4-3. Supporting HFA Implementation in the Asian Region

4-3-1. Disseminating the Tools and Methods Used in Hazard Mapping to Establish Early Warning and Disaster Management Systems

The enhancement of early warning systems in the countries of Asia is one of the priorities for action stipulated in the Hyogo Framework for Action for 2005-2015 (HFA). To ensure the implementation of these priorities, the HFA asks regional organizations to support the establishment of regional early warning mechanisms and to help develop the early warning capabilities of each country.

In the wake of the staggering devastation wreaked by the Indian Ocean Tsunami at the end of 2004, the strengthening of early warning systems was identified as a priority area into which assistance needs to be channeled. The inadequacy of early warning systems was made further evident by the damage caused by Cyclone Nargis, which hit Myanmar on 2-3 May 2008. There is strong and growing demand for assistance to be provided to these areas.

In the meantime, Bangladesh was heavily impacted by Cyclone Sidr on 15 November 2007. This cyclone was estimated to be of a scale equivalent to or larger than those that struck Bangladesh in 1970 and 1991, both of which caused an enormous amount of damage. However, the damage caused by cyclone Sidr was considerably less than that caused by those earlier cyclones. This is in part attributed to the efforts made by Bangladesh to enhance its early warning system, including efforts to construct cyclone shelters and efforts after 1991 in particular to raise people's awareness of cyclone risks.

To establish effective early warning and disaster management systems, it is necessary to increase risk awareness among local communities and to disseminate knowledge about disaster management in advance, thus ensuring that residents will take the appropriate efforts to evacuate when presented with early warnings. Community-based hazard mapping is an effective tool for this purpose. ADRC has therefore conducted workshops and other activities to promote risk communication using hazard-mapping activities developed in Japan, so as to contribute to the development and dissemination of guidelines for establishing appropriate early warning and disaster management systems.

(1) Formulation of Guidelines for Indonesia

1) Recent Efforts to Establish Early Warning and Disaster Management Systems in Indonesia

In Indonesia, there has been a growing recognition of the need to improve the country's disaster management systems, especially in the aftermath of the devastating Indian Ocean Tsunami of 2004. The establishment of a people-centered early warning system is considered to be one of the most urgent issues to be addressed, especially given the recent series of disasters in that country, which have included a tsunami in July 2006, volcanic eruptions, landslides, and flash floods.

Article 44 of the Disaster Management Law of Indonesia, which was enacted at the end of March 2007, explicitly states that early warnings must be issued by agencies responsible for disaster management when a disaster threat is identified. Moreover, Article 46 of that law specifies that the early warning process is to consist of (a) the observation of disaster signs, (b) the analysis of observation results, (c) decision-making by the authorities, (d) the distribution of disaster warnings to society at large, and (e) actions taken by individuals. Early warnings that include evacuation instructions are a key factor in ensuring a successful disaster response. However, the agencies responsible for issuing early warnings are not clearly identified in the law. Thus, improving the early warning system must include the clear identification the agencies that are responsible for issuing warnings.

2） Assistance with Efforts in Indonesia

ADRC has conducted activities to enhance community-level disaster risk management through community-based hazard mapping activities aimed at helping to improve the early warning and disaster management system in Indonesia. These activities are described below.

① Preparation of Leaflets for Community-Based Hazard Mapping

To launch its activities, ADRC started by preparing a leaflet entitled "Town-Watching for Disaster Reduction: Community-Based Hazard Mapping as an Effective Tool for Raising Public Awareness." Based on the Japanese experience, this leaflet was translated into Indonesian for local distribution. A brief summary of its contents are shown in Table 4-3-1-1.

