
ESSENTIALS OF URBAN DISASTER RISK REDUCTION

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The world is urbanizing rapidly and at the same time, corresponding risk to urban population is growing exponentially. The year 2007 is an important milestone as half the world population started living in cities. Understanding urban risk became increasingly important not only to specialists but even to the ordinary citizens because 50% of the world's cities are situated along major earthquake belts, river flood plains, landslide prone mountain slopes or on tropical cyclone tracks.¹ Environmental degradation leading to deteriorated quality of life further adds to this irony. Adding more to this is the spread of health hazards (including HIV/AIDS and SARS) industrial, chemical and biological risks, terrorism and fatal accidents. Today, cities are at alarming risk, which is not only reflecting in physical dimension, but is manifested in social and economic regimes as well.

DEFINING URBAN RISK REDUCTION

In recent times, 'disaster risk reduction' is emerging as a specialized field of study within

which 'urban risk reduction' is comparatively less recognized yet very important. One of the underlying reasons for this biased perception is based on the evidences of past disaster events, which have mainly disrupted a region comprising few towns and more hinterlands. Nonetheless, with the balancing population across rural-urban settlements, it is imperative to develop thorough understanding of risks critical to urban areas and ways to minimize not only the losses but the risks as well. Towards this end, it is better to understand some basic terms on this subject described in the following section.

Urban

The most simplistic way to define urban is 'all built forms which are not rural'. In other words cities, towns, municipal areas, metropolitan areas, megacities are all urban. It is natural that our ancestors started settling on land which was more suitable for agriculture and close to water. This is the reason why most of the ancient world civilizations have their origins on the banks of rivers. Today's cities

are yesteryears' villages or rural areas. Both 'push' and 'pull' factors have contributed significantly in transforming few villages into urban areas of the present era. Literature suggests that throughout the 20th century, growth of cities was largely fueled by rural to urban migration. However, today, it is the 'natural increase', which is making much larger contribution in population growth of cities than migration. Beyond demographic statistics, urbanization is also marked by process associated with development of civilization in multidimensional manner. Urban areas can be defined by their economic functions, i.e., secondary (industrial, manufacturing) or tertiary (service) sectors dominate over the primary (extractive agriculture, forestry or mining) sectors found in rural areas,² by population density or size, or simply by administrative region, where all land and activities lying within a metropolitan district become 'urban'.³ It has been pointed out that viewing urbanization within the limited confines of a single municipality or corporation has serious consequences, as the pattern of urbanization has become increasingly that of urban agglomerations.⁴ Ramchandran notes that:⁵ "The city is a physical entity occupying several square kilometres of area... it functions as an organismic whole, although comprising of interdependent and interacting component parts. The city has several focal points within it—the main market, railway station and bus stand, the secondary markets, and professional, educational and medical institutions; all these focal areas are linked with the residential areas of rich and poor alike. The city is heterogeneous in terms of its population composition...has a variegated and complex land-use structure...is unified by network of planned and unplanned roads and modes of transportation and communication. The city comes to life with the spatial mobility of its people engaged in their day-to-day activities to satisfy their economic, social

and cultural needs. Each component unit performs a significant role, so that the city may function harmoniously and perform its wider role as a focal centre of the region and the nation."

Risk

Every human being has to go through unpleasant situations and progress through responsible actions despite risks. Since our childhood we progressively refine our risk-taking skills; we learn how to handle sharp things and hot things, how to ride a bicycle and cross the street, how to communicate our needs and wants—each of these actions requires us to perform a balancing act, to avoid inherent risk. In his classic work, *Risk, uncertainty and profit* Frank Knight presented easy to understand definitions of 'risk' and 'uncertainty' which gradually have assumed the role of technical terms in the risk and safety literature:⁶

- *Risk*: If you do not know for sure what will happen, but you know the odds, that is risk, and
- *Uncertainty*: If you do not even know the odds, that is uncertainty.

