living room''. Unlike the other two projects forming this new ''urbanization'', no construction equipment was hired, as the entire process relied on manual labor. In La Hermandad, one adult per nuclear family had to work 150 h each month; family members were to reside full-time on the construction site and had to respect a series of regulations. Workers received training from 17 professional masons, and were under the authority of a supervisor and an engineer. A social worker was also hired for 6 months in order to develop ''community'' activities on the site. What is of significance here is that in order to have access to a new anti-seismic house, 80% of the beneficiaries had to abandon their other remunerated activities in order to comply with the mandatory working hours. This entailed a major or total loss of income for the entire duration of the reconstruction process. In exchange of their manual labour, participants received food rations on a monthly basis (distributed by the World Food Program) and—at the end of the process—became the recognized owners of a house they could legally claim as their own.

The project began in June 2001 and was supposed to end in early February 2002. However, due to various problems such as an overall increase in physical fatigue and health problems, the latter in part due to irregularity in food distribution and an unbalanced diet, project completion was delayed until the end of June 2002. Throughout

the entire process, participants had very little input in decision-making, both in terms of the physical aspects of construction and the more social components of the project, namely the creation of six ''social committees'' organized by the social worker who mainly recruited the women (committees on food distribution, hygiene, environment, education, etc). The purpose behind this initiative was to foster a sense of community in La Hermandad, an objective which was regularly insisted upon during the monthly general assemblies, where project supervisors would encourage beneficiaries to get along better, work harder (as the project was lagging behind) and realize that they were now forming part of a ''new community''. This communitarian ideal is not new in both development and reconstruction projects but cannot be taken as self-evident.

In March 2002, project leaders halted a participants' initiative to form a local representative body with official legal status, so long as the construction process was still underway. In other words, they did not wish to see their authority undermined by an initiative, which could have indeed enhanced a sense of social cohesion among the beneficiaries.

Project management followed a strictly top-down approach, where the lines of command remained hierarchical throughout the entire duration of the process; this, in turn, could not sustain the communitarian ideal, which was promoted in all public discourses. Second, the contradiction between discourse and practice shows a lack of understanding of people's motivation to participate in the project; indeed, beneficiaries were not there to form a community but first and foremost to have access to a new house they would eventually claim as their individual property. In this sort of situation, motivations are better explained in individualistic and utilitarian terms rather than according to an idealized concept of community building. Third, even if in the end the users' perception of the physical qualities of the houses was positive, their participation in the process remained quite limited; they did not have any impact on the technical aspects of construction and were disinclined to engage themselves in any social components and/or activities organized from above.

Source: Davidson, Colin, Cassidy Johnson, Gonzalo Lizarralde, Nise Dikmen, and Alicia Sliwinski. 2006. Truths and Myths About Community Participation in Post-Disaster Housing Projects. Elsevier. http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V9H-4M6SB59-1&_user=10&_coverDate=03%2F31%2F2007&_rdoc=1&_fmt=high&_orig=search&_sort=d&_docanchor=&view=c&_searchStrId=1433602165&_rerunOrigin=google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=f95f69f9d1bead3ea756009aa7fc32ea

Lessons

- Physical fatigue and health problems among workers can cause unexpected delays in reconstruction
- Social communities can be formed around key issues that are required to support recovery, such as food distribution and hygiene, for example
- Top-down approaches to project management inhibits community

ownership in the project

The second largest pool of personnel is typically drawn from the governmental (affected government and bilateral assistance) and nongovernmental agencies and organizations active in disaster response and recovery. These agencies may use their own full-time personnel for this task or recruit accordingly. For example, in addition to providing all of the necessary materials, Habitat for Humanity recruited enough volunteer labor from both within and outside of the region to construct over 5,000 houses in various impacted Central American and the Caribbean countries after Hurricane Mitch.

Finally, private contractors from around the country and the world may be lured with the promise of recovery dollars to work in the affected area. It is possible to support the local economy by using local construction contractors, but given that demand greatly exceeds what is normal (and therefore a driver of local supply), these local resources will quickly find themselves overbooked. Externally sourced contractors are a strong source of recovery labor given that the pool of individuals with the necessary experience is much larger, and their disassociation from disaster impacts increases the likelihood of their availability. However, they are much less likely to be familiar with cultural preferences, community dynamics, and vernacular styles, and have much less vested interest in the long-term success of the community (among other important factors). External contractors are also likely to bring with them their own support staff and teams, including laborers and artisans, thereby pulling more funding away from the affected area and competing with other non-construction jobs that exist locally. It has also been found that the machinery outside contractors bring can lead to further reductions in local employment potential (Rawal, 2006).

Case 68: Earthquake and Tsunami, 2004, Banda Aceh, Indonesia

Topic: Contract Labor

Following years of conflict, very little skilled labor existed in Aceh prior to the tsunami. As a result, the local construction capacity was extremely limited. Moreover, reconstruction programs (particularly self- or community-build) suffered from a mismatch between the chosen type of construction (reinforced concrete and masonry) and the capabilities of these local laborers. This was particularly true in communities whose main livelihoods were fishing and agriculture, and where old vernacular housing construction skills were no longer being passed down from generation to generation. One DEC Member Agency was successful with a small scale program that enabled community-build by focusing on the retraining of fisherman from within the community to become builders. These skills allowed the fisherman to reconstruct their houses and have an alternative source of income. Unfortunately, this approach (which recognized the livelihood opportunity of reconstruction) was not widespread. Finding skilled local labor was a constant challenge and increasingly skilled labor was imported from Medan, Jakarta or Java. However the remoteness of many sites, lack of infrastructure and poor

living conditions meant laborers were only prepared to work a few weeks or months at a time.

Source: da Silva, Jo. 2010. Lessons from Aceh: Key Considerations in Post-Disaster Reconstruction. Arup. Practical Action Publishing Group

Lessons

- In post conflict situations, there may be extreme shortages in locally-available labor
- Contract laborers may not be willing to work in remote locations for extended periods of time

Of paramount concern to recovery planners is keeping recovery funding where it is needed most – in the affected community itself. Just as this was true with the purchase of materials from local markets, it is important that local labor be supported by this sudden influx at a time when expendable income will otherwise be short or nonexistent. There is, of course, no single correct way that this may be done, as the capacity of each village to meet these demands differs considerably. One organization (UpLink) has set a target of keeping 60% of recovery funds expended within the affected community, while the other 40% is spent on imported materials and labor (UpLink, 2005).

