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EARTHQUAKE RECOVERY MANAGEMENT FOR LONG-TERM DEVELOPMENT AND COMMUNITY RESILIENCE**Sanjay Agarwal¹ Tukaram U Fulzele² and Garima Aggarwal³**

¹Director, Ministry of Home Affairs, Government of India, New Delhi, India
Email: agarwalsanjay117@gmail.com

²Professor, School of Management Studies,
Indira Gandhi National Open University, New Delhi, India
Email: tufulzele@ignou.ac.in

³Project Associate, UNDP, Disaster Management Division,
Ministry of Home Affairs, New Delhi, India
Email: agg.garima@gmail.com

Abstract: *The disasters not only cause loss of lives, property, and livelihood but also reverse the progress achieved by the community. The problem gets compounded when reduction of old risks and avoidance of new risks are not addressed effectively during recovery. An earthquake, because of its magnitude and occurrence in large area, causes setback to the entire development. Hence, it is essential that risk reduction shall be integrated with all the phases of disaster management including recovery for building community resilience. This paper analyses the issue in light of the earthquake recovery projects and processes adopted in a few countries as well as in India and investigate the prospective role of disaster recovery management as a tool for long-term development and community resilience. The study is based on the data collected from secondary sources. The paper concludes that all development activities should be disaster resilient leading to sustainable change in the lives of the community.*

Keywords: Earthquake, Recovery Management, Risk Reduction, Community Resilience

Introduction

Earthquakes normally occur on and around fault lines, which could result in structural damage, loss of human lives and destruction of infrastructure and property. The degree of risk depends upon the magnitude of earthquake, its location, depth of epicentre, size of population residing nearby, type of built-in environment and capacity of community to cope up with the situation. More than 90 percent of disaster deaths take place in developing countries and over 70 percent of these in Asia alone (Gol 2007). Although economic loss in absolute terms has been higher in the developed world, Gross Domestic Product (GDP) loss has been much higher in developing countries (UNISDR 2002). Indian sub-continent is amongst the world's one of the most earthquake prone areas. Geologists predispose approximately 60 percent of the country's area to earthquake risk, out of which, 12 percent of the land, consisting of Andaman & Nicobar Islands, North-Eastern states, parts of north-western Bihar, eastern sections of Uttaranchal, Kangra in Himachal Pradesh, Srinagar area in Jammu & Kashmir and the Rann of Kutch in Gujarat, is considered as most vulnerable to earthquakes (Gol 2011). The major earthquakes in India in the last 100 years are summarized in Table 1. The communities, impacted with large-scale disasters like earthquake could not bounce back to normal and had to be dependent upon external aid for meeting their day to day needs. They further slipped into long-term poverty and deprivation due to loss of their livelihood and houses.

Table 1: Major Earthquakes in India (1905-2015)

#	Year of Occurrence	Location/Affected Areas	Magnitude	Deaths
1	2015 (April 25)	Nepal/Bihar, West Bengal, Uttar Pradesh, Delhi	7.9	79 (India)
2	2011 (Sep. 18)	Gangtok, Sikkim	6.9	7,860
3	2005 (October 8)	Kashmir	7.6	1309
4	2004 (Dec. 26)	Sumatara/ Coastal areas of Tamil Nadu, Andhra Pradesh and Kerala	9.3	16,389
5	2001 (January 26)	Kutch, Gujarat	7.7	20,005
6	1999 (March 29)	Chamoli, Uttarakhand	6.8	100
7	1997 (May 22)	Jabalpur, Madhya Pradesh	6.0	56
8	1993 (Sep. 30)	Latur, Maharashtra	6.3	9,748
9	1991 (October 20)	Uttarkashi, Uttarakhand	6.6	2,000
10	1988 (August 21)	Bihar-Nepal Border	6.4	382
11	1975 (January 19)	Himachal Pradesh	6.2	47
12	1950 (August 15)	Arunachal Pradesh	8.5	1500
13	1934 (January, 15)	Bihar	8.3	6000
14	1905 (April 4)	Kangra, Himachal Pradesh	8.0	20,000