However, in development literature, the distinction between risk and uncertainty is almost translucent and the words are used interchangeably.⁷ Senior citizens often recall 'the good old days' and argue that despite technological advancement and improved quality of life, world is much riskier than it used to be. Giddens pointed out that hazards created by ourselves are sometimes more threatening than those that come from outside.⁸ Among the disaster professionals, UN/ISDR definition of risk is widely accepted as:⁹

The probability of harmful consequences, or expected loss (of lives, people injured, property, livelihoods, economic activity disrupted or environment damaged) resulting

from interactions between natural or human-induced hazards and vulnerable/capable conditions. Conventionally risk is expressed by the equation.

$$\text{Risk} = \frac{\text{Hazards} \times \text{Vulnerability}}{\text{Capacity}}$$

Beyond expressing a probability of physical harm, it is crucial to appreciate that risks are always created or exist within social systems. It is important to consider the social contexts in which risks occur and that people, therefore, do not necessarily share the same perceptions of risk and their underlying causes.

It can be deduced from the above definition that understanding of hazards, vulnerability and capacity is essential to express risk. Discussion on urban risk reduction in this chapter will therefore be articulated around these basic terms which are well-accepted among risk professionals around the world.

Reduction

Reduction literally means decreasing the value or lessening the impact of something. In disaster domain, reduction is directly associated with reduction of risks and hence disaster risk reduction (disaster reduction) is an acceptable term defined in UN/ISDR as “The conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impact of hazards, within the broad context of sustainable development.”

UNDERSTANDING URBAN RISK

The world is steadily becoming more urban,¹⁰ although, urbanization rates vary across the world. The level of urbanization is far higher in countries like USA and UK compared to China or India, but annual urbanization rate is much slower. About two-third of the world’s current urban population—1.9 billion people—live in low- and middle-income nations in Africa,

Asia, Latin America and the Caribbean, and at least 600 million of these, even find it difficult to meet their essential needs due to extreme poverty and low asset base.¹¹ Many consider urbanization as an irreversible process and thus urban vulnerability becomes a reality.¹² The complexity of urban growth cannot be explained in an oversimplified manner. Broadly, lethal combinations of economic and environmental pressures increasingly keep forcing the rural poor to search alternative living in nearby towns or cities. Supply of developed and safe land is always short of demand in urban areas and often result is mushrooming of informal settlements, slums, and squatters through encroachment on public and private land. Cities’ commercial, industrial and residential locations prove to be livelihood centre for urban poor, who are left with no choice but to settle on dangerous locations subject to natural or man-made hazards.

Urban risk matrix in Fig. 32.1 explains that urban hazards and vulnerabilities are greatly interconnected whereas there are many other factors, which contribute significantly as ‘risk multipliers’. Urban hazards vary considerably compared to their rural counterparts. They are not only represented by one-off events like earthquake or cyclones but also get exaggerated due to hindrances in accessing basic services or public health services. To understand the urban risk and its impacts on local environment, it may be appropriate to deconstruct the underlying factors making urban risk more critical than in any other built environment. These factors may be summarized as follows.

Urban population

By 2050, the world population is expected to grow by 3 billion people. Most of this growth will take place in developing countries—and within these, in cities and towns—more than doubling urban populations.¹³ In 1950 only

Facts and figures on urbanization

- In 1800, only 2% of the world's population was urbanized.
- In 1950, only 30% of the world's population was urbanized.
- In 2000, 47% of the world's population was urbanized.
- More than half of the world population lives in urban areas now (starting mid-2007 or so).
- By 2030, it is expected that 61% of the world's population will live in urban areas.
- Almost 180,000 people are added to the urban population each day.
- It is estimated that there are almost a billion poor people in the world; of this over 750 million live in urban areas without adequate shelter or basic services.
- In 1950, New York City was the only city with a population of over 10 million inhabitants.
- By 2015, it is expected that there will be 22 cities with populations over 10 million.
- Of the 22 cities expected to have population of more than 10 million by 2015, 17 will be in developing countries, 13 of these are situated in the Asia-Pacific region.
- By 2030, Asia will have higher number of urban dwellers than any other major area of the world, except Africa.

