

Capacity Building for Long-term Preparedness

First Step In Disaster Rehabilitation

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Summary

In the aftermath of Kutchchh Earthquake in the State of Gujarat in western India a unique program was taken up. It was an attempt in Capacity Building of the affected people for a long-term preparedness against future disasters. It involved a number of different, but simultaneous activities to achieve synergy for a maximum possible impact on the psyche of the people and of the building artisans. It was aimed at initiating a process of attitudinal changes concerning the acceptability and the use of the disaster resistant building technologies. It involved awareness creation, confidence building, demonstration, and training.

It was observed that if a program like this is taken up as the first step in disaster rehabilitation program, the effectiveness of the program could be increased significantly. It could greatly help in ensuring the proper use of the funds disbursed for the restoration of housing such that the long-term safety of the people is ensured through the construction of the disaster resistant houses. It could also help in increasing the speed of the program by preparing the beneficiaries for meaningful participation in the program. In other words the chances for the success of the program could be greatly enhanced through such a program.

Background

In the last decade Indian subcontinent has experienced a large number of natural disasters including earthquakes and cyclones. This has resulted in to huge losses in terms of houses and infrastructure, deaths and injury, and unwarranted hardship to the people. **Table 1** shows the losses suffered in some of the earthquakes. The cyclones too were equally destructive. The destruction means losses to individuals and to the country.

Table 1 - The Impact of Recent Earthquakes in India

Earthquake	Year	Magnitude Richter Scale	Villages Affected Approx.	Cities Affected	Houses Severely Damaged or Destroyed Approx.	Houses Dama-ged Approx.	No. of Deaths Approx
Uttarkashi	1991	6.5	400	None			1,200
Latur	1993	6.4	1,200	None	35,000	200,000	9,400
Jabalpur	1997	6.1	45	1	5,600	57,000	45
Chamoli	1999	6.8	4,175	None	19,300	86,000	135
Kutchch	2001	7.7	8000	6	150,000	750,000	14,000

(Source BMTPC-TARU_{1,2,3})

These losses could be translated in to indicative monetary figures as shown in **Table 2**. For a developing country such huge losses result in to slow pace of development and even increase in debt.

Table 2: Indicative Losses of Property (Buildings) in Past Earthquake

No	Name of Earthquake	Houses in US\$	Public Bldg. US\$	Total Loss in US\$
1	Latur	375,000,000	700,000	375,700,000
2	Chomoli	900,000	1,424,000	2,324,000
3	Kutchch	585,000,000	19,500,000	604,500,000

In addition to the direct losses caused by the disaster it has been observed that the people suffer **self-inflicted losses** out of **ignorance** and under the influence of the **unscientific myths** that prevail after the disasters. In the aftermath of the Latur Earthquake a number of myths had surfaced that made people think that there was no future in their houses that were built out of stone, wood and mud, or those with foundation built on soil instead of rock, or those that were made with load-bearing system. They had developed tremendous fear of stone and heavy wood that had killed their loved ones. This led them to get their houses dismantled and sell the salvaged material at a throw away price. As a result tens of thousands of families lost perfectly good undamaged houses.

In the aftermath of the Chomoli Earthquake the people saw that upper story of their two story houses had suffered most damage. If nothing else, the corners had opened up in all the houses. The lower story had no damage. This made them conclude that the upper story is unsafe. As a result many households dismantled their upper story. Many concluded that the mud mortar was unsafe and hence, got their houses dismantled and rebuilt with cement mortar. But this time it was much smaller because of the high cost. In short, the ignorance resulted in to huge permanent losses to tens of thousands of house owners.

Future Losses

In future, hundreds of thousands of more households could be affected like this. In seismically active areas like North-west Himalaya or the North-Eastern region of India severe earthquakes have been observed to occur every fifty years or so. In the North-eastern states there is a high probability of a major earthquake measuring around 8 on Richter scale to occur in not too distant future. Similar probabilities prevail for the North-western area of the country. The extent of damage could be as much as or more than that in the past quakes. It is, hence, extremely important that measures are taken to mitigate the dangers of a future disaster.

