Disaster Management and Role of Academic Institutions

–Meena Galliara and Ananya Prabhawalkar[1]

Abstract

Frequent and intense natural and manmade disasters are having devastating impact at global as well as local level. Globally attempts are being made to develop disaster resilient communities by shifting the focus of addressing disasters from providing mere response and relief to disaster affected victims to disaster mitigation and preparedness. It is in this context, the present paper makes an attempt to examine the socio economic impact of disasters on the global level in general and India in particular. The paper briefly discusses the context in which Government of India developed its disaster management strategy and the administrative mechanism set up to address disasters. To accelerate the process of disaster related knowledge dissemination the paper makes an attempt to discuss how academic institutions can play a larger role in influencing young minds to develop appropriate values and attitudes necessary to create a culture of disaster preparedness and mitigation through developing appropriate knowledge modules, demonstrating activities related to developing institutional disaster management plans, carrying out mock drills and conducting capacity building programmes. Universities and institutions of higher education in addition to developing a sound knowledge base can undertake relevant research in the areas of disaster management and play an advocacy role for reviewing and revising disaster management policies and approaches adopted by the Nation.

Key Words: Disaster Management; Disaster management policies and approaches; Role of Academic Institution in disaster management

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I. INTRODUCTION

Disasters have claimed more than 12,35,349 lives and affected more than 403 million people worldwide over the past two decades[2] (The International Disaster Database [EMDAT], 2009). About 75 percent of the world's population lives in areas affected at least once between 1980 and 2000 by earthquake, tropical cyclones, flood or drought[3]. Disaster loss is on the rise with grave consequences for the survival, dignity and livelihood of individuals, particularly the poor and hard-won development gains. Disaster risk is increasingly of global concern and its impact and actions in one region can have an impact on risks in another, and vice versa. This, compounded by increasing vulnerabilities related to changing demographic, technological and socio-economic conditions, unplanned urbanization, development within high-risk zones, under-development, environmental degradation, climate variability, climate change, geological hazards, competition for scarce resources, and the impact of epidemics such as HIV/AIDS, points to a future where disasters could increasingly threaten the world's economy, and its population and the sustainable development of developing countries.

In view of India's vulnerability profile, the recurrent phenomenon of natural and man made disasters impacted millions across the country leaving behind a trail of heavy loss of life, property and livelihoods. Economic and social costs on account of losses caused by disasters continue to mount year after year outweighing even the developmental gains. In this context the Government was compelled to look at the development perspective of disaster management. With the shift in the traditional focus from response and relief to disaster mitigation and preparedness, Government of India developed decentralized disaster management mechanism.[4]

Despite the growing understanding and acceptance of the importance of disaster risk reduction and increased disaster response capacities, disasters and in particular the management and reduction of risk continue to pose a challenge. Though the Government bears the primary responsibility of

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[2] The International Disaster Database. (EMDAT). (2009). Natural Disasters Trends. Retrieved from http://www.emdat.be/natural-disasters-trends (accessed November 16, 2009).

[3] United Nations Development Programme. (2004). Reducing Disaster Risk: A challenge for development. Retrieved from http://www.undp.org/cpr/disred/english/publications/rdr.htm (accessed November 18, 2009).

[4] GOI. (2004). *Disaster Management in India - A Status Report.* National Disaster Management Division, Ministry of Home Affairs, Government of India, MHA/GOI/28/06/2004, Jun 2004.

safety and security of the people, community awareness and participation becomes crucial.

Creating effective public awareness and motivating a collective commitment to develop a culture of prevention, requires sustained activities which are essentially educational in nature. There is need of consistent efforts in this direction as single and one time activity will not create significant impact. Hence integrating disaster risk reduction in the structured educational programmes and providing professional training becomes essential. Investing in capacity building of various stakeholders to inculcate the prevention approach will have more lasting effect than the investment made in only technological systems in order to reduce disaster risks.

Disaster management includes wide range of activities from planning, organizing, crisis management activities, recovering function and tasks related to proper information and communication. Thus it is imperative to develop holistic approach towards disaster risk reduction through capacity building, research and networking of different stakeholders.

In this context, Part I of this paper briefly examines the current scenario of disasters at global and national level and analyses its impact. Part II of the paper discusses the context in which Government of India devised its strategy from post disaster relief to pre disaster preparedness, mitigation and risk reduction and the subsequent administrative arrangements and financial commitments made to implement the strategy. The literature review presented in Part III of the paper highlights the goal of developing 'disaster-resilient communities' rests heavily upon the success of disaster risk reduction education. Hence, there is an urgent need to educate all the stakeholders in disaster management. In this context the paper makes an attempt to discuss how academic institutions can accelerate the process of disaster related knowledge dissemination to various stakeholders by designing appropriate courses and set positive example by designing field development projects, develop hazard risk management programme, conduct institutional risk assessment and aim at becoming disaster resistant institution to develop a culture of PRO-VENTION.

Disasters

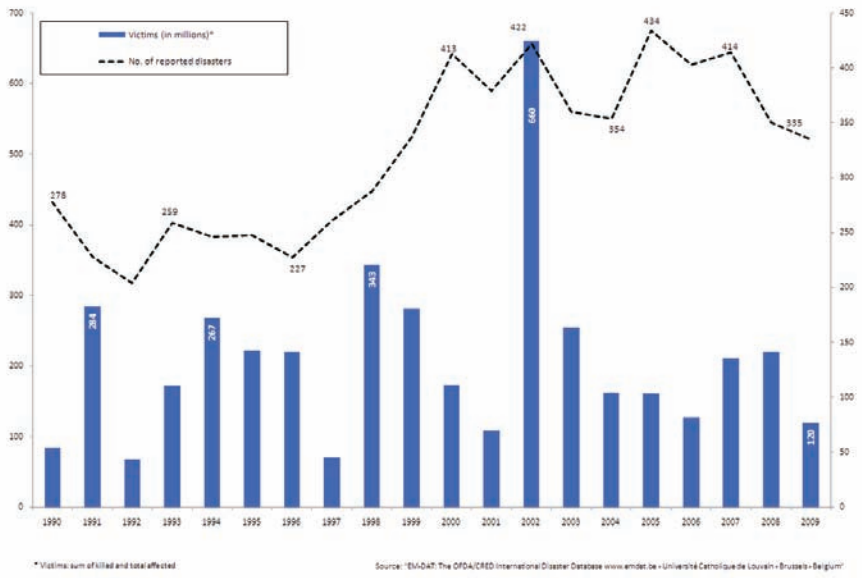
According to United Nations, disaster is 'a serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the ability of the affected people to cope using its own resources.' However, many other international and local organizations have used different definitions of disasters. The

definition promoted by the World Health Organization, (Guzman, E., n.d.) elaborates more about the impact on health which states, 'A disaster is any occurrence that causes damage, ecological disruption, loss of human life, or deterioration of health and health services on a scale sufficient to warrant an extraordinary response from outside the affected community or area.'[5]