Source: Compiled from Gol 2011, EM-DAT (www.emdat.be); IMD (www.imd.gov.in)

This paper is an attempt to develop a conceptual understanding of recovery as a tool for community resilience, followed by reviewing selected reconstruction programs and recovery initiatives taken by the various countries including India. The authors collected information/ data from government agencies and secondary sources to analyze the issue. The study helps to understand the significance of recovery in building capability of the communities to withstand, adapt and to recover from the natural disasters smoothly so that people are less impacted and continue to lead their lives normally. The paper also suggests a broad recovery framework for reducing disaster risk.

Significance of Recovery

The United Nations International Strategy for Disaster Reduction (UNISDR) defines recovery as 'decisions and actions aimed at restoring or improving livelihoods, health, as well as economic, physical, social, cultural and environmental assets, systems and activities of a disaster-affected community or society, aligning with the principles of sustainable development, including build back better to avoid or reduce future disaster risks' (UNISDR 2015). It is apparent from the definition that the recovery could be termed as valuable opportunity to improve living conditions and implement disaster risk reduction measures. It is an important component of risk reduction strategy and prevents the affected community from descending into the situation of scarcity. In India, although a holistic and integrated approach to disaster management has been adopted, it is perceived that recovery has not received adequate attention at the level of policy, processes, financial allocations and programs. While the Disaster Management Act, 2005 mandates the government to carry out reconstruction activities, it does not explicitly refer 'recovery' as a component of a disaster management strategy. The National Policy on Disaster Management 2009 distinguishes 'recovery' as one of the six elements within the disaster management continuum where it is linked to physical, social and economic assets within the overall context of 'safe development' (Gol 2009). Government of India (Gol) in

2016 has formulated a National Disaster Management Plan, which elucidates significance of 'Recovery and Build-Back-Better' (Gol 2016). However, specific guidelines on recovery at local level are yet to be developed.

Recovery Practices

Worldwide, studies on post-disaster reconstruction programs highlight issues related to delay in beginning of recovery, funding for reconstruction, relocation of the earthquake affected community and timely restoration of services. The other set of challenges in reconstruction are coordination and communication among the agencies involved, technical experts, mobilization of equipment and resources in reconstruction (Johnson 2007). Reconstruction program in Sri Lanka, highlighted competence issues in field staff due to lack of relevant experience or training to manage large and complex projects (Koria 2009). The experience in Aceh Indonesia and Tafren in Sri Lanka suggested that the reconstruction needs to be coordinated effectively (Hidayat & Egbu 2010).

After the 1st World Conference of Disaster Reduction (WCDR) 1994, disaster risk reduction strategies became essential ingredients and Hyogo Framework of Action 2005-2015 and subsequently, Sendai Framework for Disaster Risk Reduction 2015-2030 were accepted by the Nations in the 2nd and 3rd WCDR held in 2005 and 2015 respectively. These frameworks seek to promote an effective integration of disaster risk reduction into sustainable development policies and recovery planning (www.unisdr.org). The International Recovery Platform (IRP) along with UNDP, developed Guidance Notes on Recovery on various sectors namely Shelter, Infrastructure, Gender, Livelihood, Environment, Governance, Climate Change, Health and Psycho-social support. This has collection of the successes and failures of past experiences in disaster recovery (Gol 2011). Few experiences of recovery related initiatives in India and at the global level given in the succeeding paragraphs are useful in devising future strategy for recovery management.