Causes of Destruction

Detailed studies^{1,2,3} carried out on the damage and destruction in the recent disasters have revealed a number of reasons for this impact. These could be listed as...

- Poor workmanship
- Ignorance in the people and building artisans about the...
 - disaster resistant building technologies
 - retrofitting option
 - importance of adherence to the basic rules of construction
- Ignorance among engineering community about the disaster resistant load-bearing building systems and retrofitting option for such structures.
- Poor maintenance of the old structures
- Unavailability of certain materials

Past Disaster Rehabilitation Programs – achievements & problems

The post disaster rehabilitation programs offer an unprecedented opportunity to bring about a permanent change in the construction scenario that may help effectively mitigate the impact of future disasters. The experience of the past ten years, however, shows that this is not an easy proposition.

During that period the country witnessed two post disaster rehabilitation programs that are note-worthy since **a large scale structured program was carried out with the help of a huge force of field engineers who were installed in the affected villages.** These include (a)

Maharashtra Emergency Earthquake Rehabilitation Program (MEERP) in the aftermath of Latur Earthquake, and (b) Gujarat Earthquake Rehabilitation Program in the aftermath of Kutchch Earthquake. The points worthy of mention are...

- Official technical guidelines were prepared for the local context based on the relevant building codes.
- A system was set up to get the damaged houses repaired in order to restore them to the pre-earthquake condition.
- In MEERP the damaged houses were also to be retrofitted.
- Destroyed houses were replaced by disaster resistant houses.
- In case of Kutchchh the house owners had the option of getting the house reconstructed by a non-governmental agency that may adopt the village or of getting it done by himself or herself. In other words the government played the role of a facilitator rather than a builder.
- Funds were disbursed in installments after verification of the work already done for compliance with the official guidelines by the field engineers.
- Local building artisans were used in a big way. This labour force got slowly supplemented by outsiders that came looking for work.

An unprecedented amount of work got done in these **path-breaking** rehabilitation programs. But there was a tremendous pressure to move on and get on with the work fast without losing time. This along with the lack of earlier experience of designing a program of such a **huge scale** adversely affected the formulation of the programs. As a result some of the **critical but uncommon items** did not receive the attention that they deserved. These could be briefly described as...

- At the onset the people did not fully understand the program in regards to their role and obligation in return for the free assistance, method of disbursement of funds, process of the evaluation by the engineers, time frame for the execution of the work etc. As a result MEERP moved very slowly at the onset and precious time was lost.
- People had very limited understanding of the disaster resistant technologies to be used in the program since this was a new concept for them. So there was confusion about how exactly the work was to be carried out. In many cases the funds were spent on wrong items such as plastering or flooring.
- There were too many myths and too many opinions about what was right and what was wrong in regards to the “earthquake safe” construction. Too many individuals and agencies arrived with ideas that were irrelevant and often lacked scientific basis. People out of ignorance often fell for them.
- There were too many technical “experts” in the field that created confusion.
- The engineers posted in the field had no knowledge to begin with of the disaster resistant technologies since the engineering curriculum simply does not cover them. In due course they were trained by various agencies. Much of the training was in class-room and it lacked the practical aspects of the onsite problems.
- In the early stages of the program many beneficiaries simply did not listen to the engineers. Instead they listened only to their masons.
- But the masons had no knowledge of the technologies to be used. As a result their work reflected mistakes.
- There were a number of mason training programs. But there were too many masons, too much work at hand, and much money to be earned, little time for training and too few trainers. As a result the masons gained inadequate knowledge and inadequate training, and follow-up was not possible since these activities demand much time and

resource. As the saying goes “old habits die hard”, the masons were not able to shed many of their old wrong habits.

- Various agencies conducted mason training programs. There were major disparities among these. There was neither any system to make them uniform nor to ensure the necessary qualifications of those imparting the training.
- The biggest constraint for the training was the **lack of felt need** for it. Masons saw no need for it nor did the people. There was nothing that required them to get trained. Hence, many simply did not attend any training. Others who did, demanded as much as Rs.300 for stipend.
- Some critical materials were not available in the villages. It was a proverbial chicken and hen situation. They were not available since there was not in demand to begin with, and at times people could not implement the options that used them since they were not available. For example in MEERP knee braces for the retrofitting of timber frames were not readily available. In case of Kutchchh the materials and equipment required for the proper repair of cracks were not available since before the earthquake they were used in very special situations only. Similarly, the weld mesh for retrofitting was not available at the onset.

