

Mainstreaming Disaster Risk
Reduction in Development Process



HANDBOOK ON

**Disaster Risk Management
Mainstreaming in Development**



**National Institute of Disaster Management (NIDM)
National Disaster Management Authority (NDMA)
Islamabad**

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Disaster Risk Management Terms and Concepts

1- Hazard

- Hazard is an event or occurrence that provokes disaster.
- A hazard is a natural or human-made phenomenon, which may cause physical damage, economic losses, or threaten human life and well being if it occurs in an area of human settlement, agriculture or industrial activity. Note, however, that in engineering, the term is used in more specific, mathematical sense to mean the probability of the occurrence, within a specified period of time and given area, of a particular, potentially damaging phenomenon of given severity or intensity.
- A hazard can be defined as a phenomenon that has the potential to cause injury to life, livelihoods and habitats.
- **Natural Hazards:** Natural phenomena which pose a threat to people, structures or economic assets and may cause disaster. High winds, floods, fires, volcanic eruption, landslides, droughts and earthquakes are all natural hazards. In this fast developing society, the distinction between natural and man-made hazards is becoming harder to define. For instance, flooding may be increased through landfill, drainage or groundwater extraction; storm surge hazard may be worsened by the destruction of mangroves.
- **Human-man hazards:** Conditions that may have disastrous consequences for a society. These are associated with industries or energy generation facilities and include explosions, leakage of toxic waste, pollution, dam failures. War or civil strife is included in this category.
- **Hazard Assessment:** The process of estimating, for defined areas, the probabilities of the occurrence of potentially damaging phenomena of given magnitude within a specified period of time. Hazard assessment involves analysis of formal and informal historical records and skilled interpretation of existing topographical, geological, hydrological and land-use maps.
- **Hazard Mapping:** The process of establishing geographically where and to what extent particular phenomena are likely to pose a threat to people, property, infrastructure, and economic activities. Hazard mapping represents the results of hazard assessment on a map, showing the frequency / probability of occurrence of various magnitudes or durations.

- **Hazardous Waste:** Any waste which is flammable, corrosive, reactive or toxic and which may pose substantial or potential hazard to human health and safety or to the environment when improperly managed (reactive refers to the ability to enter into a violent chemical reaction which may involve an explosion or fumes).
- **HazMats:** 'Techno jargon' for hazardous materials, which, if released or misused, could pose a threat to people and the environment. HazMats can be explosives, flammable and burnable substances, poisons and radioactive materials.

2- Vulnerability

All the evidence points to a steep and continuing rise in deaths and injuries from disasters since the 1960s, and there is general consensus among researchers and insurers that the number of disasters is increasing. This rise cannot be explained by a parallel rise in the number of earthquakes, cyclones and the like. What we are seeing is an increase in the effects of disasters on people – or, in other words, an increase in people's vulnerability to disasters.

It is the social, cultural, economic and political environment that makes people vulnerable. This is most apparent in the economic pressures that force many of the poor to live in cheap but dangerous locations such as flood plains and unstable hillsides; but there are many less visible underlying factors – social and political as well as economic – that affect people's ability to protect themselves against disasters or to recover from them.

Some groups are more vulnerable than others. Vulnerability is not just poverty, but the poor tend to be the most vulnerable. The influence of poverty and the development process on vulnerability to disasters is now well established. Being poor, and having no choice, increases vulnerability to disasters. Class, caste, ethnicity, gender, disability and age are other factors affecting people's vulnerability. Those who are already at an economic or social disadvantage because of one or more of these characteristics tend to be more likely to suffer during disasters.

Poor people often get locked in a cycle of vulnerability. Because they are poor, they become vulnerable. Because they are vulnerable, they are at great risk in the face of a natural hazard leading to disaster. Because they suffer greater losses from a disaster, they become even poorer, more vulnerable, and are at an even greater risk of another disaster.

- Vulnerability is the susceptibility to harm of those at risk.
- Vulnerability is the coping capacity of those at risk.
- Vulnerability is the degree of susceptibility and resilience of the community and environment to hazards
- Vulnerability depends on the characteristics of a person or group in terms of capacity to anticipate, cope with, resist and recover from the impact of hazard
- The extent to which an individual, community, sub-group, structure, service, or geographic area is likely to be damaged or disrupted by the impact of a particular disaster hazard.
- Conditions of vulnerability are a combination of factors that include poor living conditions, lack of power, exposure to risk, and the lack of capacity to cope with shocks and adverse situations.
- **Classification of Vulnerabilities:** Vulnerabilities can be classified as following:
 - **Physical Vulnerabilities** are the hazard-prone locations of settlement, insecure and risky sources of livelihood, lack of access to basic production resources (such as land, farm inputs, and capital), lack of knowledge and information, lack of access to basic services.
 - **Social Vulnerabilities** are reflected in the lack of institutional support structures and leadership, weak family and kinship relations, divisions and conflicts within communities, and the absence of decision-making powers.
 - **Attitudinal Vulnerabilities** are seen in dependency, resistance towards change, and other negative beliefs. People who have low confidence in their ability to affect change or who feel defeated by events, are harder hit by disasters than those who have sense of their ability to bring the changes they desire.
 - **Economic Vulnerabilities** pertain to how people make their living and from where they get their livelihood. Determining which type of livelihood is easily affected by disasters (e.g. fishing, tricycle driving,

etc.) is a key issue to be considered in determining the magnitude of economic vulnerability.

- **Vulnerability Analysis:** The process of estimating the vulnerability to potential disaster hazards of specified elements at risk. For engineering purposes, vulnerability analysis involves the analysis of theoretical and empirical data concerning the effects of particular phenomena on particular types of structures. For more general socio-economic purposes, it involves consideration of all significant elements in society, including physical, social and economic considerations (both short and long term), and the extent to which essential services and traditional and local coping mechanisms are able to continue functioning.

3- Capacity

All natural crisis events such as floods or earthquakes do not become disasters. Sometimes, they cause no major damage to life or property because they occur where no one lives or because people have taken measures to prevent or reduce their damaging effects. Even when these events do cause damage, not everyone in a disaster area suffers equally. Why is it some people suffer more from disasters than other people? The answer is that some people have fewer capacities and are more vulnerable than others.

Capacity has been included in disaster management initially as a guide for both international and local agencies who work with vulnerable communities to link disasters to development – even in emergency situations disaster survivors have capacities. They are not helpless victims but have coping mechanisms on which to build on for emergency response and recovery. As the developmental and risk reduction paradigms in disaster management emerged, for many vulnerable groups, the viable track to reduce vulnerabilities has been by increasing their social / organizational capacities.

- Capacity is a community's actual or potential ability to withstand disasters through the presence of material and human resources that aid in the prevention and effective response to disasters. This includes the resources and skills people possess, can develop, mobilize or have access to which allow them to have more control over shaping their future. It is the ability of the community to deal with hazards effectively.
- **Classification of Capacities:** Capacities can be classified as following:
- **Physical Capacities:** Even people whose houses have been destroyed by a typhoon or crops have been destroyed by a flood can salvage things from

their homes and farms. Sometimes they have food in storage or crops that can be recovered from the fields or farm implements for planting again. Some family members from the fields or farm implements for planting again. Some family members have skills which enable them to find employment if they migrate, either temporarily or permanently.

- **Social Capacities:** In most disasters, people suffer their greatest losses in the physical and material realm. For rich people, they have the capacity to recover soon because of their wealth. In fact, they are seldom hit by disasters because they live in safe areas and their houses are built with stronger materials. However, even when everything physical is destroyed, people still has their skills and knowledge; they have family and community organization. They have leaders and systems for making decisions and capacities in the social and organizational realm.
- **Attitudinal Capacities:** People have also positive attitudes and strong motivations such as the will to survive, love and concern for and willingness to help each other. Coping mechanisms or strategies are generally considered capacities for survival.
- **Economic Capacities:** This refers to the ability of the business sector to recover and re-establish the economic community.

5- Disaster

The term ‘disaster’ is defined in different ways. For example:

- Sudden or great misfortune, calamity (Concise Oxford Dictionary).
- A sudden calamitous event producing great material damage, loss and distress (Webster’s Dictionary).
- An event natural or man-made, sudden or progressive, which impacts with such severity that the affected community has to respond by taking exceptional measures (Disaster Management, A Disaster Manager’s Handbook, Asian Development Bank, Manila).
- An event associated with the impact of a natural hazard, which leads to increased mortality, illness and/or injury, and destroys or disrupts livelihoods, affecting the people or an area such that they perceive it as being exceptional and requiring external assistance for recovery (Cannon 1994).

- An event, natural or man-made, sudden or progressive, which impacts with such severity that the affected community has to respond by taking exceptional measures (Carter 1991).
- Calamity beyond the coping capacity of the effected population, triggered by natural or technological hazards or by human action (D&E Reference Center 1998).
- A disaster is a normatively defined occasion in a community when extraordinary efforts are taken to protect and benefit some social resource whose existence is perceived as threatened" (Dynes 1998).
- A disaster is an event concentrated in time and space, in which a society or one of its subdivisions undergoes physical harm and social disruption, such that all or some essential functions of the society or subdivision are impaired (Kreps 1995).
- Disasters are the interface between an extreme physical event and a vulnerable population (Okeefe et al 1976).
- A Condition or situation of significant destruction, disruption and/or distress to a community. (Salter 1997-98).
- A disaster occurs when a disruption reaches such proportions that there are injuries, deaths, or property damage, and when a disruption affects many or all of the community's essential functions, such as water supply, electrical power, roads, and hospitals. Also, people affected by a disaster may need assistance to alleviate their suffering. (Simeon Institute).