Case 69: Cyclone (1999) / Flood (2001), Orissa, India

Topic: Using Local Labor to Reduce Construction Costs

Orissa State was affected by a super-cyclone in 1999, damaging about two million houses, and a flash flood in 2001, damaging another 275,000 houses. About 70% of the houses have mud floors and/or walls, and about 50% have grass, thatch, bamboo, wood, mud, or other natural materials for a roof. As such, houses are highly vulnerable. An original Government of India plan to rehabilitate 600,000 houses, which provided each family with 22,000 Indian Rupees (about $540), ultimately proved insufficient for a number of reasons including a spike in construction materials and transportation costs in the disasters' aftermath, families using a portion of the money for other needs (e.g. food), families attempting to build a much larger house than the funds could accommodate, and a shortage of skilled masons to address the scope of need. In July of 2002, the "Rural Housing Project" was launched to address these identified shortfalls. The project aimed to accomplish the following:

- Promote the use of local building materials and appropriate housing technologies
- Allow them to acquire housing that adequately meets their needs
- Promote a community-driven effort

- Develop the capacity of local laborers to construct disaster-proof housing
- Enable networking and training to increase technical expertise

Ultimately, about 4500 families benefited from the project, and built new homes using disaster resistant design. Individuals provided with training, both technical and non-technical, were able to improve their income generation potential. And finally, many women were able to use their skills to gain a livelihood in skilled masonry. It was only through persistent attention to human resources that this project was able to bring about such positive social and economic linkages. Most rural construction artisans lacked the skills to construct a safe masonry house prior to the program, but the program helped to ensure that risk reduction mechanisms were incorporated into all houses, reconstruction or new, moving forward. It was found through the project that the greatest amount of behavioral change occurred in areas struck by repeat disasters, and that without guidance, rural construction is rather informal with regards to planning and approvals (causing many houses to remain unfinished for years).

Source: Sarkar, Anindya Kumar and Pradeep Jena. 2007. Promoting Social Mobilisation and Appropriate Housing Technologies for Disaster Mitigation and Poverty Reduction in Orissa. http://www.undprcc.lk/ext/mdgi_regional_workshop_2007/pdf/Employment%20Generation%20and%20Participatory%20Area%20Development/India_Orissa_Housing.pdf

Lessons

- Individuals provided with training, both technical and non-technical, are able to improve their income generation potential
- Persistent attention to human resources was required to bring about positive social and economic linkages
- The greatest amount of behavioral change occurs in areas struck by repeat disasters
- Without guidance, rural construction is rather informal with regards to planning and approvals, possibly causing many houses to remain unfinished for years

One of the greatest benefits of local and owner labor use is the long-term positive impacts related to skill-building and community empowerment. The sustainability of projects are increased substantially given the ability of local homeowners and laborers to make repairs and renovations to existing houses, and to build new houses with hazard resilient design. Also, the livelihoods development relevant to such training can help affected individuals to better cope with traumatic stress and the loss of their regular livelihood income.

Case 70: Earthquake and Tsunami, 2004, Banda Aceh, Indonesia

Topic: Local Labor

The December 26 earthquake and subsequent tsunami that struck Banda Aceh resulted in the need for the construction of 130,000 new houses and the repair of about 95,000. Most humanitarian organizations tried first to construct houses using their own labor, or to tap the community. Cash for work, tools, and equipment were provided. However, a shortage of adequately trained construction workers resulted in the need for organizations to hire skilled labor directly or to appoint contractors (with the community providing only unskilled work). It was found through the administration of these projects that community and self-help efforts are most appropriate where housing or shelter design is relatively simple, communities have a tradition of self-building and there are no strict time pressures. Shelter reconstruction was a good source of income generation for the affected population, and helped to provide victims with training and access to credit. The training itself helped to alleviate staff shortages that occurred in the initial stages of the project. Using large-scale vocational training programs, it became possible to strategically address immediate shortfalls in skilled labor in the short term while fueling longer-term development of a local construction industry.

Source: da Silva, Jo. 2010. Lessons from Aceh: Key Considerations in Post-Disaster Reconstruction. Arup. Practical Action Publishing Group.

Lessons

- A shortage of adequately trained construction workers may result in the need for organizations to hire skilled labor directly or to appoint contractors (with the community providing only unskilled work)
- Community and self-help efforts are most appropriate where housing or shelter design is relatively simple, communities have a tradition of self-building and there are no strict time pressures
- Shelter reconstruction can provide a good source of income for the affected population, and help to provide victims with training and access to credit
- Training can help to alleviate staff shortages that occur in the initial stages of a housing reconstruction project

It is of dire importance to the economic balance of the community that the use of local labor is utilized in such a way as to avoid negatively impacting stable and recovering livelihoods. When local recovery labor schemes offer salaries that exceed market rates of other professions requiring equivalent skill and knowledge, workers can be drawn away from their jobs thereby causing the weakening or collapse of other markets and industries. For instance, agricultural laborers may elect to take advantage of a higher salary in the recovery construction efforts, which in turn leave local farmers unable to

manage their harvest. Food for cash programs need to strike a proper balance between accommodating an unemployed and destitute workforce and creating an adversarial competitive atmosphere among employers.

Case 71: Cyclone, India, 1977

Topic: Local Labor

Local labor was used for reconstruction of the housing sector following the cyclone. Government recovery planning utilized a holistic recovery approach, addressing livelihoods and shelter together. This effort included the provision of livelihood training (relevant to construction), and ensured that the timing of efforts correspond with agricultural seasons as to minimize the impacts on that sector. The program included the distribution of kits that included locally applicable reconstruction guidance materials, supplemented by information that allowed laborers to more effectively build cyclone resistant housing. The effort was further supported by the creation of a special center that provided technical training and information to interested local laborers. As needed, the project was halted to ensure that labor was not diverted from agricultural tasks, and to ensure the availability of appropriate materials. Where recoverable materials were available, affected communities were able to reconstruct sufficient shelter for themselves. Livelihoods, and the recovery of the rice crop and paddy fields, were recognized as being of primary importance to long-term sustainable recovery. Traditional materials choices and traditional building methods were supported and strengthened. Using inter-agency coordination to set up a specialized technical training center created a neutral forum where all actors could get information and could receive evaluations of their progress without bias. Due to the complexity of such timing, gaps in coordination did occur, thereby preventing a systematic and equitable response to all affected areas (and in some cases resulted in the provision of inappropriate housing types and response methodologies that were damaging to the recovery process.)

Source: International Federation of Red Cross and Red Crescent Societies (IFRC), United Nations Human Settlements Programme (UN-HABITAT) "IASC Emergency Shelter Cluster: Shelter Projects 2008." UN HABITAT, 2008. http://www.disasterassessment.org/documents/IASC_shelter_projects_2008.pdf

Lessons

- Planning can incorporate a holistic recovery strategy by addressing shelter and livelihoods together
- Owner-driven construction planning should accommodate agricultural and fishing seasons, and construction should be halted as necessary to ensure that labor is not diverted from necessary tasks
- Kits that explain how to construct hazard-resistant homes will help to increase the likelihood that hazard-resistant construction methods are applied by owners

Issue 9: Maintaining Lives, Livelihoods, and Community Character

Chapter 10

Many aspects of housing reconstruction, most importantly that of its site selection, have profound impacts on the lives and livelihoods of beneficiaries and on the character of the community itself. Communities are comprised of much more than simple groupings of houses and their inhabitants. The community is the product of the jobs people have built over generations, the customs and practices they embrace, and the interactions between family members and neighbors. The very shape of houses and their placement in relation to each other (and to community landmarks) are vital to the acceptance by the community and therefore the success of the overall project. Each of these factors must be considered and addressed when performing recovery in the housing sector, whether in the same or a new location.