All these issues contributed in different ways to create impediments in the rehabilitation program. In Gujarat, nonetheless, a unique attempt was made to resolve some of these problems.

Capacity Building Program for Long-term Preparedness – Gujarat

The idea for the program evolved during the on-site training program of some 1200 field engineers of the government, appointed to different villages in the rehabilitation program. The training program was conducted by a team headed by the author at 12 different locations in the quake affected parts of the State. The engineers had found the training program very useful. But they anticipated two problems. Firstly, they were not sure if the villagers would listen to them. Secondly, they knew that the masons who were to execute the work simply were ignorant about the required technologies. Hence, a number of engineers demanded that a program be taken **up to demonstrate the technologies to the villagers and to train the masons**. What evolved had more to it than their demands.

Objectives

A program was formulated to do the following...

- Help smoothen the progress of the rehabilitation program by bringing clarity and reduce confusion about the disaster resistant building technology among the people.
- Interact with the Village Reconstruction Committee over a 20 day period to...
 - Facilitate the construction of a disaster resistant demonstration structure that is based on the official technical guidelines that was based on relevant Building Codes to be used later as a “**disaster preparedness centre**”.
 - Facilitate the demonstration retrofitting of a public building based on the official technical guidelines
 - Facilitate the construction of a roof top rain-water harvesting tank connected to a public building such as a school or a day-care centre
- Help evolve a core group of local residents to form a “**disaster preparedness brigade**” that is concerned about the disaster preparedness at community level.

- Organize community level awareness program through poster exhibition, video show, meetings and discussions, rally by school kids
- Organize training of local building artisans.
- Facilitate the capacity building of the government site engineer through his active participation in the program in the village of his posting as a part of the Village Reconstruction Committee.
- Provide the disaster preparedness brigade with awareness literature including posters, booklets, video CD, and Repair & Retrofitting kits.
- Involve local NGOs to help sustain the process of preparedness.

Execution

The program was started nearly a year after the earthquake. It was scaled up in four stages increasing the geographical coverage with each stage. At its peak approximately 56 teams of engineers and social workers worked hard in the villages with the people and the building artisans. It was a fast paced program that involved intensive interaction not only with the local people but also with the government functionaries. The pace and the outcome greatly depended upon the response of both the groups. The funds for the village level activities were routed to the village reconstruction committee through the government functionaries at the District and Block levels before reaching the village. The last in the line was the respective government primary school head-master. The head master was the most important link in the whole chain since he/she managed the funds at the village level. All this called for intense interaction with these officials for smoother flow of funds.

Assessment of Outcome

The outcomes that could be counted is listed below...

477	Construction of Disaster Resistant Demonstration Structure
439	Retrofitted Pubic Building
477	Construction of Roof Rainwater Harvesting System
477	Disaster Preparedness Brigades
6000	Building Artisans received hands-on training

Observations

More important than the quantitative aspect of the program are the observations that were made. The most important observations could be listed as...

- Limited cooperation was coming from the area (block or *taluka*) level government functionaries since most of them simply did not understand the relevance and importance of the program. This resulted in to great time delays.
- The government site engineers did not participate in the program at all since there was no pressure on them from their superiors at area level to participate. As a result a precious opportunity of intensive on-site learning was lost for 477 engineers.
- Without the site engineers who were the only technical members of the Village Reconstruction Committee the Committee had serious difficulties in ensuring the quality of the demonstration work to be carried out.
- The response of the people varied from one extreme to the other. The villages where major reconstruction was already carried out showed little interest. The monetary investment of the project at an individual village level was insignificant compared to that already made in the village. But the villages which were lesser affected welcomed the project.

