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Workshop on Disaster Recovery: Used or Misused Development Opportunity



Post-Disaster Recovery



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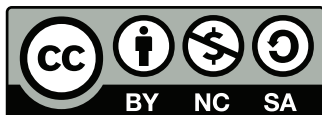
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About International Environment and Disaster Management (IEDM)

International Environment and Disaster Management Research Field targets to reduce the gap between knowledge and practice through pro-active field-level, community-based project implementation. The target areas are mainly developing countries in Asia, which have the highest population growth, and high vulnerability, due to different types of natural and man-made disasters. The focus of this research field is to learn lessons from the field experiences through effective environment and disaster related project management. Disaster issues are directly related to environmental degradation, and global climate change. Disasters hit poor people, affecting their lives, properties and livelihoods. Thus, disaster, environment, and development are closely linked to each other, under the broad umbrella of human security. The key of environment and disaster management is the end-user's participation, which are the communities, and its people. Added to this, is education and learning through formal/ non-formal education, and community/ family interactions. Working closely with the governments, non-governments (NGO/ NPO), international organizations (United Nations and other bilateral and multilateral development agencies) and regional bodies, this research field is developing a unique process-oriented participatory approach of environment and disaster management through direct involvement and ownership of the community.



The Role of Community Radio in Disasters



Workshop on Enhancing Disaster Resilience of Education Sector and Communities

Workshop on Disaster Recovery: Used or Misused Development Opportunity



Workshop Program

DAY 1 [3rd of December 2012]

09:30	Opening: Shigeo Fujii, Dean, GSGES, Kyoto University	10:15	Emerging issues of East Japan Earthquake and Tsunami: Rajib Shaw
09:45	Self introduction of Participants	10:45	Purpose and Objectives: Rajib Shaw
10:00	Photo session	11:00	Parallel Group Discussion

Group 1: Governance and Institutional Issues of Recovery

Moderator: Joy Pereira, Raportuer: Md. Abedin and Umma Habiba

- Post-Disaster Reconstruction and Institutional Mechanisms for Risk Reduction: A Comparative Study of Three Disasters in India: V. Thiruppugazh
- Collaborative Governance and Disaster Recovery: The National Disaster Recovery Framework (NDRF) in the US: Naim Kapucu
- Typhoon Morakot and institutional changes in Taiwan: Jet-Chau Wen, Shao-Yang Huang, Chi-Feng Lin, Chia-Chen Hsu, Wen-Ni Chen
- Institutional response in education sector in Kesennuma city: Yukihiro Oikawa
- Institution and governance related learning from the East Japan Earthquake and Tsunami: Mikio Ishiwatari

Group 2: Education and Learning Issues of Recovery

Moderator: Manu Gupta, Raportuer: Glenn Fernandez and Tong Thi

- Role of civil society and its role in formal and informal education as a part of disaster recovery: Manu Gupta
- Pakistan flood of 2010 and implications to education sector: Amir Nawaz Khan, Amjad Ali and Kamal Ahmed
- New insights of education sector from East Japan Earthquake and Tsunami: Yukiko Takeuchi and Rajib Shaw
- School Based Community Recovery in Kamaishi, Japan: Shohei Matsuura and Rajib Shaw

Group 3: Technology and Innovations Issues of Recovery

Moderator: Anshu Sharma, Raportuer: Farah Mulyasari and Nitin Srivastava

- Post-disaster Housing Reconstruction in Indonesia: Review and Lessons from Aceh (2004), Yogyakarta (2006), West Java (2009) and West Sumatra (2009) Earthquakes: Krishna S. Pribadi, Dyah Kusumastuti, Saut Sagala, and Ramanditya Wibardana
- Application of remote sensing in coastal zone management in Tamil Nadu, India: R. Krishnamurthy, K. Chandrasekar and D. Shanmugam
- Post-Aila community recovery innovations and ecological planning: Fuad Mallick and Aminul Islam
- Incorporating traditional knowledge to cope with climate change in post disaster recovery: Anshu Sharma and Sahba Chauhan
- Technological and Innovative Measures to Improve Flood Disaster Recovery following Mumbai 2005 Mega-flood: Kapil Gupta and Vinay Nikam

Group 4: Cross-cutting Issues of Recovery

Moderator: Juan Pulhin, Raportuer: Rajarshi Das Gupta and Mrittika Basu

- Mangrove management and cyclone risk reduction in Kutch, Gujarat: R. Parthasarathy and Mahima Gupta
- Adaptive and transformative capacities of communities after disaster: the case of oil spills in Guimaras: Andrew Eusebio S. Tan and Juan Pulhin
- Environmental management and urban recovery: Akhilesh Surjan and Rajib Shaw
- Integrated health care as the future of disaster recovery Japan: Kenji Isayama and Rajib Shaw
- Role of community radio in post disaster recovery: Comparative analysis of Indonesia and Japan: Junichi Hibino and Rajib Shaw

16:00 Group presentation

- Group 1: Governance and Institutional Issues of Recovery
- Group 2: Education and Learning Issues of Recovery

DAY 2 [4th of December 2012]

9:00 Group presentation Continued

- Group 3: Technology and Innovations Issues of Recovery
- Group 4: Cross-cutting Issues of Recovery

11:00 Wrap-up and discussion

Preface

Disaster recovery is a development opportunity. In post disaster situation, different types of resources are put into the affected region, which varies from technical, financial, intellectual, and community resources. If properly used, it can change the context of risk reduction approaches, and if not, it can create different types of additional hazards. In different countries, the post disaster recovery process changed the socio-economic and political context of the affected region and country.

The workshop was aimed to discuss the chapters of a book on Disaster Recovery. This book will attempt to draw some of the key lessons learnt from different disaster situations, and will analyze them with the framework of GET [Governance Education and Technology]. The book will finally provide a framework of disaster recovery in the form of lessons learnt. Thus, the workshop objectives were:

- To share the recovery experiences from different recent disasters
- To contribute and finalize the book chapter

The participants were a small group of 30 professionals and practitioners from different disciplines with experiences in disaster recovery. The discussion was confined to 1.5 days with group discussion under the four heading: governance, education, technology and cross-cutting issues. The book chapters follow the same structure.

The workshop was supported by JSPS (Japan Society for the Promotion of Science), Church World services (CWS) Asia-Pacific, and MERCY Malaysia. We are grateful for their generous support. This proceeding provides an overview of the salient points of the chapters and the summary of the discussion. Hope, this is useful to the readers.

Rajib Shaw



1 This chapter examines the institutional set up for reconstruction following Gujarat earthquake, Maharashtra earthquake and Tamil Nadu Tsunami in India.

2 The concept of Extra-ordinary mechanism (EOM) is discussed in this chapter which is the first and fundamental reconstruction issue stated by Haas, Kates and Bowden, 1977.

3 EOM got more attention in post-disaster reconstruction field because it overcomes the time consuming bureaucratic norms of policy making.

4 This chapter also emphasizes on the establishment of EOM mechanism that can be used for sustainable risk reduction using the window of opportunity created by disaster.

5 The issues and challenges related to EOM are highlighted here. It focuses the nature and structure of EOM mechanism, longevity of EOM and the effectiveness of EOM in the long run.

6 The methodology used in this chapter includes both qualitative and quantitative method covering respondents ranged from chief minister to village leader.

7 Among three states, the EOM mechanism in Gujarat is highly successful because of setting up single EOM rather than multiple EOM for reconstruction.

8 In Gujarat case, the EOM is more successful because it brought together political executives and bureaucrats in the same platform through Gujarat State Disaster Management Authority (GSDMA).

9 This chapter further highlights the failure of EOM that happened through mismatch between the routine and emergent procedures, lack of co-ordination, inter-departmental rivalry and fractured politics.

10 In conclusion, this chapter focuses on the mandate, scope, structure and power of EOM that help to continue the disaster management activities even after the reconstruction program was completed.



1 The concept of disaster recovery is described in this chapter and it gives important action points in the pre- and post- disaster period time.

2 This chapter indicates the importance of intergovernmental relationship to reach recovery goals and outcomes, taken from past recovery experiences.

3 Hence, the collaborative governance principles in disaster recovery were applied to the recent National Disaster Recovery Framework (NDRF) in the US.

4 Collaborative governance is a form of governance system where both public and private entities are involved in collective and consensus-oriented decision making that is utilized and applied to managing disasters that provides catastrophic effects.

5 The conditions and importance of collaborative governance are emphasized with detailed study cases.

6 NDRF is a comprehensive document that is aiming to enhance the capacity of communities to not only speed up the recovery process, but also to make it more effective.

7 The NDRF discusses the core principles that guide a successful recovery process. These core principles are: individual and family empowerment, leadership and local primacy, pre-disaster recovery planning, public information and so on.

8 This framework is also in line with the “whole community” approach that is being adopted by Federal Emergency Management Agency (FEMA) for better preparedness and in building resilient communities.

9 This study denotes the limitation of NDRF because it is a comprehensive document and cannot be used as a stand-alone tool. It needs to be further supported with additional operational and training tools.

10 In conclusion, the study emphasizes the role of federal government who can take lead in developing and improving existing federal level guidelines and plans for disaster recovery.

