

## Emerging risks and approaches for reducing vulnerabilities of the urban built environment

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*Asian Disaster Preparedness Center*

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On 24 December 2004, as many as seven countries in Asia were devastated by a tsunami event recognized to be the biggest natural disaster event the world has ever known, reflected in the magnitude of lives lost (more than 200,000), families displaced (several millions), and damages to assets and economic losses (combined total of nearly US\$ 10 billion). Among many areas destroyed were urban coastal areas with important infrastructure and lifeline facilities. Subsequent major events, such as flash floods in Mumbai and Jakarta, losses due to Typhoon Xangsane in urban coastal areas of Vietnam, have shown that there is an urgent need to re-enforce hazard mitigation and preparedness practices in the development policy agenda.

Urban areas are recognized as economic engines of any country, but even these engines can fail if action is not taken to address the soaring reconstruction costs and to minimize significantly the losses to shelter, infrastructure, and commerce. Urban governments need to take serious note of the priorities for disaster management. Urban governments should adopt proactive approaches and practices for mainstreaming disaster risk mitigation within the efforts for sustainable development.

### Issues and Concerns

Push factors drive the population to the urban and semi-urban regions, specifically, a lack of economic opportunities, frequent destruction of assets, crops, harvests as a result of natural disasters and limited rural livelihood alternatives. Pull factors that encourage rural to urban migration are the economic and welfare opportunities offered by urban areas.

Rural to urban migration comprises a major proportion of the urban workforce, but most of the migrants cannot afford to buy land in safer areas, find few or no alternate formal settlements, and no government programs to provide shelter to the poor segment of urban population. In cities such as Mumbai, India, 60% population live in slums occupying 7% of land. Hence, this migration concentrates what was once dispersed rural poverty into

unsafe land within the urban area in what can be described as the urbanization of poverty and disaster risk.

Asia is seen as one of the fastest urbanizing regions in the world. In 2000, 37% of its population lived in cities and the proportion is projected to reach more than 50% by 2025. By 2020, seven of the world's ten largest economies will be from Asia. The majority of Asian mega-cities and other urban municipalities are located in hazard prone areas. In the period 1994 to 2004, Asia accounted for one-third of 1,562 flood disasters, half of 120,000 people were killed in floods, and 98% were affected by floods (Few and Matthies, 2006).

A global-level analysis of the location of multiple hazards found that the eastern coastal regions of the major continents are exposed to a combination of hazards that are driven mainly by hydro-meteorological processes (Dilley, 2005). Unfortunately, coastal areas of low elevations are more densely populated than other areas. Asia accounts for eight of the top ten countries with populations in the coastal zone with elevation from 0 to 10 meters<sup>1</sup> (McGranahan, Balk and Anderson, 2007: p. 26). In addition, the largest coastal urban areas are located in the flood plains of major rivers of Asia (e.g. Ganges-Brahmaputra, Mekong, and Yangtze), and many other coastal urban areas are within cyclone-prone regions (e.g. Bay of Bengal, South China Sea, Japan and the Philippines).

The risks from these hazards require monitoring as they are affected by the continuing urbanization of coastal areas and slope destabilization due to migration from low-lying to upland areas. The rural people moving into coastal cities carry their traditional practices and are unaware & or have limited knowledge of the sensitivities of their new environment and adaptive practices for the coastal areas. There is also a potential increase in the intensity and frequency of hydro-meteorological hazards in the event of climate change or global warming.

<sup>1</sup>In descending order: 1-China, 2-India, 3-Bangladesh, 4-Vietnam, 5-Indonesia, 6-Japan, 9-Thailand, 10-Philippines

<sup>2</sup>Lifeline services include transportation links (roads, rail, seaports, airports), government administration facilities (government offices, police, fire), emergency service facilities, health facilities, education facilities, community services, key commercial assets (banking, commerce and manufacturing), cultural assets (historic structures and museums).