6- Disaster Risk

- The probability of meeting danger or suffering harm and loss.
- A measure of the probability of damage to life, property, and/or the environment, which could occur if a hazard, manifests itself, including the anticipated severity of consequences to people.
- Risk = Likelihood x Consequence. (Ansell and Wharton 1992).
- Risk is nothing more than the consequences of hazard (Bezek 2002).
- The possibility of suffering harm from a hazard (Cohrssen and Covello 1989)

- Risk is the probability of an event occurring, or the likelihood of a hazard happening (Presidential/Congressional Commission on Risk Assessment and Risk Management 1997).
- Risk refers to the probability that death, injury, illness, property damage, and other undesirable consequences will stem from a hazard (Lerbinger 1997).
- A function of two major factors: (a) the probability that an event, or series of events of various magnitudes, will occur, and (b) the consequences of the event(s) (Petak and Alkinson 1982).
- Expected losses (of lives, persons injured, property damaged and economic activity disrupted) due to a particular hazard for a given area and reference period. Based on mathematical calculations, risk is the product of hazard and vulnerability (U.N. 1992).
- 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 $\text{Risk} = \text{Hazards} \times \text{Vulnerability/Capacity}$ (U.N. ISDR 2002, 24).

7- Elements at Risk

- Following are described as ‘elements at risk’
 - Peoples’ lives and health
 - Household and community structure
 - Facilities and services such as houses, bridges, schools, roads, hospitals, etc.
 - Livelihood and economic activities, which include jobs, equipment, crops, livestock, etc.
 - Natural environment

8- Disaster Risk Assessment

- A participatory process of determining the nature, scope and magnitude of negative effects of hazards to the community and its households within an anticipated time period (ADPC, CBDRM 11).

- The First Step of the process identifies hazards in the community. Its output should identify, list down and describe the nature of hazards in terms of its recurrence, seasonality, location, possibility of early warning and general knowledge of the people about the hazard.
- The Second Step captures hazards, vulnerability and natural resources and facilities of the community in community and / or digitized maps.
- The Third Step identifies and assesses the vulnerabilities and capacities of the community in general but makes sure that there is gender desegregation of data; special needs groups like children and disabled are given utmost considerations as well.

9- Disaster Risk Management

- Disaster Risk Management is about looking beyond hazards alone to considering prevailing conditions of vulnerability. It is the social, cultural, economic, and political setting in a country that makes people vulnerable to unfortunate events. The basis of this understanding is simple: the national charter and chosen form of governance can be as much of a determinant in understanding the risks in a given country, as are the various social, economic and environmental determinants (U.N. ISDR 2002).
- A systematic application of management policies, procedures and practices to identify, analyzes, assess, treat, monitor and evaluate risks. This involves decision-making based on the examination of those risks, which includes hazard, vulnerability, and capacity of people and institutions. (ADPC, DMC-30, 2003)

10- Disaster Risk Reduction

- The systematic development and application of policies, strategies and practices to minimize vulnerabilities and disaster risks throughout a society, avoid (prevention) or to limit (mitigation and preparedness) adverse impact of hazards, within the broad context of sustainable development (U.N. ISDR 2002).

11- Mitigation

- Mitigation is the social attempt to reduce the occurrence of a disaster, to reduce the vulnerability of certain populations, and to more equitably distribute the costs within the society (Dynes 1993, 179).

- Those activities designed to alleviate the effects of a major disaster or emergency or long-term activities to minimize the potentially adverse effects of future disaster in affected areas (FEMA 1990).
- Sustained action taken to reduce or eliminate long-term risk to people and property from hazards and their effects. Mitigation distinguishes actions that have a long-term impact from those that are more closely associated with preparedness for immediate response to, and short-term recovery from a specific event (FEMA 1997, Multi Hazard).
- In its simplest sense, mitigation is risk management. The term describes actions that can be taken at the individual, local, State and Federal levels to reduce the overall risk from natural disasters.
- Action to reduce the effects of a disaster on a population (Nimpuno, 1998).
- Mitigation is seen as prevention – stopping a negative event before it happens. (Peterson and Perry 1999, 242).
- Measures taken in advance of a disaster aimed at decreasing or eliminating its impact on society and on environment. (U.N. 1992, 4)
- Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards. (U.N. ISDR 2002, 25)

12- Preparedness

- Those activities, programs, and systems that exist prior to an emergency that are used to support and enhance response to an emergency or disaster. (FEMA 1992)
- Preparedness represents actions that are undertaken to reduce the negative consequences of events where there is insufficient human control to institute mitigation measures. (Peterson and Perry 1999, 242)
- Activities designed to minimize loss of life and damage, to organize the temporary removal of people and property from a threatened location and facilitate timely and effective rescue, relief and rehabilitation.

- Activities and measures taken in advance to ensure effective response to the impact of disasters, including the issuance of timely and effective early warnings and the temporary removal of people and property from a threatened location. (U.N. ISDR 2002, 25)
- Measures to ensure the readiness and ability of a society to forecast and take precautionary measures in advance of an imminent threat, and to respond to and cope with the effects of a disaster by organizing and facilitating timely and effective rescue, relief and appropriate post-disaster assistance.

Disaster Risk Situation in Pakistan

The October 2005 earthquake highlighted the risk exposure and vulnerability of Pakistan. The decision makers, politicians, media, development workers, international donors and the general populace have become aware for the first time of the major catastrophic risks facing Pakistan. Pakistan's exposure to natural hazards and disasters could be ranked between moderate to severe. A range of natural hazards including earthquakes, droughts, floods, landslides, avalanches, cyclones/storms, tsunami, glacial lake outbursts, and river erosion threaten Pakistan. In addition a variety of human induced hazards also threaten the society, economy and environment in the country. They include industrial, nuclear and transport accidents, oil spills, urban fires and civil conflicts. The high priority hazards from the perspective of disaster risk reduction include earthquakes, droughts, flooding and transport accidents that can cause widespread damage and losses when they occur. The following is an overview of the key hazards that threaten Pakistan.

Earthquakes

The Indo-Australian plate upon which Pakistan, India and Nepal lie, is continuously moving northward, colliding with and sub-ducting under the Eurasian plate, thus forming the Himalayan mountains, and triggering earthquakes in the process. Within the Suleiman, Hindu Kush and Karakoram mountain ranges, the Northern areas and Chitral district in NWFP, Kashmir including Muzaffarabad, and Quetta, Chaman, Sibi, Zhob, Khusdar, Dalbandin, the Makran coast including Gawadar and Pasni in Baluchistan are located within high hazard and very high hazard risk areas. The cities of Islamabad, Karachi and Peshawar are located on the edges of the high hazard areas.

The areas comprising Pakistan have suffered four major earthquakes in the 20th century including the great Quetta earthquake of 1935, the 1945 earthquake off the coast of Makran, the 1976 earthquake in Northern areas, and the October 2005 Kashmir earthquake. In between these major events, the Northern areas and Kashmir have experienced many small quakes with localized impact.

The 7.6 Kashmir earthquake of October 2005 occurred in a region where a major plate-boundary earthquake was considered long over due. Although the earthquake resulted in widespread devastation, the scientists believe that it may not have released more than one tenth of the cumulative elastic energy that has developed

since the previous great earthquake in the region in 1555 or earlier¹. The seismologists are also concerned about the absence of earthquakes in Baluchistan in the recent history, which may mean the occurrence of major seismic activities in future.

Seismologists like Dr. Roger Bilham and his associates believe that one or more great earthquakes may be overdue in a large fraction of the Himalaya, threatening millions of people in the region². They also don't rule out the chances of occurrence of ruptures with magnitudes in the range 7.5 Mw. to 8 in the Baluchistan area³.

Droughts

The incidence of drought in Pakistan is becoming increasingly common with substantial consequences on food security, livestock production, environment and natural resources. Low rainfall and extreme variations in temperature characterize the climate in Pakistan. About 60 per cent of the total land area in country is classified as arid, which receives less than 200 mm annual rainfall. The main arid rangelands include Cholistan, Dera Ghazi Khan, D.I. Khan, Kohistan, Tharparkar and Western Baluchistan. The average annual precipitation in Baluchistan and Sindh provinces is about 160mm as compared with 400 mm in Punjab province and about 630mm in NWFP province. Within Baluchistan, the average precipitation varies from less than 50 mm in the southwest to about 400 mm in the northeast. Rainfall variability during different seasons is also considerably high. The climate of the country in lower southern half is arid and hyper-arid. Some regions of the country in each season remain drastically dry and are always vulnerable to drought. Even a small negative deviation from the low mean rainfall creates additional water scarcity in southern provinces of Baluchistan and Sindh and makes them more vulnerable to droughts. In this way drought has become a typical feature in Pakistan. These areas experience two-three drought years in every decade.