- 1** This chapter examines the modification of institutional set up that happened through the catastrophic disaster typhoon Morakot in Taiwan in 2009.
- 2** It highlights the nature of the devastating typhoon Morakot, its causes and impacts in southern region of Taiwan.
- 3** It reveals that in Taiwan, the National Fire Agency (NFA) under Ministry of Interior was previously responsible for fire prevention, disaster rescue and emergency medical service. So, there was a misconception of the local people that NFA was used only for national fire administration affairs.
- 4** This chapter highlights that typhoon Morakot has triggered the idea of NFA to be replaced by National Disaster Prevention and Protection Agency (NDPPA) through the Disaster Prevention and Protection Act.
- 5** It further states that NDPPA will be used as a professional institution in dealing with future disasters and gives emphasize on the role of local governments who have to establish Disaster Prevention and Protection Bureaus for operating

- disaster prevention system effectively.
- 6** This chapter highlights the amended Disaster Prevention and Protection Act that includes several articles that mainly depict the way of implementing the disaster management activities.
- 7** This chapter also indicates the shortcomings of the Disaster Prevention and Protection Act that hinder to implement the disaster management activities in Taiwan.
- 8** It also mentions that after the disaster Typhoon Morakot, Executive Yuan of Taiwan had established "Office of Disaster Management" which is in charge of supervising central and local governments to execute disaster prevention and response plans.
- 9** This chapter point outs the function and the actors of the Disaster Prevention and Protection Office.
- 10** In conclusion, this chapter denotes that typhoon Morakot not only amended some acts, but also changed the disaster management system. It also helped in reducing many issues and tasks that were overlapping among different institutions.

- 1** This chapter focuses on the propose practical institutional and governance mechanisms of quick recovery for developing countries and development agencies by examining practices in the East Japan Earthquake and Tsunami (EJET).
- 2** Therefore, this chapter examines how institutional and legislative features of Japanese governance system may contribute to prompt recovery of the affected areas.
- 3** It is found from this chapter that Japan has established various schemes for the recovery process. For example, in case of emergency response, relief goods, evacuation shelters, and construction of transition shelters are conducted and managed by the Ministry of Health, Labor and Welfare.
- 4** In term of rehabilitation in Japan, public infrastructures and agricultural facilities are managed by Ministry of Land, Infrastructure, Tourism and Transport (MLIT), and Ministry of Agriculture, Forestry and Fisheries (MAFF).
- 5** This chapter points out the importance of the advanced financial agreement for rehabilitation costs that are mainly allocated through the central

- government to the local government.
- 6** It also gives emphasis on the public-private partnerships. In rehabilitation works, for example, the governments can arrange pre-agreements in various areas including medical, logistics, transportation, mass media, public utilities and waste management with the private sector.
- 7** This chapter states that the mobilization of expert teams through national networks can foster the rehabilitation work.
- 8** It also highlights that the structural measure such as seismic reinforcement of infrastructure can reduce rehabilitation costs after the disaster.
- 9** In terms of disaster recovery, this study recommends several measures for the developing countries to strengthen their capacity for prompt recovery.
- 10** In conclusion, this study suggests that advance financial arrangements, such as public-private partnership, mobilization of expert teams through national networks and structural measures, prior to disasters are necessary for prompt recovery.

1 This chapter mainly focuses on nature and dimension of massive disaster of East Japan Earthquake and Tsunami (EJET) and how educational institutes have been implementing strategies for recovering schools and education from that disaster.

2 It also talks about Kesennuma in Miyagi Prefecture is located in the northeast of Japan that affected by massive disaster of EJET on March 11, 2011.

3 Kesennuma had huge damages in human lives, houses, transport, education, industries and so on. More than 1400 victims including 260 missing persons and 100 dead persons to the disaster.

4 The massive earthquake of Magnitude 9.0 and consequence of tsunami creates devastation on 3 elementary schools, 1 junior school, 1 high school and 1 kindergarten etc.

5 This chapter describes the case study of damage and experiences of different school in Kesennuma during and post disaster period of time.

6 After earthquake and tsunami, many schoolyards became sites for temporary housing facilities, hence the remaining schoolyards are utilized by two or three school on sharing basis.

7 To restart schools and education, supplying school lunch was one of the most important factors that Kesennuma city government had to take measures to, with the help of Board of Education (BoE). Initially, the city was able to provide 3 types of lunch; full, semi and only milk.

8 Kesennuma BoE started providing transport for student from their residence to school with the help of Ministry of Education, city government and bus companies for the new academic year.

9 After disaster, Kesennuma BoE took initiatives to give financial support as part of recovery process to students who were affected by the disaster. This aid covers learning materials, lunch and transport fare. They also offered grant for orphaned students in lump-sum payments.

10 Finally, education sector of Kesennuma is trying to establish recovery process through participation and collaboration among multistakeholders.

1 Schools and school children often bear the greatest impact of disasters. The loss of precious young lives through the destruction of schools in disasters has fueled public outcry for safety in schools.

2 The key to a successful disaster recovery is strengthening resilience by way of recognizing and strengthening community's traditional coping mechanisms rooted in their culture and environments.

3 Here are examples of civil society's involvement in the disaster recovery of the education sector.

3-a Following Typhoon Nargis in Myanmar, SEEDS implemented a school safety project to enhance the capacity of local schools to cope with natural disasters. To reach out to "unreachable" schools and provide access to timely and appropriate knowledge and information, SEEDS conceived Mobile Knowledge Resource Centres. These mobile centres have been able to overcome physical and location barriers to benefit communities that are often at very high risks.

3-b The project of establishing a Citizens' Resource Centre by

SEEDS in collaboration with the Municipal Council of Port Blair, India specifically to educate citizens who had been traumatized by the Tsunami, was first of its kind in the country.

4 The role of external agencies is to create enabling environments that strengthen community's understanding and application of their natural environments and find technological solutions that help remove impedance is understanding and applicable.

5 Partnerships between governments and civil society organizations in mutually accountable relationships are creating widespread ownership, capacity and transparency at local levels.



1 Generally, schools have disaster preparedness manuals. However, these manuals focus only on students' safety within the school premises. They usually do not address issues like transferring students to another school in case of severe infrastructure damages; impacts on the school of injury to or death of teachers; how classes will be conducted if the school is used as evacuation site for an extended time; etc.

2 It is assumed that without prior disaster experience it might be difficult for schools to take effective measures in disaster preparedness. However, based on the experience of EJET, which damaged 6,284 public schools and left 733 students and teachers died or are missing, lessons need to be extracted on why some schools had difficulty learning from past disasters and did not prepare sufficiently.

3 How schools are affected by natural hazards depends on the characteristics of the local area. Therefore, it is necessary to customize disaster prevention education in the local context. Not only should the teachers and students become familiar with the visible physical environment, they should also know the history and the current social networks in and around the area. The social infrastructure was very important in mutual assistance and relief during EJET and will be in the restoration and revival of the Tohoku area.

4 Disaster prevention education for the staff of a school is carried out by incorporating it into the teacher training to ensure safety of students during emergencies. Teachers become important actors who bind school and community together, serving as a leading figure in the disaster prevention education.



1 The concept of "School-Centered Community Building" promoted by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) for school recovery has four main pillars, which are: (1) securing safety of schools and relocating them to safe areas as necessary, (2) retrofitting schools to improve their functions as evacuation center and hub for disaster management, (3) making school building eco-friendly and (4) making schools multi-functional public facilities to become the center of communities.

2 The unique feature of the concept is the idea to combine multiple public facilities or services with schools that will be rehabilitated (or reconstructed) from the damages of EJET. In doing so, it is expected that the new schools will become central hubs for community interaction that will help rebuild community ties which was weakened because of the effects of EJET.

3 The concept also looks into longer term issues such as low birth, aging communities and for schools to take an important role in revitalizing communities through interactions among different age groups and possibly attracting new students to the new schools.

4 However, actual implementation of the concept has not been witnessed on the ground due to difficulties in coming up with community consensus, delays in finalizing new land use planning and coordination among related local government departments.

5 The case study focuses on Toni District of Kamaishi in which both elementary school (ES) and junior high school (JHS) were destroyed by EJET. Temporary school buildings are now set

up in the former JHS premises and discussions have been held on ways to implement the school centered recovery concept in Toni.

6 Through survey/analysis and after consultations with the School Construction Consultative Committee of Toni, it was determined that the new school should (1) incorporate the unique history and culture at the same time preserve the DRR awareness of students and teachers; (2) design of the building be simple and (3) be recovered on prerequisite that it will be opened to the entire community.

7 The strength of Toni primarily lies in its strong community linkage, determination in education and high DRR awareness. However, EJET had shaken the school – community linkage and lessons are now reviewed to further strengthen DRR measures.

8 There are also opportunities to receive support from community based organizations and NGO/NPOs for rehabilitation and recovery as well as funds with special preference. On the other hand, the process beyond recovery into community building should be considered simultaneously to tackle chronic issues such as population drainage.

9 In conclusion, it is recommended that the new school should be promptly rebuilt, but at the same time, longer visions of giving the schools a role as hub for community interaction should be considered simultaneously. For this, it is important for the community to be willing to support the schools and for local government to provide institutional arrangement in order to prevent too much burden on the schools.