- With the school head-master being the most educated person who is generally respected in the village, wherever the school head master was positive the participation of the people was excellent and the activities moved rapidly.
- The school head-masters were very much over-loaded with many duties other than teaching and managing the school. Even the most positive head-masters had little time to spare. As a result much time was lost.
- The village level intervention that was envisioned to take place over 20 day period took anywhere from 20 days to as long as 90 days.
- In the severely affected villages the masons had their hands full with work. Hence, there the masons were not too keen to participate in multi-day training program. Four days in training meant a loss of daily wage of four days. In many villages the training program schedule had to be modified to suite their convenience.
- The masons that executed all the work became experts. The others learnt little due to limited time, training, and no follow up.
- The positive villages pressured the masons to go for training.
- Geographical remoteness of the villages resulted in too much loss of time where the engineers depended on the public transportation.
- With a team of 50 engineers and 50 social workers in the field at any given time it was not possible to target more than 100 villages. As a result the program lasted for several months. On the other hand the rehabilitation activities progressed in hundreds of villages at a time since there were over a thousand field engineers. Thus it was not possible for the program to keep pace with the rehabilitation program.
- The video shows in the villages were at the mercy of the power supply which was highly undependable. As a result a generator was indispensable
- During the program's tenure the VCD players began to reach the villages in a big way. This medium was found to be very convenient for taking the ideas to the people,
- The people in most villages appreciated the new knowledge and confidence that they had gained from the program. But majority of them felt that in their village the program ought to have come much earlier.
- Masons felt that the disaster resistant structure that they had built could withstand any earthquake.

Lessons for Future Disasters

Many lessons were learnt from the program. These have great relevance for the future disasters. These could be listed as...

- A program similar to the “Capacity Building Program for Long-term Preparedness of Gujarat” should form the **first step in the future disaster rehabilitation programs to ensure their success..** Such a program will...
 - Bring much needed understanding of the technology being promoted in the official technical guidelines well in advance before the actual repair, retrofitting and reconstruction activities take off. It will also bring the confidence that is crucial for ensuring the use of such technologies.
 - Train the masons well in advance in all different aspects of disaster resistant technologies so that during the rehabilitation program their advice is in line with that of the government engineers.
 - Bring a full size demonstration that can always be referred to in the time of doubt.

- Bring printed materials and videos about the technologies for the people and the masons to use during rehabilitation program.
- Bring simple tools and equipment for proper execution of the task. Such items could be easily reproduced.
- Such a program shall cover every community/village/town that is covered under the rehabilitation program.
- Every field engineer and his superior will intensively participate in the program for his/her own capacity building.
- Such a program should have the necessary backing from the highest level of the rehabilitation program coordinating authority so that support required at all levels is ensured for expeditious execution within the prescribed time limit.
- Successful completion of the training should be made mandatory for the all building artisans to become eligible for work in the rehabilitation program.
- Artisans list should be computerized and they should be given numbered certificates from an appropriate authority/agency in order to maintain a permanent list of qualified masons.
- Such a program should involve the local non-governmental organizations for establishing effective communication with the people, for organizing the artisan training programs and for sustaining the new ideas for a long time to come.

Impact on a Disaster Rehabilitation Program

A properly and timely executed “Capacity Building Program” at the onset of a disaster rehabilitation program will ensure the...

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| <ul style="list-style-type: none"> • Timely participation of the people in the rehabilitation program. • Positive attitude of the people in building disaster resistant houses; thus make the best use of the rehabilitation program • Adherence to the stipulated technical guidelines for Repair, Retrofitting and Reconstruction • Reduce the impediments in the execution of the Program, and thus help it move in a timely fashion |
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In short it will **greatly increase the chances of success of a people driven rehabilitation program.**

Impact on Future Disaster Scenario

Beyond the rehabilitation program the “Capacity Building Program” would leave behind...

- **Increased awareness in the people about the need and the ways of disaster preparedness**
- **Improved masons**
- **Better quality construction and adherence to rules**
- **Local CBOs concerned about the preparedness for future disasters**
- **Government functionaries sensitized to preparedness issues**
- **Safer Communities**

Demonstration Models



Demonstration Retrofitting



Mason Hands-on Training Program,



Village Construction Committee athering



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