These trends are summarized in the compelling article by Pelling (2006), "Cities are getting more and more vulnerable" on disaster risks in urban areas. For example, he points out how the complex lifeline services<sup>2</sup> that urban areas rely on for social and economic well-being are part of the natural attraction and comparative advantage of cities vis-à-vis rural areas. However, these services are easily overwhelmed by hazards. Failure in lifeline services can cause substantial insecurity in a community, leading to increases in illness, death, the breakdown of communication, and the disruption of economic activities that continues long after the hazard struck.

However, a change in location of vulnerable settlements and land use is not always the answer to reduce disaster risks. Vogel (2001) noted that while location is, in a sense, the main cause of urban vulnerability for a particular natural hazard, location might also be one of the main underlying factors for urban (economic) growth because it promotes economic and spatial linkages between producers of goods and their distributors and consumers. Simply relocating the city or its inhabitants cannot reduce vulnerability because hazards can occur outside any city and still disrupt the urban economy.

Secondary and tertiary cities in Asia are often planned to spread development evenly. This economic goal makes smaller cities the site of increasing urbanization and land use change, as they grow into the surrounding peri-urban space. However, these cities usually do not strictly enforce building regulations and monitor land use, nor do they have enough qualified technical staff to engage in planning, development control and construction regulation. Therefore, the secondary and tertiary cities are in the forefront of the urban disaster risk scenario in Asia.

City governments in general seem to fail to design action plans to address the problems associated with vulnerability and fail to engage the urban poor in their own disaster mitigation, although it is directly connected with the urban development process. Institutional vulnerability of city governments refer to the limitation in capacity of municipalities to assess risk trends. It is related to the lack of technical information and probable scenarios of hazard exposure, socio-economic and physical vulnerabilities, risk assessment tools, an early warning mechanism, and historical information on destructive events. It is also related to the ability to use technical information and probable scenarios within the urban planning and decision-making processes. The responsibility of urban authorities is to provide safer areas for living, but cities do not implement strict land use and construction regulations. The result is the death, damage and destruction that could have been avoided through zoning, adequate building codes implementation, emergency response planning, and disaster mitigation and preparedness that involve communities. The June 2007 landslides in Chittagong, Bangladesh, is an example of poor land use regulation that did not prevent cutting hillside sections to "make room for development".

In most countries in Asia, DRM is a subject handled by central authorities and little effort has been made to delegate the DRM responsibilities to the local government

<sup>3</sup>*Proceedings of workshop on Financing Infrastructure, USAID, 2003*

sector. Despite the increased recognition of the effectiveness of mitigation at local level, it has not generated the resources and attention necessary from city governments to make it a mainstream requirement of their development efforts to spread the benefits of mitigation to a greater portion of the population<sup>3</sup>. It is in this respect that mechanisms for participatory approaches for decision-making are recommended. Most decisions taken in the absence of representation from vulnerable communities are unfavorable to them, and consequently resisted by them.

### **Mainstreaming disaster risk reduction**

Mainstreaming refers to relating development priorities to the environmental and social issues that contribute to disasters. Within its various functions, it identifies areas prone to hazard events, identifies communities and sectors at risk, implements protection measures, promotes its citizens' abilities to cope. This can be achieved by authorities by:

- Increasing the coping capacities of citizens by enabling them to reduce their own risks
- Reducing risks by strictly regulating specific, disaster risk-related private sector activities
- Include disaster risk considerations within urban planning, development planning and poverty reduction programs
- Promoting good governance to sustain disaster risk reduction.

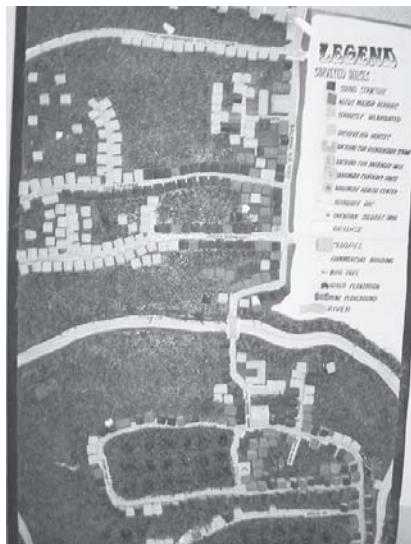
Despite the growing risks, most of the rapidly developing countries in Asia adopt a reactive approach for management of the risks in urban areas. Spatial plans are often prepared without adequate considerations to seismic or hydrological aspects with city expansions directed towards the most prone areas or even creating new risks from rapid land use change. Countries need to understand the urban risks arising due to natural and manmade hazards and subsequently, should adopt a long-term proactive strategy for risk management. Some of the strategies that can be adopted are as follows:

#### **Increase the coping capacities of citizens by enabling them to reduce their own risks**

Through the city governance process, local governments are encouraged to engage in a constructive dialogue with stakeholders on development issues, and involving them in decision-making through a sustainable and proactive risk reduction approach. In many countries, the national legal mandates of cities do not include such processes and therefore, it is necessary to promote the establishment of Municipality Disaster Management committees with representation from city government, civil society groups and public sector. This can be an effective informal governance approach for risk reduction.

Participatory hazard and vulnerability mapping with the subsequent participatory risk assessments are considered starting points in the process. These assessments are carried out using participatory tools and trained volunteers to facilitate inputs from a wide range of community stakeholders. At the municipal level, the

assessment is integrated into other municipal maps, such as land use, human settlement data, etc. using GPS and GIS technology, transforming the community knowledge into formal products. At the community level, the assessments are the basis for community action plans to reduce their own risks. It was successful in the Philippines in cities like Marikina, Dagupan and Naga, and the knowledge and support of civil society stakeholders was considered an essential aspect for solving the safety of city population.



**Sample vulnerability map used for flood disaster mitigation planning and evacuation route planning by a community in the Philippines**

#### **Reduce risks by strictly regulating specific, disaster risk-related private sector activities**

One of the essential aspects of urban disaster reduction is ensuring safer housing and shelter, capable of withstanding the forces inflicted due to hazard events. Most of the casualties from disasters are associated with collapsing buildings. Few countries in Asia have appropriate construction regulations for specific potential hazards that occur within the city, and the strength specifications of building materials often do not take into consideration potential disaster impacts. More often, buildings are built by owners themselves who do not use appropriate construction materials and techniques; they would rather take on the *perceived* smaller cost for reinforcing and renovating existing vulnerable buildings. The appropriate government institutions have to take initiatives to promote techniques for construction in disaster prone areas through demonstrations of model housing, school retrofit programs, including reinforcement of community centers, schools, historical buildings, etc.

While the private sector is considered a catalyst in the development process, it shares responsibility in converting negative vulnerable environment into a positive safe environment. When the commitment of the vulnerable communities is high, it is expected that private sector institutions should step in to fill the funding gap for mitigation. Risk can be minimized if it is always considered to be part of an investor's consideration within a project design. This has been demonstrated in school retrofitting programs implemented by National Society for Earthquake Technology (NSET) in Nepal and disaster resistant model housing initiatives undertaken by Center

for Housing Planning and Building (CHPB) and National Building Research Organization (NBRO) in Sri Lanka.

#### **Include disaster risk considerations within urban planning and development planning**

Development choices can come in the form of stronger infrastructure and poverty reduction programs with emphasis on the role of development in reducing vulnerability to disasters by increasing the ability of specific groups to cope and recover from their aftermath. The United Nations and others have taken an active role in promoting vulnerability reduction through land use planning and other development actions by city governments through their publications: *Living with Risk* (UN, 2002), *Reducing Disaster Risk* (UNDP, 2004), and *Tools for Mainstreaming Disaster Risk Reduction* (Benson et al., 2007).

#### **Include disaster risk considerations within poverty reduction programs**

The urban poor should be made a specific target for risk reduction because they have a greater exposure to hazards, lower tendency to move to safer areas, lower protection through insurance and other economic mechanisms, and lower adaptive capacity to changing risks. Effort should be made to include risk reduction indicators within programs for attaining the Millennium Development Goals and other poverty reduction programs. For example, livelihood programs should not promote economic options that are vulnerable to interruption by floods or other present risks. Attempts can be made for crop insurance against floods and drought. Community savings schemes and micro-credit should be designed to promote disaster recovery. Low-cost housing should be designated upon safe sites.