1 The Floods 2010 are declared to be the worst since 1929 in Pakistan. It has been estimated that the education sector has been one of the seriously affected sectors as a consequence of Floods 2010.

2 Affected institutions are only 6.2 percent of the total institutions in the country and 12 percent of the institutions are in the flood affected districts.

3 Educational buildings in majority of the flood affected areas were used as shelter for flood survivors.

4 The extent of damage, especially for the most vulnerable group as a consequence can clearly be observed by the fact that 1.6 million children have been affected because the schools were damaged or because schools were being used as shelters. To provide an broader overview, children under 18 who were affected counted 8.6 million.

5 Floods did not result so much in loss of school hours, with the only exception being that summer vacations were extended for a few days up to Eid-ul-Fitr (although some provinces, such as Punjab, had announced the extension of summer vacations up to Eid-ul-Fitr even before the occurrence of floods).

6 Reconstruction of affected buildings is undertaken using a two-step approach: first being the immediate rehabilitation in the short-term (6-12 months) and long-term reconstruction.

7 Total reconstruction costs are estimated to be PKR 42,906.58 million (US\$ 504.8 million).

8 The reconstruction strategy provides an opportunity that should be availed to improve access to higher quality education through improved design of learning spaces, laboratories, capacity development of teachers and strengthening the district education offices for improved service delivery.

9 The Education Departments at the provincial and district levels will need to play a leading role in the planning and implementation of recovery and reconstruction of the education system.

10 To foster the reconstruction of the affected areas, the approach of Build Back Smarter (BBS) is being implemented in the affected areas, which focuses mainly on the cost optimization of the multi hazard reconstruction.

1 Past earthquake experiences in Aceh, Yogyakarta, West Java, and West Sumatera showed that most of the casualties and economic losses are due to damages of engineered and non-engineered structures.

2 Based on the provided case studies, the stakeholders' coordination, which was involved in housing reconstruction, has proved lack of effectiveness due to large numbers of organization.

3 Reestablishing housing is a critical factor in the recovery processes, which enhance communities' capacities in different aspects.

4 Challenges of housing reconstruction are identified, which is not only in the often-limited capacity in the technical or engineering aspects of the reconstruction itself.

5 Reviewing the past earthquake experiences and challenges in the post-disaster housing reconstruction programs is important to be able to identify the problems and strategic issues to be addressed in the future.

6 To achieve sustainable post-disaster recovery activities, one needs to

look at factors such as: financing scheme, housing construction, and house location.

7 The awareness and perception of the house builders and house owners needs to be strengthened, which is important to influence the decision making process in investing for safer housing.

8 Disaster education for better earthquake risk perception should be implemented in order that mitigation efforts can be accepted at both national and local levels.

9 Combined efforts and coordination of multi-stakeholders (government, agencies, construction developers and personnel, and community) are determining to the improvement of building performance in future earthquakes.

10 Policies in better project delivery systems, mechanisms for providing adequate supervision and technical advices - more down-to-earth training and capacity building mechanism - financing and incentives systems, supported by appropriate technology approaches are needed for better post-disaster housing reconstruction programs for achieving earthquake safer housing.

1 The concept of Integrated Coastal Zone Management (ICZM) involves the community decision-making process, in relation to local, regional, and international goals, focusing on the interactions between human activities and resource demands is needed on the ground.

2 Coastal pollution is one of the important environmental factors, which affect the quality and livelihood security of coastal communities in urban center houses (Chennai, India example).

3 The combination of the use of high-tech such as remote sensing and field skills could support quantitative assessment of coastal ecosystem (mangroves, species distribution, coastal morphology changes).

4 Coastal engineering structures vs. shoreline erosion. Although the construction structure can protect to tsunami, it has been confirmed and accepted that the most important anthropogenic cause shoreline erosion is the construction of harbor and other coastal engineering structures along the coast (showcased by Tamil Nadu example).

5 Tsunami and storm surges wave modeling found to be a useful tool for understanding the past events and simulation for future forecasts.

6 Addressing the high population concentration and unsustainable utilization of coastal resources still continues despite several awareness measures.

7 Lack of multi-institutional cooperation mechanism and participation of local community to development ICZM plan and its implementation are identified and need to be addressed and emphasized.

8 Trans-boundary issues such as sharing of freshwater resources, affect the mangrove ecosystems, which in turn linked to the coastal fisheries and the use of this ecosystem as natural barrier (showcased by Tamil Nadu example).

9 Both the combination of field survey and spatial analysis are proven to support the quantitative assessment on vulnerability in ICZM.

10 More science-based people centered approach found to be successful in ICZM and its application needs to be widely encouraged.

1 Bangladesh has 700 km long coastline, which is 20% of country's land mass and houses 30 million people. The coast is vulnerable to unprecedented tropical cyclones, hurricanes and storm surges damage.

2 Pre Aila scenario – no adequate response planning and implementation from disaster management agencies, restoration of vulnerable population's livelihood and shelter unmet. A dedicated national effort was required to provide science-based information.

3 The trends of coastal inundation, storm intensity, poor planning, construction, and implementation of regulations, and the inexperience of coastal dwellers to prepare for and recover from these events, had compounded the situation in such areas.

4 The concept of Disaster Resilient Habitat (DRH) was introduced by UNDP to strengthen the houses and infrastructure of an entire village. It was a response to reduce the loss of assets to poor communities, and to ensure the sustainability of the measure.

5 DRH ensured conversion of each structure into a cyclone shelter, and minimize the destruction caused. This would allow the community to recover from the disasters.

6 It is a bottom up approach as it involves community's indigenous knowledge with technical aid, and makes the community self-sustaining in the long run. This would also allow them to help other coastal communities.

7 The process included a reconnaissance visit with workshop involving the local people, followed by a stakeholders' workshop to identify the skills of the community and design the structures.

8 The day to day problems were identified with design modifications on site, different stakeholders were engaged, salinity issues were overcome and the final shape of the DRH was realized.

9 DRH instilled confidence in people and brought new developments of the livelihood of the people, still shaping up and facing challenges ahead.

1 Traditional knowledge is recognized due to its strength, local contextualization, and appropriateness, leading to highly customized usage over generation.

2 The study of the effectiveness of local multi-stakeholder action as an enabling factor for mainstreaming DRR-CCA in post disaster program is necessitated.

3 The impact of consolidation of local change agents, their participation through knowledge tools and their strategic actions as an institution, as enablers for shift in long term recovery program towards linking DRR and CCA and mainstreaming them in development processes are going to be critical to address this sector in future.

4 There is a need to address the integration of DRR and CCA at the district level; since this level is best suited to bring about upward filtered transformation.

5 The main factors for the survival of shelter in the remote desert areas construction technology and for dissemination to other communities in the larger region of Rajasthan, India, are:

a) community leaders set an example by using this technology, b) community involvement in construction of shelter, c) extreme climatic conditions, d) availability of local materials at no cost, and e) good design for safety and comfort.

6 After the cloudburst and flash flood in Leh, 2010, an approach of combination of both technical as well as social aspect of the affected community was adopted.

7 Post disaster recovery programs must capitalize on existing traditional wisdom since it has been tested over generations and is best suited to the local environment and culture.

8 Linkage with local stakeholders including governments, academia and the private sector is useful for creating a local buy-in for the approach, which will help in its sustainability in the long term.

9 Information is the key to all the approaches, and the ability of local populations to create and access information, to disseminate it to the larger community, and to use it to influence the policy environment is the ultimate goal of local action on DRR CCA.

1 Mumbai is an economic based city, with about 12 million population spread in 437 square kilometers. It experienced a severe flood on 26th July 2005 with 944 mm rain during the 24 hours, causing death of 419 people, inundation of 107 low lying areas, collapse of transport and communication system, and damage to buildings.

2 Mumbai is susceptible to floods because of: increasing population, informal settlements and obsolete and inadequate drainage system, intensive reclamation, urbanization and decrease in the coastal mangrove system.

3 Chitale committee (2006) gave recommendations with the background of 2005 mega flood : detailed contour map of all watersheds, restoration of the Mithi river, stream gauging, installation of automatic rain gauges by the IMD, regular maintenance and desilting of the existing drains, removal of the obstructions and provision of additional gated outfalls/pumping stations and holding ponds.

4 Enhancement of Flood Response Mechanism; Institutional mechanisms have been strengthened with creation of specific authority for restoration of Mithi river and rainwater harvesting compulsory.

5 Emergency control center has been upgraded with enhanced communication and computer systems, laden with disaster management software, and emergency supplies.

6 Installation of 30 Automatic weather stations consisting of tripping bucket rain gauges, audible alarm, resulting in enhanced response mechanism and judicious deployment of resources.

7 Other measures included a decision support system for mitigating Urban Flooding for Mumbai, Standard Operating Procedure. This allows better insight into rainfall variation over the city development of design curves for future drainage works and construction of innovative structures on the river.

1 Disaster recovery is not just about rebuilding of infrastructure in affected areas but is also about the rehabilitation and transforming the lives of affected people.

2 Psychological support mechanisms are recognized as essential elements to build community resilience and for strengthening and sustaining health and emergency response system.