Source: Ref [15]

30% of the world's population lived in cities, which has reached 50% today. The United Nations expects more than 60% of population to be living in cities by 2030.¹⁴ The 21st century has been dubbed 'The Urban Millennium' by the United Nations in recognition of the fact that the world is becoming increasingly

urbanized. Since urbanization offers both 'promise' (as hubs of dynamism, change and opportunity), as well as 'peril' (as centres of exploitation, disease and unemployment), efforts to squarely meet the challenges and maximize the opportunities afforded by urbanization are essential.¹⁵ In other words, worldwide, people started congregating in particular geographical areas. These areas may or may not be hazard-prone. In case of natural disaster or an extreme climate event, these urban areas as populous concentrations become much more vulnerable.¹⁶ Not only this, urban systems supporting this huge population also get severely disrupted and virtually paralyze the population as a whole.

Urban structures

Urbanization has its origin since industrialization gradually emerged in different parts of the world. With the growth of industrialization, economic activities started accumulating in urban areas alluring migration from rural areas in search of newer livelihood opportunities. Cities started expanding both horizontally as well as vertically. However, they neither had enough natural resources to feed population nor capacity to consume the waste (solid and liquid) generated. The environmental impact of a city on its adjoining areas kept growing resulting in larger 'environmental footprint' than ever. Analysis for Tokyo metropolitan region shows that its environmental footprint is much larger than the area of Japan. Since both urban area and dependent rural areas are interconnected in many ways, a disaster in either of them may impact other adversely. This further deepens urban-rural divide and with urban bias.

Urban setting

The densely populated areas of the world are near deltas, coastal areas and seismically active zones. In fact, population started

growing in productive flood plains, coastal zones and fertile volcanic slopes. as these offered most lucrative land to settle in. However, with additional vulnerability as a result of global warming, flooding incidences are expected to increase everywhere and specially in coastal areas.¹⁷ Any potential rise in sea level makes portcities particularly vulnerable. Recent tsunami in Indian Ocean has demonstrated the fact well that coastal cities are at risk from tsunami, storms, cyclones, typhoons and floods and at the same time are subjected to geological hazards as well. As a result many urban areas which have had seemingly positive attribute setting earlier, are now concentrations of multiple hazards both natural as well as man-made.

Compact urban forms

Even in large urban areas, population density varies and determines the severity concentration in specific pockets of the city. Moreover, day-time and night-time density varies significantly. In downtown or in commercial and office areas, day-time population concentration is very high on working days. This pattern switched to recreational centres like shopping malls and cinema theatres on weekends and holidays. It is obvious that when more people are confined to a limited area, even a small yet harmful event will have potential to cause harm to more number of people. In some large cities of developing countries, especially in core areas and informal settlements, the density could be many times higher than the average population density of the city. In Kobe, Japan, average population density is 2,765 persons per square kilometre however, the Nagata Ward which was severely affected by 1995 earthquake had a density of 11,498 persons per square kilometer.¹⁰

Urban primacy

Many cities are also the concentration of a particular country's major functions. For

example, a hazardous event in a megacity like Manila, which is the hub of political, administrative, and economic activities of Philippines, may lead to complete disruption in the country as a whole. This makes Manila more vulnerable compared to other cities. Today, the world is networked very well and economies are now increasingly interdependent in the era of globalization. A major earthquake in a city like Tokyo could have global impact especially economic. This is equally true at national and regional levels. A supercyclone (1999) in a major Indian state, Orissa, also devastated its capital city Bhubaneswar. As a result, not only the far-off places, but the capital city itself remained disconnected from other parts of the state and the rest of the country as well. This resulted in serious delay in rescue and relief work. Hence, a disaster striking an urban area may not only affect the city itself but depending upon its functional primacy, may hamper a wider area.

