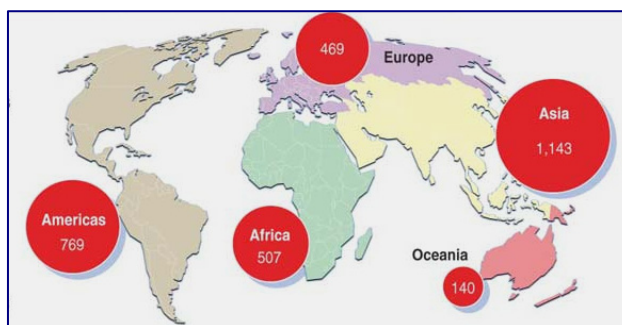


Disaster Mitigation - Lessons Learnt & Future directions - A Perspective *

Background

Natural disasters have become a continuous phenomenon all over the world. Every passing year witnesses a massive death toll and destruction during each calamity at one place or the other, reminding mankind of the nature's strength and fury. Although all of these extreme events are an outcome of a natural phenomenon, their intensity and causes are closely linked to the human interventions. Flash floods, landslides or droughts can be easily associated with situations arising out of human activities. Although technological advancement has provided us with tools to predict these events to some extent, statistics indicate our inability to abate frequency of their occurrence or reduce their impacts. In many developed countries advanced technical knowledge and emergency preparedness has improved handling of risk situations as well as mitigate their impacts but at enormous costs. At the same time, financial instruments like insurance and re-insurance takes care of immediate losses in these countries by transferring the risk. However, Asia has suffered largest losses due to its vulnerability and lower capacity to handle these risks



Number of Natural Disasters by continent -1994-2003

Source: International Red Cross Red Crescent, World Disaster Report 2004

Cost of Disasters

The United Nations estimates the total cost of disasters worldwide during the 1980s at \$120 billion (in constant (1990) US dollars). Moreover, there is clear evidence of a rising trend, with total costs increasing from \$70 billion in the 1970s and \$40 billion in the 1960s. This trend continued even during last decade e.g. before 1987 there was only one case where the insured losses from a natural disaster exceeded \$1 billion; by 1995 there had been 14 instances. Between 1980 and 2003, the World Bank financed 147 post-catastrophe reconstruction projects worth about \$12.5 billion.

As per annual World Disasters Report 2004, economic cost of natural disasters has skyrocketed. In the past two decades alone, direct economic losses from natural disasters multiplied five fold to US \$629 billion.¹

These mind boggling statistics are indicative of the fact that one step towards development can be reversed 100 times by a single incident of a disaster. In fact, the estimates presented here are based on direct costs evaluated from the actual damage, while indirect costs of social and environmental damage have hardly been accounted for.

* Prepared by Taranjot K Gadhok, HSML, HUDCO

¹ " Protecting Development by John Mitchell

Vulnerability of human settlements is higher in urban areas due to larger population densities and costlier assets subjected to the damages during disasters. Development has in fact, known to trigger off vulnerability of nations while vice versa is equally true as quoted by Didier ²

“Disasters are first and foremost a major threat to development and specifically to the development of the poorest and most marginalized people in the world. ... and ensure they stay poor.”

Losses from natural disasters are most devastating to the poorest people and therefore it is particularly true in developing countries. Extensive research shows the poor are more likely to occupy dangerous, less desirable locations, such as flood plains, riverbanks, steep slopes and reclaimed land. This being the reason, during International Decade for International Disaster Reduction, UN bodies emphasized prevention, preparedness and mitigation rather than disaster management, recovery and rehabilitation through various programs of United Nations.

Figures compiled by World Bank for 1990-2000 indicate that natural disasters resulted in damages constituting between 2 to 15 percent of an exposed country's annual GDP.

GDP losses calculated for individual events provide much worst scenario; for example in Honduras, Hurricane Mitch caused losses equal to 41% of GDP. In terms of the government's annual tax revenue, the losses amounted to 292%.

Changing face of losses or impacts of disasters across developing and developed nations

As one moves along the spectrum from developing to highly developed economies, the nature of a disaster's impact alters. The absolute cost of physical damage increases, but its relative cost (as a proportion of national or local wealth) decreases; and the number of lives lost also declines.