Government of Maharashtra undertook one of the largest post-disaster recovery projects after an earthquake of 6.3 M occurred in Latur. The earthquake caused loss of 9,748 lives, 16,000 injuries and over a million people were rendered homeless. The project targeted to relocate 27,000 houses situated in 52 most-affected villages and strengthening of 200,000 houses spread over 40,000 sq. kms. The project focused on enhancement of structural safety of the buildings and capability of the government to respond efficiently to future disasters (Greene et al 2000). Similarly, Gujarat Earthquake Reconstruction Program was implemented by the Government of Gujarat immediately after the earthquake of 7.7 M, occurred on 26 January 2001 in Kutch. It posed enormous challenges due to its magnitude, intensity and geographical spread for rescue, relief and rehabilitation. Almost 20,005 human lives were lost, about 167,000 persons were injured and over a million houses were damaged and destroyed (EM DAT). The recovery program was designed to address the needs of the affected people through build-back-better approach by active participation of the community (Mishra P.K, 2012).

A field study was conducted by UNDP in Assam (Floods), Gujarat (Kutch Earthquake 2001) and Odisha (Super Cyclone 1999) to analyze recovery measures implemented on ground and to list out common issues and gaps in recovery management and lessons learned from different disasters in India. The study emphasized upon the need for strategic guidance to various stakeholders for a disaster recovery management framework. The study also supports need of community participation in all the stages of recovery planning and rebuilding, which was the key to success of Gujarat Earthquake Reconstruction and Recovery Program (Agarwal et al 2016). Another study on Jammu & Kashmir Floods, 2013 (Agarwal et al 2014) highlighted the issues and gaps identified during response and recovery period of flood disaster and recommended that recovery management planning as an apt solution for meeting these gaps and to ensure long-lasting community resilience.

The Federal Emergency Management Association (FEMA), USA developed a National Disaster Recovery Framework in 2011 to promote effective recovery, particularly for large-scale disasters. The framework provides a flexible structure that enables disaster recovery managers to operate in a unified and collaborative manner. It also focuses on how best to restore, redevelop and revitalize the health, social, economic, natural and environmental fabric of the community and build a more resilient nation (FEMA 2011). New Zealand Ministry of Civil Defense and

Emergency Management (CDEM) developed a holistic framework for recovery in 2005. It aims to increase the capability of local authorities, CDEM Group and government agencies to undertake short, medium and long-term recovery activities, enabling a timely and effective response to the recovery of affected communities (Mesurier et al 2006).

After the Great East Japan Earthquake in 2011, the Government issued a basic policy and regulation framework for recovery and reconstruction. The planning included the land-use and population relocation strategies. The policy recommends developing a shared vision for recovery that recognizes local, cultural and life values; planning for resilient recovery; necessity for a dedicated reconstruction agency; participatory methods which integrates the views of experts; improve spatial planning which is an opportunity given by mega disasters; balancing of safety and livelihood of the affected population; and open and transparent information sharing (IRP 2012). The Wenchuan Earthquake, 2008 in China Sichuan Province had the total 43 million affected people, out of which 15 million people were evacuated and temporarily resettled. The development based reconstruction was started by balancing short-term recovery and long-term reconstruction (IRP 2010).

Findings

From the above studies, it is pertinent that countries are largely relying upon recovery programs designed after the disaster except USA and New Zealand who have already developed recovery frameworks for their respective countries to facilitate long-term community resilience. In India, although there is a policy consensus to 'build-back-better' during recovery, on ground there are several challenges which are still unattended.

The specific recommendations from the review are: firstly, there is a need to arrange for dedicated resources for comprehensive recovery planning which shall focus on capacity building, damage and loss assessment in social & economic sectors and integration of risk reduction measures in development planning.

Secondly, it is essential to put in place an effective institutional mechanism at national and state level which can execute short-term, medium term and long-term measures in post-disaster scenarios. This will facilitate instant execution of disaster recovery program without exhausting crucial time and post-disaster recovery planning. Insurance of houses, properties and assets is another area which needs to be promoted at all the levels of the communities and government so as to reduce financial burden on public funds.