Town-Watching for Disaster Reduction: Community-based Hazard Mapping as an Effective Tool for Raising Public Awareness	
Topics	Brief Summary
Front Page: Introduction	
Importance of bridging the risk perception gap	There is a disparity between actual risks and those recognized by individuals, and it is vital to close this gap to reduce the negative impact of disasters.
Limitations of hazard maps	Mere dissemination of hazard maps by governments to local residents is usually an inadequate means of raising disaster awareness.
What is community-based hazard mapping?	Three key objectives of community-based hazard mapping 1) To involve local residents in the development of hazard maps for their community. 2) To have the opinions of local residents reflected in policies developed by their local government. 3) To foster common understanding of risks among local residents, government officials, and experts.
Page 2: Flow of Town-Watching & Hazard Mapping	
Town-watching for disaster reduction	Explanation of the activity flow in town-watching (field surveys) and hazard mapping.
	1. Relevant lectures (mechanisms of natural hazards, historical events, causes of local vulnerabilities, countermeasures, etc.).
	2. Walking around the town to identify and study what aspects of the community would serve as advantages/disadvantages in an emergency.
	3. Mapping based on field observations and assembled information.
	4. Discussion of problems identified, and consideration of possible solutions for effective disaster reduction.
Pages 3-4: Good Practices in Town-watching for Disaster Reduction	
Case 1: Town-watching for earthquakes and tsunamis in Japan	
Background	Mie Prefecture, located in the southern central part of Japan and facing the Pacific Ocean, has a history of frequent major earthquakes and tsunamis.
Implementation of town-watching	In the local districts of Owase City in Mie Prefecture, town-watching was conducted over the course of three workshops.
	First workshop: Field survey
	Second workshop: Mapping
	Third workshop: Discussion of vulnerabilities, possible countermeasures, priorities, etc.
Follow-up on town-watching	Installation of metal plates on the streets, allowing the measurement of tsunami water levels in the street.

Case 2: Town-watching for floods in Vietnam	
Background	Central Vietnam is mountainous and suffers many flash floods caused by typhoons and monsoon rains.
Implementation of town-watching	Town-watching was implemented, and hand-drawn base maps were used for the "Training of Trainers" (TOT). The targeted area was rural and sparsely inhabited.
Follow-up on training course	This training course was conducted as a "Training of Trainers" (TOT), primarily targeting local officials from flood-prone communities, districts, and provinces. Those trainees were expected to become trainers upon returning to their local communities.
Page 4: Summary of Town-watching for Disaster Reduction	
	The major merits of town-watching are that people are better able to: 1) Develop a concrete image of disaster reduction activities. 2) Autonomously identify problems in their own communities. 3) Share opinions derived from various viewpoints. 4) Build confidence within the local community through face-to-face discussions. 5) Reach a reasonable social consensus.

Table 4-3-1-1 Brief summary of the contents of the translated leaflet

② Development of a Basic Manual for Community-Based Hazard Mapping

A basic manual entitled “Community-Based Workshops for Disaster Reduction Using the Town-Watching Method: Raising Awareness and Capacities of Communities” was developed in English based on past ADRC activities. Intended to serve as a source of reference for the practitioners of community activities, it includes specific procedures and information on conducting workshops, including information on the overall workshop flow, workshop organization, the meaning of disaster reduction, and resources practitioners can use in developing workshop content.

Topics	Brief Summary of the Contents
Introduction	Community participation in the creation of community-based hazard maps helps residents learn about safe evacuation routes and sites in their communities and ensures that local knowledge is used to create the best disaster management plans possible.
I. Workshop Process	Flow of activities
II. Before Holding a Workshop	Notes for workshop facilitators Event preparation (venue, documents, materials??)
III. Outline of a Community-Based Workshop for Disaster Reduction	
1. Explanation of the purpose of the workshop	Workshop purpose • Know the risks in the community and prepare for future disasters • Create an evacuation plan for natural disasters at the community level • Disseminate what you have noticed and learned in the workshop to the community at large, raise awareness, and enhance the local capacity for disaster reduction under local leadership
2. What is disaster reduction?	
2-1. Understand the larger picture of disaster reduction based on each disaster phase	Three phases of a disaster: • Emergency response • Relief • Recovery and reconstruction
2-2. Importance of knowing risks in your community	Utilization of hazard maps