For example, Hurricane Andrew struck Florida and Louisiana in the USA in 1992. Within a few hours it had caused damage estimated at \$22 billion - equivalent to 0.3 per cent of gross domestic product (GDP) - but only 14 people lost their lives. On the other hand, Typhoon Angela, which struck one of the more densely populated parts of the Philippines in late 1995 caused damage of \$63 million - equivalent to 0.1 per cent of GDP but only 0.3 per cent of the damage caused by Hurricane Andrew - and resulted in 916 deaths. Recurring natural disasters may cost Bangladesh more than 5 per cent of its annual GDP. Losses from the Mexico City earthquake in 1985 added up to 3 per cent of Mexico's GDP; losses from the San Salvador earthquake in 1986 amounted to 24 per cent of El Salvador's GDP; and losses from the Nicaraguan hurricane in 1988 were 40 per cent of national GDP.

From above mentioned statistics some of the general trends that could be observed are:

- Developed nation suffer more economic losses due to higher cost of infrastructure and assets while developing nation suffer losses in terms of increased number of deaths and social and environmental damage
- Little or no financial instruments exist in many developing countries to support, prevent or prepare for such eventualities except for mechanisms for relief and rehabilitation

² Didier J Cherpitel, former Secretary General of the International Federation of Red Cross and Red Crescent Societies said in the organization's 2002 Disaster Report.

- Cities are more prone to impacts as they host larger population densities and higher cost and dependence on infrastructure, high-rise buildings and larger built environment
- Poor, women, children and the aged are more vulnerable to impacts of disasters as they have lower capacity to cope with emergencies
- Very little has been achieved in taking proactive measures and preparedness.

Natural Disasters – Indian Scenario

Challenges posed due to hazards in a country like India are very different compared to the developed countries. India with its 15 ecological regions has different climates and topography. Located on a Latitude of 8° 4' 37" to 6' North and longitude of 68° 7' 97" 25' East, the country is subjected to extreme climate conditions. Although largely a rural country, it is currently hosting around 300 million urban dwellers. In absolute numbers it is the largest urban population in a country. Apart from unplanned growth of human settlements, India's national geography, ecology and topography all lead it to be a multi-hazard prone nation.

In fact, the Indian sub-continent is amongst the world's most disaster prone areas with:

55% of land vulnerable to earthquakes and landslides

8% of the country vulnerable to cyclones

5% of the country vulnerable to floods³

The Himalayan belt constitutes one of the most seismically active regions in the world. Four earthquakes of magnitude of 8 plus have occurred in this very belt in last 100 years. North Eastern hill ranges and Western Ghats experience number of landslide due to seismic activities in the region as well as rivers carrying debris.

With an annual precipitation of around 400 million hectare meter across the country, out of which 75% is received during four months of monsoons, the drainage systems and the rivers get flooded invariably. Floods in Brahmaputra basin are a regular annual feature.

Indian coastline extends to around 8000 kilometres. On an average, around 5 to 6 tropical cyclones form in the Bay of Bengal and Arabian Sea each year during pre-monsoon and post- monsoon period. From 1891-1990 around 262 cyclones occurred in a 50 km wide strip on east coast out of which 92 were of severe nature. The super-cyclone of Orissa that visited Indian east coast in 1999 surpassed all severity of disasters during last century.

The frequency of occurrence of these natural disasters in the past decade and their aftermaths has taught hard lessons to Indian authorities and community alike. They have raised awareness as well as need for integrated efforts of all stakeholders including the community to meet the challenge arising out of such situations.

³ Shelter- Special issue On Disasters, 1999

Institutional Frameworks for Disaster Mitigation in India

In India, during last few years there has been a concentrated effort towards mitigation by bringing in a major change in organization structure at federal level. Based on the recommendations of high powered committee set up in 1999 by Government of India, the responsibility to deal with disaster mitigation and management was assigned to National Disaster Management Authority that has been moved to Ministry of Home Affairs from Ministry of Agriculture.