3 Mental and behavioral health should be integrated together in assessments and services, disaster education and training and needs more advanced research.

4 The medical facilities collapse significantly after a disaster like after 1995 earthquake in Japan where medical buildings collapsed, malnutrition and stress engulfed people followed by difficult medical issues like pneumonia.

5 Life support centers and weekly area meetings along with its collaboration with local residents in Kamaishi city, Health promotion managers established by Kesennuma City Mayor and the family support system executed by Natori City when combined together will help the local residents in affected communities.

6 Regional comprehensive support centers providing consultation, comprehensive long term care insurance claims and welfare services like sports and recreation in the community centre helped disaster victims from these cities to overcome the trauma.

7 For the cities under this study depopulation, aging and increased medical expenses make the community more vulnerable to disasters. These require the communities to be self-sufficient without depending on the government.

8 Policy measures supporting social ties including family units and community participation should be emphasized to lower mental stress.

9 After a disaster, healthcare teams must provide support in the acute phase and in the chronic phase volunteers from NPOs/NGOs must provide help disaster victims to revive their life to normal.

10 A shift is necessary in the healthcare system from focusing on public health nurses to members of health promotion team in communities and enhancing community health care systems.

1 The paper aims to delineate the role of mangroves along Kachchh coast from protection service perspective and emphasizes collective action amongst all stakeholders to support the effective management and restoration of mangrove resources.

2 Kachchh district of Gujarat is considered highly susceptible to various natural disasters such as earthquakes, cyclones, storms and tsunamis by state level disaster agency. Meteorological data of the region points out that number of cyclone hitting Kachchh has increased since 1990. Historical records show severe cyclonic events in the year 1998 and 1999 over Arabian Sea that made landfall at the coast of Kachchh claiming hundreds of lives and loss of property.

3 Convincing evidences on the role of mangroves has emerged from the field studies along the coastal villages of the district in the aftermath of these cyclonic events. Historically, Kachchh had an extensive mangrove ecosystem which had changed over time due to various development activities as well as natural disasters and anthropogenic interactions.

4 During 1999 to 2007, mangrove cover decreased from 854 sq.km to 672 sq.km out of which less than 20% is dense and rest is sparse or open.

5 Coastal communities perceive that mangroves reduce the velocity of cyclonic wind and distribute water among the channels and creeks, thus reducing the level of inundation

and also provided shelter to many fishermen during tropical cyclones. The evidences from the field and damage assessments however need to be supported by detailed ecological studies.

6 Two major modes of initiatives have been taken up for mangrove conservation and management in the state: 1) by The State Government and NGOs and 2) by the Industries.

7 Government's REMAG (Restoration of Mangroves) project attempted to introduce participatory management of mangroves through community based approach but lack of motivation, sense of ownership and incentives along with changing mangrove-livelihood linkages amongst the newer generations pose challenges towards mangrove regeneration through community participation.

8 Industries as a part of their social responsibility have recently undertaken mangrove regeneration activities with community participation.

9 Taking into account the changing approaches and attitudes of community towards natural resources the component of community based management of mangroves needs to be revisited and a management strategy integrating all the stakeholders such as State Government agencies like State Disaster Management Authority, Ecological Commission and Pollution Control Board, , NGOs, Industries and local community needs to be evolved.

1 Community radio helps in strengthening disaster preparedness and facilitates disaster management in local communities.

2 Community radio is a medium of collecting, transmitting and sharing disaster related information and is also used for boosting up the mental status of disaster victims.

3 In the recovery period, emergency radio helps in the development of a shared recovery plan for the local area, ensuring public participation in the process and carrying out recovery activities effectively.

4 Public participation is a defined characteristic of community radio like Minamisoma Saigai FM in Tohoku region but absence of public participation has been evident from the case studies of Indonesia.

5 In Japan, 3 radio stations have been established after a year of the occurrence of the disaster showing the need for a community radio for the evacuees still living in the temporary households which will provide them with all the necessary information.

6 Minamisanriku Saigai FM, after Great East Japan Earthquake, illustrates the limitations of disaster radio stations that are primarily driven and centered on the local government, with programming limited to transmitting disaster related information provided by local authorities.

7 Information network like COMBINE helps in transmitting information to villagers living in and around Mount Merapi on the current status of Merapi Volcano. Similarly, social networking sites can also be used for interactive communications.

8 There is an urgent need for organizations that provide continuous support to the community radio stations in disaster affected areas across the geographic and organizational borders.

9 There is a need for manuals providing an established procedure to start a temporary emergency FM and it should also provide guidelines and information to the staffs.

10 Funds and licenses for the secured operation of the temporary radio stations is a pre requisite and the role of emergency community radio needs to be considered urgently in the Disaster Risk Reduction framework.

1 Adverse environmental and socioeconomic impacts of industrial pollution such as oil spill present a significant challenge for governance and disaster management authorities.

2 The oil spill in the Guimaras province, Philippines in 2006 affected the livelihood, environmental integrity and institutional arrangements of the local communities and needs regular follow up.

3 Recovery efforts mainly addressed coastal clean-up, alternative livelihoods, education, information and communication on the hazard and restoration of degraded environment and still going on.

4 The adaptive capacity of the three communities under this study is fair and their dependence on economic well-being and stability is higher than to demographic structure and interconnectivity to higher levels.

5 Transformative capacity, decisions or actions made in the course of oil spill, reveal the inadequacy in knowledge and management of the community but exposed the community to experience and empowered them to respond to future perturbations.

6 A workable disaster preparedness management plan, sustainable alternative livelihood and a transparent policy making mechanism needs to be imbibed, institutionalized and accepted by the community.

7 After the spill, legislations have been formed, committees/bodies are created by the local government and annual educational campaign regarding spill is regularly carried out.

8 Outside intervention were ineffective and useless among the community's existing situation after the spill. Hence, in the disaster recovery phase, best knowledge and proper consultation with the participants should be strictly observed to derive decisions and actions.

9 Networks and linkages and collective effort for drawing support to action should be harnessed and enhanced.

10 Indigenous knowledge and management of water resources based on research and development should be sustainably practiced to address oil spill in future.

- 1** Environmental management is a pre-requirement for reducing risk from major disasters and towards swift recovery.
- 2** Statistical indicators are assumed to provide a powerful basis for comparative analysis and development of systematic knowledge base in the recovery phase and provide a quantitative basis for developing more generalized understanding.
- 3** Kobe disaster recovery showed notable spatial disparities with both the concentration of damage and long term trends in population shifts.
- 4** After Kobe earthquake, the sectoral shift towards a more service oriented economy can be considered an acceleration of long term changes in Japanese economy.
- 5** After the Aceh earthquake in 2004, it became evident that Participatory approach is effective in mass scale housing reconstruction in post disaster recovery and an effective organizational structure and process helps in ensuring public participation.
- 6** Infrastructure recovery in a long term involves repair, replacement and reestablishment of infrastructure components. Use of hazard resistant materials, innovative designs, and a holistic approach to community hazard risk can greatly reduce the infrastructure vulnerability.
- 7** Livelihood recovery, though in a young and experimental stage, involves provisioning, protection and promotion. Flexibility, contextual knowledge and a long term commitment is required to strengthen livelihoods against future shocks.
- 8** Along with temporary shelters and assurance to local governance, disaster recovery phase should also emphasize the environmental recovery which is essential to reduce the risk of future disasters.
- 9** Disaster recovery is a gateway for addressing development deficits and calls for realistic planning.
- 10** The need for a systematic framework covering environment and social aspects for measuring disaster recovery at the community scale is utmost felt and it should provide guidance for use of statistical data, facilitate comparisons and should show the ways to achieve recovery as well as prepare for future risks.



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1, Overview

Governance and Institutional Issues of Recovery is one of the key issues that provide the tools for decision-makers and community leaders to facilitate good policies and strategies, appropriate institutional and legislative systems at national level to grass root level for the designing of effective recovery plans and programs. Five case studies that focus on governance issues in disaster recovery process were discussed.

A study on Post-Disaster Reconstruction and Institutional Mechanisms for Risk Reduction was discussed, where a comparative study of three disasters in India that highlighted a institutional set up named Extra Ordinary Mechanism (EOM) for reconstruction followed in Gujarat, Maharashtra and Tamil Nadu aftermath of earthquake and tsunami disaster was conducted. EOM was successful in Gujarat, because it brought together political executives and bureaucrats in the same platform through Gujarat State Disaster Management Authority (GSDMA). This study further identified that the success and failure depends on the mandate, scope, powers, structure and nature of the EOM.

Collaborative governance and disaster recovery was discussed with an example on the National Disaster Recovery Framework (NDRF) in the U.S. which addressed that collaborative governance is a form of governing where both public and private entities are involved in collective and consensus-oriented decision making that is being utilized and applied to managing catastrophic disaster effects. NDRF is a flexible structure that is currently being utilized as a resource which can help engage various stakeholders with each other in the recovery process. Discussions revealed that implementation of NDRF require joint training and common understanding of stakeholders.

