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Information Note N° 2
Urban and Megacities Risk – What is at stake and what should be done?

The ISDR secretariat commissioned three papers to guide discussions at the High Level Dialogue of the first session of the Global Platform for Disaster risk Reduction. The notes are provided as background information relative to the three selected topics. The authors of the notes were requested to introduce the topics briefly, to provide some excerpts of cases studies, with figures, as well as highlighting some pressure points that could be addressed by the ISDR system.

The three notes are:

1. Linking Disaster risk Reduction, Climate Change and Development
2. Urban and Megacities Risk – What is at stake and what should be done?
3. Costs and Benefits of Disaster Risk Reduction

Session documents are available on the Global Platform website
http://www.preventionweb.net/globalplatform

2. Urban and Megacities Risk What is at stake and what should be done?

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Urban and Megacities Risk. What is at stake and what should be done?

1. Urbanization and disaster risk

The year 2007 is unique in human history since the world urban population will exceed its rural population for the first time. However, nearly one-third of the urban population lives in marginal settlements or slums with very high population density and inadequate access to public infrastructure. The trend towards urbanization is ever increasing and by 2030 more than 60% of the people are expected to live in cities, with unprecedented concentrations of population in big cities and megacities.

The population of the global countryside has peaked and will begin to decline after 2020. On the other hand, global urban growth is at 1.8 percent. Eventually, cities will account for all future global population growth. And most of this growth will happen in urban agglomerations in the developing world. Cities in more developed countries (MDCs) will grow at the rate of 0.38 percent, a doubling time of 185 years, while cities in less developed countries (LDCs) will double their size in just 29 years. By 2015, 12 out of the largest 15 cities in the world will be in developing countries.

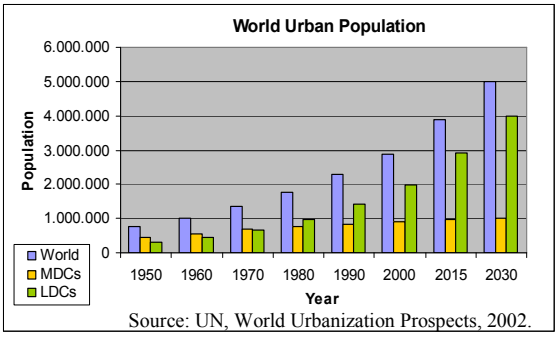
Large urban conglomerations[1] and megacities[2] are often the centers of political and economic development, wielding tremendous political and economic influence over their country and the region. The disruptions caused by a disaster in any major city will harm large populations both within and far beyond its boundaries. Unfortunately, the planning and development of cities has only given scant consideration to the consequences of hazards such as earthquake, floods, typhoons and others. Eight out of the ten most populous cities in the world can be severally affected by an earthquake, whereas six out of ten are vulnerable to storm surge and tsunami waves.

Table 2: Top 15 cities 1990 versus 2015 projection

	1990		2015	
Rank	City	Population	City	Population
1	Tokyo	32.5	Tokyo	35.5
2	New York-Nwark	16.1	Mumbai	21.9
3	Mexico City	15.3	Mexico City	21.6
4	Sao Paolo	14.8	Sao Paolo	20.5
5	Mumbai	12.3	New York-Nwark	19.9
6	Osaka-Kobe	11.0	Delhi	18.6
7	Kolkata	10.9	Shanghai	17.2
8	Los Angeles	10.9	Kolkata	17.0
9	Seoul	10.5	Dhaka	16.8
10	Buenos Aires	10.5	Jakarta	16.8
11	Rio de Janeiro	9.6	Lagos	16.1
12	Paris	9.3	Karachi	15.2
13	Cairo	9.1	Buenos Aires	13.4
14	Moscow	9.1	Cairo	13.1
15	Delhi	8.2	Los Angeles	13.1

Source: U.N. Dept of Economics and Social Affairs (2005)

Table 1. Trend in Urban Growth 1950-2030



Source: UN, World Urbanization Prospects, 2002.

[1] Typically cities over 1 million inhabitants
[2] Typically cities over 10 million inhabitants

The sheer magnitude and scale of what is at risk in cities and megacities are unmatched in history, setting the scene for unparalleled human tragedy and loss of life in an urban disaster. In urban areas, the human population and assets are concentrated, lifeline networks are complex and highly vulnerable, and risk-causing factors are intensified. Overwhelming demographic pressure on social services, scant attention to hazards in the development process, weakness in governance, and inadequate awareness of risk among the population and their governing institutions all combine to increase the scale of potential destruction and human suffering.

***Andean Region**: In the Andean Region (Venezuela, Colombia, Ecuador, Peru and Bolivia) of Latin America urban growth has increased from 30% to 75% in the last three decades[1]. 75% of the population resides in urban centers; with the percentage going as high as 93% in Venezuela. On an annual basis, close to 7 million people are exposed to earthquakes, 43 million may suffer from flooding and landslides and close to 8 million are exposed to hurricanes. Poverty is also high but inequality is even higher; Statistics indicate that 18% of the urban population lives in extreme poverty.*

Source: Reducing Disaster Risk, A Challenge for Development, UNDP/BCPR, 2004

2. *What is at Stake?*

2.1. Unprecedented scale of loss

A disaster can have consequences of uncontrollable proportions. Human, economic and ecological losses can reach unprecedented levels. Risk assessments studies[3] undertaken in some of the megacities of the world produce frightening risk scenarios. Horrendous human and economic losses are estimated from earthquake occurrences in Tehran, Istanbul, Mumbai, Bogota, Metro Manila, and Kathmandu, just to point out a few[4] for which data is known. For many fast growing cities in the world, the impact of earthquakes and other hazards has yet to be evaluated with a level of accuracy that can yield reasonable disaster planning parameters. These include Delhi, Jakarta, Dhaka, Karachi, Mexico, Lima, Cairo and others. Losses from a large disaster in any of these megacities could overwhelm existing global infrastructure for response and rehabilitation and will have social, political and economic consequences beyond the city and the country. This situation cannot be ignored.