The design and functionality of the house, and its location relative to its original site, have the greatest impact on the ability of an individual to maintain a viable livelihood. However, the availability and quality of wraparound services (including such things as electricity, transportation, water, sanitation, education, healthcare, social and religious networks, etc.), are key to the retention of the community's function and character and thus paramount to the sustainability of any housing sector recovery effort. For this reason, housing reconstruction cannot be planned in a vacuum. Rather, planners must think beyond the simple reconstruction of units and to take a broader view of the linkages that exist between sectors and among people and their surroundings

Case 72: Earthquake and Tsunami, 2004, Banda Aceh, Indonesia

Topic: Wraparound Services

In the reconstruction effort that followed the December 26 earthquake and subsequent tsunami in Banda Aceh, communities took a number of different approaches to prioritizing the order of sectors addressed. In those communities where reconstruction planning prioritized the provision of houses but failed to concurrently address the need for community services, livelihoods assistance, or the resumption of public facilities, the reconstructed and repaired houses often remained unoccupied for quite some time after completion. Many families chose rather to remain in their temporary or emergency

accommodation for reasons ranging from proximity to stable employment, access to water and electricity, and working sanitation systems.

Source: da Silva, Jo. 2010. Lessons from Aceh: Key Considerations in Post-Disaster Reconstruction. Arup. Practical Action Publishing Group

Lessons

- Reconstruction planning efforts should concurrently prioritize the provision of houses and the resumption of vital community services and livelihoods
- Families may choose to remain in their temporary or emergency shelter to be closer to their jobs, or to have access to life-sustaining infrastructure

Communities are often in high-risk locations because the jobs of those that live there are dependent upon some benefit that is to be gained through the location. For instance, the fertile soils of floodplains and volcanic slopes, the ease of access to fishing resources along coastal and riverine waterways, the interaction with commercial routes in mountain valleys and on major rivers. Livelihoods that form in each of these areas may have developed over generations, and are now synonymous with the identity of the community. When communities with such location-dependant livelihoods are moved away from the very resources that make their lives viable, it takes an incredible amount of support to ensure that the community survives the transition. Similarly, it must be recognized when a home is also a place of work for the resident. When the design of a house is the product of an evolution in livelihoods development, such that the design itself is what allows the affected individual to perform a task or produce a product, any changes to that design can have dramatic effects on the livelihood of the occupant.

Organizations or agencies faced with a situation where a housing program is likely to impact livelihoods must first garner a strong understanding of the dynamics of that livelihood in relation to location, housing design, community character, and other factors, and analyze how the new location or new design will impact those factors. It is possible to maintain livelihoods, or to reinvent livelihoods, but not without proper consultation, training, and resource support.

Case 73: Indian Ocean Tsunami, Maldives, 2004

Topic: Effect of Relocation and Housing Redesign on Livelihoods

Following the tsunami in the Maldives, it was determined that relocation was the only sustainable option for villages located on some of the smaller islands that had been severely affected and for which projected changes in sea level that threatened to flood all buildable land. In one particular case, an entire island fisher folk community was relocated to a larger island. Beneficiary families were given suitable replacement housing that was considered comparable or better than what they had previously owned. The only major difference in the housing design was the removal of facilities

suitable for processing fish. The facilities were not built into the housing because the new location was very close to a major fish processing plant that alleviated the need for in-home processing. Fishing opportunities were otherwise comparable to the former location. There was, however, an unforeseen impact from this approach in that the women, who spent hours each day processing and cooking the fish, suddenly found their skills irrelevant because of the processing plant. And without the processing facilities in their houses, these women could not have maintained their traditional ways even if their families chose to do so. The thinking behind the omission of this component was that the processing plant offered an equivalent cost alternative that was otherwise seen as an improvement in quality of life. However, the result was that women exhibited higher rates of depression than had existed in the former location, and in turn dissatisfaction with the new housing provided.

Source: H.E. Mr. Abdulla Shahid. 2010. IRP Recovery Focus Group. Kobe, Japan.

Lessons

- Relocation may be the only acceptable solution when small islands or coastal communities seek to reduce hazard risk
- Relocation that results in the loss of livelihood or household function, even for non-compensated family members, must be addressed through some alternate means

Case 74: Floods in Mozambique, 2000

Topic: Maintaining Access to Fields

The World Bank published a report that considered the impact and outcome of disaster recovery on communities in Mozambique after the flooding of 2000. This report, *Learning Lessons from Disaster Recovery: the Case of Mozambique*" used surveys of the residents to gather information about the conditions in several cities after resettlement programs had been carried out. The results show that there are a number of issues with the resettlement program in the three cities where the surveys were conducted. Many of the resettled populations had to move a considerable distance from their farms. This led to the households taking one of two options - refusing to move and maintaining their homes in the lowlands but not receiving any official support, or living in the resettled areas and building temporary shelter near the farms during peak agricultural work periods. Facilities such as schools and health clinics are being provided in the resettled areas. Families resettled from the city of Maputo were please to find themselves with more space and privacy than previously experienced in the overcrowded suburbs. This was mentioned as a positive aspect. However, these families were faced with reinventing livelihood strategies - becoming farmers instead of petty traders and social disruption with the male members of the household staying in the city during the week and only returning home at weekends in order to maintain jobs and other income

earning opportunities. The majority of households in Marracuene was pleased with the new housing arrangements and felt that the fresh start may help to create a community spirit not apparent in the city, where criminality was one of the major risks to household livelihood security. In areas such as Chokwe where land was not an issue, resettled families were accepted and absorbed. By contrast, in Marracuene the resettled population has found it difficult to find land for farming in the area and was having to "borrow" land from residents in a type of sharecropping scheme. Initially in the resettled areas resident families did not benefit from new housing, but this created conflict within the communities, and the national NGO involved decided to expand the re-housing program to include all affected residents in the settlement areas.