Urban built environment

Built environment consists of buildings as well as infrastructures. The vulnerability of human settlements in an urban area is largely dependent on safety features incorporated in the built mass with reference to particular hazard. It is estimated that over two-third casualties during an earthquake result from building collapse. It is rightly quoted that 'earthquake does not kill the people, non-resistant buildings do'. In developing countries, poor often live in areas which are unfit for habitation (low-lying areas, flood plains, over the drains or unstable slopes). Moreover, due to resource constraints, they erect houses which barely provide a roof over the head and in case of disaster, be it earthquake, flood, fire or typhoon, is the first to get damaged. Nonetheless, even in so called 'strong-looking buildings', if the applicable building codes, hazard safety features, standard material specifications are not followed, it is likely to

Tracing the root of urban risk: Manila landslide

On July 10, 2000, 300 people were killed by a landslide in Manila, the Philippines. A shameful and avoidable loss, but just one from a growing list of urban disasters with a natural trigger. The event stands out because the landslide was not of soil, rocks or mud but of solid waste. This was truly an urban disaster. The disaster occurred in a squatter settlement, home to 30,000 people. The squatters lived on and around the Payatas rubbish dump, which takes garbage from Manila's 10 million inhabitants. The landslide and the response of survivors to it help in showing some of the fundamental characteristics of urban risk and vulnerability in Africa, Asia and Latin America and the Caribbean.

Source: Ref [3]

behave as 'unsafe' building and will prove to be a constant threat to its inhabitants. Similarly, indiscriminately mixing of various non-compatible landuses with the thick residential areas may also trigger the secondary disaster. Leakage of deadly gas from a factory in Bhopal, India in 1984 leading to immediate death of about 3,000 people is an example poor landuse planning leading to worst industrial disaster.¹⁸ It is reported that the accident site is still contaminated and needs scientific cleaning.

Urban informal settlements

The form and structure of informal settlements can vary from one urban context to another, however, in legal terms, they remain 'illegal constructions'. This includes shanties, squatters, slums, ghettos as well as any other construction not permitted on a particular land area by the local legislation.¹⁹ Since the tenure remains illegal, these settlements

typically represent owner-built, community-built or small contractor-built houses with minimal engineering standards followed. Moreover, the city administration denies the access to basic facilities in these areas which further makes them vulnerable to health hazards and epidemics.²⁰ Most residents in these settlements are from the poorest sections of the society, socially backward and neglected from recognition as 'urban residents'. Fear of eviction from the illegally occupied land also keeps forcing them to stay in unsafe housing conditions even if some residents can gradually afford to improve their situation. Because of their locations, low-quality housing, lack urban services and continuous neglect of their integration into overall city.

Urban economic imbalances

As discussed earlier, poor tend to live in an unsafe environment. They live in most vulnerable housing, in absent of or degraded environmental conditions and hazard-prone locations with very poor personal assets to help themselves in even minor emergencies. This is how, in a same city, with the same disaster event, people with different income groups get affected differently. Resilience or capacity to cope and bounce back after an extreme event is much better in higher and middle income groups. They also have access to formal banking, insurance and other financial instruments whereas poor do not get recognized in the formal housing finance market. They have very limited livelihood options and often depend on informal networks to get low-paid jobs. In disaster situations, their livelihoods get affected most severely and many can not recover fully from the losses incurred even over their lifetime. In a way, to the poor, disasters turn back the development clock, destroying years of effort and labour and perpetuating poverty for those already poor.²¹

Urban services

The bigger the city, more complex is the infrastructure service systems it will have. In developed countries, urban services generally consists of complicated network spread across city and are dependent on high energy inputs and require sophisticated technology to fix problems. Dependency on infrastructure in developed world is much higher compared to developing nations. The intricate web of services makes it difficult and expensive to repair but needs attention during disasters. Provision of water supply, sanitation, become more crucial in disaster-struck regions. Immediate health hazards arising from failure of water supply and sewage systems act as secondary disaster in many areas. Boulle et al noted that 10% of the victims in Kobe earthquake died due to resulting fire.¹⁰ Similarly, Hurricane Kathrina resulted in massive loss of city infrastructure in New Orleans. Infrastructure damage can impair majority of the city functions and wobble the economic base of the region specially targeting at the poor.