Economic impact. Among recent disasters, Hurricane Katrina (2004) and the Kobe earthquake (1994) are considered to be the costliest with direct losses estimated at US$130 billion and US$120 billion, respectively. Economic losses are highest in developing countries such as the USA and Japan because of the high value of property. However, these losses are only a fraction of the GDP's of these countries. On the other hand, the cost of disasters in developing countries can be many times their GDP paralyzing their growth and reducing their potential to provide to their populations. In the two decades from 1970 to 1999, the cost of natural disasters to the country of Nicaragua exceeded 300% of its 1995 GDP. For many countries in Latin America and the Caribbean, including Honduras, Ecuador, Colombia and Peru, the percentage was between 5 and 25% of GDP. (Source: R. Haussmann). In many cases, a single disaster occurrence can account for a large proportion of their GDP as show in Table 3.

[3] For details see a comparative analysis of DRM in seven megacities around the world carried out by the EMI's 3cd Program Implementation Team www.emi-megacities.org/3cdprogram

[4] DRM-Knowledge Base, EMI/PDC 2006, www.emi-megacities.org/megaknow

Projected Losses from Urban Earthquakes

Istanbul*: A large earthquake hitting Istanbul[1] is expected to cause a death toll of at least 40,000 persons as well as about 200,000 injured persons requiring hospitalization and a staggering 400,000 households requiring shelter. A total of about 40,000 buildings would be completely damaged or suffer total collapse "pancake type failure". Another 300,000 more would have moderate to severe damages. The direct monetary losses due to building damage alone would add up to USD 11 billion.*

Tehran*: The North Tehran and Mosha faults situated towards the northern side of Greater Teheran and the Ray Fault on the southern limits of the city have the potential to generate Mw= 7.2 and 6.7 respectively, which according to the earthquake scenarios developed under the JICA-CEST, 1999-2000, could produce a death toll of 120.000 to 380.000 if any of the two faults were to rupture, basically due to the vulnerability of existing structures to seismic forces.*

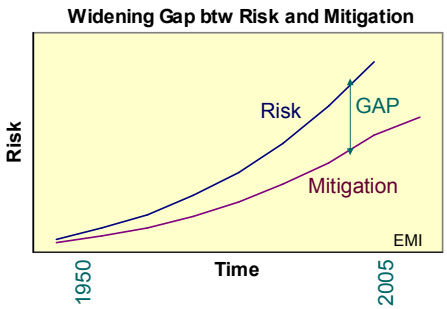
Mumbai: *Several studies (Radius 2001, Sinha et al. 1997 &1999), suggest that one of the most vulnerable elements exposed in Mumbai is it building stock, which certainly contributes to increasing risk of its population. The Mumbai region is 100% urban and the building stock exhibits a rich mix of several different building technologies. A moderately low earthquake intensity level of VII (MSK scale) in the city could produce a dead toll of 34,000 and another 95,000 injured if it was to happen early in the morning.*

Kathmandu: *The Kathmandu Valley has been receiving a large influx of migrants, adding pressure on the local authorities to provide housing and basic services. The old part of town is particularly vulnerable to hazards due to: a) poor living conditions in a high density neighborhoods, b) Poor capacity of the buildings to withstand seismic forces, c) dense and narrow road patterns that limit access in case of an emergency response, and d) Limited water provision along with intricate electrical installations where fires can easily take hold. Scenario projections undertaken by NSET indicate that a repeat of the 1934 Bihar-Nepal earthquake would produce a death toll between 22,000 and 40,000 and about 60% of all buildings in the Valley will be heavily damaged, many beyond repair. 90% of the water pipes would be seriously damaged and about half of the bridges would be closed due to damage.*

Source: EMI ; www.emi-megacities.org/megaknow

2.2 Threat to development and social advancement

ban risk, especially risk to large metropolises, threatens the entire economic, political and social life of countries and the livelihoods of their citizens. The social and political stability and economic well-being of a country and a region are at stake. The disruption from a major event could easily reach global proportions, as megacities produce critical services such as finance, banking, insurance, and global industries such as entertainment and advertising. For example, the at-risk cities of Mumbai and Istanbul are culturally influential in their regions through films, literature, media networks, and other forms of entertainment that generate huge economic transactions. The normal functioning of ships and vessels through the Bosphorous in Istanbul is critical to the trade between many countries in the region. Disasters disrupt business and commerce, waste resources of all kinds, set back development, and sabotage efforts to alleviate poverty and create well-being.



2.3 Compounding effect on the poor and the more vulnerable

Urbanization, poverty, and disaster produce tragedy. Cities are magnets for the poor seeking refuge from socio-political conflicts, looking for jobs, and aspiring for a better future for their families. The urban poor often settle in the most hazardous areas (e.g., river flood plains or unstable hilly slopes) with poor public amenities and live in precarious conditions. They contend with never-ending hardship and every-day risk from malnutrition, inadequate health care, substandard housing, unemployment, and illiteracy. They have limited access to clean water and sanitation and endure constant threats to their physical and psychological security. This 'every-day risk' is compounded by disaster risk, because the poor are highly vulnerable to disasters. Disasters such as floods, landslides, and earthquakes reinforce their poverty, undermine their livelihoods, and destroy their hope to provide better future for their children. Further, disasters drive many non-poor to become poor as a consequence of losing their means of living or income provider in the family.

2.4 Delay will be more costly and more difficult to resolve

The risk trend is going in the wrong direction--urbanization, poverty, and risk are continuously spiraling out of sight. Inaction brings further complication of the problem and further accumulation of risk, creating the need for future investments that are significantly costlier than those needed now.