Source: World Bank. "Learning Lessons from Disaster Recovery: The Case of Mozambique." World Bank, 2005

Lessons

- Separation of individuals and their livelihoods caused by relocation may result in disruption of households when the working members of the family choose to remain at the original site rather than lose their income

Case 75: Great Hanshin Earthquake, Japan, 1995

Topic: Fragmentation of Local Communities

In the period of short-term recovery following the earthquake in Kobe, there was minimal assistance for the construction of private temporary housing on private lots and temporary repairs. As a result, many residents had no choice but to leave their original community, causing social fragmentation. The administrative bodies did not accept cooperation from the residents in obtaining land for temporary housing, rather they willingly purchased lots in the to-be-redeveloped or to-be-rezoned areas but gave little consideration to the potentiality of other lots. There were many small lots available for temporary housing in the inner city area. It was, however, actually made infeasible for temporary housing to be built on a private lot by a strict condition set up in response to the demand from people for the construction of temporary housing on a single lot (in the case of Kobe city), despite the fact that the Public Housing Law States that the building of two or more housing units on one lot can be recognized as publicly beneficial. The administrative bodies that were demanding large housing sites built temporary housing estates in suburban areas. As a result of such policy that totally dominated the pursuit of public temporary housing, residents were shunned from their home town.

Source: Shiozaki, Yoshimitsu, Eiichi Nishikawa, Toshikazu Deguchi, eds. 2005. Lessons from the Great Hanshin Earthquake. Hyogo Research Center for Quake Restorartion; Kobe, Japan

Lessons

- Relocation wherein fragments of society relocate together causes disruption in

the makeup of the social communities

- Density regulations may need to be adjusted to allow for the retention of community integrity in cases where relocation is required

The protection and/or retention of community character is closely related to the psychosocial recovery of a community, but driven by the decisions made in the planning and implementation of housing recovery and the recovery in other sectors. By involving community member recipients and leadership in the planning and development phases, it is possible to avoid the mistakes that might not surface until well after construction has begun. Only community members can adequately identify and assess needs, and predict how any changes to the community layout and functionality might impact those needs.

Case 76: Hurricane Mitch, Nicaragua, 1998

Topic: Housing Use

In the post-hurricane housing reconstruction efforts following Nicaragua, little consideration of cultural context was incorporated into the planning conducted for the allocation of recipient housing. As a result, it was often the case that extended family members were excluded from consideration in planning designs, and in turn the new homes were not constructed with ample space to accommodate these individuals despite that they were regular members of the household. Without adequate replacement housing in relocation communities, they had no choice but to remain in the area of highest risk. In Central America, it is customary for several generations to live within the same area. However, when determining the beneficiaries for the project, the notion of "family" was confined to parent(s) and children, so houses were designed for up to six people. Inevitably, this meant that some members of the wider family, such as grandparents, stayed behind, often remaining in the risk area from which the rest of the family was relocated.

Source: IFRC, 2007. Rebuilding after Hurricane Mitch: Housing reconstruction in Honduras and Nicaragua. http://www.proventionconsortium.org/themes/default/pdfs/IFRC_Mitch_recovery07.pdf

Lesson

- Permanent housing needs to account for the household preferences of recipients, including multiple generations of the same family or lateral relations cohabitating

Without consultation of the affected population or with community leadership, efforts that do not rely upon owner-driven planning, that require the use of foreign design, or that involve any form of relocation, it is more likely that reconstruction efforts will rely upon a common standard of design and community layout. The most obvious consequence is a loss of character, most notably the uniqueness of the community.

Other less tangible consequences will result as well, and perhaps with greater impact overall. These include the disruption of social networks, the unease of the population associated with a sense of displacement, and an upset of the social order.

Case 77: Earthquake and Tsunami, 2004, Banda Aceh, Indonesia

Topic: Housing Function

The December 26 earthquake and subsequent tsunami that struck Banda Aceh caused significant devastation in coastal communities that was near total in places. Over 800 km of coastline was destroyed. The reconstruction effort was especially challenging given the scale of destruction, the difficulty in reaching the affected areas, and the pre-existing poverty caused by nearly 30-years of armed conflict. The combined earthquake and tsunami dramatically impacted housing stock in Aceh. Official estimates showed 130,000 new houses were needed, and about 95,000 were damaged but repairable. Many victims expressed a desire for improvement in the design of their new home over what they previously owned. The need most commonly cited by recipients of donated homes was the addition of a kitchen facility that allows for open fire cooking. Although many NGOs built homes with kitchens, many built more 'modern' indoor kitchens that did not necessarily account for beneficiary customs. As a result, many families have since built wooden structures with zinc roofing that lean against the back wall of the main house to meet their cooking space needs at a cost of about US$200. However, given the significant amount of donor funds provided, many beneficiaries have received additional low-cost housing amenities that include (for instance) glass windows, internal ceilings, plastered walls and painted exteriors. Although many of the donated homes are not connected to septic systems, this is no change from pre-event conditions and as such has not been a major point of contention. A post-recovery assessment of this project found that while an open fire kitchen might be considered by a donor to be a 'downgrade' or even an addition; many Aceh beneficiaries did not consider homes to be complete without one. A lesson that emerged was that a massive influx of donor funding, coupled with a desire to quickly address housing shortages, can result in inferior or undesirable homes. Timeframes also influence quality, because shortages of skilled labor can cause some institutions to feel they need to hire substandard construction contractors in order to complete housing shelters in a short timeframe. Coupled with competition for resources, the short timetables led NGOs and grantees to design products that met the vision of the donors, rather than the needs of the local population. It was also found that the rapid increase in demand for building supplies led to profiteering by institutions that sold inferior products to the contractors charged with construction. To quickly provide shelter for homeless tsunami survivors, many institutions used prefabricated homes or designs that resulted in culturally inappropriate housing (such as including an indoor bathroom and/or kitchen, which is not typical or desired in Aceh.) Using the homeowner as a supervisor was an effective oversight mechanism that helped to ensure palatable, high-quality, contractor-built housing

resulted.

Source: Bringle, Tara Panek and Lisa Pacholek. 2008. Case Study: Post Emergency Housing Finance for the Poor; Aceh, Indonesia. Development Innovations Group. July 31.

Lessons

- Modern appointments in replacement housing may be incompatible with the preferences and lifestyles of recipients, and as such planning must be cognizant of these needs even if they mean that modern amenities are avoided
- Household design should meet the needs of the recipients, not the vision of the donors
- Using the homeowner as a construction supervisor cab be an effective oversight mechanism that helped to ensure palatable, high-quality, contractor-built housing resulted

Of course, the disaster impacts are a major factor in changing community character and culture – most typically in a negative fashion. The loss of structures presents a loss of history, and of appearance. When buildings and houses remain damaged, destroyed, and/or abandoned for a long time, they become characteristic of the community as a whole, and detract from other reconstruction milestones. Morale among community members may remain low as long as the reminders of the pain and suffering wreaked by the event remain before them. In the poorest communities, there will be the fewest resources for recovery and as such, more structures are likely to go for longer periods of time without repair or reconstruction. Governments and other donors may see no reason to address these abandoned structures given that there is no recipient to benefit. To the residents around them, however, they can be a signal that recovery is not occurring quickly enough, that the community is failing, or that what was lost cannot be regained. Moreover, these buildings are a safety hazard and can be a magnet for crime and/or ongoing hazard risk.