Urban environment

Urbanization itself, in most cases, has proved detrimental to local and regional environment. Once ecologically fragile areas have now been swallowed by expanding cities resulting in loss of biodiversity, disrupted balance of ecosystems and threat of extinction to many living organisms. Mcmichael AJ noted that “Beyond the traditional risks of diarrheal disease and respiratory infections in the urban poor and the adaptation of various vector-borne infections to urbanization, the urban environment poses various physicochemical hazards.²² These include exposure to lead, air pollution, traffic hazards, and the ‘urban heat island’ amplification of heat waves”. In addition to this, ground subsidence, underground excavations, surface and ground water contamination, water table reduction, are some of the counter effects of urbanization.

Urban management

Urbanization as a result of complex socio-economic process, poses a daunting task of managing cities. Heterogeneous societal structure, opportunist political system, lack of administrative capacities, very poor resource generation capabilities, archaic urban planning and development legislation contribute collectively in making cities more vulnerable to poor management and disaster risks. In developing nations, local authorities are also not suitably empowered due to vested interests or other reasons to devote resource towards risk mitigation. Moreover, occurrences of disasters wash away their existing limited resources and leaves a behemoth task to further upgrade city wide infrastructure and services.

URBAN RISK REDUCTION: THE WAY AHEAD

‘Words into Action: A Guide for Implementing the Hyogo Framework’ is a very recent publication of UN/ISDR.²⁵ This section is entirely drawn from this publication as it has very clearly spelt out a set of guiding principles for implementing disaster risk reduction. Figure 32.2 schematically illustrates essential principles of urban risk reduction where urban local governments are represented to play pivotal role. In this paper, these principles are adjusted to urban specific risks as follows:

- Urban local governments have the primary responsibility for implementing measures to reduce disaster risk. Disaster risk reduction needs to be an essential part of a city’s investment in sustainable development. Local governments have the responsibility to protect their citizens and their city-wide assets by reducing the risk of losses from disasters.
- Local governments, however, cannot do the job alone. Effective disaster risk reduction relies on the efforts of many different

Reducing urban risk: Surat, India

Surat, the twelfth most populous city of India is also famous as India's diamond-cutting city, whose share in the global market is 80%.^{23,24} This success story of Surat's transformation is compiled from a document prepared by MoEF (2002) for the World Summit on Sustainable Development (WSSD) Johannesburg. Like many other cities in developing countries, Surat also witnessed rapid growth of population and urbanization resulted in the growth of slums, garbage, and overflowing drains. The city faced an outbreak of pneumonic plague in September 1994 which was the result of constant rains, which lashed the city for more than two months, and led to flooding and large-scale water logging in low-lying areas primarily due to faulty drainage system. Hundreds of cattle and other animals died due to the flood and water-logging. The floods, in fact, only brought to a crisis point the dangers inherent in inadequate waste management systems. Following the disaster, environmental cleanliness became the paramount concern with priority to cleaning of dirt and debris, disposal of carcasses accumulated due to the floods, pumping of stagnant water, spraying of pesticides, and anti-rodent operations. Towards this, Surat Municipal Corporation (SMC) launched an action plan by involving the government, NGOs civil society, and the private sector (especially doctors) working together. An integrated approach was adopted towards sanitation, public health and garbage management. Primary importance was given to the monitoring, regulation and streamlining of garbage collection and disposal. Within one year, the clearing of accumulated garbage rose from 50% per day at the time of the plague, to almost 94% of the garbage generated everyday. The strategy of microplanning included meticulous ward-level planning and