All provinces of Pakistan have a history of facing major droughts in the past. In recent years, drought has brought extensive damages to Baluchistan, Sindh and Southern Punjab. Severe drought episodes from 1997-2002 affected livelihoods, resulted in human deaths, forced tens of thousands of people to migrate, and killed large number of cattle. This drought led to 120 deaths and affected 2.2 million people, while 2.5 million livestock died and another 7.2 million livestock were

¹. [http://cires.colorado.edu/~bilham/Kashmir 202005.htm](http://cires.colorado.edu/~bilham/Kashmir%202005.htm)- Dr. Roger Bilham of the Cooperative Institute for Research in Environmental Sciences

². Himalayan Seismic Hazard, Roger Bilham, Vinod K Gaur, Peter Molnar

³. Kashmir quake of October 8 2005: A quick look report, Mid America earthquake centre, MAE Report No. 05-04 Ahmed Jan Durrani et al

affected⁴. Twenty-three (23) out of the 26 districts in Baluchistan and about 6 districts in Sindh were severely affected. The drought of year 2001 was termed as worst in the history of the country, which reduced the economic growth rate to 2.6 per cent as compared to an average growth rate of over 6 per cent. Furthermore the drought reduced the country's ability to produce hydro-electricity.

In general, per capita water availability is declining in Pakistan over time due to the combined impact of rising population, falling water flows and erosion in the storage capacity. The country's per capita water availability of 1136.5 cubic meters is only marginally above the threshold level of water scarcity i.e. 1000 cubic meters. Experts predict that with prevailing consumption rates and a population growth of 4 million people per year, one out of three people in Pakistan will face critical shortage of water, "threatening their very survival". The Government has started National Water Resources Development Programme (NWRDP) 2000-2025. The program has formulated a strategy for water resources development and identified possible sites for dam construction with a total storage capacity of 35.66 MAF (Million Acre Feet).

Floods

Fifty six (56%) percent of the Indus river basin, one of the largest river basins in Asia, lies in Pakistan and covers approximately 70 % of the country's area (IUCN, 2005). The largest river in the basin is the Indus River with Chennab, Jhelum, Kabul, Ravi and Satlej rivers as its major tributaries.

Generally major floods in the Indus basin occur in late summer (July to September) when the South Asian region is subjected to heavy monsoonal rains. In the upper to mid reaches of the Basin, it is generally the tributaries like Jhelum and Chennab rivers, which are the cause of flooding rather than the Indus River itself. The monsoon low depression that causes intense rain develops either in the Arabian sea or the Bay of Bengal. Major flooding is generally associated with the depression from the bay of Bengal moving across India in west/north-westerly direction and then turning north at the border with Pakistan.

The mountain ranges in the extreme north of Pakistan provide perennial source of inflow into the rivers. River floods particularly hit Punjab and Sindh while hill torrents tend to affect the hilly areas of NWFP, Baluchistan and northern federally administrated areas. Districts of Charsadda, Mardan, Nowshera and Peshawar in NWFP are exposed to flood risks from the flooding in river Kabul.

⁴. Strengthening National Capacities for Multi-Hazard Early Warning and Response System, Pakistan Meteorological Department, May 2006.

Since many rivers are snow-fed, they are also likely to cause flooding due to heat wave in early summer, combined with early monsoon⁵. Floods in Pakistan can also occur due to the dam bursts. For example in February 2005, the floods hit Pasni in Baluchistan due to the Shadi Kor dam burst, resulting from a week of torrential rains.

Economic damages resulting from annual flooding are a major burden on the country. Floods threaten country’s vital agricultural, communication infrastructure and have caused damages and losses worth Rs. 225 billion (USD \$ 4 billion) recorded for the ten largest floods since country’s independence in 1947.

Major Floods of Indus River Basin in Pakistan

Year	Lives Lost	Monetary losses (Billion rupees)	Villages Affected	Area Flooded (miles 2)
1950	2910	9.08	10,000	7,000
1955	679	7.04	6,945	8,000
1956	160	5.92	11,609	29,065
1973	474	5.52	9,719	16,200
1975	126	12.72	8,628	13,645
1976	425	64.84	9,150	32,000
1978	393	41.44	9,199	11,952
1988	508	15.96	1,000	4,400
1992	1008	56.00	13,208	15,140
1995	591	7.00	6,852	6,518
1998	47		161	
2001	201			
2003	230			
Total	7378	225	78,236/ 86471	

Landslides

The regions of Kashmir, Northern Areas and parts of the NWFP province in Pakistan are vulnerable to landslide hazard. Aside from the young geology and the fragile soil type of the mountain ranges, accelerated deforestation is a major cause behind increased incidences of the landslides in the region. In the aftermath of the 2005 earthquake the steep mountains in Kashmir and NWFP came down tumbling. The landslides isolated already hard to reach villages and cities. In some cases wide sections of the mountain, more than a kilometre in width slid into the valleys below. Small scale isolated landslide hazards happen frequently in the above regions,

⁵. Indus Basin River system-flooding and flood mitigation, H. Rehman, and A. Kamal.

which cause significant damages and losses at the local level. The incidences of landslides can increase in future, since due to deforestation, the forest cover is shrinking by 3.1 % and woody biomass by 5 % annually (7000-9000 ha taken away annually).

Tsunami

Pakistan also has a history of tsunami disasters. A big tsunami was experienced on 28 November 1945, due to a great earthquake of magnitude 8.3, offshore Makran Coast south of Pasni during the early hours. The tsunami produced sea waves of 12-15 meters height that killed at least 4000 people in Pasni and adjoining areas. The tsunami waves reached as far as Mumbai in India. Karachi, about 450 kms from the epicentre, experienced 6 feet high sea waves which affected the harbour facilities. Fortunately when the sea wave occurred it was not the time of high tide at Karachi coast. The risk of the occurrence of a future tsunami from this source region exists. The fact that cities like Karachi lie close to the potential epicentres for large submarine earthquakes, demands attention for enhancement of local capacities for disaster risk reduction, early warning and response in order to reduce losses to life, property and environment from future earthquake or tsunami events. Tsunami may reach the coastal region within one hour. Thus, there is a need to put in place a warning system that would ensure that the warning message reaches the coastal inhabitants as soon as possible.

Cyclones/storms

Coastal belt of Pakistan (especially in Sindh) is highly vulnerable to cyclones and associated storm surges. Fourteen cyclones were recorded between 1971 and 2001. Cyclones can cause large scale damage to the coastal areas of Sindh and Baluchistan. The cyclone of 1999 in Thatta and Badin districts wiped out 73 settlements, and it killed 168 people, and 11,000 cattle. Nearly 0.6 million people were affected. It destroyed 1800 small and big boats and partially damaged 642 boats, causing a loss of Rs. 380 million. The losses to infrastructure were estimated at Rs. 750 million.

The climate change is causing increase in the frequency and intensity of storms and changes in their tracks. Although the frequency of cyclones is low along Pakistani coast, yet they cause considerable damage in the area, when they occur. Coastal belt is mostly low-lying therefore storm surges extend several kilometres inland and they damage crops and convert the agricultural land into gully lands for long time. Strong winds create havoc by destroying human settlements, electric and communication installations and trees. In the aftermath of cyclones the areas are left water logged where cultivation is not possible for months due to the soil conditions.

Glacial Lake Outbursts

Another likely scenario that can come into play is the burst of glacial lakes in the upstream of Indus basin due to heat waves, a phenomenon termed as Glacial Lake Outburst Flood (GLOF). A recent study found that, of the 2420 glacial lakes in the Indus basin, 52 lakes are potentially dangerous and could result in GLOF with serious damages to life and property. The study has also indicated that global warming can increase the potential of GLOF in future⁶.

Avalanches

The Kashmir region and northern areas in Pakistan experience avalanches on a regular seasonal basis. Local people in the hazardous region and the tourists are vulnerable to this hazard.

Industrial, nuclear and transport accidents

Transport accidents are a common phenomenon in Pakistan. Particularly the train system in Pakistan is notorious for collisions. Hundreds of people have been killed in such accidents. Plane crashes and road accidents are not uncommon events. The growing industrialization particularly within urban settlements in cities like Gujranwala, Faisalabad, Karachi, Lahore, Sialkot and elsewhere can be a source of major industrial disasters, although Pakistan has not experienced any such events in the past. The neighbouring India suffered from Bhopal Gas leakage in 1985, in which 5000 people were killed and enormous health hazards were experienced by citizens of Bhopal. Having installed various nuclear facilities and nuclear power stations, Pakistan is also exposed to the risks of nuclear accidents. The Chernobyl disaster in Russia must serve as a reminder in this regard.

Pakistan now has two ports in Karachi and Gawadar along the coast of Makran. These areas are at risk from marine accidents. In Karachi, in August 2003 the wreckage of Tasman Spirit a Greek old-ship caused colossal environmental losses and health hazards for the businesses, port workers and adjacent communities. About 28,000 ton oil spilled all over the harbour area, which affected marine life in a major way. The residents in the area reported headaches, nausea and respiratory problems in the weeks following the accident. It took months for the authorities to clear the oil affected areas.

Urban fires

⁶. Indus Basin River system-flooding and flood mitigation, H. Rehman, and A. Kamal

Fortunately Pakistan has not experienced any major urban fire incidents so far. However, considering the pace of urbanization, coupled with industrialization, the chances of urban fires can't be ignored. The CNG gas stations are installed in all urban areas and it is also sold at small shops and stores for household use. In small cities and towns the sale of petroleum products at small shops located within residential areas is also common. These practices combined with mass culture of smoking cigarettes could pose a major fire risk. The fire services in urban centres, except Karachi, are poorly equipped.

Civil conflicts

Pakistan is a diverse society, ethnically, linguistically, religiously and culturally. This diversity has some times led towards civil conflicts amongst various social groups. For example, Pakistan has suffered sectarian conflicts during the 1980s and 1990s. These conflicts caused loss of life and damage to property, while creating insecurity for various social groups in the affected areas. Pakistan has also borne the brunt of Afghan war in the form of hosting about 6 million refugees for more than two decades. About 2 million Afghan refugees still live in various parts of Pakistan. This mass scale invasion has damaged the social fabric of Pakistan.