II. STATISTICAL ANALYSIS OF GLOBAL DISASTERS

According to Centre for Research on the Epidemiology of Disasters (CRED) in 2010 globally 373 natural disasters were recorded. Events like earthquake in Haiti, China and Chile, heat wave in Russia, floods in Pakistan and severe weather conditions in the U.S. had larger impact on human settlements. It is estimated that more than 2,96,800 people were killed, 207 million people were affected and the economic loss was accounted for over 109 billion US$ in the year 2010. (*See Chart I for natural disaster trends over last twenty years*)

Chart I *Trends in Occurrence of Disasters & Victims*

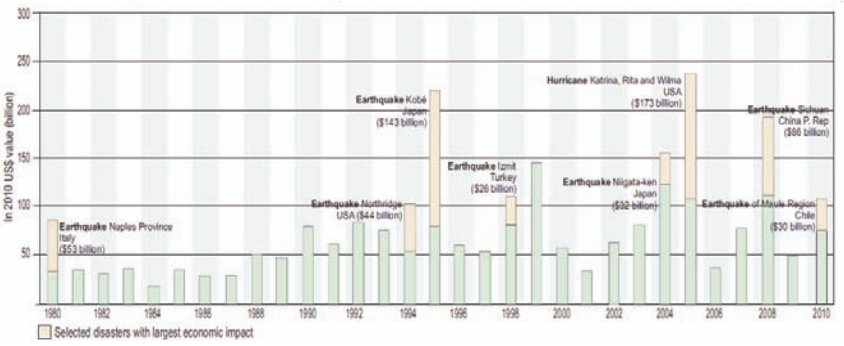


Source: Annual Disaster Statistical Review 2009, EMDAT

[5] Guzman, E. (n.d.). Towards Total Disaster Risk Management Approach, Retrieved from http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN009657.pdf (accessed November 20, 2009).

Natural disasters pose a significant threat to prospects for achieving the Millennium Development Goals, especially the overarching target of halving extreme poverty by 2015. Annual economic losses associated with such disasters have been increasing since 1990s. *See Chart II for the average annual damage caused by natural disasters from 1990 to 2010 across different regions.* The chart also displays that post 1990 the occurance of earthquake and its economic impact is significant.

Chart II *Average Annual Damage (US$ billion) caused by Natural Disasters (1990-2010)*



Source: EM-DAT, The OFDA/CRED International Disaster Database, 2010

Globally Asia was the most affected continent where major impact was due to earthquake and flood. In 2009, out of 335 disasters, 135 occurred in Asia impacting 106.44 million people. In 2009 the proportion of economic damages from natural disasters was also highest in Asia (38.5%), followed by the Americas (32.1%) and Europe (24.8%)[6]. Most recent disaster in Asia is an earthquake that struck off the coast of Japan churning up a devastating tsunami and followed by nuclear emergency. According to National Police Agency 14,416 people were killed, 5314 were injured and 11,889 went missing due the same. The tsunami resulted in over 3,00,000 refugees in the Tohuku region and shortages of food, water, shelter, medicine and fuel for survival. The economic impact which includes immediate damage due to destruction with industrial production suspended in many factories and the longer terms issues of cost of rebuilding has been estimated at US $122 billion.[7]

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[6] 2011 Tōhoku Earthquake and Tsunami. (2011). Retrieved from http://en.wikipedia.org/wiki/2011_T%C5%8Dhoku_earthquake_and_tsunami (accessed April 26, 2011).

[7] Swiss Reinsurance Company Limited. (2009). Natural Catastrophe and Man-made Disasters in 2008: North America & Asia suffers heavy losses. Sigma, 2. Retrieved from http://www.swissre.com/resources/dd6346004d4e9669ac76eecedd316cf3-sigma2_2009_e.pdf (accessed November 16, 2009).

Over the past two decades, the number of recorded disasters has doubled from approximately 200 to over 400 per year. Nine out of every ten of these disasters have been climate related. Current projections regarding climate change suggest this trend is set to continue and that weather related hazard events will become more frequent and more volatile. Patterns of drought and desertification are also intensifying. In the absence of mitigation and preparedness efforts, vulnerability is also growing in many countries.

Man-made disasters were reported to be highest in Asia (174 disasters). Shipping disasters, mining accidents, stampedes and terrorism were identified as the major reasons for man made disasters in 2008.[8]

Apart from direct financial losses, natural disasters also lead indirect losses[9] which may set back social investments aiming to ameliorate poverty and hunger, provide access to welfare services, or to protect economic investments that provide employment and income. It is interesting to note that only 11 percent of the population living in countries like Bangladesh, Afghanistan, Iran, Ethiopia, Sudan and so on account for more than 53 percent of total recorded deaths due to disasters (10 deaths per million population). This clearly establishes the fact that these countries have invested fewer resources in disaster mitigation and preparedness efforts. The levels of poverty in a country have a direct bearing on the levels of impacts of disasters. Though absolute levels of economic loss are greater in developed countries due to the far higher density and cost of infrastructure and production levels, less-developed countries suffer higher levels of relative loss when seen as a proportion of Gross Domestic Product (GDP).[10]

Women are made more vulnerable to disasters through their socially constructed roles. As per the WHO women and children are particularly affected by disasters, accounting for more than seventy five percent of displaced persons. During disasters women are vulnerable to reproductive and sexual health problems, and increased rates of sexual and domestic violence. Women's vulnerability is further increased by the loss of men

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[8] Swiss Reinsurance Company Limited. (2009). Natural Catastrophe and Man-made Disasters in 2008: North America & Asia suffers heavy losses. Sigma, 2. Retrieved from http://www.swissre.com/resources/dd6346004d4e9669ac76eecedd316cf3-sigma2_2009_e.pdf (accessed November 16, 2009).

[9] Indirect losses include destruction of infrastructure, the erosion of livelihoods, damage to the integrity of ecosystems and architectural heritage, injury, illness and death.

