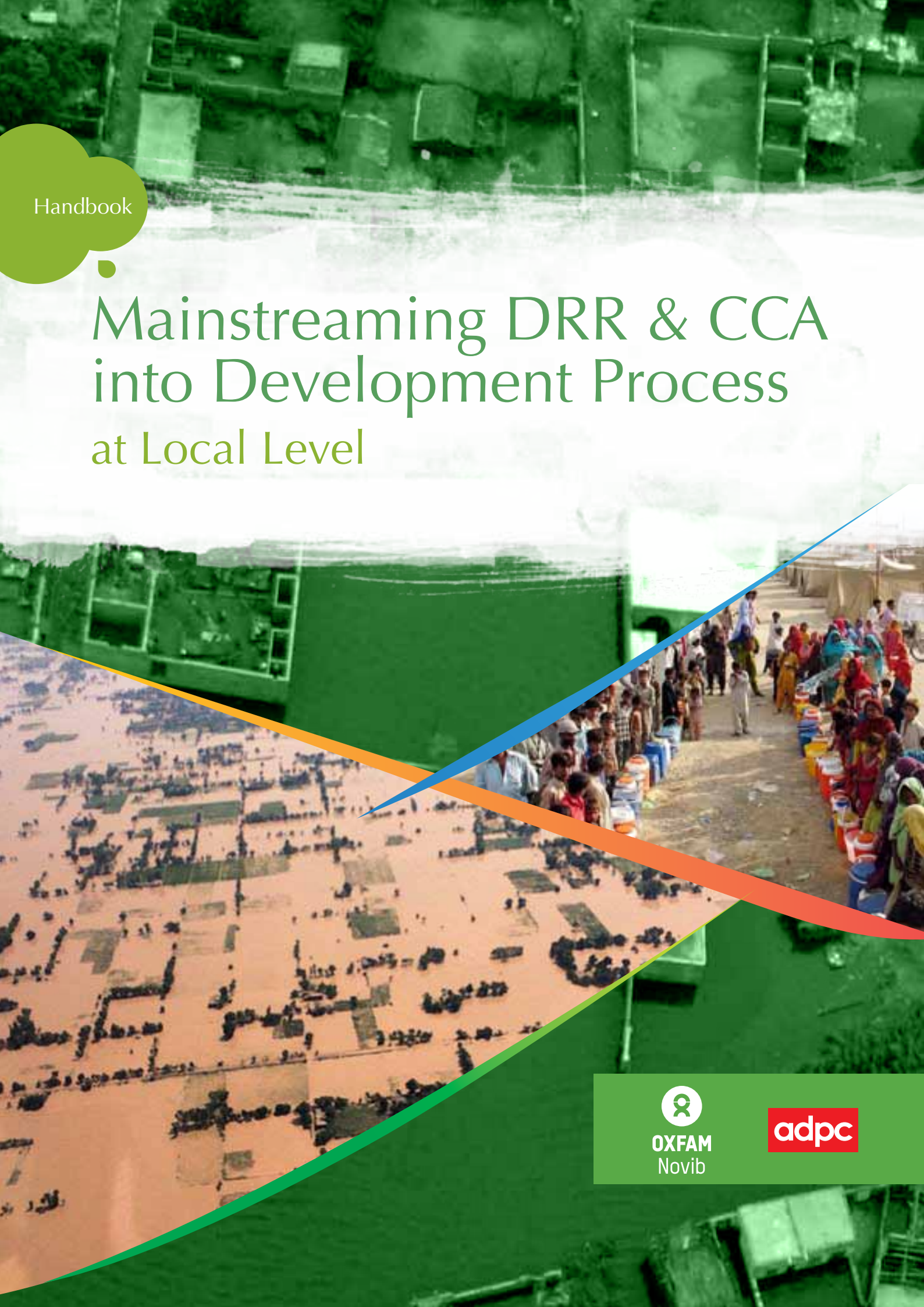

Handbook

Mainstreaming DRR & CCA into Development Process

at Local Level

OXFAM Novib

adpc

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Introduction to Disaster Risk Management

Basic Terms and Concepts used in Disaster Management

Crisis

A crisis is any event that is, or is expected to lead to, an unstable and dangerous situation affecting an individual, group, community, or whole society. The management is required to take appropriate decisions and measures to manage the crisis properly because if not managed properly, it can lead to a disaster.