Case 78: Los Angeles, USA Earthquake, 1994

Topic: Community Stabilization

In the months following the earthquake, the municipal government estimated there to be 19,000 vacated housing units with an additional 10,000 units "at risk" for abandonment. Many of these buildings were low-rise structures that had suffered from "soft story" failures that were repairable. Landlords and owners generally lacked insurance or other means to secure financing. Damaged and abandoned buildings became gang hideouts and crime quickly rose. The municipality identified 17 "Ghost Towns" according to a set assessment criteria (within the city limits, having more than 100 vacated units, and more than 60% of the units were either heavily damaged or destroyed). The primary fear was that the conditions associated with the damaged and

abandoned units would cause additional flight from the neighborhoods and additional blight. The 17 Ghost Towns contained approximately 1,000 properties and 17,000 residential units. The city formed a special division to monitor Ghost Town progress. Security was provided for the neighborhoods to reduce and prevent crime. Loan alternatives were provided to property owners who did not have insurance and/or could not secure funding on their own. Apartment rental units were classified as businesses, allowing them access to a greater number of government and private loan programs. Funds had to be used to repair damage and the repairs had to meet the latest building code standards. The city also required that 20% of all rental units in buildings repaired with these loans be "affordable" (i.e. available at below market rental rates). By January 1996, more than 65% of the Ghost Town units had loans and repairs were underway, and by January 1999, nearly all units were repaired and loan payments were beginning. LA's Ghost Town loan program successfully rebuilt damaged housing and stabilized neighborhoods. Only 500 units were demolished, which reduced the recovery time involved in demolition and full reconstruction. A post-recovery assessment found that the provision of security to reduce crime and illegal settlement in damaged structures can help prevent ghost towns. Governments and donors should also prioritize reconstruction to ensure that community failure is contained according to established and situation-appropriate standards. Expanding access to financial resources (including loans) to landlords and homeowners can also help to prevent total community failure. Then, by tying mitigation and construction requirements to financial assistance, it is possible to better control hazard risk reduction.

Source: Johnson, Laurie. 2000. Kobe and Northridge Reconstruction: A Look at Outcomes of Varying Public and Private Reconstruction Financing Models. Euro Conference on Global Change and Catastrophic Risk Management. Austria. http://www.iiasa.ac.at/Research/RMS/july2000/Papers/johnson_housing0401.pdf

Lessons

- Landlords of damaged or destroyed structures may lack the means to repair or replace their buildings, leading to a reduction in post-disaster housing stock
- The inability of landlords or homeowners to replace housing can lead to the appearance of 'ghost towns', which make recovery more difficult or impossible even for those with the means to recover
- Landlords may require access to business recovery funding in addition to shelter recovery funding to address the scope of repairs and reconstruction that is required
- Support for landlord repair can be accompanied by restrictions on rental prices that increase the amount of affordable housing available in the immediate and medium-term aftermath of a disaster (when housing shortages are most likely and rental rates typically rise)
- Security to reduce crime and illegal settlement in damaged structures can help

prevent ghost towns

- Governments and donors should prioritize reconstruction to ensure that community failure is contained according to established and situation-appropriate standards

In certain instances, the disaster itself is enough of a shock to the affected society as to bring about a change in community character irrespective of the housing efforts. Whole societies can change their preferences and ways of thinking due to the losses they have endured, and what they see as a way forward towards recovery. Individuals, families, and communities must 'make do' in the intervening period of recovery, and this can equate to permanent migration away from the affected area, a move towards urban centers where alternate livelihoods are, and changes in the way people choose to house their families. Housing reconstruction planning is most effective when these trends can be anticipated and accommodated. Planners need to understand if beneficiaries wish to rebuild their single family homes as medium and high-rise apartments, or if they would like to modernize their housing stock. These types of decisions are only effective when they are driven by the affected population, not imposed upon them.

Case 79: Great Hanshin Earthquake, Kobe, Japan, 1995

Topic: Community-Level Planning

The earthquake destroyed thousands of housing units in the city of Kobe. Japan instituted a top-down, government-led, reconstruction planning and implementation process. The municipal and regional governments applied the lessons of previous reconstruction efforts, such as the land readjustment and urban redevelopment used extensively after World War II. The recovery plan did not anticipate a large increase in urbanization caused by various direct and indirect factors (including economic recession and a search for housing), or the fact that complex ownership patterns - compounded by land readjustment processes and lack of private resources – would fuel an on-going, reactive, housing policy. Because the government's policies and programs for private housing reconstruction tended to favor full reconstruction and repair funding was more limited, demolitions and full-scale reconstructions were unintentionally encouraged. In spite of all of this, the government was able to maintain the continuity of neighborhoods, and to return a sense of community where it had been weakened or lost in the years following the earthquake, by ensuring that government funded planners were aware of and gave due consideration to community-level concerns. Despite that this was a government-led recovery effort, stakeholder consensus on recovery plans was garnered through negotiation with neighborhood groups as conducted by government-funded planners. Japan used the lessons of previous development and reconstruction efforts, such as land readjustment and urban redevelopment used extensively in previous decades to modernize land ownership patterns and facilitate WWII rebuilding. Complex ownership patterns, compounded by land readjustment processes and lack of

private resources, fueled an on-going, reactive, housing policy (particularly for cooperative housing and condominium projects). The government's policies and programs for private housing reconstruction tended to favor full reconstruction and there was a more limited amount of funds for repairs, which encouraged demolitions and full-scale reconstructions. Government-funded planners and the neighborhood-level planning processes have been critical in maintaining neighborhood continuity throughout the reconstruction period.

Of particular note about these policies, however, was the unintended consequence they had in terms of relegating the more vulnerable groups to suburban districts. The logic that "the weak such as the aged and the disabled should be given relief as soon as possible," which seemed to be advantageous in light of the catastrophe the population was facing, caused a disjoint between members of the same communities, and the same extended families. Priority was placed providing the vulnerable groups with immediate temporary housing constructed in expansive suburban subdivisions, often on manmade islands. Meanwhile, the stronger, and relatively younger, populations remained in the inner city area given that they were unable to leave their livelihoods. The social structures of medicine, support, communication, and other factors were destroyed by this policy, and the more vulnerable were isolated.

Sources: Johnson, Laurie. 2000. Kobe and Northridge Reconstruction: A Look at Outcomes of Varying Public and Private Reconstruction Financing Models. Euro Conference on Global Change and Catastrophic Risk Management. Austria. http://www.iiasa.ac.at/Research/RMS/july2000/Papers/johnson_housing0401.pdf
Risk Management Solutions. 2005. 1995 Kobe Earthquake 10-Year Retrospective. http://www.rms.com/Publications/KobeRetro.pdf
Source: Shiozaki, Yoshimitsu, Eiichi Nishikawa, Toshikazu Deguchi, eds. 2005. Lessons from the Great Hanshin Earthquake. Hyogo Research Center for Quake Restorartion; Kobe, Japan.