Moreover, a growing body of knowledge and expertise now exists about how to protect urban populations and physical assets, but the knowledge must be shared and applied if we are to stem the explosion of risk in large cities.
Incremental steps will not suffice; we must put significant focus and resources into it. It is urgent to make the investment now and reverse the trend. Doing nothing is not an option.

Earthquakes, Floods and Landslides threaten many large cities in the world

Mexico City*: An 8.2 magnitude earthquake hit Mexico City at 7:30 a.m. on September 19, 1985. Nobody knows exactly how many died, but estimates range from 20,000 to 35,000. Three thousand buildings collapsed and many thousand citizens found themselves made homeless overnight and living on the streets. The earthquake epicenter was close to 300 kms away from the city.*

Source: Mexico City Profile, Mega-Know, www.emi-megacities.org/megaknow

Mumbai: *The unprecedented rainfall of July 2005flooded large areas of the city and caused severe human and economic losses, and it particularly impacted the economically disadvantaged. Of the total death toll of 447, 116 people living in slums died when the unstable slopes beneath their at-risk homes gave way to landslide, 70 more died when their houses collapsed, and 194 died due to various deluge-related illnesses.*

Source: Proceedings EMI-Asia Forum 2006, www.emi-megacities.org

Caracas: *A narrow zone between steep mountains and the coast north of Caracas, Venezuela, is home to several hundred thousand people. Torrential rains in December 1999 triggered thousands of landslides and debris flows and numerous flash floods, resulting in a death toll estimated at 30,000 people and damages estimated at USD 1.9 billion. Carmen de Uria, one of the settlements located in a flashflood and landslide prone area, was literally erased from the map.*

Source: USGS, Venezuela Landslides and Flash Flood Disasters, 1999 www.pr.water.usgs.gov

Urban disaster realities we do not want to think of

Tangshan, China. *Before the 1976 earthquake, Chinese scientists had classified Tangshan, a city of 1 million people, in the low intensity zone for earthquake risk. They were wrong. At 3:42 a.m. on July 28, 1976, a 7.8 magnitude earthquake tore the rock under the city, and in about 15 seconds the city was leveled to the ground in a huge pile of rubble. 93% of the buildings collapsed, including all the hospitals and health facilities in the city; and so did bridges and roads; railroad tracks buckled. Relief convoys clogged the only drivable road, delaying relief to the city by hours. Official estimates place the deal toll as 242,000 people; unofficial accounts put the loss of life at more than a half-million people. 7,218 households lost all their family members and did not exist anymore. The majority of people died in their beds unaware of the calamity that hit their city. Those who survived had to manage on their own in the middle of the trauma without water, power, and sanitation or any operational form of modern communication. Many who were rescued died due to lack of medical care and supplies. The lack of water forced survivors to drink contaminated water. It took weeks before relief operations finally got organized. The only legacy left from the earthquake is a museum and a portion of a damaged factory and a collapsed building that were preserved as a memory to future generations. (Chen Yong, et al, The Great Tangshan Earthquake of 1976: An Anatomy of Disaster. New York: Pergamon Press, 1988)*

The 1976 Tangshan, China Earthquake is not a rare event in the world. More recently, in December 2003 the 6.6 magnitude earthquake destroyed about 60% of the buildings in the ancient ***city of Bam****, Iran including the 2000-year old citadel. The death toll exceeded 30,000 people out of a population of 78,000; while the 24 December 2004 Sumatra earthquake and tsunami killed 61,000 people or a quarter of the population of the* ***city of Aceh.*** *Developed countries are not immune from such disasters. The 2003 heat wave in France killed close to 15,000 in* ***Paris****, most of them elderly, and more than 1800 drowned in the rising waters of* ***New Orleans****, Louisiana as a consequence of Hurricane Katrina in 2005. Most of the more than 200,000 people who left the city of New Orleans at the time of the Hurricane will never come back, changing the demographics and socio-political influence of the city forever. The 1995* ***Kobe*** *earthquake shocked Japan by the intensity of its losses to this modern striving city. Over 6400 people lost their lives and the economic losses were a staggering $100 billion at the time of the earthquake. 12 years later, the population of the city is still below what it was at the time of the earthquake and the socio-economic effects of the earthquake still linger. Japan suffered one of its deadliest natural disasters in 1923 when a 7.6 magnitude earthquake and following fire (Great Kanto Earthquake) killed an estimated 140,000 people in* ***Tokyo****.*

The 1976 Tangshan earthquake and other urban disasters provide realistic scenarios of the fate of many cities around the world should they be hit by a major disaster. For many cities, the earthquake threat is under-estimated because the memory from the last earthquake has been lost. For others, planning and building cities to resist disasters has not been a priority. As a result, worldwide urban risk has accumulated to an incomprehensible and frightening level.

3. What got us to this situation?

3.1 Problem has been neglected

The risk problem has largely been neglected by cities, and compounding the problem, cities have largely and chronically been neglected by national governments and international organizations in terms of dealing with risk and contributory factors such as poverty and rapid urbanization. Significant resources have been committed for rural and community-based projects where the association with poverty reduction is typically undisputed and there is clearer evidence of outcome. The premise has been that cities, especially megacities, have the capacity to address risk on their own; however, it is now clear that most cities, particularly in the developing world, are *not* effectively managing their risk, and that the risk is high and continuously rising.

Inappropriate construction systems to withstand earthquakes are often used

According to municipal statistics in Tehran, 66% of the city's building stock corresponds to poorly resistant and/or unreinforced masonry (approx. 620,000 units of a total of 950,000). This situation creates a potentially very vulnerable build environment for earthquakes and other hazards as demonstrated by the 2003 Bam Earthquake. The narrow streets of many neighborhoods would compound the catastrophe; emergency crews will not be able to reach certain areas in time to save victims, and there are hardly any parks that could be utilized as shelter places, especially in the southeastern part of the city. This situation is not unique to Tehran. Many large metropolises from around the world have similar vulnerability.