Disaster

Serious disruption of the functioning of society, causing widespread human, material or environmental losses, which exceed the ability of the affected people to cope using their own resources.

Disaster Management

Disaster Management is a collective term encompassing all aspects of planning for, preparing and responding to disasters and refers to the management of the consequences of disasters and includes all the pre and post disaster interventions.

Hazard

A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Vulnerability

Vulnerability means the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

Types of Vulnerability

- **Physical Vulnerability** Physical weakness or structural drawback that makes some buildings, assets or areas susceptible to damaging impacts of disasters.
- **Social Vulnerability** Conflicts among communities, lack of capacities, lack of knowledge, skill or preparedness or giving in attitude of the communities make them vulnerable to negative impacts of hazards.
- **Economic Vulnerability** Lack of economic resources or dependence on one source of livelihood because of which a community, or some part of it, becomes liable to damages in case of a disastrous event.
- **Environmental Vulnerability** Environmental degradation, deforestation or other environment related factors which makes the surrounding areas vulnerable to losses by possible disasters.

Exposure

By exposure we mean, proximity or closeness of the people, property, systems, or other elements to the hazard zones that are thereby subject to potential losses in case of any disasters.

Capacity

Capacity is the combination of all the strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals or to resist and fight the negative impacts of disastrous situation. Building capacities is the key to reducing vulnerabilities and constructing disaster resilient societies because coping capacity is the ability of people, organizations and systems, using available skills and resources, to face and manage adverse conditions, emergencies or disasters.

Disaster Risk

The potential losses in lives, health status, livelihoods, assets and services, which could occur to a particular community or society over some specified future time period (UNISDR). The combination of the probability of an event to happen and its negative consequences determine the extent of disaster risk.

Components of Disaster Risk

$$\text{Disaster Risk} = \frac{\text{Hazard x Exposure x Vulnerability}}{\text{Capacity}}$$

Disaster Risk Management (DRM)

Disaster risk management (DRM) aims to avoid, reduce or transfer the adverse impacts of hazards on people, property and the environment through activities and measures. It is the systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.

Disaster Risk Reduction (DRR)

Disaster risk reduction is the preparation and application of policies, strategies and practices to minimize vulnerabilities and hence disaster risk throughout society. It is the concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

Mitigation

All actions taken to minimize the extent of a disaster or potential disaster are called mitigation measures. These actions include Physical or structural measures, Non-structural interventions and steps to Environmental upgradation.

Preparedness

Disaster Preparedness involves specific measures taken before disasters strike. These methods include disaster forecasting, early warnings etc. The knowledge and capacities are developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions.

Prevention

Prevention Activities are the steps to avoid the adverse impact of hazards. These activities contain Capacity Building, Community Based Disaster Risk Management (CBDRM) etc.

Recovery

Recovery means restoration, and improvement, where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors.

Rehabilitation

Rehabilitation is restoration of an entity to its normal or near-normal functional conditions after the occurrence of a disaster. It includes Re-establishing essential services and Reviving key economic and social activities.

Reconstruction

Permanent measures to repair or replace damaged dwellings and infrastructure and to set the economy back on course, is categorized as Reconstruction.