[10] United Nations Development Programme. (2004). Reducing Disaster Risk: A challenge for development. Retrieved from http://www.undp.org/cpr/disred/english/publications/rdr.htm (accessed November 18, 2009).

and/or livelihoods, especially when a male head of household has died and the women must provide for their families.[11]

Though the upward trend in disaster occurrence seen over previous years stabilizes in the 2009, still there is need to be better prepared in order to reduce the destructive impact of natural disasters. The 2009 Global Assessment Report on Disaster Risk Reduction points out the intensive and extensive disaster risks. Intensive risks are those that produce high mortality disaster events. At the same time, losses from low-intensity, but more frequent disaster events continue to affect housing, local infrastructure, and large numbers of people.

Disasters in India

Along with China, Indonesia and Bangladesh in 2009, India occupied fourth position in ranking of regular occurrence of natural disasters[12]. Since 1900 to 2011, India has faced 590 natural disasters. In 2009, 1806 people were killed 9.0 million people were affected by 15 natural disasters that occurred in India. Economic losses due to disasters in India were estimated in the year 2009 to be 2.7 billion USD. According to Disaster Mitigation Institute (DMI), India suffers considerably due to disasters as about two per cent of its gross domestic product (GDP) is lost due to natural disaster.[13]

Of the 35 States[14] and Union Territories in India as many as 27 are disaster prone. (GoI, 2004a)[15] The unique geo-climatic conditions have made India highly vulnerable to natural disasters[16]. Floods[17], droughts[18],

[11] World Health Organization. (n.d). Gender and Disaster. Retrieved from http://www.searo.who.int/en/Section13/Section390_8282.htm (accessed August 7, 2008).

[12] EM DAT (2009) Annual Disaster Statistical Review, Retrieved from http://cred.be/sites/default/files/ADSR_2009.pdf (accessed April 27, 2011).

[13] Business Standard. (2005). Separate Fund urged for Disaster Management. Retrieved from http://www.business-standard.com/india/news/separate-fund-urged-for-disaster-management/200179/ (accessed November 18, 2009).

[14] "The ten most disaster–prone Indian states are Andhra Pradesh, Assam, Bihar, Gujarat, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tripura and West Bengal www.info-change.com, accessed on 11.02.2005

[15] GOI. (2004). Disaster Management in India - A Status Report. National Disaster Management Division, Ministry of Home Affairs, Government of India, MHA/GOI/28/06/2004, Jun 2004.

[16] In India, 54% of landmass is prone to earthquakes, 40 million hectares of landmass is prone to floods, 8000 km of coastline is prone to cyclones and almost 68% of total geographical area is vulnerable to droughts. The occurrence of massive Tsunami on 26.12.2004 has worsened the situation.

[17] Seventy five percent of the annual rainfall is received during June to September monsoon making almost all the rivers carry heavy discharge during this period. The flood hazard is compounded by the problems of sediment deposition, drainage congestion and synchronization of river floods with sea tides in the coastal plains. The monsoon failure or excess in some part of India creates hazard for the agricultural communities. (Gupta, K.)

[18] Drought is a temporary reduction in water or moisture availability significantly below

cyclones, earthquakes and landslides have been recurrent hazardous phenomena in India. Rajasthan is the most drought prone state of India. Cyclones are other hazards in India that generally strike the East Coast. However, some of the Arabian Sea Cyclones strike the west coast of India, mainly the Gujarat and North Maharashtra coast. Out of the storms that develop in the Bay of Bengal, more than half approach or cross the east coast in October and November. The Himalayan and sub-Himalayan regions, Kutch and the Andaman and Nicobar Islands are particularly earthquake hazard prone[19]. *See Table 1 for Natural Disasters in India (1900 to 2011)*

Apart from natural disasters, human made disasters like conflicts, communal riots and refugee situations, road accidents[20] and other disasters like fire, epidemics, industrial and transport disasters leave a long trail of mortality and morbidity. Nevertheless, more recently urban India is facing major crisis with the increasing incidences of manmade disasters. Horrifying events like blasts that shattered Delhi, capital city, in 2005 leading to 62 casualties[21], series of bomb blasts occurred in local trains in Mumbai in 2006 killing 209 lives[22] and the terrorist attacks in 2008 have caused an economic loss of nearly Rs 40,000 millions.[23]

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the normal or expected amount for a specific period. This condition occurs either due to inadequacy of rainfall, or lack or irrigation facilities, under-exploitation or deficient availability for meeting the normal crop requirements in the context of the agro-climatic conditions prevailing in any particular area. (Gupta, K.)

[19] Gupta, K. (n.d.). Disaster Management and India: Responding internally and simultaneously in neighboring countries. Retrieved from http://training.fema.gov/EMIWeb/edu/ComparativeEMBook-ChapterDisasterManagementandIndia-RespondingInternallyand-Simulta.doc (accessed November 17, 2009).

[20] Dutt, B. (2007) stated that according to the Secretary of Road Transport, Government of India, nearly 105,000 people die in road accidents every year in India, and it is the highest in the world (Gupta, K.).

[21] Wikipedia, The free encyclopedia. (n.d.). 29 October 2005 Delhi Bombings. Retrieved from http://en.wikipedia.org/wiki/29_October_2005_Delhi_bombings (accessed July 17, 2009).

[22] Wikipedia, The free encyclopedia. (n.d.). 11 July 2006 Mumbai Train Bombings. Retrieved from http://en.wikipedia.org/wiki/11_July_2006_Mumbai_train_bombings (accessed July 16, 2009).

[23] IndianExpress.com. (2008). Mumbai Lost Rs 4k crores during Attacks. Retrieved from http://www.indianexpress.com/news/mumbai-lost-rs-4k-cr-during-attacks/392203/ (accessed July 15, 2009).

Table 1 *Natural Disasters in India (1900-2011)*

Disasters	*Number of Events*	*Number of people killed*	*Total Affected*	*Damage in (000 US$)*
Drought	14	42,50,320	106,18,41,000	24,41,122
Earthquake (seismic activity)	26	78,094	2,79,19,695	51,02,700
Epidemic	68	45,43,874	4,21,473	NA
Extreme temperature	47	13.801	250	5,44,000
Insect infestation	235	60,188	79,86,54,220	3,41,45,188
Mass movement dry	1	45	0	0
Mass movement wet	42	4,762	38,39,116	54,500
Storm	154	1,64,179	9,32,94,512	1,10,51,900
Wildfire	2	6	0	2,000
Total	590	91,15,269	198,59,70,266	5,33,41,410

Source: EM-DAT: The OFDA/CRED International Disaster Database

The occurrence of natural disasters increased after 2002, as out of 590 disasters 27 % (159) disasters struck post 2002[24]. Climate change[25], increasing urbanisation, including growing concentrations of people in unplanned and unsafe urban settlements and exposed coastal areas, poverty, HIV prevalence, and inadequate attention to changing risk patterns, are placing more and more people in disaster-prone locations. In addition to this absence of disaster preparedness is seen as major reason for larger number and greater impact of natural disasters[26].