A study on Typhoon Morakot and institutional changes in Taiwan was introduced in which typhoon Morakot became the trigger for the National Fire Agency (NFA) to be replaced by the National Disaster Prevention and Protection Agency (NDPPA) through the evolution of Disaster Prevention and Protection Act (DPPA). The newly established DPPA includes several articles that mainly depict the way of implementing the disaster management activities and also gives emphasize on the role of local governments who have to establish Disaster Prevention and Protection Bureaus for operating disaster prevention and recovery system effectively.

Learning from the East Japan Earthquake and Tsunami (EJET) that aimed to propose practical institutional and governance mechanisms of quick recovery for developing countries and development agencies was also discussed. An example from the EJET affected area was given where roads and devastated areas were able to reopen in a week because of robust measures prepared from normal times. It was suggested that (i) advance financial arrangements: clear cost sharing between local and central governments, (ii) prior agreements with private sector, (iii) mobilization of expert teams through national networks and (iv) structural measures to prevent fatal damages etc. are necessary to prompt disaster recovery at normal times.

A study on Institutional response in education sector in Kesennuma city was discussed where it depicted the nature and dimension of massive disaster of EJET, and how educational institutes have implemented strategies for recovering schools and education from that disaster. This study also mentioned that supplying of school lunch was one of the major disaster recovery approaches in Kesennuma city. Furthermore, it also denoted that Kesennuma city board of education started transport for student from living place to school and gave financial support to the students who suffered most by the disaster.

2, Common Issues:

i. Institutional transformation

Introduction of new mechanisms: Regarding governance perspective, the common issues discussed by the group members are as follows: Gujarat State Disaster management Authority introduced new extra ordinary mechanism just after Gujarat earthquake 2001. This extra ordinary mechanism is usually set up in the aftermath of disaster to coordination and speedup reconstruction process

- Leadership at the highest level - political will, commitment and political culture play an important role for good governance
- Avoiding ad-hoc/Short-term arrangements – very limited; hence permanent arrangement - preserve institutional memory;
- Cabinet Resolution to Revision of legislation (streamlining of functions to reduce overlap): After typhoon Morakot in Taiwan has changed the idea of National Fire Agency (NFA) replaced by National Disaster Prevention and Protection Agency (NDPPA) through the Disaster Prevention and Protection Act
- Develop comprehensive mandate - reconstruction planning, capacity building, monitoring, reporting

ii. Decision and Policy Making

- Legislation / Policies always top-down but space made for collaboration/stakeholder input
- Relief phase: tends to be top-down – reconstruction phase more collaborative
- Nature and structure of mechanism: enables active participation of key-stakeholders
- Reconstruction policies need wider consultation
- Enhanced Fiscal Management

- Facilitate participation of external players (donors/funders)
- Measures to strengthen future capacity for sustainable risk reduction

iii. Stakeholder Engagement

- Enhance stakeholder engagement
- Provide options to the community for meaning full participation
- Trade-offs: between consultation, speed and quality of resources
- Developing schools as safe evacuation centers with adequate facilities

Besides these common issues, the discussion group further mentioned the gaps that hinder achievements for better governance in disaster recovery that include:

- Pre-disaster governance conditions:
- Social, economical, political and cultural conditions of the country;
- Governance structure / political regime;
- Pre-disaster policy context; cultural context
- Level of capacity
- Perception of safety / Level of awareness

3, Suggestions and measures for issues raised

The recommendations came from the group members are summarized below:

- a, Integration of financial and budgetary systems into governance for disaster recovery
- b, Need for capacity building targeted to appropriate levels of government and stakeholder groups
- c, Clarification of the concept of sustainability and resilience in the context of governance systems for disaster recovery
- d, Inclusion of vulnerable and special needs groups, gender, children etc. in governance mechanisms for disaster recovery

4, Specific cases (Used and misused opportunities)

In the group discussion, used and misused opportunities of disaster recovery that determines the success or failure of good governance were raised. In terms of used opportunities:

(1) Setting up of permanent mechanism: i.e. extra ordinary mechanism (EOM) was successful in Gujarat because single EOM rather than multiple EOM for reconstruction after Gujarat earthquake in 2001 was set up. It brought together political executives and bureaucrats in the same platform through Gujarat State Disaster Management Authority (GSDMA) that continued disaster management activities with budgetary support.

(2) In Taiwan, National Disaster Prevention and Protection Authority (NDPPA) evolved after Typhoon

Morakot in 2009. It is now used as a professional institution in dealing with future disasters and gives emphasize on the role of local governments who have to establish Disaster Prevention and Protection Bureaus for operating disaster prevention system effectively.

On the other hand, in terms of misused opportunity:

(1) After tsunami at Tamil Nadu in 2004, the State Government of Tamil Nadu took disaster recovery program through relocation of fishermen community in inland without taking account of their occupation. The relocated fisherman faced problem to catch fish because the sea was so far from their new place.

They argued that, in order to be able to fish, they would need to stay on the beach at all times and keep a watch on the movements in the sea, ready to launch their boats at a moment's notice and rush after a passing school of fish. But the governmental decision impeded the relocated fisherman to continue their jobs. So, this example appeared as a misused opportunity.

(2) Historically, Japan has suffered severe damage from tsunamis, storm surges, ocean waves, and other natural phenomena. To endure with tsunami, they established dike that are designed to withstand the largest of the predicted tsunami heights and storm surge levels. But in March, 2011 the East Japan Earthquake and tsunami (EJET), however, the height of the tsunami far exceeded predictions. This tsunami swept over this dike before destroying it, leaving a path of death and destruction across the community. In many cases the tsunami was twice the height of the dikes. Therefore latest EJET proved that height of tsunami dyke is not sufficient enough to protect from natural disaster to make safety. This can be misused opportunity to promote a false safety.

5, Way forward

While discussing the role of governance in disaster recovery process, the following issues came as discussing point for future task.

- Integration of budget into the governance, as proper financial system is the key element to run the disaster recovery process effectively and more efficiently.
- Inclusion of vulnerable and special needs groups, gender, children, elderly and disable etc. in governance mechanisms for disaster recovery. Special groups are truly vulnerable at the time of disaster recovery process. Hence, special groups should be kept in mind in governance mechanisms for disaster recovery.
- Involvement of community people is crucial in governance mechanism as community people take the lead first into the disaster recovery process. Furthermore, without participation of community people it is bit difficult to achieve the goal of good governance in disaster recovery.
- It is also necessary to incorporate pre-disaster governance conditions.



Education and Learning Issues of Recovery

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1, Overview

Disasters affect education systems and infrastructures. For example, 6,284 public schools were damaged and 733 students and teachers died or are still missing due to the 2011 Great East Japan Earthquake and Tsunami (MEXT, 2011 in Takeuchi and Shaw, 2013). In the 2010 Pakistan Floods, the education of 1.6 million students was affected either by the destruction of schools or by the extended use of schools as evacuation shelters (Khan et al., 2013). The 2001 earthquake in Gujarat, India devastated 1,884 school buildings and 5,950 classrooms and a total of 971 school children and 31 teachers were killed, while 1,051 students and 95 teachers were seriously injured (Gupta, 2013). Given the extent of damages and casualties caused by disasters, there is a strong need for mainstreaming disaster risk reduction (DRR) in the education sector through strengthening school facilities against various natural hazards and through the incorporation of DRR concepts and lessons into the school curriculum.

In the aftermath of disasters, disaster recovery can be an opportunity for building disaster-resistant, safe, and accessible schools and for introducing or enhancing disaster prevention education. This means that aside from fixing what was destroyed by the disaster, recovery should also address the things that already needed improvement even before the disaster. One of the keys to a successful disaster recovery is strengthening resilience by way of recognizing and strengthening community's traditional coping mechanisms rooted in their culture and environments (Gupta, 2013). Stakeholders and actors from outside the education sector have contributed toward this end. Civil Society Organizations (CSOs) have engaged in learning and education with disaster-affected communities. CSOs have also collaborated with local governments for timely the resumption of education services by providing the necessary resources, especially for people in remote areas where external support is inadequate. In the case of Pakistan after the 2010 floods, it is suggested that local departments of education should lead the recovery process in collaboration with local government, CSOs, and other organizations.

Lessons gained from past recovery mistakes can be utilized in order to inform future DRR efforts in the education sector. However, since recovery from recent mega-disasters like the 2004 Indian Ocean Earthquake and Tsunami and the 2011 East Japan Earthquake and Tsunami is still on going, it might still be too early to list all the recovery lessons from large-scale events that can be useful for the education sector. Research needs to be continued in the next few years in order to benefit from the recovery experiences. It is expected that there will be numerous issues needed for both short and long-term educational recovery. The shifting role of schools as center in the community recovery process might need to be investigated further. A future possibility in educational recovery is the multi-functional school model, where schools are positioned at the center of community recovery and combined with other public facilities, as what is being attempted in the case of Kamaishi City in Japan.

2, Common issues

The discussion group agreed that education recovery has been given a high priority after a disaster anywhere in the world. Standards for education continuity, such as those prepared by the Inter-Agency Network for Education in Emergencies (INEE), are already prepared, but are difficult to follow due to lack of resources and local know-how. In some cases, there are shortages of qualified construction manpower. As a result resumption of classes can be grossly behind target as school reconstruction takes time.