Lessons

- Disasters may lead to a rapid increase in urbanization due to the affected rural population searching for homes and jobs
- Complex ownership patterns can lead to reactive housing policies
- Housing reconstruction programs should be open to funding repair costs when doing such decreases recovery time and cost, and does not necessarily result in a reduction projected risk reduction
- Prioritization policies that target vulnerable groups should ensure that they do not segregate these individuals geographically

The social makeup of a community can be one of the most difficult factors to assess. Disrupting this balance, with or without intent, can cause problems for all members of the community, even those who would appear to benefit from such changes. Social status can be a matter of shared memory, community sentiment, or implied leadership, and as such may not necessarily be something that an outsider is able to observe

through such indicators as wealth or appearance. In some instances, even when these factors are known, a desire to provide equal assistance to all beneficiaries can upset a social balance that held a community together, despite the benevolent intentions of the organization or agency that is driving the recovery effort. While there are situations where oppressive social practices are best abandoned as recovery moves forward, there are others where this balance itself is what holds the community together.

Case 80: Bhuj Earthquake, Gujarat, India, 2001

Topic: Respecting Community Organization

On January 26th, 2001, a magnitude 6.9 earthquake killed approximately 20,000 people and injured an additional 167,000. Over one million were rendered homeless. 7,633 villages were affected, and 450 villages were completely destroyed. 344,000 houses were completely destroyed and 888,000 reported damages. Several NGOs used Ex Nihilo contractor-led reconstruction. One NGO in particular was aware of the existence and importance of castes in rural India, but reorganized the new village territory along socio-economic categories instead (thereby attempted to replace a caste-based spatial organization with a class-based one.) The attempt to introduce such dramatic social changes made people unhappy and did not contribute to a reduction in socio-economic vulnerability. Families who were isolated from their communities expressed a sense of solitude and insecurity. This problem was felt in particular among women whose life is often confined by the boundaries of their neighborhood. These social reorganization plans no longer allowed people to live near their relatives and community members, and ultimately led to a mass refusal to occupy the new houses in one of the villages, and to the sale and exchange of houses.

Source: Barenstein, Jennifer. 2005. A Comparative Analysis of Six Housing Reconstruction Approaches in Post-Earthquake Gujarat. Scuola Universitaria Profesionale della Svizzera Italiana. http://www.odi.org.uk/hpg/meetings/SUPSI.pdf

Lesson

- Recipient input should drive decisions related to social grouping in relocation housing, given that grouping by socio-economic status, ethnic background, or other arbitrary factors can disrupt existing social networks and communities and separate families

Annex 1: Acknowledgements

IRP and UNDP India would like to acknowledge the input and expertise of the following individuals who participated in consultative workshops, served as resource person and technical experts, contributed case studies and/or peer reviewed the Guidance Note on Recovery: Shelter

Abdulkhaeq Yahia Al-Ghaberi, Head of the Unit, External Coordination Unit Ministry of Water & Environment Yemen; Abha Mishra, UNDP; Anindiya K. Sarkar, Consultant; A.S.Arya, National Seismic Advisor, India; Ashok Malhotra, UNDP; Atsushi Koresawa, Asian Disaster Reduction Center (ADRC); Benjamin McGehee Billings, Majority Staff Director Subcommittee on Disaster Recovery, U.S. Senate Homeland Security Committee; C. Balaji Singh, Executive Director, Care Today; David Stevens, United Nations Office for Outer Space Affairs (UNOOSA); Dr. Abdul Matine "Adrak", Afghanistan National Disaster Management Authority; Dr. Ehsan Mahmoud Kalayeh , Housing Foundation of Iran; Dr. Neil Britton, Asian Development Bank(ADB); Dr. Sudibyakto Senior Researcher, Professional Directive of BNPB National Agency for Disaster Management(BNPB) Indonesia; Dr. T. Yoyok Wahyu Subroto, Department of Architecture and Planning Gadjah Mada University, Indonesia; Engr. Majid Joodi, Director-General for Recovery Iran; G. Padmanabhan, UNDP; H.E. Abdulla Shahid, Minister of State for Housing, Transport and Environment, National Disaster Management Centre (NDMC) Maldives; Hari Kumar, GHI; Helena Molin Valdes, Deputy Director, United Nations International Strategy for Disaster Reduction (UNISDR); Ibraheem Hosein Khan, Deputy Secretary, Ministry of Food And Disaster Management Bangladesh; Jennifer Nyberg, Emergency Operations and Rehabilitation Division, Food and Agriculture Organization of the United Nations (FAO); J. Radhakrishnan, UNDP; Marqueza Cathalina Lepana-Reyes, ASEAN Secretariat (ASEAN-UNISDR Technical Cooperation on HFA Implementation in ASEAN); Leon Esteban, UN Habitat; Mihir Joshi, SEEDS, India; Mohammad Abdul Wazed, Joint Secretary Ministry of Food & Disaster Management Bangladesh; Mr. Sugeng Triutomo, Deputy Chief Prevention and Preparedness Division, National Agency for Disaster Management (BNPB) Indonesia; Myint Thein, Ministry of Social Welfare, Relief and Resettlement, Myanmar; Nupur Arora, UNDP; Prabodh Gopal Dhar Chakrabarti, SAARC Disaster Management Centre (SAARC DMC); Rajendra Desai, NCPDP, Ahmedabad; Ravi Sinha, IIT Mumbai; Rudra Prasad Khadka, Under Secretary Disaster Management Ministry of Home Affairs Nepal; Saiful Mohammad, UNDP; Sally McKay , Disaster Management Unit Asia Pacific Zone Office, International Federation of Red Cross and Red Crescent Societies(IFRC); Sarbjit Singh Sahota, Emergency Specialist, United Nations Children's Fund; Shaukat N. Tahir, Senior Member of National Disaster Management Authority, Prime Minister's Secretariat of Pakistan; Thir Bahadur, Under Secretary Disaster Management Ministry of Home Affairs Nepal; Thomas Eldon Anderson, State Director, Office of U.S. Senator Mary Landrieu, USA ; Tom Corsellis, Shelter Centre; Unupitiya Wijesekera Liyanage Chandrasa, Director, Mitigation and Technology Disaster Management Centre, Sri Lanka; Vineeta Singh, Transparancy International India; Yoshimitzu Shiozaki, Kobe University, Japan.