Source: Mega-Know, City Profiles, www.earthquakesandmegacities.org/megaknow

3.2 Ill-planned and un-planned urbanization is having increasingly devastating effects

Unplanned and rapidly exploding growth of cities is overwhelming government institutions with the pressures of urbanization. The rural poor are migrating to the cities and becoming the urban poor. And with cities expanding so rapidly, much of the growth is haphazard, far exceeding the cities' capacity to adequately plan and control development, land use, and construction. As a result, in these expanding areas up to 50-70% of the construction is informal or illicit, driving up the risk. Inadequate construction standards to withstand earthquakes and other hazards are often used, putting millions of people unnecessarily in harm's way. Civic amenities are overburdened, exacerbating inequities in standards of living. Inadequate public services and health facilities have become the norm for larger proportions of urban populations in developing countries. Cities are unable to provide adequate infrastructure and basic services throughout these expanding areas. Ultimately, uncontrolled urbanization has often fed the growth of slums, reinforced poverty, reduced community resilience, increased disaster risk, and diminished cities' ability to deal with disasters.

Informal settlement is a key risk issue for cities

***Quito**: city officials recognize 60% of construction is illicit. The city has neither concrete plans nor resources to deal with this issue.*

***Mumbai**: City officials estimate that almost 60% of population lives in informal houses and/or slums. Millions of people are estimated to live in very old and possibly dilapidated buildings. Several slums improvement initiatives have been launched over the years, but they have resulted in only a marginal relocation of slum-dwellers to legal housing.*

***Manila**: According to the Asian Development Bank, more than 20 percent of a population of 12 million lives either below or near the poverty line and 35 percent reside in slums and informal settlements. Slum upgrading was last undertaken in 1970's. Lastly, according to a 1990 survey of UNCHS, around 76 percent of the total housing stock does not comply with building regulations.*

Source: Mega-Know, City Profiles, www.emi-megacities.org/megaknow

Lack of building code enforcement mechanisms negates the power of competent codes in reducing risk

Ecuador. *Between 2001 and 2002, an alliance of 6 universities in Ecuador collaborated in developing an updated building code specific to the seismic conditions and construction practices of Ecuador. The previous version of the code was 30 years old. In order to overcome the initial reaction of several stakeholders who argued that the increment of the construction costs was going to be too high, several comparative studies were carried out using the old code and the proposed one. The research concluded that the incremental cost of the additional concrete and steel was only about only about 1.2% of the construction cost of a typical building.*

The building code 2002 was incorporated in the Ecuadorian Legislation, but unfortunately poor enforcement mechanisms have prevented the appropriate use of this powerful tool to reduce seismic vulnerability of new construction in the country, particularly in big urban centers such as Guayaquil and Quito, where the number of new buildings constructed each year is important.

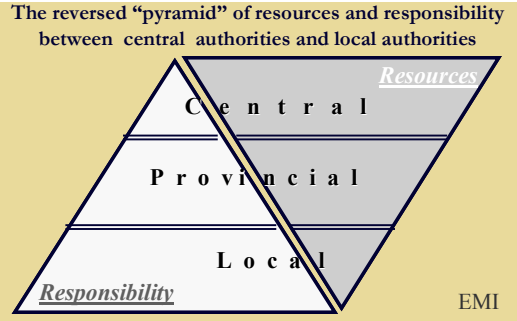
Source: Yepez et al., Building Code 2002: Proceedings of the 2003 Structural Conference, Catholic University, Quito-Ecuador

India. *India issued the first national code for earthquake-resistant construction way back in 1962. While the code provisions have been updated regularly to reflect the latest knowledge, the local authorities that implement and enforce the building bylaws do not adequately incorporate these standards in their processes. This situation has resulted in a legal lacuna inhibiting the compliance with these standards. In 2005, the Government of India issued "Model Techno-Legal Regime" for safety again natural hazards that can be incorporated in the building bylaws thereby ensuring more stringent disaster-safety standards. However, up to 2007 very few states have adopted the Model Techno-legal Regime.*

Source: www.ndmindia.nic.in

3.3 Lack of favorable institutional arrangements

In most developing countries, legislative and institutional arrangements inhibit rather than enable local action. While it is recognized that disasters are initially local events, accountability, authority and resources are not sufficiently decentralized to enable local governments to assume ownership and take actions to understand and manage disaster risk effectively. Local authorities typically do not have comprehensive rules and regulations to dictate processes and obligations for disaster risk reduction, nor do they have adequate knowledge of disaster risk considerations. Institutional arrangements and mechanisms for disaster risk reduction interventions are often weak.



3.4 Insufficient knowledge, experience and tools

Disaster risk reduction is complex, and few administrators have experience in DRR implementation. City officials are already heavily burdened in serving the often conflicting requirements of their populations and delivering these services through complex administrative structures. It takes time, effort, tools, and training to assimilate disaster risk reduction in city functions and ongoing operations. Add these factors to the human inclination to think that disasters only happen elsewhere, to someone else, and it is understandable that disaster risk reduction is inadequately incorporated in the cities' management and development.

3.5 Lack of political feasibility

Disaster risk reduction has simply not been a high priority in the public policy agenda of governments at all levels. Politicians, administrators, and community leaders all face conflicting priorities, and DRR almost invariably takes the back seat to other needs which may be considered more pressing or easier to solve. Risk is thought of in terms of something to be dealt with when disaster strikes, through emergency response and humanitarian assistance, not to be managed preemptively. The political gains from investment in disaster risk reduction are eclipsed by the negative intonation of disasters on business, real estate development and tourism.

3.6 Lack of resources and capacity

Cities have inadequate capacity in disaster risk management, especially in view of overwhelming demands from citizens for vital services and to meet day-to-day needs. The scarcity of financial resources is compounded by a significant gap in understanding what needs to be done, why and how to do it. Very few relevant capacity building programs exist for those who govern, plan, build, maintain, and support cities' development and management. As a result, the mainstreaming of disaster risk reduction at the local level remains a vague concept with little capacity and few mechanisms for implementation.