[24] The International Disaster Database. (EMDAT). (2010). India, Country Profile: Natural disasters. Retrieved from http://www.emdat.be/result-country-profile?disgroup=natural&country=ind&period=2002$2011 (accessed April 26, 2011).

[25] Climate change is predicted to have a range of serious consequences, some of which will have impact over the longer term, like spread of disease and sea level rise, while some have immediately obvious impacts, such as intense rain and flooding. The 'extreme weather events' like (a) Extreme temperature highs – heat waves, (b) Storms, including windstorms, hurricanes, etc. (c) High levels of precipitation, and associated flooding and (d) Lack of precipitation, and associated drought are responsible for natural disasters. (Anderson, J. (2006). Climate Change and Natural Disasters: Scientific evidence of a possible relation between recent natural disasters and climate change. Policy Department Economy and Science. Retrieved on November 17, 2009 from http://www.europarl.europa.eu/comparl/envi/pdf/externalexpertise/ieep_6leg/naturaldisasters.pdf)

[26] DW –World.D (2009). More Natural Disasters due to Climate Change? Retrieved from http://www.dw-world.de/dw/article/0,,4598063,00.html (accessed November 17, 2009).

Situation in Maharashtra

According to Vulnerability Atlas of India, in Maharashtra, 14 districts[27] and 7 cities[28] have been identified as disaster prone[29]. The State is prone to various natural disasters such as drought, floods, cyclones, earthquake and accidents. While low rainfall areas of the state are under the constant risk of droughts, high rainfall zones of eastern and western Maharashtra are prone to flash floods and landslides. Many areas of the State have faced droughts for consecutive years, which damaged agriculture and caused water shortage in more than 20,000 villages. Floods, though, are not a regular phenomenon, took 180 lives in 1996 and, more recently, in July 2005, about 900 people died in the Konkan Region due heavy rainfall of about 37 inches[30]. *(See Table I.1 in Annexure I for Overview of Natural Disasters in Maharashtra)*

Situation in Mumbai

Mumbai is India's most populous conurbation and the third most populous agglomeration in the world. (UNFPA, 2006). The population has increased from 11.9 million (Census 2001) to 18.84 million in 2006 (UNFPA). Though Mumbai contributes the largest share of GDP (6.16%)[31], more than half of its inhabitants (54.5%) live in slums[32]. In Mumbai, Ward A, B and C are identified for high fire risk due to old timber framed buildings where as Ward M-W is at risk due to establishment of oil refineries in the area. Chembur-Trombay belt of almost 10 kms has concentration of hazardous industries which is highly prone to industrial accidents[33].

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[27] Disaster prone districts identified under DRM programme include Kolhapur, Pune, Satara, Latur, Osmanabad, Mumbai, Mumbai Suburban, Raigarh, Ratnagiri, Sindhudurg, Thane, Nashik, Ahmednagar, and Dhule.

[28] Disaster prone cities identified under DRM programme include Mumbai, Nashik, Pune, Bhiwandi, Thane, Aurangabad, and Nagpur.

[29] Ministry of Housing & Urban Poverty Alleviation. (n.d.). Vulnerability Atlas of India. Building Materials and Technology Promotion Council.

[30] Environmental Information Center, Environment Department, Government of Maharashtra. (2006). Disaster Management in Maharashtra. Envis Newsletter, I. Retrieved from http://envis.maharashtra.gov.in/envis_data/pdf/dec.pdf (accessed November 18, 2009).

[31] The Financial Express. (2008). GDP Growth: Surat fastest, Mumbai largest. Retrieved from http://www.financialexpress.com/news/gdp-growth-surat-fastest-mumbai-largest/266636/ (accessed November 18, 2009).

[32] Singh, D.P. (n.d.). Slum Population In Mumbai : Part I. Tata Institute of Social Sciences. Retrieved from http://www.iipsenvis.nic.in/Newsletters/vol3no1/Slum_Poplation_In-Mumbai.htm (accessed November 18, 2009).

[33] Relief and Rehabilitation, Government of Maharashtra. (n.d.). Mumbai Plan. Retrieved from mdmu.marashtra.gov.in/pages/Mumbai/mumbaiplanShow.php-101k (accessed May 11, 2007).

Hence, geographic conditions[34], industrial growth, increasing population density and squatter settlements have increased Mumbai's vulnerability to disasters. Fire and industrial accidents, floods, chemical (transport and handling), biological, and nuclear hazards, earthquake, cyclones, landslides, bomb blasts, terrorism, riots and tidal surge have been identified as major hazards in Mumbai.[35]

The United Nations Intergovernmental Panel on Climate Change (IPCC) recently announced Mumbai being at the risk zone for disasters[36]. According to the Shaw (2009)[37], overall climate-disaster resilience is relatively low for Mumbai City. Gaps in the early warning system and evacuation, internal road network, solid waste disposal and water supply will have tremendous effect on the city's resilience to disasters.

Being the commercial capital of the country, Mumbai faces major challenges of man made disasters. The city has witnessed a couple of terrorist attacks[38] since 1993, which has led to serious social and economic disruptions in addition to loss of life and property.

It can be surmised from the above discussion that disasters undermine development achievements, impoverishing people and nations. Destruction of social and economic assets, loss of production capacity, livelihood, damage to transport, communications, erosion of physical as well as social capital limit the development process. Recurrent occurrence of disasters in under developed countries forces diversion of development funds and investment to handle the emergencies. In the absence of concerned efforts to address root causes, disasters represent an increasingly serious obstacle to the achievement of the Millennium Development Goals (MDGs). For

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[34] Mumbai is located on a peninsula on the island of Salcette and spread linearly along the Arabian Sea coast.

[35] Disaster Risk Management Profile. (2005). Retrieved from http://emi.pdc.org/cities/CP-Mumbai-09-05.pdf (accessed November 17, 2009).