On 23 December 2005, the Government of India enacted the Disaster Management Act, which envisaged the creation of the National Disaster Management Authority (NDMA), headed by the Prime Minister and State Disaster Management Authorities (SDMAs) headed by respective Chief Ministers to spearhead and implement a holistic and integrated approach to disaster management in India.

Headed by the Prime Minister as the Chairman of NDMA and a cabinet Minister as Vice Chairman, it comprises of eight members with the status of Ministers of State.

The NDMA Secretariat, headed by a Secretary to the Government of India is responsible to provide secretarial support and continuity. It is proposed to have two Disaster Management Wings under the Secretariat.

They are:

- DM I wing dealing with mitigation, preparedness, plans, reconstruction, community awareness and dealing with financial/administrative aspects.
- DM II wing is proposed to be composed of the National Disaster Management Operations Centre with state-of-the-art multi-redundant communication systems to carry out the tasks of capacity development, training and knowledge management.

Financing Disasters towards Development

Historically, there has been heavy reliance on aid to meet disaster-related relief and reconstruction costs in the developing world. But today, global aid flows are stagnant while the annual cost of disasters is increasing. Questions are therefore beginning to be asked about alternative ways of meeting disaster-related costs.

While development is closely linked to vulnerability and vice versa, it is important to integrate preparedness for disasters as a part of development plans. For example, most of the deaths caused during the aftermath of disasters are not due to hazard itself but due to the built environment, which is not adequate to resist the impact of such calamities, or due to weak emergency preparedness systems that are not equipped to offer response to such calamities to save casualties and losses.

In the past lots of efforts have been made in financing relief and rehabilitation and there have been a few incidents of capacity building and modernization of prediction equipment as a part of preparedness strategy in the country.

HUDCO'S Role in Disaster Management

HUDCO has been in the forefront to finance rehabilitation of disaster affected communities since 1975 under the schemes of providing shelter for households affected by natural calamities. Initially HUDCO was involved only in financing housing and infrastructure to states affected by natural calamities regularly. For example, coastal states like Andhra Pradesh was visited by cyclones every year, HUDCO had special allocation of funds for the rehabilitation of fishermen on the coastline.

So far HUDCO has sanctioned 475 projects with a project cost of Rs. 4089.12 crores with a loan amount of Rs. 2207.77 crores for building 4141435 houses under natural calamity schemes. These schemes are funded with special concession of lower rate of interest that is reduced by 1.75 % as against normal prevalent rate of interest. Loan amount is further enhanced by 25 % when undertaken in hilly region and calamity prone areas.

Earthquakes

Latur earthquake – a turning point in HUDCO's Operations

Realizing its techno-financial status, HUDCO played much larger role after the earthquake of Latur in 1993 that killed more than 9000 people who got buried under the shelter that was built to protect them from heat and harsh climatic conditions. Prior to the earthquake, Latur, in the state of Maharashtra, was in seismic zone III and there was little chance of such an eventuality taking place due to seismic conditions.

To survive through harsh hot climate of this region and make use of available building material, traditionally perhaps the houses were built with heavy mud-phuska on the slate roof tops and rubble thick masonry walls, loosely bonded by mud with lower roof heights. Largely rural areas were scattered over the farmland, but small clusters of houses comprising of such construction material and technology formed small village neighbourhoods. An earthquake of intensity 6.4 on Richter scale struck this region and caught most of the households unawares in the late hours of one night in September 1993. This quake was a turning point in the thinking of many a scientific community when it was recognized that building construction could turn out to be a killer of large populations in a matter of seconds.

HUDCO took a lead role of providing technical know how on building housing, using local material with safer technologies while maintaining sanctity of local socio-economic fabrics. It established an on-site building centre, studied soils and identified safer locations or upgraded in-situ housing based on a detailed research, survey and analysis. It financed around 4 villages building around 1319 houses including restoration of one village. HUDCO Consultancy Wing designed these houses based on socio-economic survey, planned layouts in various locations and manufactured in-situ solid blocks using rubble for walling and light weight concrete roofs or Ferro cement roofs. These houses were funded by HUDCO.