Sustainability is also a common issue among the case studies. After external assistance stops flowing in, disaster recovery slows down or even stops. One bottleneck identified in the recovery process for schools is the loss of community ties due to displaced people. Affected families are forced to evacuate to other places for weeks, and in worst cases, families cannot return to their original communities but need to relocate to other places, keeping students from the respective schools. If the community ties continue to be weakened, recovery of school as well as communities becomes very challenging. In addition, interventions conducted by external agencies without community participation leave the communities disempowered and this also affects the sustainability of recovery efforts.

3, Suggestions and measures for issues raised

It is recognized that limitations and constraints in the post-disaster situation should not become excuses for the provision of education that is below acceptable standards. To address the issue of lack of resources and sustainability, one possible solution would be to engage the local NGOs and businesses in school and community recovery. Overdependence on external assistance should be avoided for sustainable recovery and development. Instead, reliance on local resources and initiatives should be encouraged as observed in the success story of community danran, which provided welfare services in the post-Hanshin Awaji Earthquake, and the bousai fukushi (bokomi) communities, which are self-organized community associations for disaster reduction and social welfare centered around elementary schools. Both danran and bokomi are examples from Kobe City. If the local community has ownership of the recovery process, they will be more dedicated to continue exerting support for recovery initiatives for a longer period of time, if not indefinitely.

4, Specific cases (Used and misused opportunities)

Used opportunities in education disaster recovery include training of teachers as role models for the students and community residents in the recovery process. It was found that many teachers in Japan with their high sense of responsibility sometimes function beyond their given responsibility as educators to being protectors of their students during emergencies. Teachers also connect the school with the outside world (e.g., a vice principal of an elementary school in Kessenuma has been disseminating lessons learned from EJET). Practitioners on the ground have a chance of directly observing the recovery process and sharing them to others who need this kind of information, like other places prone to the same natural hazards. However, because teachers usually are overwhelmed with many responsibilities and expectations from the community, a support system, such as in examining workload of teachers to avoid having them over-fatigued by additional duties in the recovery as well as pre-disaster period should be put in place.

Making schools to become hubs which interlink resources that are needed to revitalize communities, can be another used development opportunity. As seen in the Kamaishi example, public facilities such as children's daycare center, public library, community center and DRR facilities can be centered on the school to serve and facilitate community ties. This consolidated approach can also address other chronic issues, such as aging population and lack of safe highlands, to realize more efficient and effective use of limited resources available to the community.

Mobile Knowledge Resource Centres is another used development opportunity in education disaster recovery. These mobile centres have been able to overcome physical and location barriers to benefit communities that are often at very high risks from natural disasters. Support based on innovative ideas from external agencies (e.g., civil society, community based organizations, NGO/NPOs) can strengthen community capacity, facilitate disaster recovery and contribute to sustainable development.

Misused opportunities in education disaster recovery, on the other hand, include not giving priority to infrastructure rebuilding, which resulted to high dropout rates, as in the case of Pakistan after the 2010 floods. There is also the case of not taking a multi-hazard approach in school reconstruction. Because of this earthquake-retrofitted schools that are not resistant to hydrometeorological and other geological hazards are built in new locations such as coastal areas where they are exposed to storm surges and tsunamis. In this case, in trying to address one hazard, the school has become exposed to other hazards.

Lastly, the over-standardization of disaster prevention education may become the trigger for misused opportunities in school recovery. There should be room for customization to better take measures to unexpected disasters and incorporating more of the local context in planning school recovery. Rigidity in the form or content of disaster prevention education should not come in the way of teaching the students how to make their own decision and protect themselves and others when faced with disasters and emergencies.

5, Way forward

- There is a need to analyze bad experiences in disaster recovery in the education sector, not just good practices. Investigating bad experiences will provide a list of things to avoid in the future as well as facilitate establishing benchmarks for actions necessary for recovery in various disaster situations.
- Recovery of the education sector should not just be about schools but should also take into consideration other aspects of the community, like building community ties, looking after the psychological health of the disaster victims and addressing other chronic community issues like gender balance in school enrolment. These examples point to the need for a more holistic approach that can have long-term impacts not just to the school, but also to the entire community. Effectiveness of school-based community recovery requires additional evidence-based studies as this new concept is now being implemented.
- Community participation in education recovery process has been recognized as important, but there is still no clear guidance on how members of the community, like the PTA (Parents-Teachers Association), local universities, local businesses, NGOs, religious organizations, the different age groups, etc. can take part in the process. Documentation and reporting of the roles and responsibilities of community members as well as the arrangements or protocols governing their participation in successful recovery experiences need to be conducted.
- Monitoring and evaluation of education was not raised in any of the case studies presented in the group (most likely because recovery is still on-going). As this exercise can provide important inputs that can be used in the future and in other places, monitoring and evaluation should be given consideration in subsequent research.
- Recovery lessons for the education sector need to be revisited after several years or when new lessons are picked from new disasters to keep the recovery lessons updated and relevant.
- Other issues not covered by the case studies are budgeting and human resourcing in disaster recovery in the education sector.



Technology and Innovations Issues of Recovery

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1, Overview

Disaster recovery has the potential to be used to reduce the risk of future disasters by building resilience in people and by reducing their exposure to hazard risks. Increasingly, there is evidence of good examples of how this can be achieved through the use of technology and innovation. A modern technology such as Earth Observation (EO) products and services offer innovative and comprehensive solutions that can address critical information needs for mapping and monitoring risks. Innovative technologies are critical and essential tools for disaster risk reduction and management (including recovery), which are more widely available and accessible than they were even a few years ago. They have become powerful and accessible tools that can lead to the protection of lives, assets and contribute in achieving development needs. However, disaster recovery plans must not neglect on capitalizing the existing traditional wisdom, since it has been tested over generations and may be better suited to the local environment and culture. Technology and innovations should be introduced where necessary, but in minimalist ways, so as to add value to the traditional systems and make them more resilient in the face of new threats of disasters. Therefore, the use of modern technology and indigenous innovations has to be balanced to build holistic community resilience for sustainable recovery and development.

The discussions from the Technology and Innovations Issues of Recovery group ranged from the review and lessons of post-disaster housing reconstruction from Aceh, Yogyakarta, West-Java and West-Sumatera Earthquakes in Indonesia; challenges and innovations of coastal zone management in Tamil Nadu, India, post-Aila community recovery innovations and ecological planning in Bangladesh, the use of technological and innovative measures to improve flood disaster recovery following 2005 Mega-flood Mumbai in India to incorporating traditional knowledge to cope with climate change in post disaster recovery in Rajasthan and Leh, India.

An ex-post review of the past experiences and challenges in post-disaster housing reconstruction after earthquakes in Aceh (2004), Yogyakarta (2006), West-Java (2009), and West-Sumatera (2009) was presented. The study reveals three main conclusions such as firstly, in terms of institutional approach; the governance issues depend on the scale of the disaster. Secondly, a strategic technical input and approach in implementing safer housing reconstruction are needed for achieving "build back better". Thirdly, a community driven approach in reconstruction is important, but it has to suit and tailor to the local customs.

Another discussion was on the concept of Integrated Coastal Zone Management (ICZM) in Tamil Nadu, India. The ICZM concept has blended the use of remote sensing and spatial analysis tool (GIS) technology as a decision support system with incorporating stakeholder's perception and field data. This concept has helped considerably the community in effective coastal management in Tamil Nadu, India.

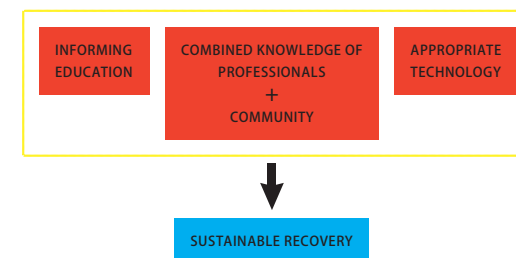
The next discussion was on new innovation named the Disaster Resilient Habitat (DRH) in Bangladesh after the Aila Super Cyclone. The DRH aims to strengthen the houses and infrastructure of an entire village as a response to reduce the loss of assets to poor communities as well as to ensure the sustainability of the measure. The DRH ensured the conversion of each structure into a cyclone shelter and minimize the destruction caused, which would allow the community to recover from the disaster. The DRH is a bottom-up approach as it involves the community's indigenous knowledge with technical aid and ultimately makes the community self-sustaining in the longer run.

A technological and innovative measure to improve flood disaster recovery based on post-2005 Mumbai Flood was discussed next. A flood early warning tool is developed, where the rain gauges have been programmed to relay the rainfall intensity in real time through LAN to the city disaster emergency control room. This information is periodically uploaded to the prominent website, which could easily be accessed by the public.

Finally, the experience in tapping the indigenous knowledge of community in tropical desert of Rajasthan and mountain desert of Leh, India to cope with climate change was shared. The traditional wisdom based on local practices, such as weather forecasting, water harvesting, snow capture, as well innovative practices such as artificial glaciers and local climate knowledge management are noteworthy to preserve. These show that post-disaster recovery programs must capitalize on existing traditional wisdom, which may contain innovative ideas since it has been tested over generations and is best suited to the local context.

2, Common issues

Although the discussion group elaborated upon the different cases from their study areas, there were related issues that form common goals and strategies, which can be employed for recovery.