Disaster Management and its Phases

The whole spectrum of disaster management is generally divided into pre-disaster and post-disaster interventions. The post disaster activities are phased as per needs of the affected populations in accordance with international standards. These activities start with the immediate rescue and relief efforts to provide immediate respite to the affectees as per the estimates reached in rapid need assessment carried out soon after the disaster strikes. These activities are called response activities and protection of the vulnerable groups remains a vital consideration during this phase. In the recovery phase facilities, livelihoods and living conditions are improved to such a level that the stage is set for rehabilitation to begin and for their lives to be brought to normal. It is only when the disaster affectees are rehabilitated to a state of normalcy that the process of reconstruction starts wherein the cities, infrastructure, households and economies are built back better so that their vulnerabilities to a similar disaster in the future are reduced.

Pre Disaster
Early Warning
Preparedness
Awareness & Capacity Building
Prevention & Mitigation
Risk Assessment

Post Disaster
Search & Rescue
Relief
Recovery
Rehabilitation
Reconstruction

The pre-disaster interventions start with Risk assessment which include hazard, vulnerability, exposure and capacity or resource assessments in detail to gauge the extent of disaster risk, its possible damages, vulnerable populations and the capacity of and resources available with the communities to absorb the effects of disasters. This assessment serves as the basis for strategizing and prioritizing rest of the pre-disaster activities which include prevention and mitigation measures, awareness and capacity building of the people and disaster management practitioners to enhance their preparedness and resilience and finally establishing an effective early warning system to reduce the disaster risks. It is universally accepted that any investments on disaster risk reduction in the pre-disaster phase is more beneficial economically because the resultant saving in post-disaster phase is manifold. Hence, while the government and disaster management institutions remain prepared for any eventuality, their main focus is and should be on the pre-disaster activities to promote disaster resilient societies.

Disaster Management Approaches

IPCC 4th report has identified following approaches towards disaster management.

Reduce Exposure

If a tree falls in the woods when there is nobody to listen to it, it may produce a sound technically, but practically it does not produce a sound because nobody listens to it. Similarly if a natural calamity happens but there are no people, assets, infrastructure or economies within the sphere of disastrous activity, it cannot be called a disaster. The reason behind massive human and material losses during disasters is that communities and infrastructure are exposed to hazards. This approach focuses on reducing exposure of the elements at risk and hence managing disasters by reducing possible losses. It visualizes a scenario where no elements are allowed to remain in the hazardous zones.

Increase Resilience to Changing Risks

The living conditions are changing and with that the extent, intensity, scope and nature of the disaster risks are also changing and this phenomenon is further exacerbated by the changing climatic conditions in the world in general and Pakistan, in special. This approach concentrates on building societies and economies in such a manner that they can resist the adverse effects of the changing nature and intensity of the risk, especially due to impacts of climate change.

Transformation

Change is the only permanent phenomenon in the world. Today's world and way of life are fast changing and so are the looming dangers of disasters and climate change. This approach aims to transform the ways of life and our economic activities and adapt to the changing environment. This includes taking account of the available resources, especially the depleting natural resources and changing weather patterns, and then molding socio-economic activities to suit the future scenario.

Reducing Vulnerability

Vulnerability means physical, social, economic or environmental weakness in a community and infrastructure because of which they are prone to different natural and man-made hazards. For example a poorly built housing on the earthquake fault line, a mud house built in the river bed, a politically, religiously or socially polarized community in a politically volatile region like Asia or an agriculture based economy in an area subject to climate change are all vulnerable in different ways to different types of hazards. And to reduce vulnerabilities we may build earthquake resistant codes compliant housings, build brick houses on a higher ground, groom cohesive internally united community and change cropping pattern, respectively. Hence this approach manages risks by reducing vulnerabilities by structural and non-structural mitigation measures.

Prepare, Respond and Recover

This approach stresses on making adequate preparations for response and recovery phases in case a disaster strikes. This includes search and rescue preparation and capacity building of the apparatus, stockpiling relief items for prompt relief activities after disasters and finally enhancing, researching and developing expertise in recovery and rehabilitation phases. This would reduce human and material losses only through better preparation for any eventuality. Public awareness and building coping capacities of the government disaster management apparatus and community organizations would also help this cause.