[36] Expressindia.com. (2009). Now, A Study to Save 'Disaster-Prone' City. Retrieved from http://www.expressindia.com/latest-news/now-a-study-to-save-disasterprone-city/435389/ (accessed November 18, 2009).

[37] Shaw, R. (2009). Climate Disaster Resilience: Focus on coastal urban cities in Asia. International Environment and Disaster Management. Retrieved from http://www.un-escap.org/idd/events/2009_EGM-DRR/Japan-Rajib-Shaw-CLIMATE-DISASTER-RESILIENCE.pdf (accessed November 18, 2009).

[38] Bomb explosions on March 12, 1993 killed 257 people and injured 700. Series of blasts at railway stations and Best buses in 2002 killed approximately 44 injured 50 persons. On July 11, 2006, seven bombs exploded in the suburban railway in which 209 people were killed. The 26/11terror attacks at Taj, Trident and Café Le'Pold in South Mumbai reported death of 164 persons.

instance, displacement of population further interrupts schooling which can be seen as direct impact of disasters. Reduction in household assets could also lead to less affordability to avail educational facilities. This creates hindrance in attaining MDG of achieving universal primary education. *(See Table 1.2 in Annexure I for Disaster Impacts on Efforts to Meet the MDGs).*

III. PARADIGM SHIFT IN DISASTER MANAGEMENT IN INDIA

India was, until recently, reactive and only responded to disasters and provided relief from calamity. The recurrent occurrences of different types of disasters compelled Government of India to take cognizance of the objectives of International Decade for Natural Disaster Reduction (1990-2000), Yokohama Strategy for safer world (1994) and the Plan of Action for Safer World (Istanbul, 1996), and set up a High Power Committee on Disaster Management (HPC) in 1999 to recommend strategies for preparation of Disaster Management plans. The High Power Committee gave its recommendations in October 2001 including a draft of the Disaster Management Act, a National Response Plan, and establishment of National Disaster Management Authority. Following one of the HPC recommendations, the Disaster Management function was transferred from Ministry of Agriculture to Ministry of Home Affairs.

The occurrence of tsunami in the Indian Ocean in 2004 and its consequential impact heightened the level of awareness of the Government about the importance of integrating disaster risk reduction into national development planning and the need for aligning and coordinating with UN agencies and other UN Member States to respond to the threat of disasters. Based on the recommendations of HPC, UN agencies and Hyogo Framework of Action[39], the Government of India has brought about a

[39] The 2005 World Conference on Disaster Reduction held in Kobe, Hyogo, Japan, adopted the Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (here after referred to as the "Framework for Action"). The Conference provided a unique opportunity to promote a strategic and systematic approach to reducing vulnerabilities and risks to hazards. It underscored the need for, and identified ways of, building the resilience of nations and communities to disasters. The scope of this Framework for Action encompasses disasters caused by hazards of natural origin and related environmental and technological hazards and risks. It thus reflects a holistic and multi-hazard approach to disaster risk management and the relationship, between them which can have a significant impact on social, economic, cultural and environmental systems, as stressed in the Yokohama Strategy (section I, part B, letter I, p. 8).

paradigm shift in its relief centric to responsive and preparedness approach to disaster management. The new approach proceeds from the conviction that development cannot be sustainable unless disaster mitigation is built into the development process. The focus is now more on disaster risk assessment[40], preparedness and mitigation *(See Fig I)*. This paradigm shift reinforces that disasters can be managed through adequate planning and preparedness for response (Guzman, 2005).

FIGURE I *Disaster, Risk and Crisis Management Cycle*[41]

Source: Adapted from Wilhite (1999). FAO Corporate Document Repository.

The new approach also emanates from the belief that investments in mitigation are much more cost effective than expenditure on relief and rehabilitation. The most noteworthy step in this direction has been the passage of the National Disaster Management Act. The National Disaster Management Authority (NDMA) instituted under the Act work's in

[40] Disaster Risk Assessment- Total Disaster Risk Management is a model integrating existing knowledge and techniques on disaster reduction and response and risk management. This model of total disaster risk management stresses on promoting coordination of functions from diverse skills and disciplines and involving cross sector partnerships to undertake risk management activities.

[41] FAO Corporate Document Repository. (2004). Drought and Climate Variability in the Limpopo River Basin. Drought Impact Mitigation and Prevention in the Limpopo River Basin: A situation analysis. Retrieved from http://www.fao.org/docrep/008/y5744e/y5744e04.htm (accessed November 23, 2009).

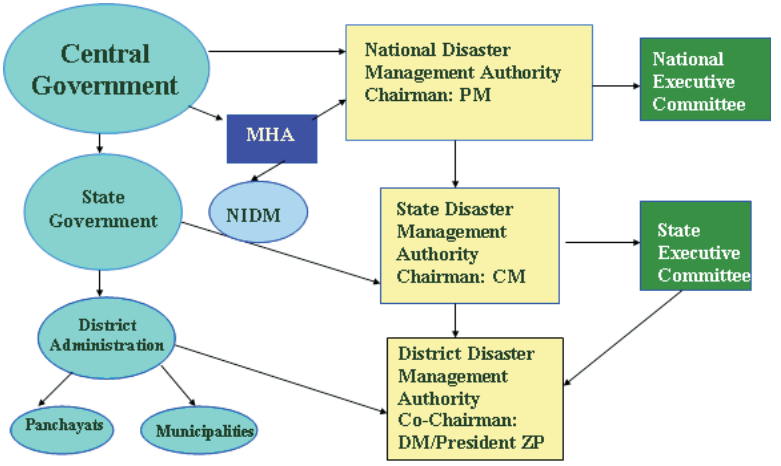
accordance with all other institutions spread across the country to anticipate the disaster and prevent it from causing huge damage. In keeping with this shift, new institutional mechanisms are being put in place at the State and District levels as well.

The changed approach is being put into effect through:

- Institutional changes
- Enunciation of policy
- Legal and techno-legal framework
- Mainstreaming Mitigation into Development process
- Funding mechanism
- Specific schemes addressing mitigation
- Preparedness measures
- Capacity building
- Human Resource Development
- Community participation

The lessons learnt from the past clearly bring out the fact that no State/ Central Government can meet the disaster management challenges alone. The Governments' efforts have to be strengthened by a host of private sector organizations and communities themselves getting involved in the emergency response system.