India: *To help develop the local capacity in DRM, the Government of India and UNDP have initiated the Urban Earthquake Vulnerability Reduction Project (UEVRP) in 38 cities with population exceeding 0.5 million. This project aims to help these cities carry out vulnerability assessment, develop city-specific disaster management plans and mainstream disaster risk management in the developmental programs of these cities.*

Source: UNDP Country Office, India

3.7 Inadequate preparedness

Cities are traditionally ill-prepared for disaster events. Response, relief, recovery, and rehabilitation practice following urban disasters is grossly inadequate. Significant deficiencies remain throughout cities and megacities in terms of inter-institutional coordination, communications networks and warning systems, incident command and control, and resources for response. Life-saving activities such as firefighting, search and rescue, and emergency medical services require technical equipment, heavy equipment, perishable supplies, trained personnel, and constant drills. Involvement of the media, utilities, the private sector, and communities is as essential as that of government and is difficult to achieve and maintain.

Improving capacity for emergency response is a priority for many city officials.

Istanbul, Turkey: *To fill the gap in pre-event response capabilities that were made obvious during the 1999 Marmara Earthquakes, the Metropolitan Municipality of Istanbul established **AKOM** as a 24/7 state-of-the-art disaster response center in charge not only of major disasters but also of all emergency/crisis management and coordination in the city. The center also deals with day-to-day monitoring of traffic and the monitoring of any hazardous situation along the Bosphorous where significant ship movement takes place. A systematic capacity building program for emergency personnel, including SAR, fire fighting, and other professionals is continuously taking place to equip the city with effective response capability. The model established by Istanbul is being reproduced in other cities such as the Municipality of **Tehran**, which also established a similar center named the Tehran Disaster Management Center.*

The impediments to urban disaster risk reduction are correlated, calling for a holistic approach to disaster risk reduction in cities, one that integrates DRR with developmental policy and planning, natural and environmental resources management, and poverty reduction

International and local partnerships for technology transfer can drive results at a cheap cost

Concrete is the most commonly used construction material in the world. Every year, approximately 5.5 billion cubic meters of concrete are produced around the globe to build highways, reservoirs, water treatment facilities, buildings, schools, bridges, dams and many other facilities which are part of the human built environment. Because of the significant resources necessary to design, build, and operate these facilities, most developed countries maintain strict quality control and quality assurance (QA/QC) processes to monitor the in-place quality and durability of concrete materials and structures. These QA/QC processes have resulted in tremendous savings as structures maintain their performance and durability features throughout their design life. Vulnerability to natural disasters of poorly constructed concrete structures and/or premature deterioration of any concrete infrastructure can cause a tremendous social and economic burden to any country, as the cost of rework is not often affordable and significantly increases the ecological footprint of any region.

Aware of the importance to develop and implement a systematic and worldwide effort towards building quality concrete structures, the American Concrete Institute (ACI) maintains a wide range of concrete construction certification programs. Each year, the ACI trains and certifies approximately 20,000 concrete engineers and technicians. However, of those certified, only 2,500 are international concrete technicians; 150 of which are located in Latin America. Larger, and more sophisticated and costly, concrete infrastructure is being built each year in developing countries. As previously noted, developing countries have a significant deficiency of concrete quality assurance technicians and professionals. This gap is being closed by a partnership between the ACI, local concrete organizations, and the voluntary support of North Carolina State University.

Because of very limited funding and resources, only pilot programs for QA/QC training and certification have been developed in the countries of Ecuador, Panama, and most recently, Guatemala. The response and results are impressive: in just three years, more than 250 newly trained concrete technicians and engineers have been certified to conduct QA/QC of concrete infrastructure in accordance with international standards. The new airport in Quito, Ecuador, the expansion of the Panama Canal-Panama, and the new airport in Guatemala City, Guatemala are examples of significant projects and regions where ACI, NCSU, and local technical communities have already made an impact towards the safety and durability of key concrete structures and the sustainability of the region. This simple technology/knowledge transfer model has proven successful and can be enhanced by cooperation from other international development agencies such as UNDP to increase its reach and effectiveness, especially in developing countries.

Source: R. Nunez, NCSU-ACI partnership, 2007

4. What can be done?

4.1 More favorable legal and institutional arrangements are attainable

Currently a trend toward decentralization is underway in many countries, offering the opportunity to enhance legal, institutional and organizational arrangements for DRR. In the past and even today, many local governments have not had the necessary legal mandate and authority to play a major part in these related efforts, constraining their ability to implement policies and practices to meet their cities' immediate and long-term needs. Decentralization can build more capable cities and local institutions. Success requires balance, so that cities acquire not only responsibility and accountability for disaster risk reduction but also the authority and resources to effectively carry it out. Reversing the "pyramid" of resources is the key to improved local governance and mainstreaming DRR policies and practices in government activities.

Decentralization is an effective tool for empowering local authorities

***Turkey**: Obvious deficiencies in disaster management unveiled during 1999 Marmara earthquakes resulted in landmark legal reforms in the country that gave cities and particularly metropolitan cities more jurisdictional authority over the land and buildings in the country. In particular, the so-called Development Law obligates cities in the preparation of microzoning maps and contingency plan, and gave them more powers on many aspects of development. Such legal changes are necessary to empower municipal authorities in enacting and implementing laws and ordinances for land-use planning and construction control.*

Source: EMI- Presentation by Istanbul Municipality Official during Special Session on Urban Risk Reduction at the World Conference on Disaster Reduction (Kobe, Jan. 2005)

International institutions can play a catalyst role in recognizing local governments as vital partners and in empowering them by given them a greater voice in international forums such as the Global Platform for Disaster Risk Reduction. Direct investment in cities and local institutions is vital in order to build local capacity and implement sound practices. A positive recent development in this direction is the newly endorsed ***Global Forum for Urban and Megacities Disaster Risk Reduction***, which will serve as a thematic cluster of the Global Platform and will provide the impetus for local intervention in urban disaster risk reduction through a coordinated action by all the relevant stakeholders.