2-3. Learning from past disaster experiences	Listening to survivors' stories about past disaster experiences
3. Town-Watching: Let's Make a Community-Based Hazard Map!	
3-1. How to create a community-based hazard map	(1) Preparation of materials (2) Division into groups and assignment of roles (leader, note taker, etc.) (3) Field surveys by group (4) Mapping
4. Group discussion	
4-1. Create evacuation plans	(1) Think about when to evacuate, which routes to take, what to take with you, and what to do before you leave. (2) Think about suitable sites for emergency evacuation. (3) Think about evacuation shelters. (4) Discuss an emergency evacuation plan for tourists. (OPTIONAL)
4-2. Think about how to improve problems spots in community (and who can implement those improvements)	Summarization of problems, solutions, and responsibilities for action in a matrix format.
4-3. Group presentation	Sharing of a wide-variety of opinions
5. Wrap-up and application	(1) Workshop wrap-up (2) Think about how to apply the information learned and workshop outcomes in your community. Develop an action plan
IV. Comments & Advice from a Facilitator or Resources	Sample advice
Summary	This manual does not suggest that the activities end with the creation of a hazard map, but rather suggests that the participating residents take a leadership role in promoting local voluntary activities for disaster preparedness and prevention/mitigation, and the development of local disaster reduction capacities.

Table 4-3-1-2 Brief summary of the Basic Manual for Community-Based Hazard Mapping

③ Training Program for Leaders

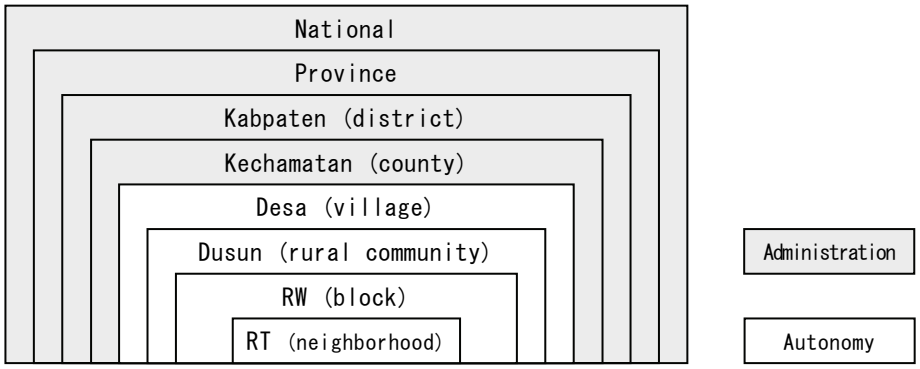

Fig. 4-3-1-1 Local Administrative Structure in Indonesia

Fig. 4-3-1-1 shows the local administrative structure in Indonesia. The *desa* (village consisting of around 1,000-3,000 households) and *dusun* (rural community consisting of around 100-200 households) are suitably sized for conducting community activities. Therefore, the first activity we conducted was a leader training program for the heads of the *desa* and *dusun*. The leaders' awareness of and positive attitude toward conducting disaster reduction activities are a driving force in promoting a community's disaster management activities.


Fig. 4-3-1-2 Hazard Mapping Activities at the Leaders' Training

The training program included lectures on basic information about disasters and disaster risk reduction, as well as practical exercises on community-based hazard mapping in a model area. These exercises will help participants conduct similar activities in their own communities later.

④ Community Workshop

To select a target community for conducting the community workshop, we evaluated the leaders that participated in the leader training based on their active involvement in the training activities and their demonstration of a strong interest in promoting community activities for disaster reduction. A leader was selected and a community workshop was conducted in that leader's village.