#### **Promoting good governance to sustain disaster risk reduction**

Good governance is the foundation for sustainable disaster management. UNHABITAT's Global Campaign on Urban Governance promotes the UN definition of urban governance as the continuing process through which conflicting or diverse interests may be accommodated with cooperative action. Adding the adjective "good" elevates the discussion to a debate over desired standards (UNHABITAT, 2002). These standards promoted are interdependent and mutually reinforce each other. They have sustainability, subsidiarity, equity, efficiency, transparency, accountability, civic engagement & citizenship and security. Disaster management is specifically mentioned under sustainability and security. Good governance is not yet fully studied in relation to disaster risk reduction, but some research into the Katrina disaster have already found issues of accountability (King, 2006), subsidiarity (Winston, 2006), and efficiency (GAO, 2006).

#### **Planning for climate change in the urban areas**

Coastal erosion and the projected increase in sea levels from climate change scenarios underline the need for city governments to re-plan their infrastructure to be ready for the future. There are lot of indications of global climate change. Urban planning of coastal cities should include a long-term climate scenario, and design the appropriate infrastructure.

**Initiatives by Asian Disaster Preparedness Center (ADPC)**

As a resource center dedicated to risk management capacity building in Asia, ADPC implements a number of urban mitigation programs<sup>1</sup> in Asia.

The Asian Urban Disaster Mitigation Program (1995 to 2005) was a key initiative that targeted urban risks and identified Urban Disaster Risk Management as one of the five core thematic areas of work. It was funded by the Official US Fund for Disaster Assistance (USAID/OFDA).

One major program is the Program for Hydro-Meteorological Disaster Mitigation in Secondary Cities in Asia (PROMISE), funded by USAID/OFDA and implemented from 2005 to 2008. The main thrust of the present intervention enhances preparedness for and mitigation of the destructive impacts of hydro-meteorological events on the vulnerable urban communities and the economic infrastructure. The program's strategies include:

- Adopting specific hydro-meteorological disaster preparedness and mitigation measures
- Increasing stakeholders' involvement and further enhancement of strategies, tools and methodologies related to community preparedness and mitigation through the promotion of good governance and community-based disaster risk management.
- Strengthening networks and regional links among relevant risk management institutions to improve potential and capacity for application and dissemination of lessons learned.

ADPC in collaboration with Norwegian Geo-technical Institute (NGI) has developed the program for Asian Program for Regional Capacity Enhancement for Landslide Impact Mitigation (RECLAIM) to promote a dialogue between decision makers and professionals about the theoretical and practical aspects and issues related to landslide hazard mitigation. The project aims to build the national capacity on landslide disaster mitigation by:

- Identifying cost effective methodologies and practices adopted by national partners
- Execution of Landslide Mitigation Demonstration Projects, (LMDPs) in 2 countries as a source of committing efforts and funds for applied mitigation, advocacy and awareness creation purposes.
- Sharing of experience of partner agencies in target countries in Asia.

ADPC has several programs that promote community based disaster risk management (CBDRM). These programs are PROMISE (mentioned above), Partnership for Disaster Reduction in South East Asia (PDR-SEA) funded by the Disaster Preparedness Program of the European Community Humanitarian Office (DIPECHO),

and the Enhancing Community Resilience to Natural Disasters in Southeast Asia funded by the Danish International Development Agency (DANIDA).

ADPC gives a regional-level course on CBDRM, Community-Based Basic Emergency Response Course, and the pioneering regional course on Governance and Disaster Risk Reduction. ADPC also provides several technical courses: the Earthquake Vulnerability Reduction Course, the Urban Flooding Mitigation course, the Technological Risk Mitigation for Cities course, and the Urban Disaster Management course.

**Conclusions**

Urban disaster risks are dynamic and severe due to the combination of exposure to several hazards, rapid urbanization and high population densities, unplanned land use change, and low institutional capacity to mainstream disaster risk management into urban planning and decision making processes. A concentration of effort must be made to increase the capacities and actions taken by all stakeholders (local authorities, communities, private sector, and civil society) to reduce risks within their control.

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<sup>4</sup> For details about ADPC and its programs, please visit <http://www.adpc.net>