Now is the time to empower cities and local institutions to play a key role in the implementation of the ***Hyogo Framework for Action*** and other major international agreements such as the Millennium Development Goals.

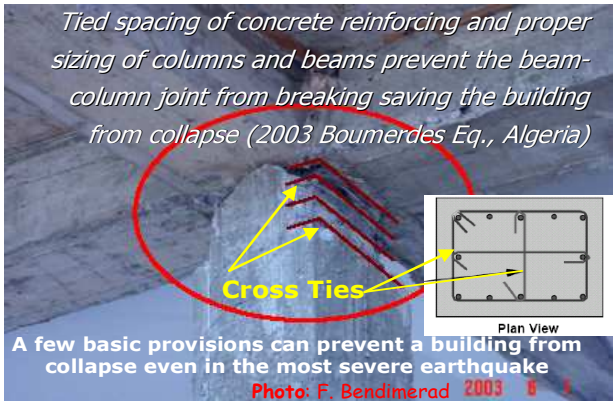
4.2 We can cut human losses significantly by making sure every building incorporates the minimum life safety construction standards

Loss of life from earthquakes and other disasters is by and large unnecessary and can be reduced significantly by ensuring that the minimum safety provisions are incorporated in every new building and all major renovations. The knowledge for building earthquake resistant structure exists for more than 40 years. With this knowledge we can ensure that no newly constructed building will ever collapse. We continue to build thousands and thousands of buildings each year that constitute a life safety threat to their otherwise unaware occupants.

If today we start making every single new building earthquake/disaster resistant (i.e., disaster life-safe) through a global effort to improve construction standards at all levels (including owner built houses), we can reach a goal of reducing human losses in the most exposed cities from preventable building collapses. A systematic and systemic training of professionals in disaster-resistant constructions can be taken up globally. This should be coupled with education and awareness programs for the public about do's and don'ts for different disasters

Pakistan: *School collapses caused the death of close to 20,000 children and their teachers. these are unnecessary losses because we have the knowledge for the last four decades to build schools and buildings so that they do not collapse – some basic construction safety provisions could have saved this generation of children which was lost because of ignorance and neglect.*

Millions of children are at risk in their schools in cities around the world due to lack of compliance with the safety standards. Ensuring safety of school buildings against earthquakes is not even expensive as studies show that the increase in cost is often significantly less than 10% of the construction cost.



The cost of making buildings earthquake safe represents no more than 5% of the construction cost

Mumbai. *Studies show that all new construction in Mumbai can be made earthquake resistant with a recurring additional investment of under US$10 million per year. This model additional construction cost will ensure that newly constructed buildings do not collapse in the event of an earthquake, and represents an increase of about 5% of the construction cost of these buildings*

Source: Ravi Sinha, ITT Mumbai

The code enforcement process for the small city of Lalitpur in the Kathmandu Valley of Nepal is based on a 10 prone strategy.

1. ***Awareness raising:*** *a laud and clear message is sent out, "we live on an earthquake prone area, we have suffered the impact of earthquakes in the past, we can reduce the losses in future events".*
2. ***Partnership:*** *a BCI Committee was constituted with the participation of a broad number of representatives from different sectors of the community.*
3. ***Assistance and Supervision:*** *the earthquake safety section was established within the municipality to provide technical assistance and supervise the implementation process*
4. ***Orientation programs:*** *addressed to end users, such as the association of house owners to emphasize the benefits of using the building code*
5. ***Training modules:*** *for professionals engaged in the construction cycle, especially masons who are the primary source in the actual building construction.*
6. ***Preparing building construction guidelines:*** *to be distributed to residents and construction workers.*
7. ***Public demonstration programs:*** *to show people the benefits of a sound construction.*
8. ***Set up an approval process****: basic blueprints are checked by the Unit of Earthquake Safety. So far, 80% of the applications are being accepted in the municipality.*
9. ***Differentiate categories of construction:*** *More elaborate checking procedures are prescribed for construction requiring a higher level of control such as high rise concrete buildings.*
10. ***Provide incentives:*** *all this process has been implemented with "0" cost to the end user to promote the application of the guidelines while people understand the benefits for life and property protection.*

Source: EMI-3cd Program in the Kathmandu Valley, Second Field Trip Report, 2006, www.earthquakesandmegacities.org/megaknow

Reducing the vulnerability of existing building stock is considered one of the most complex urban risk reduction issues. Urban renovation and urban rejuvenation can increase the economic and social potential of older neighborhoods while reducing their risk by incorporating structural and non-structural mitigation measures. Engineering knowledge on the level of safety of buildings, combined with urban planning and development tools can provide more viable options to the political leaders, the residents and the business community to make informed decisions. However, the legal, social, political and economic factors (e.g., relocation of residents and businesses, land acquisition, and property ownership) can be quite challenging to resolve and will require

compromises and leadership. However, the outcome can be safer and more economically prosperous communities

Unfortunately, most local governments are not fully aware and may not have the capacity and experience to face the challenging processes associated with urban rejuvenation. They should be supported and guided in order to demonstrate the value of such sound practices.