Disaster Management System in Pakistan

After the promulgation of National Disaster Management Ordinance, 2006 (NDMO), an elaborate system of Disaster Risk Management (DRM) at the national, provincial and district level has been established. The National Disaster Management Authority (NDMA) at the federal level has started acting as focal point to lead the process by facilitating the work of Provincial Disaster Management Authorities (PDMAs) and the District Disaster Management Authorities (DDMAs). The new system envisages to achieving sustainable social, economic and environmental development in Pakistan through reducing risks and vulnerabilities. It has a mission of enhancing institutional capacities for disaster preparedness, response and recovery with a risk reduction perspective in the development planning process at all levels. In line with the vision, the National Disaster Risk Management Framework (NDRMF) has identified the following guiding principles:

- Focus upon most vulnerable social groups; e.g. children, women, elderly, minorities;
- Promote community and local level preparedness culture;
- Follow multi-disciplinary and multi-sectoral approaches;
- Combine scientific knowledge with social knowledge;
- Make development policy, planning and implementation risk-sensitive;
- Develop culturally, economically and environmentally relevant technologies for safer construction in different parts of the country;
- Promote sustainable livelihood practices in areas at high risk from multiple hazards;
- Establish and strengthen partnerships amongst multiple sectors e.g. government, private sector, media, insurance, NGOs, civil society organizations, UN and donors;
- Work with other countries and international community to promote disaster risk reduction;
- Acquire specific capacities / capabilities keeping in view hazard-risk profile of the country; and
- Develop disaster risk management plans from district level upwards in view of specific requirements of the local area.

Priority Areas

The DRM system revolves around the following 9 priority areas, which are being implemented at the national, provincial, district and community level:

1. Institutional and Legal Arrangements:

The National Disaster Management Ordinance calls for the establishment of disaster management commissions and authorities at the federal, provincial and district level. The commissions are mandated to take policy decisions whereas the authorities are the implementing and coordinating arms. The national and provincial disaster management commissions and authorities have been established. Similarly, the DDMA's have also been notified. Under this priority area, the institution of technical committees on various aspects and development of legal instruments, guidelines and procedures are planned to be undertaken.

2. National Hazard and Vulnerability Assessment:

In order to make informed policies, strategies and programs on disaster risk management, a Vulnerability Atlas of Pakistan will be prepared. This would include hazard maps indicating the location of various hazards with zonation of risk levels (low, moderate, severe). The Atlas will also include analysis on vulnerability of settlements, housing stock, important infrastructure and environmental resources. A disaster inventory will also be developed to facilitate analysis on disaster and vulnerability trends.

3. Training, Education & Awareness:

Training, Education and Awareness programs would involve multiple sectors such as civil servants, federal and provincial ministries, staff of district, provincial and national Disaster Management authorities, technical agencies, UN staff, NGOs, media, politicians and more importantly communities. Apart from trainings on vulnerability reduction, hazard mitigation and emergency response management, specialized trainings are also being imparted in areas of search & rescue, first aid, fire fighting, evacuation, camp management and relief distribution.

4. Promoting Disaster Risk Management Planning"

DRM planning is essential to minimizing adverse effects of hazard(s) through effective disaster risk reduction, preparedness and adequate, timely and coordinated response. It is planned to have a National Disaster Response Plan, which will define roles and responsibilities of federal ministries, departments and other entities in relation to national level disaster response. All the provincial DMAs including AJK and Northern Areas have already developed their respective provincial DRM plans whereas DDMA's are in the process of developing local plans.

5. Community and Local Level Risk Reduction Programming

It is rightly believed that the community level program implementation is the heart of disaster risk reduction strategies because disaster risks are essentially

local in term of their impact and so as the response. That is why the community based initiatives for the capacity building of local officials and communities, CBOs, builders, contractors, masons, teachers and doctors etc. have been considered of immense importance in the National Framework. The NDMA has launched the first phase of community level activities in Badin & Thatha (Sindh), Quetta & Kech (Balochistan), Mansehra (NWFP) and Muzaffarabad (AJK).

6. Multi-hazard Early Warning System

The early warning capacities for droughts will be enhanced and the Early Warning System (EWS) will be developed for cyclone and tsunami hazards. The role of media will also be enhanced to improve dissemination of warnings. Likewise, communities will be linked with different warning agencies in order to be able to react timely and efficiently.

7. Mainstreaming Disaster Risk Reduction into Development

The purpose of mainstreaming DRR into development is to ensure that the development infrastructure in hazard-prone areas is built to higher standards of resilience against multiple natural and man-made hazards. This will be done by incorporating risk and vulnerability assessment into project planning stage. NDMA will work with the National Planning Commission and the Ministry of Finance in order to integrate disaster risk reduction into the National Development Plan and the National Poverty Alleviation Strategy. Some pilot projects with selected ministries will be initiated on mainstreaming of risk reduction.

8. Emergency Response System

Apart from the National Emergency Operations Centre (NEOC), NDMA will facilitate PDMA's in establishing emergency operations centers at the provincial and district levels. The NEOC would serve as a hub for receiving early warnings and issuing necessary instructions to response agencies. It would also lead coordination and management of relief operations in affected areas. Standard Operating Procedures (SOPs) will be drafted to define roles of federal, provincial and local agencies for their involvement in emergency response.

9. Capacity Development for Post Disaster Recovery

In order to manage disaster recovery programs effectively, it is very important to put institutional arrangements and system in place. NDMA will develop guidelines for recovery needs assessment and recovery program design and management for multiple sectors. Similarly, orientation workshops for line ministries and other stakeholders on post disaster recovery program design and implementation will be organized.

Disaster Risk Management Structure

In line with the provisions of NDMO, the Government of Pakistan has approved and notified the following DRM structure at the national, provincial and district levels:

1- National Level:

1.1. National Disaster Management Commission (NDMC):

Headed by the Prime Minister as its Chairperson, the NDMC is the highest policy and decision making body for disaster risk management. Other members include opposition leaders of both the houses; Chief Ministers of four provinces; Governor NWFP; Prime Minister AJK; Chief Executive of Northern Areas; Chairman JCSC or his nominee; federal ministers for Communications, Defence, Finance, Foreign Affairs, Health, Interior, Social Welfare and Special Education; Chairman NDMA; Representative of Civil Society; and any other person appointed or co-opted by the Chairperson. NDMC is mandated to formulate policies and develop guidelines on DRM, approve DRM plans prepared by Ministries or Divisions of the federal government, arrange and oversee funds, and provide support to other countries affected by major disasters.

1.2. National Disaster Management Authority (NDMA):

NDMA has been established to serve as the focal point and coordinating body to facilitate implementation of disaster risk management strategies. Following are the powers and functions of NDMA:

- Act as the implementing, coordinating and monitoring body for DRM;
- Prepare the National DRM Plan to be approved by the National Commission;
- Lay down guidelines for preparing DRM Plans by different Ministries or Departments and the Provincial Authorities;
- Implement, coordinate and monitor the implementation of the National Policy;
- Provide necessary technical assistance to PDMA for preparing Provincial DRM Plans;
- Coordinate response in the event of any threatening disaster situation or disaster;
- Promote general education and awareness in relation to DRM; and

- Perform such other functions as the National Commission may require it to perform.

2- Provincial Level:

2.1 Provincial Disaster Management Commission (PDMC):

The PDMC is chaired by the Chief Minister and other members include opposition leader and a member nominated by him. The CM has the powers to nominate other members of PDMC. Similarly, he may designate one of the members to be the Vice Chairperson. The powers and function of PDMC are as following:

- Lay down the provincial / regional DRM policy;
- Approve the DRM Plan
- Review implementation of the Plan;
- Review the development plans of provincial departments and ensure that risk reduction measures are integrated; and
- Oversee the provision of funds for risk reduction and preparedness measures.

2.2 Provincial Disaster Management Authority (PDMA):

The PDMA is headed by a Director General appointed by the Provincial Government. Following are the powers and functions of PDMA:

- Formulate DRM policy and obtain approval of the PDMC;
- Ensure implementation of DRM policies and plans in the Province;
- Coordinate and monitor the implementation of the National Policy, National Plan and Provincial Plan;
- Examine the vulnerability of different parts of the Province to different disasters and specify prevention or mitigation measures;
- Lay down guidelines to be followed by Provincial Departments and District Authorities for preparation of DRM plans;
- Evaluate preparedness and response arrangements of public and private agencies / departments at the provincial level;
- Coordinate response in the event of disaster;
- Give directions to any Provincial department or authority regarding actions to be taken in response to disaster
- Ensure that communication systems are in order and disaster management drills are being carried out regularly.