FIGURE II *Disaster Management Framework in India*



Source: Kumar, S.(2007). Disaster Management Framework, India. [PowerPoint Slides]

The National Institute of Disaster Management (NIDM) is set up by GOI in order to develop specially trained personnel to develop capacities of communities and organizations to build a culture of disaster

preparedness through training programmes and research.[42] In this context the Eleventh Five Year Plan gives impetus on addressing disaster risk reduction through education at various levels as one of the priority of all development programmes. An allocation of Rs 2,13,880/- million towards disaster management has been incorporated in the Eleventh Plan.

IV. ROLE OF ACADEMIC INSTITUTIONS IN DISASTER MANAGEMENT

To integrate disaster risk reduction into sustainable development policies and planning, to develop and strengthen institutions, mechanisms and capacities, to build resilience to hazards and to systematically incorporate risk reduction approaches into the implementation of emergency preparedness, response and recovery programmes, it is imperative to strengthen disaster preparedness and mitigation strategies at all levels. Disaster preparedness can play in saving lives and livelihoods particularly when integrated into an overall disaster risk reduction approach. The goal of developing 'disaster-resilient communities' rests heavily upon the success of disaster risk reduction education.

In India, we have the Tata Institute of Social Sciences, University of Delhi, University of Pune, University of South Gujarat and other educational institutions which have taken up the task of strengthening government's efforts in conducting research on impacted communities, designing rehabilitation initiatives, disaster preparedness and mitigation strategies.

Although knowledge does not guarantee power over natural catastrophe, it is a prime requisite of disaster preparedness and prevention. The integration of disaster risk education both formal and informal educational means at schools and universities is the one way to ensure that these messages reach into every home and community and that learning is sustained into future generations. To highlight this aspect there is plethora of research material available at the global level as well as national level. Major studies in this area have been carried out by ISDR (2007, 2008), UNDP (2004, 2005, 2006) and World Bank.

It is because of the efforts of the activists connected with non-governmental organizations, scientific, academic and research institutions disaster risk education has been prioritised both at the grassroots and

[42] National Institute on Disaster Management. (n.d.). Vision. Retrieved from http://nidm.gov.in/vision.asp (accessed November 19, 2009).

policy levels. For instance the 2006-07 UNISDR campaign "Disaster risk reduction begins at school" aimed to promote the integration of disaster risk reduction into government plans for school curricula and to ensure that school buildings are safe from the impacts of natural hazards is an outcome of UNISDR 2006 study.

Similarly based on the global research studies on climate change awareness and environmental education, Ministries of Education in developing economies like India, China, Bangladesh and others are taking on the challenge of disseminating disaster risk reduction education. The current International Decade of Education for Sustainable Development led by UNESCO, provides a long-term focus for taking this agenda forward. Early efforts in disaster education focused exclusively on hazards. More recent efforts have begun to engage children and youth in discovering and recognizing the myriad local hazards that they face, and introduce primary disaster risk mitigation: physical protection of people and property, environmental stewardship, and recognizing underlying vulnerability connected with tenuous livelihoods (Petal 2007, 2008).

Developing a Culture of Preparedness

Academic institutions have a key role to play in developing new disaster management curricula for the next generation, as well as providing short courses for policy makers and a wide range of other professionals whose daily decisions influence the level of disaster risk we all live with. Disaster risk reduction and sustainable development cross all disciplines, from Engineering, where work is being done on clean and renewable energy systems, to Architecture, which houses a 'Design Centre for Sustainability' by using holistic and synergistic approaches to sustainability, to Chemistry, where students are working on green materials. In these and other disciplines, we see a much greater emphasis on new concepts of intervention involving community consultation and partnership, a recognition that the kinds of problems we now face must be approached collectively and collaboratively, through partnerships that engage diverse range of stakeholders in creating a culture of disaster preparedness and mitigation. Artificial barriers between scientific disciplines and other faculties need to be bridged and disaster management should be imparted in a more holistic fashion. This will not only progressively enhance acceptability of DRR as an academic and professional domain but also boost knowledge management in India,

Government of India, Ministry of Human Resource Development in its Tenth Five Year Plan emphasized the need for integrating disaster management in the existing education system in India. One of the important initiatives taken by GOI includes recommending various Boards to incorporate *disaster management in the curriculum of school and professional education and design disaster management plans for their institutions.* In addition to this GOI has specially created around 15 institutes that offer courses on Disaster Management across India. Notable amongst them being the National Center for Disaster Management (NCDM) set up by the Indian Institute of Public Administration, the Centre for Disaster Management set up by Y S Chavan Academy of Development Administration, and Disaster Management Institute, Bhopal. NCDM is also the nodal agency for coordinating relief and rehabilitation work during natural calamities.

GOI, Ministry of Human Resource Development has recommended the different school boards to incorporate Disaster Management in the school curriculum. Only CBSE has designed a separate subject in disaster management for Std VIII to X in this regard. The State Education Boards of various states are still in the process of incorporating this recommendation. According to the latest government survey there are 1,124,033 schools in India in which about one-third of the population study. With nearly 85% of the land area prone to disaster it is high time the 34% of the country's future generation has been prepared to combat future disasters.[43] The Status Report of Disaster Management Education in India (2008) highlights that modules of disaster management training has been made mandatory in NCC (National Cadet Corps), NSS (National Service Scheme), Scouts and Guides, National Yuva Kendras (NYKs), Civil Defence, Sainik Board.

In case of Maharashtra, after the implementation of Disaster Risk Management Programme by GOI and UNDP in 14 districts, disaster management plans were prepared and teachers were trained in 40% of schools in these districts. However data for private schools is not available and the responsibilities towards disasters management initiatives in private schools were left to their principals or decision making authorities. In case of integration of disaster management in the higher education, only two hours training programme is conducted every year for students of NSS.

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[43] United National Center for Regional Development. (2008). Disaster Education in India: A status report. Retrieved from http://www.hyogo.uncrd.or.jp/schoolproject/awareness/india_disastereducation.pdf (accessed November 21, 2009).

In Mumbai, though disaster management plans have been prepared in all the municipal schools, there is lack of data on upgradation of these plans, training to school children, formation of different committees and conducting of mock drills. University of Mumbai conducts annually one training programme for all its affiliated colleges. The Times Disaster Management Center established in 2008 aims to provide various theory and practice based skills to interested citizens and professionals dealing with disasters.