Example of Urban Renovation Projects

Marikina City (Philippines). *Marikina City's flood mitigation program has dramatically decreased the flood exposure to residences, businesses, and essential facilities in the city. Continuously funded by local government, the project began in 1992 and has reduced the actual flooded area from 27.52% in 1992 to 19.04% in 2004 with 30% savings on the projected budget. The city's flood mitigation program is planned, managed and executed by the City's Engineering Department. In addition, to ensuring safer living, the project provides more open space and a cleaner environment for the residents of Marikina and neighboring cities as well as greater benefit to the business community. The benefits of the project are so favorable that the mayor is aiming at a zero flood goal for the city.*

Source: Mega-Know, Sound Practices
www.emi-megacities.org/megaknow

Istanbul, Turkey. *The Metropolitan Municipality of Istanbul is considering large scale urban renovation is one of the vulnerability reduction tools for the existing building stock. With more than 1 million buildings in the city, a new approach needed to be developed to quickly but reliably evaluate the relative levels of safety of buildings. A three-stage screening method was utilized. Pilot projects in the districts of Zeytinburnu, Fatih, and Kucukcekmece included first phase evaluation of more than 100,000 buildings. These studies show that roughly 20% of the Istanbul building stock can be expected to be in the high risk category. Different options for urban renovation are being evaluated based on community needs, safety and improved economic activity.*

Source: Metro Municipality of Istanbul – Reproduced in the Proceedings EMI Asian Forum 2006, Kobe, November 2006

4.4 Standard of care and work ethics can be raised and practices improved

Local institutions can be strengthened by training and improving the skills of city practitioners and managers and elevating their value in society. Professional and trade organizations can play an important role in improving the standards of practice and ethics of work but they need more efficient oversight and leadership. We must invest in "demonstration cases" to show how it can be

NSET comprehensive capacity building program

The National Society of Earthquake Technology (NSET) in Nepal, promotes the School Earthquake Safety Program (SESP) which is one of the priority initiatives in the Kathmandu Valley. This program evolved from a simple school retrofit to a comprehensive program of earthquake safety involving the entire community.

SESP includes a survey and vulnerability assessment of public school buildings through school headmasters; retrofitting and reconstruction of schools; local masons' training on earthquake resistant construction; a participatory community-based approach to earthquake mitigation; awareness raising and education on earthquake safety for teachers, school children and parents; empowerment of communities and general improvement of safety and livelihood; and institutionalizing SESP in local government.

Source: NSET reproduced in Mega-Know, Sound Practices, www.emi-megacities.org/megaknow

4.5 DRR can be mainstreamed through systemic strategic planning

The difficulties of implementing urban disaster risk reduction will become less tedious and challenging if its elements are directly integrated in the government planning processes, such as

land use and urban planning, public works, social services, and emergency planning. Cities, in particular large metropolises and megacities, are familiar with the notion of master planning.

The processes and actions indicated in the Hyogo Framework for Action and many of the targets known as the Millennium Development Goals (MDGs)[5] are linked to disaster risk reduction and have important local planning components that, if activated fully, can reduce vulnerability of urban dwellers along several fronts. Let's not forget that implementation is dependent on local action.

A good example of this relationship relates to the efforts for improving the life of slum dwellers around the world, most of whom occupy high-risk prone areas. This process involves poverty reduction, land use planning, and community participation that leads to capacity building of these groups at risk. Several examples can be drawn from city programs to legalize informal settlements in Quito, Mexico City, Mumbai, Bogotá, and other cities.

Improving conditions in slums and informal settlements through local leadership

Bogotá, Colombia. The city of Bogotá's Resettlement Program for families living in high-risk zones incorporates three components: 1) relocation, 2) improving livelihood conditions, and 3) implementing environmental rehabilitation actions to avoid new occupation of the evacuated area.

In the specific case of *Altos de la Estancia* in the locality of Ciudad Bolivar, a total of 3,033 families subscribed to the program and as of 2006, 1,800 families have been resettled and incorporated into different social programs. The action plan for mitigation, land recovery and rehabilitation of the evacuated area is currently in its design phase following an innovative framework that includes institutional intervention with strong community participation.

Source: City of Bogota – Reproduced in Meg-Know, Sound Practices, www.emi-megacities.org/megaknow

4.5 A culture of prevention can be developed Community well-being and self-reliance are strengthened through education and preparedness. A balanced program of community and institutional education and preparedness is necessary to enhance welfare, safety, preparedness, stability, robustness, and self-reliance)

Public-Private Partnerships

Makati City, Philippines. *Makati Fire Safety Foundation, Inc. (MAFSAFI) is a NGO established as a public-private sector partnership in 1997 through the initiative of Mayor of Makati City. The main motivation for the organization of MAFSAFI was the concern for fire safety in view of the existence of many high-rise buildings especially in the Central Business District of the city.*

The foundation agenda include education, awareness, training, demonstration cases, independent evaluations, lobbying and advising local governments and local professionals on sound fire and construction safety practices. The foundation was instrumental in the drafting and passage of a city ordinance requiring all owners, leasees, and operators of businesses in the city to secure public legal liability insurance.

4.6 Public-private partnerships can be fostered

Partnerships can be promoted between local organizations and city administrations in order to strengthen their mutual capacity for raising public awareness and preparedness, and for providing accurate and timely life-saving information (e.g. alert and warning) in a disaster. This could include establishing public information protocols, securing access to electrical power, and hardening communications capabilities and broadcasting or transmitting facilities.

[5] Living with Risk, A global review of disaster reduction initiatives, UN-ISDR, 2002

Effective Community awareness and involvement

Bogotá, Colombia. *In the framework of the General Program to Strengthen Bogotá's Response Capacity to a major seismic event, the "Bogotá, Feet on Land" campaign is part of the formulation and implementation of a massive and interpersonal communication plan to support educational processes in the field of earthquakes and to promote strategic alliances among institutions, academia, and private enterprises in order to prevent a major disaster. The goal is to manage efficiently all the information and documentation related to risk management; to strengthen the incorporation of risk management contents within the public education system and support communitarian processes; to identify requirements and strategic alliances nationally and internationally; and to use the media to educate the public on risk management and attention to emergencies in Bogotá.*

Source: City of Bogota – Reproduced in Mega-Know, Sound Practices, www.emi-megacities.org/megaknow