During the workshop, the participants learned basic knowledge about disaster reduction and reviewed the ways their areas could be improved to facilitate safe evacuation and reduce risks using town watching or field survey activities. Hazard maps of the participants' areas were developed based on observations made during the field survey, and evacuation sites and routes were identified through a discussion among workshop participants, as shown in Fig. 4-3-1-4.

The results of these activities are expected to provide a concrete point of reference for the BNPB (Indonesia's national disaster management agency) to expand the activities into other areas.


Fig. 4-3-1-3 Hazard mapping activities during the community workshop

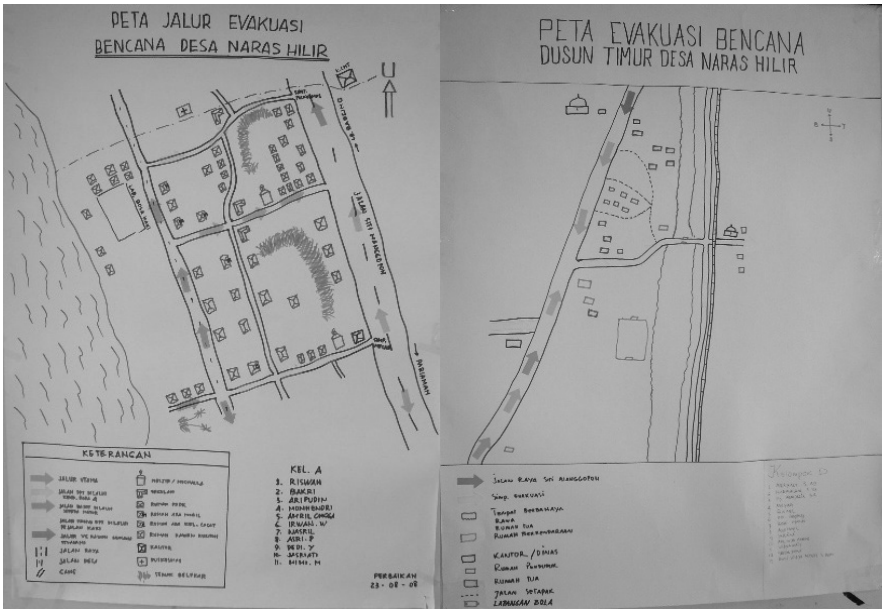

Fig. 4-3-1-4 Hazard maps developed during the community workshop

⑤ Challenges for the Future

A tsunami early warning system was developed after the devastating Indian Ocean Tsunami. Under that system, observational data and data acquired from meteorological agencies is immediately and promptly transmitted to the agencies responsible for issuing early warnings at the local government level. Also, sirens have been installed in the coastal areas with the highest tsunami risk. Meanwhile, improvements are still under way in terms of preparing evacuation sites and raising the disaster awareness of residents living in high risk areas. Further efforts to promote activities aimed at achieving these purposes are expected to be undertaken.

The early warning system for flash floods and sediment disasters is still insufficiently developed. Currently, residents need to make their own judgments regarding evacuation and risk reduction measures simply by observing the water level in local rivers and rainfall amounts. The observation of rivers and rainfall, and the analysis of the observed findings should be improved so that early warning messages can be delivered to residents. A more effective observation and information transmittal system needs to be established, and efforts must be made to enhance the capacity of communities to make accurate weather observations and to share early warning information with fellow residents in high risk areas.

4-3-2. Dissemination of a Model Program for Earthquake Risk Reduction and Recovery Preparedness

(1) Background

Asia is the most disaster prone region in the world. Many countries in the region are affected by natural disasters of varying severity, including earthquakes, floods, landslides, mudslides, tsunamis, and droughts. Two of the more recent major earthquakes in the ADRC member countries were those that occurred in Muzafabad, Pakistan in 2005 and Sichuan, China in 2008.