3- District Level:

3.1 District Disaster Management Authority (DDMC):

The Disaster Management Ordinance put ample emphasis on establishing DDMA by notifying them in the Official Gazette. DDMA are headed by District Nazims whereas DCOs / DCs, District Police Officers (DPOs), EDOs (Health), and any other district-level officer appointed by the District Government are its members. Following are the powers and functions of DDMA:

- To plan, coordinate and implement DRM measures in accordance with the guidelines laid down by NDMA and PDMA;
- Prepare District Disaster Risk Management Plan (DDRMP) and district Emergency Response plan;
- Ensure that the risk-prone areas are identified and prevention and mitigation measures are undertaken accordingly;
- Ensure that the guidelines for prevention, mitigation, preparedness and response measures as laid down by NDMA and PDMA are followed by all district level departments;
- Lay down guidelines for disaster management plan;
- Monitor the implementation of DRM plans prepared by the district departments;
- Organize and coordinate DRM training programs for district government officials, community members and community-based organizations;
- Set up, maintain, review and upgrade the mechanism for early warnings and dissemination of proper information to public;
- Prepare, review and update district level response plan and guidelines;
- Establish stockpiles of relief and rescue materials;
- Ensure that communication systems are in order and disaster management drills are carried out periodically.

Overview of Disaster Risk Assessment

- 1- Risk is the probability of something happening in the future, which has a negative consequence (R. Bellers, 199).
- 2- Risk is commonly used to mean the probability or likelihood of meeting danger or suffering harm and loss. Risk is sometimes taken as synonymous with hazard but risk has an additional implication of the chance of a particular hazard actually occurring. It is also the exposure of something of human value to a hazard and is often regarded as the combination of probability and loss.
- 3- Assessment is a participatory process undertaken in phases and involving on-the-spot collection, interpreting and analyzing of information from various sources.
- 4- Disaster Risk Assessment at the community level is hazard, Vulnerabilities and Capacities assessment.
- 5- Community Risk Assessment is a participatory process of determining the nature, scope and magnitude of negative effects of hazards to the community and its households within an anticipated time period. (ADPC, CBRM 11)
- 6- Disaster Risk Assessment involves a participatory analysis and combination of both scientific and empirical data concerning the probabilities of hazards in any particular area, the negative effects expected to result to each element at risk for each particular hazard, and considering the coping mechanisms.
- 7- Risk Assessment is a structured analytical procedure to identify hazards and to estimate the probability of their occurrence, and the consequences in the light of the conditions. These estimates are then compared with a standard or criterion in order to decide whether or not action is desirable, to reduce the probabilities or to protect people, property, or environment.
- 8- Through disaster risk assessment, we get to know the possible disaster situation and predict the severity of possible future hazards, its damaging effects, the needs and available resources at a certain location.
- 9- The assessment process has four steps:

- Hazard Assessment: Identify, list down and describe the nature of hazards in terms of its recurrence, reasonability, location, possibility of early warning and general knowledge of the people about the hazard.
- Vulnerability Assessment: Identify what elements are at risk and why (refer to unsafe conditions, dynamic pressures and root causes).
- Capacity Assessment: what are people's coping strategies; what resources are still available; who has access and control over these resources?
- Community's Risk Measurement: understanding the people's perception of risk

10- Purpose of Disaster Risk Assessment:

- Risk Assessment provides a systematic process for identifying, estimating, and ranking disaster risks.
- It is a required step for the adoption of adequate and successful community-based disaster risk reduction policies and measures (IDNDR, Yokohama Strategy).
- Disaster Risk Assessment is done for the purpose of risk reduction planning to:
 - Identify prioritized risks that need to be reduced;
 - Ensure that the risk reduction is going to be adequate and appropriate;
 - Ensure that risk reduction will be cost effective and sustainable;
 - Balance between preparedness and long-term mitigation measures;
 - Identify if there are other activities that would have a more positive development impact;
 - Identify existing capacities to assist in risk reduction both externally & within communities;
 - Assess if we are succeeding in reducing risk;
- It provides disaster specific baseline data that can be integrated in a situational analysis for development program purposes.
- The information generated through the process can be used for informed estimates in order to draft emergency appeals.

At the end of disaster risk assessment process, all actors should be able to accomplish the following objectives and outputs:

Disaster Risk Assessment Design

	Objectives	Outputs
Step 1	Describe hazards in the community	List and nature of hazards
Step 2	Conduct hazard mapping	Community hazard map Community resource map Digitized map
Step 3	Describe vulnerabilities and capacities of community, of women and men	Capacities Vulnerabilities Analysis (CVA)
Step 4	Determine Disaster Risk	Comprehensive list of risk faced by the communities
Step 5	Rank Disaster Risk	Prioritized list of risks
Step 6	Decide on acceptable level of risk	Agreed levels of risk for family and community security
Step 7	Decide whether to prevent, reduce, transfer, or live with the disaster risk(s)	Agreed strategies

Hazard Assessment

- 1- The purpose of hazard assessment is to specify the nature and behavior of the potential hazards and threats people face.
- 2- Hazard is an event or occurrence that has the potential for causing injuries to life and damaging property and the environment.
- 3- Hazard assessment means the identification of hazards in given location (D&E Reference Center 1998).
- 4- Hazard assessment is a process of estimating, for defined areas, the probabilities of the occurrence of potentially damaging phenomenon of given magnitudes within a specified period of time (Simeon Institute 1998).

Types of Hazards

Natural disasters	Earthquakes, floods, hurricanes, land and rockslide, droughts, volcanic eruptions, forest fires, tsunami, and storm surge.
Technological (man induced)	Hazardous material, transportation accidents, explosions, epidemics, fires, collapsed buildings.
Internal disturbances	Riots, demonstrations, prison breaks, strikes, terrorism.
Energy and Material Shortages	Strikes, labor problems, price wars, embargo.
Armed conflict	Nuclear or conventional, chemical or biological warfare.

- 5- Underlying causes of the possibility of any new hazard to occur are:
 - Natural: Change in the patterns of weather leading to new forms of drought and floods
 - Economic: Drastic fluctuations in real value of currency affecting immediate livelihood; other trade related policy changes, structural adjustment measures

- Social and Political Trends: Change in policy for poverty reduction, subsidy programs, re-locating people
- Political Structures: Structural changes within the country such as decentralization / centralization, conflicts
- Industrial hazards: Chemical accidents, poisoning of different kinds
- Epidemics: New forms of epidemics such as AIDS

Primary Hazard	Secondary Hazard
▪ Floods	Epidemics, snake bite
▪ Drought	Epidemics, famine
▪ Earthquake	Landslides
▪ Civil War	Refugees, epidemics
▪ Landslides	Epidemics
▪ Pollution	Disease

6- To understand the nature and behavior of hazards, we need to consider following factors:

- Origin: The factor or factors which create / result in a hazard. It can be natural or man-made.
- Warning signs and signals: Scientific & indigenous indicators that hazard is likely to occur
- Forewarning: Time gap between warning signs and the impact of hazard
- Force: Factors that make the power of hazards e.g. intensity and magnitude of an earthquake
- Speed of Onset: rapidity of arrival and impact
- Frequency: Time related patterns of occurrence of hazards
- Seasonality: Occurrence of a hazard in a particular time of the year
- Duration: Hazard's presence in a time scale

Hazard Matrix

Hazard Type	Origin	Warning Signs	Fore-warning	Force	Speed of Onset	Frequency	Seasonality	Duration
Flood	Rain, River overflow	Rainfall duration, Intensity, Quality, Speed of wind, Temperature, Movement of animals, insects and birds	Relatively short but can vary from a few hours to a few days	Volume of water	Can often be predicted a few days in advance	Seasonal	Monsoon season	Days / weeks

- 7- Small-scale and localized hazards that neither hit the headlines nor appear in disaster statistics have been increasing significantly. Collectively, these can present a more serious problem than any catastrophic event. For example, in densely populated shanty-towns, fires and epidemics are increasingly common events.

Origin or Causes of Hazards

<i>Hazard</i>	<i>Origin or Causes</i>
▪ Cyclone	Wind currents that spin
▪ Floods	River and coastal rising of water due to intense rainfall, ill-planned structural measures
▪ Drought	Rainfall deficit over long time periods
▪ Environmental Pollution	Caused by air, marine & fresh water pollutants
▪ Deforestation	Cutting forests for livelihood and commercial purposes
▪ Earthquake	Shaking of earth by the waves below the earth's surface
▪ Landslides	Down slope transport of soil & rock by natural vibrations, changes in direct water content or removal of lateral support
▪ Epidemic	Rise in parasitic infestations due to exposure to toxin

- 8- Following are some important points to be considered in Hazard Assessment:

- Look at scientific and statistical data

- Take action to translate scientific data into practical information
 - Approach other knowledgeable sources / people
 - Understand various intensities of the same hazard
- 9- Tools for Hazard Assessment: There are several tools that can help in hazard assessment but the most commonly used tools are as following:
- Hazard Map: to locate the probable area covered by a hazard’s impact and the elements at risk
 - Historical Profile or Time Line: can make us understand how hazards have changed over time; which hazards have happened in the past; or the start of particular hazard occurrence
 - Seasonal Calendar: visualizes the time, frequency and duration of common hazards
 - Hazard Matrix: helps to systematize information on the characteristics of hazards, specifically warning signs and signals, forewarning, speed of onset, frequency, period of occurrence and duration

Vulnerability Assessment

- Vulnerability is the extent to which communities, structure, service or geographic area is likely to be damaged or disrupted by the impact of a particular hazard.
- Vulnerability is a complex combination of interrelated, mutually reinforcing and dynamic factors.
- Vulnerability analysis is the process of estimating the susceptibility of ‘elements at risk’ to various hazards.
- Vulnerability assessment – the second level of hazard assessment – combines the information from the hazard identification with an inventory of the existing property and population exposed to a hazard. It provides information on who and what are vulnerable to a natural hazard within the geographic areas defined by hazard identification. Vulnerability assessment can also estimate damage and casualties that will result from various intensities of the hazard (Deyle et al. 1998, 129).