Annex 2: Shelter Response and Recovery Timeline

Activity in response timeline	Description of activity	Time frame
1. Coordination*	Development and maintenance of a coordination mechanism	From the disaster event through the end of reconstruction
2. Engagement*	Collaboration with stakeholders	From the disaster event through the end of reconstruction
3. Initial assessment*	Gathering of initial information and evaluation of local capacities	Week 1 following the disaster
4. Outline strategy*	Developing a framework for cooperation (see description below)	Week 1 following the disaster
5. Rapid appeal	First call for funding	Week 1 following the disaster
6. Emergency relief distribution	Coordinating emergency distribution based on the initial assessment activity	Throughout month 1
7. Program- and project-level work plan*	Specific shelter programs and projects	Periodic, starting in week 2
8. Program- and project-level implementation*	Implementation of the work plans based on work plan	Beginning week 2 through the end of reconstruction
9. Joint rapid needs assessment (such as Post-Disaster Needs Assessment [PDNA])*	Formally coordinated assessment based on initial assessment	First 4-6 weeks
10. Full policy or strategy*	Detailed strategy built on outline strategy	First 4-6 weeks
11. Revised appeal	Further detailed calls for funding based on rapid needs assessment	First 4-6 weeks
12. Detailed assessments (generally sector-specific)*	Formally coordinated assessments building on rapid needs assessment	Periodic, throughout reconstruction
13. Revised policy or	Revision of strategy based	Periodic, throughout

strategy*	on detailed assessments	reconstruction
14. Public financing and additional appeals	Arrangement of multilateral and bilateral loans and grants, and ongoing humanitarian appeals	Periodic, throughout reconstruction
15. Achievement of agreed goals*	Completion of benchmarks set with government and communities in the strategies	End of reconstruction

Source: Source: Jha, Abhas K. 2010. Safer Homes, Stronger Communities: A Handbook for Reconstructing After Natural Disasters. The World Bank http://www.housingreconstruction.org/

Annex 3: Pre Disaster Recovery Planning

During the pre-disaster period, the community may have analyzed their risk and even come up with a broad range of mitigation options. Due to expense or feasibility problems, they may have discarded many of these options. After a disaster, conditions change considerably. Budgets may swell with relief funding. Buildings that required very expensive retrofitting may have been destroyed, allowing for much cheaper "mitigation through design" to be performed. Residents of high-risk areas where housing should never have been built in the first place and subsequently was destroyed by the disaster, may be more easily convinced to relocate or may be prevented from rebuilding. Unknown risks from unmapped or poorly understood hazards will now be easier to incorporate into development plans and thus avoid.

Like response, recovery is a process that is performed within a time-constrained setting and on which victims' lives directly depend. To be performed well, recovery and response require special skills, equipment, resources, and personnel. Unlike response, however, disaster planning very rarely includes disaster recovery operations.

The recovery period follows the emergency phase of a disaster and is one in which confusion is likely to reign. There may be people displaced from their homes, business owners anxious to resume operations, and government offices that must restart service provision, among other pressures. To ensure that overall vulnerability is reduced, rebuilding without considering the disaster's effects as well as any new hazards is unwise and irresponsible. Unfortunately, decisions are often made with little or no planning or analysis, and opportunities for improvement can be lost.

In the planning process, disaster managers identify hazards, analyze risk, and determine ways to reduce those risks. In doing so, they gain a much greater understanding about how each of those hazards would affect the community if they were to strike. This information can be effective if used to plan the community's recovery from a disaster. Predisaster planning—sometimes referred to as "Pre-Event Planning for Post-Event Recovery (PEPPER)— can reduce the risk of haphazard rebuilding. Though nobody can predict exactly how a disaster will affect a community, many processes are common to all disaster types (such as hurricanes, for example), and they may be identified and studied in advance. Many decisions will have long-term repercussions and, as such, are better made in the relaxed, rational environment that only exists before the disaster occurs.

Examples of recovery decisions that may be made before a disaster include:

- The site selection for long-term temporary housing (which is often maintained for a period much longer than originally expected)
- The site selection for temporary business activity

- The site selection for the disposal of debris
- The identification of contractors from around the country that could be called upon to assist in housing repair and reconstruction
- The development of coordination mechanisms, including leadership, membership, and information sharing, for example
- Volunteer and donations management
- Mitigation measures and other hazard reduction actions that may be too expensive or unfeasible before a disaster, but that may be more opportune if existing structures were damaged or destroyed

It has been postulated that disaster recovery based upon pre-disaster planning is much more organized, is more likely to result in community improvement, and is more likely to result in a reduction of future disaster losses. Because nobody knows for sure exactly how and where the disaster consequences will manifest themselves, recovery plans are hypothetical, focusing more on broad goals and ideals than on specific actions and procedures. For instance, they may include "Reduce vulnerability to electrical transmission wires" or "Revise building codes to address new seismicity estimates."

During much of the actual recovery period, many decisions will require split-second action, with little or no time for analysis. A plan outlining overarching goals and objectives can help guide those decisions. Decisions made without considering these goals can drastically limit opportunities to rebuild the community to be more resilient and disaster resistant. Through the hazard identification and analysis process; communities that have performed adequate hazards risk planning will have determined what consequences they should expect to occur. Using this information, they will have created a mitigation plan outlining the possible options for disaster risk reduction. In the post-disaster recovery period, when many decisions are being made about construction and repair of structures, zoning of land, and new development, this mitigation plan can be used to ensure that proper action is taken to minimize risk. For example, if the community had explored strengthening building codes, those codes would be likely to pass in light of the recent disaster, and all new construction could be required to follow the new codes. Planners may find that many of the measures deemed un-fundable or impossible before the disaster are now perfectly acceptable.

Throughout the recovery process, recovery planners must be sure to align any recovery efforts with the community's needs and goals. This also is true for new opportunities. Communities may have already been planning improvements before the disaster occurred. In communities that developed with little or no planning, recovery can provide the rare opportunity to apply lessons learned on a grand scale, creating an end product that is much more conducive to the community's social and commercial activities and

needs. Planners who apply the philosophy of letting community members' guide themselves through recovery and reconstruction will likely find a great deal of acceptance, enthusiasm, and success.

Examples of changes to community design that can reduce hazard vulnerability and be made in the recovery period include:

- Redistribute emergency resources (fire, police, emergency medical)
- Rezone to account for new hazard information
- Adjust building codes and ensure that all repairs and reconstruction are made to code
- Restrict building within zones of greatest risk (e.g. in the floodplain, on unstable ground, below landslide risk zones)
- Create natural fire breaks
- Design adequate evacuation routes
- Construct public buildings that can double as shelters
- Reduce population density
- Widen primary roads to alleviate pressure (for evacuation or emergency response)
- Address problems related to informal settlements in high risk zones

Annex 4: Resources Cited

ALNAP and Provention Consortium. 2003. Responding to Urban Disasters: Learning from Previous Relief and Recovery Operation. http://www.proventionconsortium.org/themes/default/pdfs/alnap-provention-lessons-urban.pdf

Asian Disaster Preparedness Center. N/d. Earthquake Vulnerability Concepts: An Overview. In Earthquake Vulnerability Reduction for Cities (EVRC-2). Module 3. http://www.adpc.net/casita/Course%20Modules/Earthquake%20vulnerability%20reduction%20for%20cities/EVRC0301A_Earthquake_Vulnerability.pdf

Barakat, Sultan. "Housing Reconstruction after Conflict and Disaster." Humanitarian Practice Network no. 43, Dec. 03 p.16.