This became a pilot project that provided enough experience to be able to undertake further research and projects in other locations. Later HUDCO provided consultancy and funding during earthquakes in Jabbalpur, in the state of Madhya Pradesh, HUDCO along with BMTPC were involved in damage assessment of the houses and it is, here that it prepared a detailed criteria/ guidelines for

damage assessment in order to take up retrofitting in situ. Here HUDCO adopted two villages for retrofitting.

In 1999 another Earthquake of 6.8 on Richter scale killed around 100 people in Chamoli, Pauri, Tehri and Rudraprayag in Garhwal district in Uttarakhand. Here, 2216 houses were totally damaged and around 11462 suffered severe structural damage. HUDCO adopted 2 villages (Adarsh gram) and one slum (adarsh basti), it took up execution of 20 demonstration units in scattered places that were prominently located. It set up 7 building centres, 4 sub centres and 2 mobile building centres. It also took up dissemination of technical information in vernacular languages based on Indian standards for earthquake resistant design codes.



However, the Gujarat earthquake of 6.9 on Richter scale devastated lives of almost 15.9 million people in 7 districts of Gujarat in 2001. HUDCO took up construction of 194 units and allocated Rs 2.39 crores for reconstruction and retrofitting on behest of Ministry of Housing and poverty alleviation as well as under MPLAD schemes. It built 3 community asset buildings and primary schools also using disaster resistant technologies and locally available material. As massive destruction of high buildings caused maximum loss of life, it moved the engineering fraternity to set up a techno-legal regime. A national level task force was set-up to change building bye laws in order to incorporate provision of seismic building codes before sanction of the building plans to local bodies.



Cyclones

In the past in Andhra Pradesh and Tamil Nadu, HUDCO has been financing building of houses for the weaker sections under its natural calamities scheme. Cyclone prone districts of East Godavari, Prakasan and Nellore are affected by cyclones regularly making them very vulnerable to damage. In order to meet the challenge, HUDCO set up Building centres for providing architectural and design services and identified villages closer to sea shore to demonstrate cyclone resistant technologies.

In series of major disasters, super cyclone of Orissa in 1999 destroyed 3.5 lakh houses completely and 2.5 houses partially with 6 villages washed out completely and 59 villages partially affected and around 14800 primary schools /college buildings damaged. This disaster shook up the government to take much more proactive measures towards risks involved in coastal states due to cyclones and tsunamis.



However in Orissa HUDCO took up six villages under model village project, It set up building centre to augment the building activities and demonstrate use of cyclone resistant technologies. HUDCO organized series of training programs for masons, project formulation, training programs for trainers on cyclone resistant technologies.

Apart from these HUDCO took up to construct School-cum- Cyclone Shelters under MPLAD schemes through various building centres set up for the purpose. Under Chief Minister's relief fund HUDCO undertook to build schools, dwelling units for EWS, temples, community halls, taxi stands, Bus Stands, vegetable markets that served as live demonstration projects for cyclone resistant technologies.

Other Disasters

HUDCO won an award for designing and construction of housing for the rehabilitation of victims of worst technological hazard in the country i.e. Bhopal Gas tragedy. HUDCO provided financial assistance for construction of 2071 houses. As most of the victims were handicapped the basic characteristics of design was to provide low rise high density houses around pedestrian clusters with growth potential.

HUDCO's role as techno-financial Institution

While the success of vulnerability reduction measures such as building codes depends, to a large degree, on proper implementation and enforcement by government, financial and insurance companies can play a significant role in promoting hazard-resistant building practices through financial incentives, educational information and promotion of minimum building standards. Catastrophe insurance focuses foremost on spreading or distributing losses, rather than on reducing losses. It is in the financial sector's interest, however, to promote vulnerability reduction in its market, and consequently the potential loss, as this would lead to lower premium rates (because the risk is lower) and a larger overall market. The insurance industry can promote loss reduction through incentives to policyholders for taking loss reduction measures, and by providing support for public sector and community-based disaster prevention. In the retail lending sector, it is in an Institutions' best interest to ensure that the buildings built or purchased with their funds will survive through the life of the loan period.