took into consideration the special needs of critical spots like vegetable markets, eateries and congested areas with heavy traffic flow. This resulted in a tremendous boost in the morale of the employees, officials and residents of the city. Surat's citizens, who had earlier accepted filth and dirt as a part of life, now had a sense of belonging and pride for the city, and a concern for its well-being. Parallel to this, health department initiated a programme of 'public health mapping', strengthening of the health infrastructure, revival of work ethics among health workers, and an extensive sanitation drive which considerably helped boosting the city's health indicators. Subsequently, SMC also introduced a system of health monitoring entailing close surveillance of health indicators on a regular basis. This can act as an early warning system with regard to the outbreak of any epidemic in future. Improvement of sanitation in slums was one of the most important focus areas of the post-plague sanitation drive. The emphasis was on providing community facilities rather than individual facilities by involving NGOs. Community water hydrants, pay-and-use community toilets, paved open drains, paved roads and streetlights were provided on a priority basis. These were strengthened by the positive, proactive participation of other stakeholders of the city. The birth rate, death rate and infant mortality, which were showing a desirable downward trend in the last three decades, have further improved in the post-plague period. Community participation played a key role in the rapid implementation of decisions taken. Following the disaster, there was a change in the attitudes of the citizens; they began to participate proactively in improving living conditions in the city.

Source: Refs [23, 24]

- stakeholders, including regional, provincial, national and international organizations, civil society including volunteers, the private sector, media, scientific community and people of the city.
- Disaster risk reduction must be integrated into development activities. Disasters undermine hard-won development gains, destroying lives and livelihoods and trapping many people in poverty. City governments can minimize such losses by integrating disaster risk reduction measures into development strategies, assessing potential risks as part of development planning, and allocating resources for risk reduction, including in sector plans. Because of the enormous development losses suffered around the world from disasters, development banks and international assistance institutions now increasingly place importance on integrating risk reduction into development policies and practices. At the same time, disaster risk reduction is also being recognized by humanitarian participants as a fundamental component of their policies and programs, in order to avoid the loss of lives and livelihoods and to reduce the need or extent of humanitarian response and relief.
 - A multihazard approach can improve effectiveness. A particular community is usually exposed to risks from a variety of hazards, which can be either natural or human-induced in origin, and can stem from hydrometeorological, geological, biological, technological or environmental forces. The resulting cumulative risk cannot be tackled effectively if actors plan merely for selected hazardous events. A multihazard approach involves translating and linking knowledge of the full range of hazards into disaster and risk management, political strategies, professional assessments and technical analysis, and operational capabilities and public understanding, leading to greater effectiveness and cost-efficiency.³⁰
 - Capacity development is a central strategy for reducing disaster risk. Capacity development is needed to build and maintain the ability of people, organizations and societies to manage their risks successfully themselves. This requires not only training and specialized technical assistance, but also the strengthening of the capacities of communities and individuals to recognize and reduce risks in their localities. It includes sustainable technology transfer, information exchange, network development, management skills, professional linkages and other resources. Capacity development needs to be sustained through institutions that support capacitybuilding and maintenance as permanent ongoing objectives.
 - Decentralize responsibility for disaster risk reduction. Many disaster risk reduction activities need to be implemented at municipal, zone, ward and local or neighbourhood levels, as the hazards faced and the populations exposed are specific to particular local geographic areas. Similarly, the administrative responsibilities to manage key risk factors, such as land-use zoning or building approvals, are often devolved to such scales. In order to recognize and respond to these locally specific characteristics, it is necessary to decentralize responsibilities and resources for disaster risk reduction to relevant local or zonal authorities, as appropriate. Decentralization can also motivate increased local participation along with improved efficiency and equitable benefits from local services.
 - Effective disaster risk reduction requires community participation. The

The Urban Renewal Mission (India): A missed opportunity

Launched in December 2005, the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) is claimed to be the largest initiative in the India's urban history committing Central Government support of US\$10 billion to 63 cities (including 35 million plus cities among them seven are mega cities) across the country over a seven year period. The creation of 'sustainable, equitable and economically vibrant cities' is the proclaimed objective of JNNURM. The Mission is envisaged to address improvements in infrastructure development (water supply, sewerage and sanitation, solid waste management), urban poverty (integrated development of slums and provision of basic services for the urban poor) and urban governance (effective decentralization as per constitutional amendment, entrustment of city planning and other municipal functions to urban local bodies, financial reforms, enactment of public disclosure and community participation laws). In the process it is hoped, cities will be enabled to move from the present fragmented project based approach to one of comprehensive and integrated vision.