As per the data available with the UGC 402 academic institutions all over the country imparting post graduate studies have incorporated courses on 'Emergency Management/ Disaster Management/ Crisis Management in their post graduate programmes. There are around 419 public and private universities[44] (Avoid general referencing and refer to authentic source of information such as government, UN agencies, prominent institutions etc.) and 6014 colleges[45] providing higher education in India, this clearly indicates huge gap in the educational sector to integrate emergency management as part of formal educational system.

Need to Demonstrate Pro-activism

Apart from developing appropriate courses in emergency/disaster response management for various stakeholders, academic institutions should implement the principles of disaster risk reduction in all aspects of their operations. To accomplish this, institutions must have a mandate to develop an environmentally-responsible campus. Institutions must move beyond theory and argument to physical demonstration, so that our stakeholders including the students come to accept them—and accept them—in every aspect of their educational experience: in their cafeterias, in their use of water, as well as in their classrooms and laboratories. By immersing them in such an environment, students will learn to apply the practices and principles they encounter in their subsequent lives as, working professionals and citizens. It should be recognized that disasters threaten the health and welfare of multiple members of the institution and can disrupt their functioning. Some disasters strike with advanced

[44] Wikipedia: The free encyclopedia. (2009). List of Universities in India. Retrieved from http://en.wikipedia.org/wiki/List_of_universities_in_India (accessed November 23, 2009).

[45] IndiaStudyCenter.com. (2009). Statistical Information of Colleges & Universities in India. Retrieved from http://www.indiastudycenter.com/Univ/College-Statistics.asp (accessed November 23, 2009).

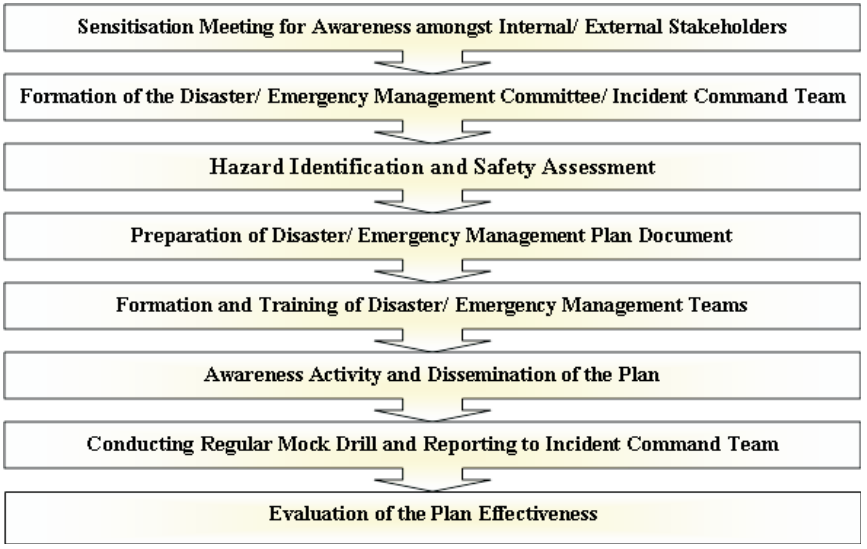
warning (heavy rains, storms, cyclones), while others, such as fires and acts of violence occur suddenly. Regardless of form or notice, institutions must plan for a wide array of disasters, including natural disasters (such as floods and earthquakes), facility disasters (such as fires, chemical leaks and breaches of technology), criminal events (such as murders, terrorist threats or hate crimes), and human crises (such as deaths and infections diseases).

Disaster Management at educational institutions generally, involves identifying the types of disasters that can impact them, studying options to prevent or mitigate the results of those disasters, developing a response plan for each type of disaster, implementing that plan when needed, and reviewing and revising the plan post-disaster.

Steps to Design Disaster/Emergency Management System

It is important to involve all concerned internal and external stakeholders[46] of the academic institution in designing, reviewing and revising the disaster management plan. This will help to build consensus and the necessary social capital to be proactive. Not needed at this stage.

Figure III *Steps in Disaster/Emergency Management System*



[46]External Stakeholders- Police, Fire-brigade

Design Extension Services

Educational institutions have a vital role to play in shaping the way in which future generations learn to cope with the complexities of sustainable development. They bear a distinctive responsibility for developing the professional and moral quality of future leaders in society and economy. "As significant societal actors, educational experiences shape local, regional and national environment and is therefore an important partner in the agenda for attaining sustainable development"[47]. In this context educational institutions are expected to play a transformational role, from being just providers of education to demonstrate the power of education in the community through its action. This facilitates an inclusive mechanism to involve faculty and students more closely in the fabric of the society they wish to serve, through exchange and consultation, collaborative research, and participation in projects that bring the community and the academy into a new and fruitful working relationship. The kind of engagement requires faculty members to descend from their professorial podiums and be ready to learn as well as teach.

V. CONCLUSION

The world is becoming increasingly vulnerable to natural and man made disasters. Nearly 1.2 million people worldwide may have been killed in past 20 years due to natural disasters such as landslides, earthquakes, floods, snow avalanches, cyclones and others. Out of the total deaths, 92.12 percent[48] of the total disaster related deaths worldwide occur in developing countries in which India has the share of approximately 12.28 percent. Recognizing the need of the hour, the decade 1990-99 was declared as *"International Decade for Natural Disaster Reduction"* with a main objective to focus on disaster management planning for prevention, reduction, mitigation, preparedness and response to reduce the loss of life and property due to natural disasters. Keeping with the global trends GOI adopted a paradigm shift in its approach from post disaster relief to pre disaster preparedness, mitigation and risk reduction.

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[47] United Nation's Educational Scientific and Cultural Organisation. (n.d.). Higher Education for Sustainable Development. Retrieved from http://portal.unesco.org/education/en/ev.php- (accessed April 15, 2008).

[48] United Nations International Strategy for Disaster Reduction. (2005). Disaster Statistics 1991-2005. Retrieved from http://www.unisdr.org/disaster-statistics/impact-killed.htm (accessed November 18, 2009).

Disaster management occupies an important place in India's policy framework as it is the poor and the under-privileged who are worst affected on account of calamities/disasters. In the recent years there is a phenomenal upsurge of knowledge and research on disaster management across a wide range of disciplines and subjects, which has consistently highlighted that the goal of developing 'disaster-resilient communities' rests heavily upon the success of disaster risk reduction education. In this context educational institutions like schools, colleges and universities can play a vital role providing disaster management education to different stakeholders as well as extend support to provide relief and support measures to the affected community during crisis. Higher educational institutions can set positive example by designing field development projects, develop hazard risk management programme, conduct institutional risk assessment and aim at becoming disaster resistant institution. Together with strong management skills and the available assets, academia can make major and lasting contribution by establishing coalitions with government, NGOs and corporate organizations and design new intervention strategies, products and services in the areas of disaster mitigation. Research institutions can accelerate research in disaster management to influence significant policy changes.