The devastating effects of these disasters have hindered the overall development efforts of countries in the region. Governments and populations need to be aware of the risks facing them, and to take concrete actions to prepare for and mitigate the natural disasters that affect their areas. Thus, greater attention must be paid by governments, bilateral and multilateral donor communities, and other stakeholders to efforts aimed at identifying and reducing disaster risks within local communities. It is important to disseminate disaster reduction information in Asia in a way that it can be relatively easily adapted to local conditions. Thus, as a part of its efforts to promote seismic resistance improvements that will help reduce earthquake damage, ADRC is working to disseminate methods of promoting locally applicable seismic reinforcement techniques.

(2) Identification of the Problem

The recent earthquakes in Pakistan and China were a wake-up call for the disaster stakeholders in the region, highlighting the need for well coordinated earthquake risk reduction initiatives there. A lack of disaster awareness and the poor disaster response capacities of the national governments and local communities resulted in significant damage in both of these countries. Most public buildings (such as schools, hospitals, and community centers) and private houses in these countries are highly vulnerable to earthquakes, and this resulted in a significant number of deaths among school children and other vulnerable populations during these recent earthquakes. Despite the devastating effects of earthquakes in South Asia, only limited efforts have been taken to promote earthquake preparedness and to mitigate the risk of future disasters. In addition, most of the post-disaster recovery initiatives are re-building risks because they are based on inappropriate recovery planning efforts and programs. Findings from various evaluations on earthquake recovery programs reaffirm these observations. There are significant gaps in the disaster knowledge and policy expertise among recovery stakeholders in the region.

(3) Project Outline

The Hyogo Framework for Action (HFA) establishes as a priority for action the promotion of seismic strengthening efforts, a specific disaster risk reduction measure that can reduce potential vulnerabilities. In the major earthquakes that struck Sichuan, China and Central Java, the greatest amount of damage was caused by the collapse of weak buildings. However, in many cases, those buildings are being reconstructed with the same weaknesses they had before, such that the disaster risk is only being reproduced. Given that the post-disaster reconstruction process is the perfect opportunity to improve communities, the introduction of technologies that are suitable for the society and culture of the disaster-stricken region is the most effective way to overcome local vulnerabilities.

It is therefore important to demand disaster preparedness measures that are tailored to the actual conditions in local communities, while at the same time increasing awareness of the importance of seismic resistance improvements that are effective in reducing earthquake damage. Since the promotion of these specific efforts requires the development of an integrated response that includes systems, structures, and training programs, ADRC is promoting the use of Japanese knowledge while introducing seismic reinforcement promotion methods that are adaptable to local environments.

(4) Implementation of Proposals and Problem Areas

Earthquake damage affects buildings built with the input of engineers, as well as those built without such input. Buildings are damaged by floods and landslides, as well, but the greatest damage is sustained when the building itself collapses. To reduce the human losses caused by earthquakes, efforts are being made to conduct education and outreach on the following issues.

1) Development and Dissemination of the Building Standard Act and Related Regulations. The

problem with building standards in developing countries lies in the difficulty of creating systems (of incentives and penalties) for promoting adherence to legal systems. This is an extremely challenging administrative issue that even posed a problem in Japan several years ago.

2) Improving Building Construction Methods

Building construction requires a combination of people and materials. Good building construction requires that both the people involved and materials used meet the required construction standards. If local people can do good construction work using materials that are easy to acquire locally, the damage caused by building collapses can be reduced for the entire society.

In this context, good construction work means building structures that will sustain only minor damage in an earthquake. Local communities have many years of local experience and local technologies. Considering that most future construction work is likely to be performed much as it has been in the past, using local technologies, it is important to realize that providing technical guidance that ignores these technologies is not going to result in the construction of strong buildings.

The problem often faced in local construction is a lack of engineering knowledge in a particular area. For example, water contaminated with mud or debris is often used to mix the mortar used in masonry construction. As a result, the mortar lacks the strength that it needs. Also, it is not enough for rebar simply to be placed inside concrete. According to the local standards formulated using the international standard such as British Standard, reinforced concrete will not have the prescribed strength if the anchorage length of the rebar and concrete covering thickness to the rebar are substandard. Workshops and seminars should be held to ensure that local engineers are adequately aware of such information. Even if a building is designed based on local standards using locally attainable materials, it is important to remember that only the careful management of quality in the construction process and the use of appropriate construction processes will result in the creation of strong buildings that are as earthquake resistant as they need to be.