Thirdly, it is suggested that a framework for Earthquake Recovery Management should be developed beforehand and executed at the need of hour. It is necessary to develop this framework in advance for its success in the long-term, especially to prevent poverty and deprivation and to ensure sustainable development for all disaster affected people, as well as to reduce any future risks by enabling community resilience.

Framework for Recovery Management

The recovery framework has instrumental role in developing resilient communities by ensuring long-term protection to physical and social gains of the people and their livelihoods. Recovery is not only a set of orderly actions triggered by the impact of a disaster upon a community but also consist of several related activities such as damage assessment, restoration of public utilities, temporary housing, demolition, reconstruction, integration of disaster risk reduction measures into various development activities, financial management, economic impact assessment (Gol 2016). Though it is important to understand the community needs arising from a disaster, yet recovery framework should be formulated beforehand. The framework should aim to provide guidance to plan and implement post-disaster recovery in order to reduce future risks and ensure long-term sustainability (Agarwal 2014 et al). The suggestive features of a recovery framework are given in Table 2.

Table 2: Essential Features of a Recovery Framework

#	Features	Tasks at Normal time
1.	Damage & Needs Assessment to understand the actual losses and needs to the people.	<ul style="list-style-type: none"> • Design and development of questionnaire/formats. • Identification of professionals to undertake the task. • Training of the assessment team. • Collection of actual information of people and their assets.
2.	Recovery Centre: Pool of experts from diverse areas to assist in special tasks during recovery phase.	<ul style="list-style-type: none"> • Identification of experts/disaster managers from various fields such as engineering, community leaders, finance & accounts, communication technology etc. • Pre-contract with the experts/concerned agencies to use their services during the need of hour.
3.	Inclusion of Innovative ways for sustainable risk reduction, damage assessment, communication and decision making.	<ul style="list-style-type: none"> • Mainstreaming of risk reduction measures in development programs, retrofitting of buildings, promoting earthquake-resistant structures, risk transfer/insurance, community awareness, training, mock drills and response planning. • Use of Information and Communication Technology for dissemination of warning through Emergency Operations Centers. • Setting up decision support system by integrating Geographic Information System and remote sensing based models. • Monitoring & Evaluation through social audits.
4.	Partnerships for coordination between non-governmental organizations, international agencies, private sector and community.	<ul style="list-style-type: none"> • Identification of concerned organizations. • Delineation of their roles in early recovery, restoration of services and livelihoods and relocation activity. • Agreement between state government and organizations.
5.	Institutional setup for long-term implementation of recovery program.	<ul style="list-style-type: none"> • Identification of roles and responsibilities of recovery managers. • Constitution of program management units, implementation units and taskforces. • Identification of team of experts, staff and leaders.
6.	Financial mechanism: The framework shall provide sources of funding for recovery.	<ul style="list-style-type: none"> • Identification of public funds such as state plan funds, National Disaster Response Fund, flexi-funds for disaster mitigation and special funds announced by the Government. • Identification of non-governmental sources such as external aids, NGOs, communities, private sector and other potential sources.

The framework for recovery management should be developed on community based approach which should be able to improve capacity of community to manage future risks along with sustainable livelihood opportunities. The framework could be divided in three paradigms; firstly, recovery of housing and physical assets; secondly, recovery of basic services which includes education, health, transport and communication, water supply and electricity; and thirdly, recovery of livelihoods and production levels in the sectors of agriculture, livelihood, fishery, forestry, industry, trade and commerce, mining and tourism.

Conclusion

Recovery phase after a disaster provides several mitigation and development opportunities that may not be possible in normal conditions. If properly utilized, these opportunities can in return, improve the effectiveness of recovery and increase the coping capacity of the community to withstand possible future hazards. The present paper advocates the development of a framework for recovery management to execute recovery programs in an effective way. The framework should provide a gateway to practice built-back-better approach that combines risk reduction, mitigation,

needs assessment and sustainable livelihoods through well-defined institutional and financial mechanism. The framework not only enables early mobilization of resources but also present smooth transition from relief to reconstruction stage to long-term development.

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