1- Types of vulnerability:

- Physical / Material: Pertains to the man-made environment of infrastructure, and the natural environment of agriculture, and forestry. It is not limited to the geographical location of population, buildings and crops. This also pertains to the physical capacity of buildings to cope with the battering of forces. The following are factors that determine the magnitude of physical vulnerability:
 - Disaster-prone location of community, houses, farmlands, infrastructure, basic services, etc.
 - Insecure and risky sources of livelihood
 - Lack of access and control over means of production (land, farm inputs, animals, capital, etc.)
 - Dependence on money-lenders / Aarhtis etc.
 - Inadequate economic fall-back mechanisms

- Occurrence of acute or chronic food shortage
- Lack of adequate skills and educational background
- Lack of basic services (education, health, safe drinking water, shelter, sanitation, roads, electricity, communication, etc.)
- High mortality rates, malnutrition, occurrence of diseases, insufficient caring capacity
- Overexploited natural resources
- Domestic violence, community conflicts, or war
- Socio-Cultural Vulnerability: Elements or factors, which come from demographic concerns such as population density and level of awareness. Following are key issues to be considered in assessing social vulnerability:
 - Special categories of vulnerable groups of people i.e. single parents, women, pregnant mothers, mentally and physically challenged, children and babies, elderly.
 - Population density which has a strong correlation with casualties. It is necessary to assess areas of hazards in relation to where people work and live.
 - Common perception and beliefs of the community about hazards, its impact and corresponding mitigation measures.
 - Weak family / kinship structures
- Organizational / Institutional: Vulnerability factors which come from organizational or institutional concerns include:
 - Lack of leadership, initiative, organizational structures to solve problems or conflicts
 - Ineffective decision-making, people / groups are left out, etc.
 - Unequal participation in community affairs
 - Rumors, divisions, conflict (ethnic, class, religion, caste, ideology, etc.)

- Weak local institutions (government, private organizations) that cater to assisting / responding to the pre-disaster and disaster needs of the community
- Lack of access to political processes
- Inconsistency in organizational dynamics which determines how they respond to disasters.
- Economic Vulnerability: Pertains to how people make their living and where they get their livelihood. Determining which type of livelihood is easily affected by disasters is a key issue to be considered in determining the magnitude of economic vulnerability.
- Attitudinal / motivational: Refers to the individual's perception of risk and his / her ability to mitigate and cope with disasters. This also addresses the people's sense of priorities. Those who perceive disasters as uncontrollable events are harder hit than those who believe that disasters can be mitigated or avoided. The elements of this type of vulnerability include:
 - Negative attitude of communities / individuals towards change
 - Passivity, fatalism, hopelessness, dependence
 - Lack of spirit for taking initiative
 - Lack of unity, cooperation, solidarity
 - Negative beliefs / ideologies
 - Unawareness about hazards and consequences
 - Dependence on external support

Things to remember:

- Vulnerability assessment framework must be simple enough to be useful, but complex enough to capture reality
- Vulnerability is specific to location, sector, interest group, etc.
- Vulnerability is dynamic
- Vulnerability is sometimes irreversible
- Vulnerability and poverty are strongly linked with each other.

(M.B. Anderson)

The Vulnerabilities Assessment Matrix:

Physical / Material	Socio-Cultural	Organizational / Institutional	Economic	Attitudinal / Motivational
<ul style="list-style-type: none"> What are the ways the community may be physically vulnerable (land, climate, environment, people’s health, infrastructure, food, housing, physical technologies)? What adjustments can be made to strengthen existing structures? Are building codes adequate? Are codes enforced? 	<ul style="list-style-type: none"> What measures are being taken to develop community awareness and capacities to reduce disaster impact? What social structures in the community are vulnerable? How can social activities be improved? How can conflicts / division within the society be reduced? 	<ul style="list-style-type: none"> What formal and informal systems are vulnerable? How can decision-making be improved? How can leadership be improved? 	<ul style="list-style-type: none"> How can economic activities be improved? What measures are being taken to diversify economic activities to reduce vulnerability/ What are the vulnerable livelihoods in the area? 	<ul style="list-style-type: none"> How does the community view itself and its ability to deal with the physical, social and political environment? Do the people feel they have the ability to shape lives Do people feel victimized

2- PRA tools for Vulnerability Assessment: A verity of tools can be used to enrich the community’s participation in assessing vulnerability: These include following:

- Hazard Maps visualize the elements at risk.
- Transect Walk gives a better understanding of the map done by the community and provides opportunities to ask more questions regarding physical / material vulnerability.
- Seasonal Calendar gives insight in periods of stress, diseases, hunger, debt, etc.

- Livelihood Analysis helps to learn that not everybody is equally affected by hazards; some groups and people are more vulnerable than others.
 - Venn Diagram shows the state of coordination among organizations and government agencies, or leadership patterns.
 - Semi-structured Interviews help to assess the motivational vulnerabilities of the community.
 - Problem Tree and Ranking enables community members to express their main vulnerabilities and which one they prioritize to be addressed.
- 3- Although poverty and vulnerability are closely related, they are not synonymous. While people are vulnerable to a hazard because of physical proximity combined with low economic or social status, it is not only the poor who reside in hazard-prone places. When personal, community or national wealth is inadequate even for basic daily security, few investments are made in measures that can help to ensure survival from hazard exposure. On the other hand, in upscale residential areas, which are built on hills and shores, design and engineering technologies are applied to minimize risk but do not eliminate it.

Capacity Assessment

- 1- All natural hazards do not become disasters. Sometimes, they cause no major damage to life or property because they occur where no one lives or because people have taken measures to prevent or reduce their damaging effects. Even when these events do cause damage, not everyone in a disaster area suffers equally. Why it is some people suffer more from disasters than other people? The answer is that some people have fewer capacities and are more vulnerable than others.
- 2- Capacity is a community's actual or potential ability to withstand disasters through the presence of material and human resources that aid in the prevention and effective response to disasters. This includes the resources and skills people possess, can develop, mobilize or have access to which allow them to have more control over shaping their future. It is the ability of the community to deal with hazards and their attendant impact.
- 3- Capacity assessment is the process to determine what people do in times of crisis to reduce the damaging effects of the hazard, and to secure sustainable livelihood by:
 - Understanding people's previous experiences with hazards that enabled them to develop coping strategies
 - Analyzing which resources are available and used by the community to reduce risk, who has access to these resources and who controls them.
 - Assessing capacities of people at risk is a very important step in choosing strategies for community disaster risk reduction and capability building. It is a step in the risk assessment process that most people forget. When we put it aside, we can make mistakes in program design and waste scarce external resources.
- 4- Capacities can be classified as following:
 - Physical / material: People with economic and material resources can survive better. These may come in the form of cash, land, tools, food, jobs, or access to credit. The appropriateness and abundance of people's resources make a difference as to whether they can handle or control any kind of threat and whether they can lead a satisfying and dignified life. For example, people with access to food and clean water have better

health to withstand disease; those with the means can afford materials and skills to make their homes strong cyclones.

- Social / organizational: People have social resources that help them cope with, resist and handle the threats they may face. For example, communities that are close-knit and have social networks for support are stronger. Communities where good leadership, caring local and national institutions are in place, and where people share the physical resources they have in times of need are more likely to survive. These communities may be economically poor but can be socially strong.
- Attitudinal / Motivational: People, who are aware of their abilities and have confidence in themselves, are better able to cope with a crisis. When they have a sense of control over events and the power to change their condition, they are less vulnerable to threats.

5- Coping and Coping Mechanisms: 'Coping' means 'managing resources' in adverse situations. Coping can include defense mechanisms, active ways of solving problems, and methods for handling stress. Coping mechanisms are employed when vulnerable communities face difficulties in recovering from a disaster. Their livelihood has become unstable; they face food shortages and even hunger. However, previous experiences with seasonal problems and hunger itself have enabled communities to develop coping strategies. Immediate concern is to secure livelihood than maintaining food supplies. People would rather eat less than be forced to sell livestock or tools, which would undermine their livelihood in the long-term. (Maxwell, 1996)

6- Sequence of Coping Strategies:

- Stage 1: At the first stage, communities develop an indigenous coping mechanism to deal with disasters. For instance, they develop a warning system, evacuation routes and places, and coordinate relief efforts. They also rely on kinship relations during crisis. People bank on these capacities in pre and during disaster situation to minimize the loss of life and property.
- Stage 2: The following strategies are employed to overcome normal seasonal stress, when a number of factors converge into a weakening food supply basis:
 - ◇ Short-term dietary changes
 - ◇ Change in farming practices and patterns

- ◇ Diversification of income sources
 - ◇ Temporary migration in search of work during lean months in the farming calendar
 - ◇ Sale of non-essential possessions
 - ◇ Sale of animals
- Stage 3: In case of a prolonged stress, strategies take a shift from solving long-term problems to short-term gains. Stress often cause change in gender roles and responsibilities; productive and reproductive tasks are done regardless of gender since priority remains on income-generating sources, which include:
- ◇ Essential livestock is sold
 - ◇ Seeds for next cropping season are consumed
 - ◇ Agriculture tools are sold
 - ◇ Money is borrowed from outside on high interest rates
 - ◇ Land is mortgaged or sold
 - ◇ Migration
 - ◇ Sale of essential household belongings
 - ◇ Begging
- Stage 4: At this stage, affected population is left with no other option but to take extreme measures such as:
- ◇ Raids on the warehouses of the Government or NGOs where food is stockpiled
 - ◇ Permanent out-migration of whole family
 - ◇ Residing in relief camps for emergency food
 - ◇ Begging
- Stage 5: Starvation and death
- 7- Coping strategies at community level do not always work but certainly contribute in ensuring survival during disaster. The standard practice of relief agencies usually comes during fourth and fifth stage when affected families threaten to raid warehouses
- 8- If the outsiders ignore existing resources at household and community level during the process of designing risk reduction measures, their indigenous coping mechanisms may be undermined that eventually lead to increasing people's vulnerability.