- 1, Appropriate technology interventions - These interventions must be derived from appropriate choice of technology and its application should be at small scale, labor intensive, energy efficient, environmentally sound and can be controlled locally.
- 2, Improvement in community resilience – An increase in community's resilience would have a positive effect on the recovery process of the community. Therefore measures to increase the resilience of the community should be proposed and adopted.
- 3, Combined knowledge of professionals and community – The indigenous knowledge is not always the cost-effective or sustainable solution. The same is true for the professional solution which may not be locally contextualized. Therefore, the indigenous wisdom from the community should be amalgamated with professional knowledge to devise just and applicable solutions for disaster recovery.
- 4, Informing education – The appropriate solutions for disaster recovery and the related information

should be made available to all the stakeholders. This can also be useful for other disaster affected communities to learn and apply the solutions. This can be achieved through 'informing education' through various platforms, such as education sector, mass media and social media.

The four issues are culminated into a concept of sustainable recovery through the just use of technology and innovations (see Figure 1). There is need to apply three fold strategy including all the above said issues to achieve sustainable recovery which will ensure that not only the disaster recovery is quick, but also that the next disaster is dealt with increased resilience.

3, Suggestions and measures for issues raised

Mainstreaming and risk communication of technology and innovations in disaster recovery are the main issues raised during the discussion. So far, the examples of technology and innovations applied in the discussion, such as the Disaster Resilient Habitat (DRH) of post-Aila Super Cyclone in Bangladesh and the incorporation of traditional local climate knowledge management in Rajasthan and Leh, India are part of the recovery process, yet have not been mainstreamed in future policies. In the future, these innovations have to be mainstreamed in all sectors and at all levels. Current situation denote towards the imperatives of creating and animating the disaster risk management concepts and processes in the local environment. Responding to above issue, technology and innovations in disaster recovery as part of disaster management is strongly suggested to be consciously and deliberately fused or mainstreamed in the local development planning processes. Reviewing the case of the concept of DRH, it provides the opportunity in adopting in the national development planning of Bangladesh. Since the country is prone to storm surges and cyclones, a disaster resilient habitat could be manifested in the national development process and budget, and translated into the real actions and resilience activities at the local level (cities and villages). The DRH may transfer this concept to the building regulation, policy, and plan by strengthening and conversing the houses and other important infrastructure (schools) into family and community cyclone shelters development. These elevated constructions allow the community safety as well as secured livelihoods, where they could still protect themselves and the space underneath to bring in cattle(s) if a cyclone warning is issued. Mainstreaming this concept into development planning and budget will considerably help other coastal communities, who face the same post-cyclone disaster recovery issue.

In terms of risk communication, the conveying process of the use of modern ways of technology can adopt a user-friendly communication interface. This shows in the case of Mumbai Flood 2005. The Municipal of Corporation of Greater Mumbai (MCGM) had already initiated the procurement and completed the installation of 30 automatic weather stations by June 2006. The weather station included tipping bucket rain gauges that is capable of giving rainfall data every minute and an audible alarm at preset rainfall intensity values (in this case when the rainfall exceeded 40 mm/hr). The weather stations are linked to the central control room via internet, whereas the MCGM officials monitor the updated rainfall every 15 minutes from each location and issue alerts from the central control room. This has enabled the MCGM to issue warnings to the public through mass media and display the appropriate information on the internet

during the four monsoon months on prominent websites as means of wider public outreach. Through the aforementioned example, a user friendly modern technology innovation could address the risk communication issue of sophisticated ones.

4, Specific cases (Used and misused opportunities)

● Used Opportunities:

• Resilient housing and habitat:

In the cases of cyclone in coastal Bangladesh and Barmer-Leh flash floods, the housing provision has been utilized as an opportunity to provide the resilient habitat as well. This ensures communities to be resilient and at the same time the recovery can be accelerated to provide livelihood and shelter.

• Institutionalizing and decision support system:

In the cases of Aceh post disaster housing reconstruction with regards to coastal zone management in Chennai and urban floods in Mumbai, the opportunity to institutionalize the technology and innovations has been utilized and converted into a decision support system for better use by the community and the government. This allows input for community driven reconstruction and judicious deployment of resources.

● Misused Opportunities:

• Imposed Appropriate Technology:

The pre-fabricated housing was imposed on the victims of Leh floods in 2010 in India, and more importantly an opportunity to improve upon and innovate the vernacular architecture techniques was lost.

• Top-down Non-contextualized approach:

The housing reconstruction after disasters fail to include the local contextual issues - social, cultural, environmental, and non-user friendly contextualized. This was evident in Aceh reconstruction phase, where many international organizations tried to implement the housing solutions from their earlier experiences to a new location with different context. For example, construction of permanent accommodation for the victims, fails to consider issue of environmental sanitation.

5, Way forward

- Mainstreaming the above technologies and innovations in all sectors and at all levels, as well as institutionalizing them.
- Community knowledge is not fully utilized to the potential and should be upgraded with the help of technology and innovation
- Low cost technology should be made available to the public for wider impact
- Multi-stakeholder approach would enhance the effectiveness of the technological innovation through focused strategies.



Cross-cutting Issues of Recovery

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1, Overview

The spectrum of the discussions from the 'Cross-cutting Issues of Recovery' group extended from mangrove management in Kutchh, India, oil spills in Guimaras, Philippines, environmental management and urban recovery from the post disaster experiences of Kobe (Japan) and Banda Aceh (Indonesia), integrated healthcare system in Japan to a comparative analysis of role of community radio in disaster recovery in Indonesia and Japan.

- A case study from the western most state of Gujarat in India that is prominently facing cyclones since 1999 was presented and found that degradation of mangrove forests is increasing the disaster risks. Following the 2001 earthquake in Gujarat, a great amount of industrial and infrastructural investment has been taken place that promoted development along the coasts. The local government lately realized the environmental cost of mangroves and promoted regeneration of mangroves, however, the regeneration areas are very small compared to what has been lost during the coastal infrastructural development. Since the community dependence on mangrove has reduced significantly, they are no longer interested in protecting the mangroves; hence the future of the coastal mangroves remains at stake. At this juncture, the need of a comprehensive mangrove management plan and consolidated local level actions was envisaged.

- Secondly, a study on the adaptive and transformative capacities of communities after a manmade disaster in form of oil spills in Guimaras, Philippines in 2006, which damaged the marine environment and severely affected the livelihood of the local communities, was discussed. The oil spill demanded a massive cleanup drive; however, inadequate and insufficient technology posed as the major hindrance leading to stagnation of oil in coastal water for months. The study mainly focused on the assessment of the adaptive capacity of the local households through an adaptive capacity index which indicates that the households, aside from the loss of livelihood, are fairly adaptable to the oil spill event. The external support played an important role following the oil spill; however, it was informed that the transformative capacities of the local communities did not improve due to lack of attention to the livelihood issues, lack of good governance and poor functioning of the social networks.

- Two interesting case studies on urban recovery in Kobe (Japan) and Banda Aceh (Indonesia) was put forward in this workshop that highlighted the fact that even though there are substantial investments during the response phase, the long term recovery is often overlooked. In some cases, recovery has regenerated vulnerability observed in the past, and therefore, reducing vulnerabilities from the pre-disaster to post disaster recovery phase was emphasized. In case of urban recovery, community and local government partnership plays an important role which was a case from the Kobe experience where such kind of self-help groups applied themselves to impart training, organize mock drills and town

watching programs together with the local government. On the other hand, housing recovery initiatives in Banda Aceh was proved to be very challenging because of the absence of a comprehensive recovery plan and recovery approaches were found to be unconsolidated with minimal community acceptance due to lack of good partnerships. On a concluding note, mainstreaming environmental recovery proved to be an integral part of urban recovery.

A paper on integrated healthcare system in Japan was explained with a brief background of how psychological isolation of certain groups of the aging community is impacting emergency services. From the present experience it is observed that even in non-emergency cases, mental isolation of aged people is affecting the emergency services. To address this problem, a new approach of integrated healthcare system, which aims to build community network by combining conventional healthcare system with non-conventional health care system with the concept of self-help and mutual health care system amongst the community was recommended. It was concluded that good social network coupled with an environment that offers to build good mental health may strengthen community's coping capacity to disasters. Some good examples of integrated health care system are currently being documented from the recovery experience of EJET.

- A unique experience in operating the community radio for disaster response and recovery process was shared in this discussion. In the post disaster period, it helps minimize the challenges in providing accurate and essential information to the victims and in recovery phase, provides opportunities for victims to participate in radio activities and share their experiences. Apart from that, community radio establishes two-way communication between the aid providers and victims and raises awareness of the community regarding recovery plans of the national government and local NGOs. In case of EJET, 20 temporary emergency radio stations were set up in Tohoku, however, despite of being managed by the community, some radio stations were subjected to censorship of the local government. Others have faced challenges in continuing their activities because of the non-renewal of broadcasting license. Experience of community radio in Indonesia was also reported. It was mentioned that almost 800 such radio stations are in operation, but majority of these functions as 'hobby radios' and do not necessarily fulfill the requirements of the essential functioning of community radio.