Kathmandu Ward Level Awareness and preparedness mechanisms. *Due to organizational weaknesses and lack of adequate resources, the local government and other national organizations will not be able to provide adequate assistance in case of a new earthquake impacts the Kathmandu Valley. Therefore, it is necessary for the communities to get ready and get organized before hand. Key actions include: a) Advise every ward(smallest administrative units) to constitute its own Disaster Management Council (DMC), which should include individuals and institutions that are influential, the strength and sustainability should come from strong partnerships and alliances with different actors of the community. b) Training at the community level is needed, it should include first aid rescue and an awareness program for the communities. c) Need to identify safe places in their homes and other sites of the neighborhood where people can protect them selves.*

Source: EMI 3cd Program, Kathmandu, second field trip 2006, www.earthquakesandmegacities.org/megaknow

5. The premise for success

Clearly the resources are always going to be limited and we must adopt a strategy for effective action. Such strategy should recognize some basic collective lessons:

- **The HFA provides the unique favorable circumstances for disaster risk reduction**

Above all, we now have the Hyogo Framework for Action as a global agenda, which commits states and international organizations to disaster risk reduction and provides guidance on how to make progress. With the establishment of the Global Forum, the HFA can be made more specific for cities and for local institutions to provide more concrete guidance and to support the development of tools and sound practices.

- **Cities cannot do it alone**

The problem is too complex to be managed by cities alone. A more concerted effort is needed. Most often financial help is secondary compared to scientific/technical help and also managerial help. Cities have difficulties understanding what needs to be done and how to do it. This fundamental step can be resolved through collaborative effort between local and central governmental authorities, with the help and collaboration of international institutions, funding organizations and technical organizations. Further, there is a common investment in new planning tools, practices and methods as well as developing efficient mechanisms for information sharing that needs to take place and that goes beyond a single city or a nation. The Global Forum for Urban and Megacities DRR can be a catalyst for such bottom line investment.

- **Avoid trivialization – Making the investment**

We should avoid the "trivialization" of the needs for investments in urban risk reduction. Existing tools are often inadequate and require customization and improvements. Solutions must be city-specific, and must be developed by involving the cities and their local institutions. Turning

"*Lessons learned*" into "*Lessons Practiced*" will require long term sustained action to trigger new policies and to build the skills of practitioners and capacity of institutions. Here again, the role of international institutions and funding organizations is critical in creating the conditions for success. Just as we are learning about how much investment is needed to make progress in the implementation of the HFA's or the MDG's or in reducing the effects of climate change, we should be mindful that urban risk reduction is not going to take place without significant investment.

- **Recognize local institutions as vital and viable partners**

In the past, few cities have engaged in disaster risk reduction, but more and more local institutions are incorporating disaster risk reduction as an integral part of their responsibility towards their citizens and in developing sustainable development practices. Cities such as Istanbul, Bogotá, Manila, Quito, Cape Town and others are establishing processes and implementing actions for DRR in their cities. Such examples should be supported and encouraged and efforts should be made to disseminate them and use them as models to other cities. More city-to-city experience sharing is also taking place. Local governments should be recognized as vital and viable partners by capacity building organizations at all levels and by donor organizations.

City-to-City Cooperation. *After the 2004 Indian Ocean tsunami, CityNet was the first international organization to dispatch technical staff from its local government partners to assist with reconstruction planning and water purification in Banda Aceh. CityNet also participated in the reconstruction of two community centers in Sri Lanka using donations from its member city of Yokohama, Japan.*

Source*: CityNet Presentation – Organizational meeting for urban forum for disaster risk reduction, April 2007, Kobe, Japan*

- **New strategies, practices and tools are emerging**

International organizations, local government networks, universities, and specialized organizations are developing tools and practices and supporting local governments and local institutions in implementing them. Such initiatives should be documented and supported to demonstrate the feasibility and cost-benefit of mitigation and to serve as demonstration cases to other cities.

Global Risk Identification Program (GRIP) – *The goal of GRIP is to reduce natural hazard-related losses in high risk zones to promote sustainable development. Its objectives are an improved evidence base for disaster risk management as an alternative to over-reliance on emergency response. There are many cities doing risk assessment and risk management under GRIP worldwide. For example, in a recently launched project, five cities of Baja California in Mexico (representing 95% of the State population) are working together to introduce risk management in their development plans, which will then be integrated in the State disaster risk reduction strategy. Similar projects are being prepared at the national level in Nepal and Pakistan, and at the sub-national level in Chile and India. At the regional level, many Caribbean cities are collaborating in preparation of the Caribbean Risk Report.*

Source: Carlos Villacis, Coordinator UNDP/BCPR carlos.villacis@undp.org

Municipal Information System Network (RED-SIM) – *This project is aimed at supporting the incorporation of environmental and disaster risk management in local planning processes. The initiative was born out of the need to update local geographic information in emergency situations, as reported by local authorities. Through joint local, national and international efforts, a system was set up whose applications go far beyond the environmental and disaster risk management. The purpose of RED-SIM evolved into a tool that records, generates, and provides socio-economic, environmental and hazard information to guide developmental planning processes of municipalities.*

Source: The municipal information system network, GTZ, Eschborn, Germany

MEGA-Learn - *MEGA-Learn is the online platform developed as a joint project of EMI (the Earthquakes and Megacities Initiative), UNDP/BCPR, ProVention Consortium, the Pacific Disaster Center (PDC) and Kobe University to enable knowledge sharing and to enhance the skills of professionals and practitioners in disaster risk reduction. It consists of tools, technologies, methodologies and online training courses for disaster risk management practitioners, city managers, researchers and others. It includes e-learning tools such as* ***MEGA-Know*** *and* ***MEGA-Plan.*** *The first is a disaster risk management (DRM) Knowledge Base that contains megacity profiles, DRM sound practices, as well as downloadable resources and contact information pertaining to the implementation of a systematic city planning process for cites following the Disaster Risk Management Master Plan (DRMMP) model developed by EMI. MEGA-Plan is a specialized training module for risk-sensitive land-use planning.*

Source: www.emi-megacities.org/megalearn