A chief constraint towards educational institutions adopting more favourable environment disaster/ emergency management is the very short attention spans that disaster risks generally command. In the immediate aftermath of a disaster, with memories of human and material losses vivid, mitigation investment is a very high priority in both the eyes of communities at risk and the management too. As time goes by and memories fade, so too does the priority for preparedness and mitigation.

Considering the intensity and dimension of the problem and its impact it is high time that all educational institutions introspect in examining what strategies they have adopted to design a risk free campus and inculcate a culture of disaster preparedness. It is important to note that whatever institutional mechanism or technology government may put in place to mitigate disasters, percolating information about the same and creating a culture of disaster preparedness to a large extent becomes the primary responsibility of the educational institution.

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ANNEXURE I

TABLE 1.1 *Overview of Natural Disasters in Maharashtra*[49]

Floods[50]	• The 1996 flood in the state destroyed 2,899 lakh hectares of land, killing 198 people and 38 cattle. • A series of landslides triggered by heavy monsoon rains have killed at least 418 people in Maharashtra in the month of July, 2005. • According to Government of Maharashtra, Mumbai incurred economic loss of Rs. 5,000 crores due to floods on 26th July, 2005.
Droughts[51]	• The 1996 drought affected 7 districts and 266.75 lakh people. • The 1997 drought affected 17 districts. • In 2001, droughts affected about 20,000 villages in 23 districts; 28.4 million people and 4.5 million hectares of crops in the State. According to a report from the GoM, number of districts affected by droughts in the year 2002-03 and 2003-04 were 33 and 11, respectively.
Earthquakes[52]	• A severe quake with magnitude ranged between 6.5 and 7.5 Richter scale occurred in Koyna on December 11, 1967 killing 200 people and injuring hundreds of people in Kokan region. •An earthquake on September 30, 1993 measuring 6.4 in Latur killed 7,938 people, injured 16,000 and left 15,847 livestock dead. 52 villages were razed to the ground and around 27,000 houses were totally damaged. • An earthquake measuring 3.7 on the Richter scale his Maharashtra Koyna region as recently as March 2001.
Cyclones	• Maharashtra has experienced only 6 cyclones in last 50 years. • In the Arabian Sea, during the period 1890-1995, around 207 depressions, mild cyclonic storms or severe cyclonic storms have been recorded. Out of these 19, six were major ones causing 70 deaths, with 150 boats and 160 crew missing and extensive damage to trees and ships. • Source: Disaster Management in Maharashtra, 2006.

[49] Environmental Information Center, Environment Department, Government of Maharashtra. (2006). Disaster Management in Maharashtra. Envis Newsletter, I. Retrieved on November 18, 2009 from http://envis.maharashtra.gov.in/envis_data/pdf/dec.pdf

[50] The rivers, which normally cause flood in the state, are the Tapi, Wardha and occasionally, the Pen-Ganga. The eastern parts of the state are prone to floods.

[51] The Deccan plateau constitutes 50 percent of the drought-prone area of the state and 12 percent of the State's population lives in drought-prone areas. Once in 5 years, deficient rainfall is reported and severe drought conditions occur every 8-9 years in the State.

[52] This state lies in seismic Zone I. The Koyna dam is situated in one of the most active seismic zones of Maharashtra and in 35 years this region has witnessed more than one lakh tremors.

Table 1.2 *Disaster impacts on efforts to meet the Millennium Development Goals (MDGs)*

MDG	Direct impacts	Indirect impacts
1. Eradicate extreme poverty and hunger	• Damage to housing, service infrastructure, savings, productive assets and human losses reduce livelihood sustainability.	• Negative macroeconomic impacts including severe short-term fiscal impacts and wider, longer-term impacts on growth, development and poverty reduction. • Forced sale of productive assets by vulnerable households pushes many into long-term poverty and increases inequality.
2. Achieve universal primary education	• Damage to education infrastructure. • Population displacement interrupts schooling.	• Increased need for child labour for household work, especially for girls. • Reduced household assets make schooling less affordable, girls probably affected most.
3. Promote gender equality and empower women	• As men migrate to seek alternative work, women/girls bear an increased burden of care. • Women often bear the brunt of distress 'coping' strategies, e.g. by reducing food intake.	• Emergency programmes may reinforce power structures which marginalize women. • Domestic and sexual violence may rise in the wake of a disaster.
4. Reduce child mortality	• Children are often most at risk, e.g. of drowning in floods. • Damage to health and water & sanitation infrastructure. • Injury and illness from disaster weakens children's immune systems.	• Increased numbers of orphaned, abandoned and homeless children. • Household asset depletion makes clean water, food and medicine less affordable.
5. Improve maternal health	• Pregnant woman are often at high risk from death/injury in disasters • Damage to health infrastructure. • Injury and illness from disaster can weaken women's health.	• Increased responsibilities and workloads create stress for surviving mothers. • Household asset depletion makes clean water, food and medicine less affordable.

(contd.)

MDG	Direct impacts	Indirect impacts
6. Combat HIV/AIDS, malaria and other diseases	• Poor health & nutrition following disasters weakens immunity. • Damage to health infrastructure. • Increased respiratory diseases associated with damp, dust and air pollution linked to disaster.	• Increased risk from communicative and vector borne diseases, e.g. malaria and diarrhoeal diseases following floods. • Impoverishment and displacement following disaster can increase exposure to disease, including HIV/AIDS, and disrupt health care.
7. Ensure environmental sustainability	• Damage to key environmental resources and exacerbation of soil erosion or deforestation. • Damage to water management and other urban infrastructure. • Slum dwellers/people in temporary settlements often heavily affected.	• Disaster-induced migration to urban areas and damage to urban infrastructure increase the number of slum dwellers without access to basic services and exacerbate poverty.
8. Develop a global partnership for development ALL MDGS	• Impacts on programmes for small island developing states from tropical storms, tsunamis etc.	• Impacts on commitment to good governance, development and poverty reduction—nationally and internationally. • Reallocation of resources – including ODA – from development to relief and recovery.

Source: Disaster Risk Reduction: A development concern, DFID