Barenstein, Jennifer Duyne. 2006. Housing Reconstruction in post-earthquake Gujarat: A Comparative Analysis. Humanitarian Practice Network no. 54. http://www.odihpn.org/documents%5Cnetworkpaper054.pdf

Beck, Tony. 2005. Learning Lessons from Disaster Recovery: The Case of Bangladesh. Disaster Risk Management Working Paper Series No. 11. World Bank. http://www.recoveryplatform.org/assets/publication/bangladesh.pdf

Boen, Teddy. N/d. Engineering the Non Engineered Houses for Better Earthquake Resistance in Indonesia. http://drh.edm.bosai.go.jp/files/6cc5597e09050a9b482d9f257c5f256ec28f6e50/7_PT8_P.pdf

Bringle, Tara Panek and Lisa Pacholek. 2008. Case Study: Post Emergency Housing Finance for the Poor; Aceh, Indonesia. Development Innovations Group. July 31.

Central United States Earthquake Consortium (CUSEC). 1998. Housing Recovery Strategy for a New Madrid Earthquake. Draft Report of the Housing Recovery Working Group A FEMA / Federal - CUSEC Initiative. http://www.cusec.org/documents/cusec/housingstrategy.pdf

Corsellis, Tom and Antonella Vitale. 2005. Transitional Settlement: Displaced Populations. Oxfam, GB. University of Cambridge.

Davidson, Colin, Cassidy Johnson, Gonzalo Lizarralde, Nise Dikmen, and Alicia Sliwinski. 2006. Truths and Myths About Community Participation in Post-Disaster Housing Projects. Elsevier. http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V9H-4M6SB59-1&_user=10&_coverDate=03%2F31%2F2007&_rdoc=1&_fmt=high&_orig=searc

h&_sort=d&_docanchor=&view=c&_searchStrId=1433602165&_rerunOrigin=google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=f95f69f9d1bead3ea756009aa7fc32ea

Davis, Ian. Et. Al. 2006. Shelter Security in Kashmir–a Central Aspect of Long-term Recovery. Issue 22. Southasiadisasters.net: Ahmedabad, India, 2006. http://www.recoveryplatform.org/outfile.php?id=321&href=zhttp://www.recoveryplatform.org/assets/submissions/200909010529_pakistanearthquakeshelterssadn2006.pdf

Dikmen, Nese. N/D. Relocation or Rebuilding in the Same Area-An Important Fact for Decision Making for Post-Disaster Housing Projects. http://www.grif.umontreal.ca/pages/DIKMEN_Nese.pdf

IFCR. 2009. Supporting community recovery and risk reduction in Yogyakarta: Case Study. International Federation of Red Cross and Red Crescent Societies. http://www.recoveryplatform.org/assets/publication/supporting_community_recovery_risk_reduction_in_Yogyakarta.pdf

IFRC. 2008. IASC Emergency Shelter Cluster: Shelter Projects. UN HABITAT. http://www.disasterassessment.org/documents/IASC_shelter_projects_2008.pdf

Ikaputra. 2008. People Response to Localize the Imported Culture. Presented at the 14th World Conference on Earthquake Engineering. http://static.monolithic.com/pdfs/dftw/Ikaputra.pdf.

Johnson, Laurie. 2000. Kobe and Northridge Reconstruction: A Look at Outcomes of Varying Public and Private Reconstruction Financing Models. EuroConference on Global Change and Catastrophic Risk Management. Austria. http://www.iiasa.ac.at/Research/RMS/july2000/Papers/johnson_housing0401.pdf

National Development Planning Agency (BAPPENAS) Indonesia. 2005. Notes on reconstruction: the December 26, 2004 Natural Disaster. BAPPENAS: Indonesia. http://www.recoveryplatform.org/assets/publication/reconstruction1notes01public1.pdf

Norton, John. 1999. Sustainable Architecture: A Definition. Habitat Debate. Vol. 5. No. 2.

Rawal, Vivek, Rajendra Desai, and Dharmesh Jadeja. 2006. Assessing Post-Tsunami Housing Reconstruction in Andaman & Nicobar Islands: A PEOPLE'S PERSPECTIVE. Books for Change. Bangalore.

Sarkar, Anindya Kumar and Pradeem Jena. 2007. Promoting Social Mobilisation and Appropriate Housing Technologies for Disaster Mitigation and Poverty

Reduction in Orissa. http://www.undprcc.lk/ext/mdgi_regional_workshop_2007/pdf/Employment%20Generation%20and%20Participatory%20Area%20Development/India_Orissa_Housing.pdf

Shelter Center. 2010. Transitional Shelter Guidelines. Draft Version. http://www.sheltercentre.org/sites/default/files/Transitional%20Shelter%20Guidelines%2009a.pdf

Subroto, T. Yoyok Wahyu. 2010. Yogyakarta Earthquake 2006: Lessons Learnt Through the Recovery Process. Presented at the International Recovery Forum, 2010. Kobe, Japan.

UN-HABITAT. 2007. Twenty First Session of the Governing Council 16-20 April 2007, Nairobi, Kenya Field Report: Building back better in Pakistan. http://www.recoveryplatform.org/assets/submissions/200909010544_pakistanearthquakeshelterunhabitat2007.pdf

UN-HABITAT. 2007b. Anchoring Homes: UN-HABITAT's People's Process in Aceh and Nias After the Tsunami. UNDP. http://www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=2469

UpLink. 2005. HOUSING IN ASIA. Newsletter of the Asian Coalition for Housing Rights. Number 16, August.

World Bank. 2005. Indonesia: Notes on reconstruction the December 26, 2004 Natural disaster. The World Bank. http://www.recoveryplatform.org/resources/publications/49/indonesia_notes_on_reconstruction_the_december_26_2004_natural_disaster

World Bank. 2005. Learning Lessons from Disaster Recovery: The Case of Mozambique. World Bank.

International Recovery Platform Secretariat

DRI East Tower 5F
1-5-2 Wakinohamakaigan-dori
Chuo-ku, Kobe 651-0073
Japan

TEL: +81-78-262-6041
FAX: +81-78-262-6046
E-mail: info@ recoveryplatform.org
URL: www.recoveryplatform.org

Special thanks to the partners who support IRP: Asian Disaster Reduction Center(ADRC); Hyogo Prefectural Government, Japan; International Federation of Red Cross and Red Cresent Societies(IRFC); International Labour Organization (ILO); Ministry of Foreign Affairs Government of Italy; Cabinet Office Government of Japan; Swiss Agency for Development and Cooperation (SDC); Government of Switzerland; United Nations Development Programme (UNDP); United Nation Environment Programmes (UNEP); United Nations Human Settlements Programme (UN Habitat); United Nations International Strategy for Disaster Reduction (UNISDR), United Nations Office for the Coordination of Humanitarian Affairs (UN-OCHA), and The World Bank