It is important that local construction workers have a certain minimum level of basic knowledge, and that technology transfers focus on technologies that can be accepted and used in good conscience over time to ensure the construction of strong buildings.

3) Improving Current Conditions

The following improvements are currently under investigation.

① Engage in education and outreach by creating posters showing the minimum standards that must be met by engineers and construction workers, in a format that is easy to understand.

② Create simple guidelines tailored to local needs, as this is the first step in raising awareness of the importance of quality management.

4) Approach to Guidelines

To ensure the effective dissemination of seismic-resistance construction methods, it is important to utilize the original full strength of existing construction methods and building materials. The following items should be checked.

① Is the water being used to mix concrete or mortar contaminated with mud or debris?

② When mixing concrete, are the right mixing proportions of water, cement, sand, and gravel being used?

③ When mixing concrete, is the size of the aggregate appropriate? Does it contain any foreign matter, such as mud, shells, or brick fragments?

④ Will the cement be exposed to the outdoors for long periods of time, where its quality might be reduced by rain or water seepage?

⑤ Is the appropriate concrete covering thickness to the rebar and anchorage length of the rebar being used in the reinforced concrete?

⑥ Is there any oil or other contaminant on the surface of the rebar that might interfere with its adhesion to the concrete?

⑦ When assembling a structure using rebar, has an adequate binding been achieved between the steel bars?

⑧ Have the bricks (of a masonry structure) been laid so they are level and vertically straight?

(5) Facilitate sharing and exchange of national and regional information, lessons and best practice for Policy Feedback and advocacy

Perform joint ownership for experience or the lesson of the good practice between the people concerned effectively and perform technical support effectively and perform the risk reduction to face the earthquake at the country level, and sharing the information of a lesson for the revival, practice, the information of the experience.

For main activity：

① Carry out a workshop and a seminar for a policy decider and key person of the development, and deepen the understanding about the important matter on the occasion of the development program at the country level.

② Share the lesson and the good practice that can convert in the other areas as the information.

③ To visit the site and perform the information exchange from Japanese knowledge into local for the present improvement.

④ Perform the pulling down test by using an existing building (a non-engineered building)for suggesting a retrofitting method of the weakness at the time of the earthquake to the existing building.

Fig.4-3-2-1 Technical Assistance at Work Shop in Nepal

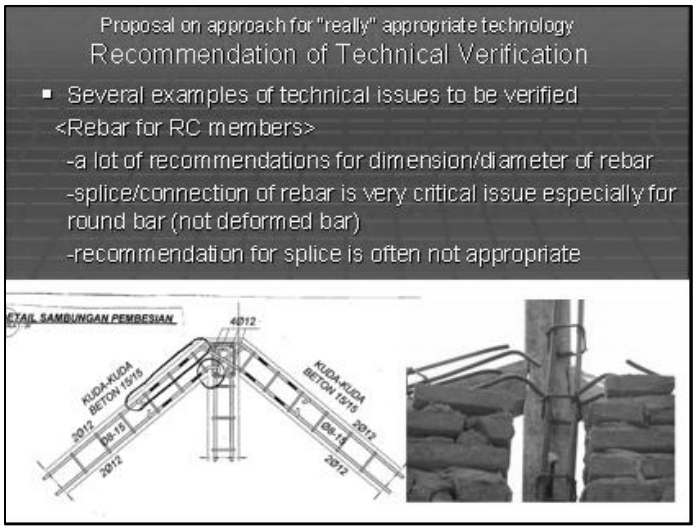

Fig.4-3-2-2 Poor lapping of reinforced bar