2, Commonalities and Differences

Even though the entire group discussion revolved around various different topics, there were some common issues, which might be inferred when viewed over a broader perspective. At first, the issue of unavailability of baseline information for the vulnerable areas before disasters was highlighted. In fact, it was prominent in case of mangroves degradation in Kutchh, urban recovery case in Banda Aceh and also in the case of oil spill in the Philippines. Absence of clear road map for recovery process provided the major hindrance in these particular cases. Another commonality was the effectiveness of community participation in disaster recovery process, which proved to be significant in determining the success and failure of recovery. In all the cases, especially in the case of community based mangrove management and poor social networking leading to poor transformative capacities of communities in oil spill events, a need for better community participation was envisaged. Absence or inadequacy of linkage among different sectors such as government, industry and community has been another common hindrance addressed by the majority of the case studies. On the other hand, urban recovery experience from Kobe highlighted the effectiveness of community self-help groups in the recovery process.

- On a different note, since the majority of the discussions addressed coastal issues and hazards, the common feature of poor and weak implementation of laws, by laws and acts in land use planning and coastal zone regulations was highlighted, particularly in the developing countries such as India, Indonesia and the Philippines. In majority of cases, despite of existing legislative arrangement, coastal zone regulation are not being followed properly. In this regard, striking similarities between the mangrove degradation in Gujarat and the oil spill event in the Philippines was observed. Oil-spill in Philippines, which was a human induced disaster, raises concerns of similar threats that might occur in the Indian coasts due to rapid industrialization. Poor implementation of coastal zone regulation is not only destroying the mangroves, but also mounting risk of oil spills and water pollution in the coastal areas of Gujarat. Lastly, common linkage on livelihood in issues regarding urban growth, coastal resources management and oil spill events was identified. Finally, it was concluded that there exists the need of mainstreaming environmental recovery as a component of disaster recovery to reduce vulnerability from future disasters.

- While addressing the differences amongst the discussed studies, it was observed that there exist differences or diversity in local context which calls for different disaster recovery approaches. Particularly, the political process influences disaster management and post disaster recovery. For example, In Aceh, during 2005-2009, Rehabilitation and Reconstruction were greatly affected by the decentralization and such conditions differ from one area to others. On the other hand, different

local government has different priority settings. It was also highlighted that the response mechanism amongst countries and various level of government (local, provincial and federal) varies significantly according to their long term and short-term priority.

3, Suggestions and Measures for Issues Raised

In the first case of Mangrove Management and cyclone risk reduction in Kutchh, Gujarat, the key issue was to identify the priorities of a developing nation that is whether the local government should promote development or conserve vulnerable coastal ecosystems. It was reported that such priority settings is different and varies significantly between the provincial government and the federal government, the key issue remains with this is how to minimize these gaps and also formulate the methodology to find the balance between economic development and natural resource conservation. Secondly, how the local wisdom can be effectively involved for sensitive ecosystem management in case of Gujarat. Finally, it was suggested to the author that amidst of the rapid development and urbanization in coastal areas all over the world, some good examples of coastal urbanization in sensitive areas may be documents and cited as guidelines.

- In the Environmental Management and Urban Recovery case study, the key issue was to find out the minimum threshold time to start recovery process for which the local context varies significantly. An enquiry was made whether the stabilization and scattering of population in the post disaster period in Kobe necessarily relates to recovery process or as a natural phenomena observed in similar kind of urban areas. On the other hand, it was mentioned in the discussion that there was much delay in mobilizing the recovery process in case of Aceh. In this regard, a point came out about the timing of the disaster which coincides with the decentralization process in Indonesia and also Aceh is a place where there was 20 years of civil war which might have affected the recovery process. In this regard the role of Kechamathan Development Program (KDP) was discussed, a nationwide village level institution formed by the World Bank, which was instrumental for decentralized disaster recovery in Banda Aceh.

- Related to the Integrated Health Management in Japan, it was highlighted that fire service which also provides the emergency medical support is very much unique; however, it was enquired whether strong social network under the proposed Integrated Health care system can really be an alternative to the trained professionals which the fire department offers. It was opined that such initiatives require training of manpower at community level and training may be provided by the Resident Associations through trained officials with proper certification. So, in that case, each community will have some trained people who shall be available during an ordinary medical emergency.

- The last paper on the Role of community radio in post disaster recovery largely revolved around the gaps between the community members and the local government in operating the community radio. It was suggested that the effective measures to reduce the gap between the Local government and community need to be identified. Also, there were some specific comments that the social media such as Facebook can be an effective platform for information interchange amongst the community members and other stakeholders.

4, Used and misused opportunities

In case of mangrove management in Kutchh, it was observed that since the earthquake in 2001 and consequent cyclones in the Gulf of Kutchh, both the government and industries realized the importance of mangroves which the author cited as used opportunity, on the contrary, unplanned industrial and coastal infrastructural development after the earthquake in 2001 have not only led to depletion of mangroves but have also caused concerns on resources like water and marine

pollution- which appeared, in some places, as misused development opportunity.

- The oil spill event in Philippines in 2006 was instrumental for legislating an important policy in form of "The Oil Pollution Compensation Act of 2007" which actually addresses the economic concerns of the victims. This was referred as the used opportunities from the Philippines. On the other hand, even though the external funding was available, the central key issue of sustainable livelihood was not addressed during the recovery from the oil spill which was cited as misused development opportunity.

- In case of Environmental Management and Urban Recovery, some general cases were highlighted where disasters have impacted positively in better preparedness and formulation of Disaster Management Authority. For example, In India, after 1999 cyclone & earthquake in 2001- DRR Institutionalization picked up very well including DRM Act, DDMA and Guidelines on specific hazards etc. These were investment for better recovery and can be referred as used opportunities. On the other hand, it also pointed out that external funding in case of Indonesia damaged the social capital which may be inferred as misused opportunity.

- In case of the role of community radio in Disaster Recovery it was observed that following the East Japan Earthquake and Tsunami, decision making for recovery was done by all stakeholders regardless of gender, generations, employment and degree of affected people, which typically appears as used opportunity. However, community's dissatisfaction of the over censorship by local government over broadcasted contents revealed that the local government, in some cases, did not reflect community needs in the reconstruction process, which can be considered as misused opportunity.

- Finally, in case of Integrated Health care approach, it was inferred that the existing ambulance services in fire department is a used opportunity to diversify the fire department services which simultaneously takes care of the medical emergency. However, it requires further fine-tuning and judicial use of emergency resources.

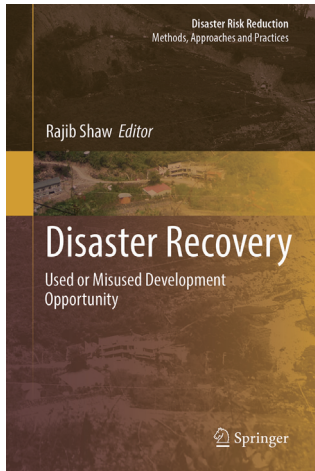
5, Way forward

The group discussion on cross-cutting issues of recovery addressed various dimensions of recovery processes spread across different countries. It was difficult to identify a common point of departure; however, the members highlighted some key issues pertaining to future disaster response and recovery as follows:

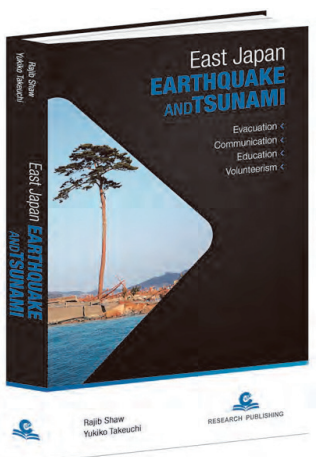
- a, Need of integration of different stakeholders such as community, government and NGOs in formulating disaster recovery plan and translating them to local level actions.
- b, Need for judicial arrangements of emergency resources and external aids with respect to economic and social well being of the affected community in disaster recovery.
- c, Disaster Recovery should not be regenerating vulnerable conditions in the past, but should be an opportunity for improving coping mechanisms to future disaster risks. Also, environmental management should be given priority in the recovery processes.
- d, Proper emphasis should be given to carry out disaster recovery and welfare simultaneously and the momentum should be maintained for effective development of the society.
- e, Local-level wisdom for intrinsic ecosystem management should be harnessed.



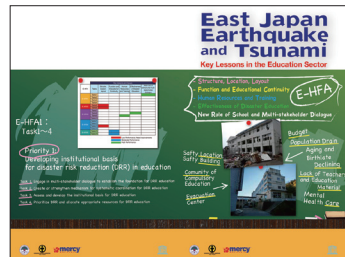
Recovery



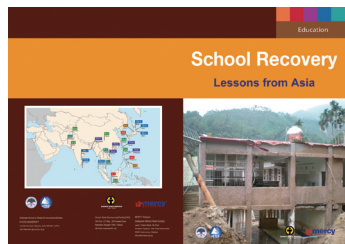
Book on disaster recovery and development (2013, Forthcoming)



Book on post disaster recovery from East Japan Earthquake and Tsunami



Recovery lessons in the education sector



Post disaster school recovery



Role of Community Radio in post disaster recovery in Natori city



Tohoku Research 1