9- Tools for capacity assessment:

- ◇ Hazard Map
- ◇ Historical Profile
- ◇ Seasonal Calendar
- ◇ Gendered Resource Mapping
- ◇ Focus Group Discussion
- ◇ Livelihood / coping analysis
- ◇ Institutional and Social Network Analysis

Prevention and Mitigation Framework

1. Major Mitigation Components

Certain major components or activities generally apply to mitigation programs. These are covered below under the headings of non-structural mitigation and structural mitigation.

Non-Structural Mitigation

Legal framework: Generally speaking, existing disaster-related legislation tends not to place enough emphasis on mitigation. In establishing or reviewing such legislation, therefore, it may be advantageous to ensure that mitigation requirements are adequately covered. Land-use planning and the application of building codes provide some legal basis for successful mitigation. However, both these aspects tend to fall short of full effectiveness unless they are rigidly enforced.

Incentives: Incentives can often provide better inducements for mitigation than legal impositions. Government grants or subsidies may help to persuade commercial and other institutions to include mitigation measures in their building or reconstruction activities. The provision of government technical assistance can help towards the same end. Insurance can also provide useful incentives: for instance, insurance companies may be persuaded to offer reduced premiums for buildings, once hazard-resistant measures have been incorporated.

Training and education: If mitigation is to be successful, its requirements must be widely known and understood. Therefore, there is a need to train and educate all those involved, including disaster risk management officials, construction specialists and the general public. In this regard, public awareness programs can provide an important foundation by informing people generally of the need for and benefits of mitigation programs. In a more specific sense, programs of training and education are necessary to ensure that mitigation programs would be supported and properly implemented. Four target groups are especially important:

- Public officials who play a vital role in disaster risk management. Appropriate training modules should be incorporated in their career-path training programs and opportunities provided to them to attend specialist courses.
- Technical students whose professional education should include disaster mitigation courses.
- Small builders and craftsmen who may be given on-the-job training in simple mitigation practices.

- School children who should be introduced to simple mitigation measures in the context of environmental studies, natural science or geography classes.

Public awareness: In addition to general awareness, certain particular areas of public involvement are necessary for effective implementation of mitigation programs. These include:

- A good public knowledge and understanding of local hazards and vulnerabilities.
- Public awareness of the kind of mitigation measures which can be applied.
- Public participation in community preparedness programs.

Governments can substantially assist public awareness of safe mitigation practice by ensuring that their own public buildings (such as post offices, tools, hospitals, government offices) and services are built to high safety standards. This will also help to ensure that designers, builders and engineers gain experience in safe construction and, at the same time, contribute to a safer environment.

Institution building: The strengthening of a country's or community's social structure can enhance disaster mitigation capacity. Such strengthening is, however, difficult to achieve. Three possible ways are to extend normal development as follows:

- First, through institution building; Organizations that serve as coping mechanisms can be identified and strengthened. A deliberate effort can be made to increase their institutional capacities and skills thus enhancing their ability to deal with a crisis.
- Second, through increasing the number of coping mechanisms within a country or community. By developing formal institutions and linking them to outside resources, means are established for intervention and the provision of assistance.
- Third, through encouraging actions that promote co-operation among different groups within society. Such cooperation can considerably reduce the social impact of disasters.

In their development activities, both government and non-government agencies should be careful to avoid actions that will further increase or institutionalize a society's vulnerability. It is especially important to identify institutional dependency relationships, particularly those that may be increased in a disaster situation, and work to eliminate them. By increasing self-sufficiency, agencies may improve the ability of families and communities to cope with disaster. This can be a mitigating

factor and help to speed recovery. Strong institutions can play a vital role in various aspects of mitigation, such as promoting public awareness programs, training at community levels and monitoring hazards and vulnerabilities.

Warning systems: Various modern developments have significantly improved the ability of disaster management authorities to provide effective warning of impending disaster. Better warning systems have, for instance, been instrumental in evacuating vulnerable groups, moving livestock to safety and mobilizing emergency services and resources. In the particular context of mitigation, three matters are underlined here.

- The steps between the issuing of warning and the taking of action by relevant authorities or vulnerable people are critical.
- Evacuation should only be ordered when there is virtual certainty of hazard impact; a false evacuation order for a hazard that does not materialize can destroy public confidence in the warning system and neutralize several years of preparedness planning.
- To the extent possible, the dissemination of warnings should use duplicate systems to ensure effectiveness. For example, radio message backed up by siren warnings; warning flags backed up by house-to-house visits by local wardens.

Agricultural mitigation measures: Various measures can be applied in agriculture to mitigate the effects of disaster. These include:

- The planting of shelter breaks, comprised of trees and shrubs, to reduce wind effects.
- Crop diversification.
- Adjustments to crop planting/harvesting cycles.
- Food storage programs to insure against shortage arising from disaster.

Structural Mitigation

Non-structural mitigation measures may need to be complemented by structural measures. In the case of flood-prone areas, embankments, regulators, drains or bypass channels can be provided, where appropriate, to protect areas from damage by floods. Techniques to mitigate the effects of earthquakes, cyclones and floods on structures also exist. Structural mitigation measures may apply to both engineered structures and non-engineered structures.

Engineered structures: Engineered structures involve architects and engineers during the planning, designing and construction phases. They may include buildings ranging in scale from simple dwellings to multi-story office blocks, as well as infrastructure such as electricity pylons to dams, embankments, ports, roads,

railways and bridges. While professionals are trained to plan, design and supervise the construction of buildings and infrastructure to achieve necessary structural safety standards, they may need additional training to incorporate mitigation practices into their design of structures resistant to seismic shock, storm winds or floods. The application of sound technical principles is achieved through:

- site planning;
- assessment of forces created by the natural phenomena (earthquake, typhoon and flood);
- the planning and analysis of structural measures to resist such forces;
- the design and proper detailing of structural components;
- construction with suitable material; and
- good workmanship under adequate supervision.

Most countries have building codes for engineered construction. These codes provide general guidelines for the assessment of forces and further analysis, appropriate design methodologies and construction techniques. If a country does not have a building code which specifies design and construction requirements for earthquake and wind forces, such a code should be formulated as soon as possible, technical personnel trained in its use and enforcement ensured. The quality of construction is as important as good analysis and design. Good workmanship must be encouraged by appropriate training and supervision to achieve better performance.

Non-engineered structures: Non-engineered structures are those constructed by their owners themselves or by local carpenters and masons who generally lack formal training. Such structures mainly comprise simple dwellings and public buildings, built with local materials in the traditional manner. In some disasters, high casualties and economic losses can be attributed to the failure of non-engineered structures. The improved designs vary according to the many different traditional ways of building that suit various cultures, climates, available skills and building materials.

Another important aspect of increasing the safety of non-engineered structures is to try to ensure that they are not built on hazardous sites such as steep slopes subject to landslides, floodplains subject to flash floods or river bank erosion, or coastal areas exposed to storm surges. However, people often do not want to leave their traditional homes and the area in which they have been living for generations, even though the location may be hazard prone. Economic pressures may also induce people to settle in hazardous areas. Wherever practical, incentives should be offered to attract people out of hazardous locations; alternatively, consideration may be given to substituting appropriately engineered structures where this might be

practical and economic, or mitigation measures introduced in non-engineered constructions so as to enhance their safety.

2. Formulation and Implementation of Mitigation Programs

The requirements and circumstances for formulating and implementing mitigation programs are likely to differ in various countries. However, the information given should be of general assistance.

- If possible, a simple broad strategy should be devised to cover foreseeable mitigation requirements. This strategy should contain component programs, with desirable priorities.
- The strategy should be interlocked, as far as possible, with national development planning, environmental considerations and other disaster risk management activities.
- A system for monitoring and reviewing the strategy should be introduced and applied.
- Responsibility for overseeing and coordinating mitigation activities should be clearly defined. Normally, this responsibility would be vested in the Minister/Official responsible for disaster-related affairs or the Commission on Emergency and Disaster Management, with clear down ward delegation. Responsibility for individual mitigation programs should also be clearly defined.
- There should be a requirement for an annual progress report covering mitigation activities; this should normally be embodied in an annual disaster risk management report to Cabinet.
- Mitigation activity should be regarded as a suitable and productive area for international assistance.
- Since many different agencies are likely to be involved in mitigation programs, the national disaster risk management office (in the case of Afghanistan Department of Disaster Preparedness) or section should be authorized (on behalf of government) to fulfill day-to-day liaison requirements, in order to ensure coordination of effort.
- For individual mitigation programs it is likely that a particular government ministry/department can be given the lead role. For instance, a mitigation program to protect and conserve a vital road system should be led by the Ministry responsible for roads.
- Mitigation programs should not be regarded as, or be allowed to become, a separate activity. They should be part of an integrated national program.

3. Guiding Principles of Mitigation

The following principles are widely recognized as providing a valuable guide to disaster mitigation.