As both the insurance and banking sectors play significant roles in building and development, HUDCO has a much larger role in taking a lead in creating incentives within its lending guidelines to encourage private sector in the real estate to support more resilient buildings. Having tremendous experience in building and demonstration of technical needs for safety in built environment, HUDCO could be branded as an institution that finances only safer built environment.

HUDCO has been proactive in rehabilitation of disaster affected, From the lessons learnt and the experience it has gained HUDCO could take a lead role in preparedness and mitigation efforts of the government. It has been well established that large cost savings could be achieved through investments in preparedness and proactive actions.

For example during Orissa Cyclone, Building centre at Jagatsingh pur built by using building codes and cyclone resistant technologies suffered no damage, while rest of the village was totally washed away is an illustrative example of proactive measure in building safer building that could withstand most critical disaster in the history of country

The owner of a sweetshop in India, interviewed in 1994, said he had paid 25 Rupees to put stepping stones around his shop so that customers would not have to stand in flood water. Not to have done so would, he reckoned, have cost him 100-200 Rupees in lost business.

In China, \$3.15 billion has been invested over the past 40 years in measures to control floods: this is believed to have averted potential losses of \$12 billion

The World Bank and United States Geological Survey calculated that economic losses worldwide from natural disasters in the 1990s could be reduced by \$280 billion if \$40 billion were invested in preparedness, mitigation and prevention strategies.

It is high time that proactive measures are taken to save built environment as cost of saving many houses would turn out to be cost of building only one new house.

Future Directions

***Risk Transfer Tools are becoming popular in the developed world in which** shift of financial risk from one party to another relieves pressure on Governments. The two basic tools for catastrophic risk are insurance and instruments for spreading risk directly to the capital market. An insurance policy provides cash payouts in the aftermath of a disaster in return for the payment of monthly premiums; insurance companies, in turn, redistribute their risk to global re-insurers like Munich Re or Swiss R.e Catastrophe bonds are another instrument of risk transfer.*

An increase in public insurance, in whatever form, may also stimulate more extensive and fuller private coverage. In developed countries, there are well-established markets for insurance against a wide range of hazards, including the major natural hazards of floods, droughts, cyclones, earthquakes, and volcanic eruptions. Newer hedging instruments are also gaining some popularity. In some developing countries, some basic form of insurance is often necessary to secure formal sector loans.

However, as most vulnerable are the poor, in a country like India, they cannot even afford a small house, while insurance is a distant dream. The pilot projects have demonstrated that many low-income families would appreciate having access to home improvement loans; however, they do not have the reliable income to support loans large enough to complete all of the necessary improvements at one time. Efforts to assist such families in a progressive home upgrading manner (a series of two to three small, short-term loans to complete construction sequentially) have not been sufficiently tested. Pilot projects could take a form under JNURRM project where already slum improvement is an agenda. The progressive lending model could be tested under this program as otherwise administrative costs of such loans are too high. Building community resilience to disasters through financial instruments like forming co-operatives and accessing micro-financing institutions could go a long way in meeting some of the challenges of financing disaster mitigation programs.

Ministry of Housing and poverty alleviation has already released Vulnerability Atlas for three different types of disasters, identifying vulnerable districts and cities and the extent of vulnerability of housing. Research and mapping of such damage linked to home improvement program could be launched under BSUP and IHSDP programs. In the current housing finance environment, with a competitive edge in terms of technical experience in building safer cities, HUDCO could take a lead role in preparing human settlements against natural catastrophes through financial instruments under its corporate social responsibility.

References

1. James, Lewis "Development in Disaster-prone Places": Studies of Vulnerability, 1999
2. "Shelter, A HUDCO-HSMI": Special issue World Disaster Reduction Day, Towards A Safer Millennium, October 1999
3. "Post Disaster Rehabilitation Initiatives," Housing & Urban Development Corporation Ltd., 2005
4. "Increasing intensity and costs of natural catastrophes – Is this a long-term trend?' Topics, Geo, Annual review, Muniche Re Natural catastrophes,2005
5. Mitchell John, "Protecting development",
http://www.benfieldhrc.org/activities/misc_papers/DEVRIK/MITCHELL.HTM