In October 2007, almost two years after the launch of the Mission, government announced 'Community Participation Fund'. Corpus fund of US\$125 million will be made available for present fiscal year which will be channelized through urban local bodies. Despite being

late, this is very encouraging decision where government funding is directly available to communities for local needs. Citizens have to identify and prioritize projects in their localities and get the nod of civic body. It is reported that most cities are seeking JNNURM funding for mega infrastructure projects like mass transport schemes, sewage disposal plants, and roads which do not exactly achieve the objective of citizens' participation in urban governance. Maximum of US\$25,000 can be made available to small budget projects (for example - locality-based urban waste management plan implementation) at neighbourhood level. It is important to note that City Development Plans have been finalized much before this fund was announced and hence there is a missing link as how community level projects to be implemented through this fund will be mainstreamed with city level large-scale projects.

Surprisingly enough, currently there is no independent JNNURM subcomponent that addresses either urban vulnerability or risk mitigation, and no sight of a climate change related response. Future integration of these concerns into the JNNURM architecture will only happen if appropriate advocacy is expeditiously initiated by the civil society and the urban community.

Compiled from: Refs [4, 26, 27]

involvement of communities in the design and implementation of activities helps to ensure that they are well tailored to the actual vulnerabilities and to the needs of the affected people. This informed engagement helps to avoid problems and secondary effects when hazard events occur. Participatory approaches can more effectively capitalize on existing indigenous

coping mechanisms and are effective in strengthening community knowledge and capacities. They are usually more sensitive to gender, cultural and other context-specific issues that can undermine or empower particular groups and individuals to take locality based action. The incorporation of local perspectives into decisions and activities also helps to ensure that changes

in vulnerability and perceptions of risk are recognized and factored into institutional processes, risk assessments, and other programs and policies.

- Gender is a core factor in disaster risk and in the implementation of disaster risk reduction. Gender is a central organizing principle in all societies, and therefore women and men are differently at risk from disasters. In all settings—at home, at work or in the neighbourhood—gender shapes the capacities and resources of individuals to minimize harm, adapt to hazards and respond to disasters. It is evident from past disasters that low-income women and those who are marginalized due to marital status, physical ability, age, social stigma or caste are especially disadvantaged. At the grass roots level, on the other hand, women are often well positioned to manage risk due to their roles as both users and managers of environmental resources, as economic providers, and as caregivers and community workers. For these reasons it is necessary to identify and use gender-differentiated information, to ensure that risk reduction strategies are correctly targeted at the most vulnerable groups and are effectively implemented through the roles of both women and men.
- Public-private partnerships are an important tool for disaster risk reduction. Public-private partnerships are voluntary joint associations formed to address shared objectives through collaborative actions. They may involve public organizations such as government agencies, professional and/or academic institutions and NGOs, together with business organizations such as companies, industry associations and private foundations. Because the threats from natural hazards affect both public and private interests alike, private-public partnerships can offer opportunities to

combine resources and expertise to act jointly to reduce risks and potential losses. They can thereby improve the resilience of communities.

- Disaster risk reduction needs to be customized to particular settings. Cities vary greatly in their political, socio-economic, cultural, environment and hazard circumstances. Measures that succeed in reducing risk in one setting may not work in others. Customizing involves making use of others' experience, for instance by reviewing the context of particular measures and the nature of good practices and lessons learned, and then tailoring these to implement policies and activities that are appropriate for the local contexts. An important aspect of customizing is an awareness of cultural diversity, recognizing the differences among groups of people in language, socio-economic and political systems, religion and ethnicity, and in their historical relationship with nature. Local socio-political structures and cultural conditions, such as kinship arrangements, customary rights, community and family networks and systems of leadership, nearly always persist during times of stress. It is important to take these factors as a starting point and to build on them when designing and implementing new policies and practices.

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