Initiation

Disasters offer unique opportunities to introduce mitigation measures.

Mitigation can be introduced within the three diverse contexts of reconstruction, new investment and the existing environment. Each presents different opportunities to introduce safety measures.

Management

Mitigation measures are complex and interdependent, and they involve widespread responsibility. Therefore, effective leadership and co-ordination are essential to provide a focal point.

Mitigation will be most effective if safety measures are spread through a wide diversity of integrated activities.

"Active" mitigation measures that rely on incentives are more effective than "passive" measures based on restrictive laws and controls.

Mitigation must not be isolated from related elements of disaster planning such: as preparedness, relief and reconstruction.

Prioritization

Where resources are limited, priority should be given to the protection of key social groups, critical services and vital economic sectors.

Monitoring and Evaluation

Mitigation measures need to be continually monitored and evaluated so as to respond to changing patterns of hazards, vulnerability and resources.

Institutionalization

Mitigation measures should be sustainable so as to resist public apathy during the long periods between major disasters.

Political commitment is vital to the initiation and maintenance of mitigation.

Mainstreaming Disaster Risk Reduction

Introduction

Since the late 1990s, there has been increasing recognition of the need to 'mainstream' disaster risk reduction into development – that is, to consider and address risks emanating from natural and human induced hazards in medium-term strategic frameworks, sectoral strategies and policies of the countries and in the design of individual projects in hazard-prone countries.

The rising interest in mainstreaming disaster risks has also been fuelled by a gradual upward rise in reported disaster losses, primarily due to the increasing vulnerability to natural and man-made hazard events of economic and social assets and the wellbeing and livelihoods of populations. Between the 1950s and 1990s, the reported global cost of disasters increased 15-fold in real terms while numbers affected rose from 1.6 billion over the period 1984–1993 to almost 2.6 billion during the subsequent decade.

The need to mainstream disaster risk reduction into development was formalized in January 2005 when the Hyogo Framework for Action 2005–2015 was adopted by the World Conference on Disaster Reduction with 168 nations and multilateral institution signatories. The Hyogo Framework is centred around three principal strategic goals, the first of which is "the more effective integration of disaster risk considerations into sustainable development policies, planning and programming at all levels, with a special emphasis on disaster prevention, mitigation, preparedness and vulnerability reduction".

Mainstreaming is an ongoing process not a one-off technical activity. Successful mainstreaming requires more than just developing appropriate approaches and tools. A change in organizational culture is required to ensure integration at all levels of the organization and across all programmes. Political commitment and motivation, including financial support, can contribute to strengthening the organizational culture.

Mainstreaming has three purposes:

- To make certain that all the development programmes and projects are designed with evident consideration for potential disaster risks and to resist hazard impact.
- To make certain that all the development programmes and projects do not inadvertently increase vulnerability to disaster in all sectors: social, physical, economic and environment.

- To make certain that all the disaster relief and rehabilitation programmes and projects are designed to contribute to developmental aims and to reduce future disaster risk.

Mainstreaming requires analysis both of how potential hazard events could affect the performance of policies, programmes and projects and of the impact of those policies, programmes and projects, in turn, on vulnerability to natural hazards. This analysis should lead on to the adoption of related measures to reduce vulnerability, where necessary, treating risk reduction as an integral part of the development process rather than as an end in itself.

'Win-win' solutions for securing sustainable development, reducing poverty and strengthening hazard resilience, therefore, need to be explicitly and actively sought, particularly as climate change looks set to increase the incidence of droughts and floods and the intensity of windstorms. Such solutions are best derived by integrating disaster risk reduction strategies and measures within the overall development framework, viewing disaster risk reduction as an integral component of the development process. As a recent World Bank report stated, "...it would be well to remember that there is no period when disaster risks can be safely ignored or set aside, specially for the subgroup of countries that is highly vulnerable to disasters". Instead, hazard-related issues need to be considered in national and sectoral development planning, country programming and in the design of all development projects in hazard-prone areas, seeking both to protect the development investments themselves against natural hazards and to strengthen the hazard resilience of the communities they serve. Hazard-proofing individual structures may not even cost much.

Development practices in Pakistan are not fully considerate about disaster risks. Historically, disasters have affected all development sectors in our country. A sketchy estimate indicates that the economic losses caused by disasters over the past sixty years are higher than 30 billion US dollars. When disaster occurs, the government diverts precious resources for relief and response, and the reconstruction of damaged infrastructure and facilities as evident from October 2005 earthquake in the country.

An important priority of National Disaster Management Authority (NDMA) is to promote the adoption of a risk sensitive approach in development planning and programming in all sectors. The purpose of this effort is to ensure that all development infrastructures in hazard-prone areas are built to higher standards of hazard resiliency; e.g. schools, hospitals, roads, bridges, dams and telecommunications infrastructure etc. This can be done by incorporating risk and vulnerability assessment into project planning stage, and including vulnerability

reduction measures in project implementation in case the proposed projects are found vulnerable to hazard risks.

Who is responsible for mainstreaming DRR efforts?

Risk reduction initiatives must be multi-disciplinary partnerships involving a range of stakeholders. Such partnerships should be vertical (between national and local actors) and horizontal (between government, the private sector and civil society). Disaster stakeholders thus comprises of international aid agencies, governments (at all levels), NGOs and other civil society organizations, academics, consultants, military agencies and private sector. All of these have a role to play in reducing risk – together, with vulnerable communities, who are the main actors in mitigation and response at local level.

Nevertheless, it is important to remember that the primary responsibility for all aspects of disaster management rests with the government of the country. This includes: planning and implementing long-term risk reduction and preparedness measures; requesting and administering disaster relief and rehabilitation operations, requesting international assistance if required; and coordinating all disaster-related assistance programs, both nationally and internationally-funded.

Barriers to mainstreaming DRR

Although a diversity of experiences exist across regions on how mainstreaming DRR has been attempted (and to varying degrees succeeded), there have been few, if any attempts to document the process and compare the elements of ‘mainstreaming’ across contexts. Perhaps a limitation in bringing together such experiences, is also in the fact that there has been a tendency for national and international actors to concentrate on the policy aspects of mainstreaming efforts e.g. incorporating DRR considerations into strategies, national frameworks of action etc, but not necessarily complimenting such efforts with dedication of resources for the operationalisation of mainstreaming approaches.

Main barriers to the mainstreaming DRR:

- Lack of awareness
- Cross cutting issues
- Lack of coordination
- Lack of resources
- Political commitment

Steps to successful mainstreaming

The development of practical guidelines on the integration of disaster risk concerns within development sector programming, project design and evaluation represents



only one strand in a series of steps required to ensure successful mainstreaming in hazard-prone areas. These are summarised and presented as sequential steps as given here.

Step 1. Awareness-raising

- Appreciation and understanding of the relevance of disaster risk reduction to sustainable development. Increased awareness of the potential importance of examining and, if necessary, addressing disaster risk is critical, on the part of both governments and development organisations, in striving for sustainable development and poverty reduction.
- Accountability. Most fundamentally of all, governments need to accept greater accountability for hazard-related human, physical and economic losses. Governments need to assume greater responsibility for their countries’ and peoples’ vulnerability and to actively seek to reduce risk.

Step 2. Enabling environment

- Appropriate organisation policies, strategies and institutional capacities. Overarching policies and strategies need to pay due attention to disaster risk reduction, regarding it as a development issue rather than the responsibility of humanitarian departments.
- Government prioritisation of disaster risk reduction. It is essential that governments themselves prioritise risk reduction as a critical development challenge in high-risk areas.

Step 3. Development of tools

- Programming, appraisal and evaluation tools are required to investigate sectors and individual projects at risk from natural hazards, provide detailed information on the nature and level of risk and ensure that appropriate risk reduction measures are taken.

Step 4. Training and technical support

- Government needs to provide appropriate internal training and technical support to support the integration of disaster risk concerns into development.

Step 5. Change in operational practice

- **Early assessment.** It is essential that hazard-related issues are considered during the very early stages of sectoral programming and project design so that they can be fully and systematically taken into account and appropriately addressed where relevant.
- **Adequate supporting information.** Sufficient information is necessary to permit a full and accurate assessment of disaster risk and its appropriate treatment.
- **Cost minimisation.** Disaster risk analysis should be integrated into sectoral programming and project design at minimum cost. Pooling of relevant

information and related analysis within the government would help achieve this.

- **Treatment of low-probability, high-impact risks.** Climatologically hazards are most likely to be identified as potential risks, reflecting their shorter return periods and thus higher probability that they will occur over the life of a project or country strategy. In contrast, risks emanating from earthquakes and volcanic hazards, with much longer return periods, may be discounted. However, even if ignored from an economic perspective, it is important to ensure that earthquake risks are adequately considered from a safety perspective, taking rights to safety and protection into account.
- **Transparent, inclusive and accountable consultation.** The consultative process must give a voice to poor and marginalized groups, who are often among the most vulnerable to natural hazards, and ensure that their interests are adequately addressed and their rights protected.
- **Adequate upkeep and maintenance of development investments.** Mechanisms for ensuring that development investments are adequately maintained and remain in good condition are essential in ensuring that their designed level of hazard resilience is maintained.

Step 6. Measuring progress

- Internationally agreed targets for disaster reduction should be established, providing a focus for the government against which progress in mainstreaming can be measured.

Step 7. Learning and experience sharing

- The government, together with other stakeholders, should make a concerted effort to monitor, share and learn from its experience in mainstreaming disaster risk reduction into development.