Transfer and Share Risks

Transferring risk means changing the course of river, for example, to avoid urban flooding where massive infrastructure and people are at risk and redirecting water to the rural areas where there would be smaller human and infrastructure losses. Sharing risks also means reducing the severity of the danger by diverting some portion of it to other areas. This approach is not successful in case of all the natural and man-made disasters.

Disaster Risk Situation of Sindh Province

The province of Sindh has historically suffered from both natural and human induced disasters. The high level of risk is mainly from floods/ heavy rains, cyclones in coastal area, sea intrusion, droughts, earthquakes, and epidemics etc.

Floods/ Rains

The topography of Sindh Province is almost flat and located at the bottom of Indus basin. The surplus water of Indus River and its tributaries including monsoon rain water has to pass through Sindh. Hill torrents which emanate from Baluchistan are also adding up to the pressure on both accounts, till its outfall in the Arabian Sea. The River Indus in Sindh is dangerous, because it flows at ridge. In case of breach the out flowing water cannot be drained back into the river at any point. The Indus River is also known for changing its course. High floods since the creation of modern irrigation network in 1932 are being monitored. The river Indus is contained by flood protection embankments, which are 1400 miles long, so as, to protect irrigation network emanating from three barrages having 12.8 million acres of command area. Besides, there is a large network of surface drainage and 6000 public tube wells, roads and railways network, cities / towns, rural settlements etc. The high floods occurred during 1942, 1956, 1957, 1958, 1973, 1975, 1976, 1979, 1992, 1994, 1995, 2003, 2005, 2007, 2010, 2011 and 2012.

Cyclone

The coastal districts have also been adversely affected by heavy rainfall and cyclones. The three coastal districts - Karachi, Thatta and Badin, are highly vulnerable. The districts of Thatta and Badin have been badly affected on several occasions. Cyclones not only wiped out the human settlements and resulted in the huge losses of human and animal lives, but they also destroyed and damaged fishing boats, therefore badly affecting the livelihood of the majority of residents of these two

districts. Historically, the tropical cyclones are formed over the Arabian Sea and made landfall at the coastal areas of Sindh. Major cyclones during the last 100 years which hit Sindh were in May 1902, June 1926, June 1964, November 1993, June 1998, May 1999 and June 2007 (Cyclone– 02A). The Cyclone Yemen in 1999 hit three coastal districts of Sindh, where 244 people lost life, 40177 animals perished, villages affected were 1449, houses damaged were 29873 and population affected was 0.5 million. Loss in financial terms was about Rs. 3.231 billion. Keti Bunder town was wiped out four times in recent history. The cyclones of 2010 (PHET) and 2011(KIELA) also emerged during last few years, out of which PHET caused significant damages in district Thatta.

Tsunami

The Sindh province can be a recipient of a tsunami disaster also. A tsunami disaster occurred in November 1945 at Makran coast in Baluchistan Province. It produced sea waves of 12-15 meters height that killed about 4,000 people. Although Karachi was away from the epicenter, yet it experienced 6 feet high sea waves which affected harbor facilities. This usually happens during the months of March, April and May. The effects of tsunami of December, 2004 were also felt along the Pakistan coastline. Abnormal rise in water, detected by tide gauge station at Keti Bander area created panic in the coastal population including Karachi.

Drought

Sindh geographically can be divided into four zones namely eastern desert, western hilly / mountainous area, coastal area in the south and irrigated agriculture area in the middle. Its 60% area is arid receiving rainfall on average of 5 inches during monsoon and very little in December & January. The arid area population depends upon the scanty rainfall raising livestock and millet crops. The failure of rainfall and global climatic effects reduce the water supplies in Indus River System (IRS). Sindh, being at the end of the system, usually takes the brink. Besides, two-third of ground water is brackish and 80% agricultural land is affected by water logging and salinity. People in the arid area usually move to canal commanded area but low flow in the river Indus from 1998-2002 created havoc in the entire province. Historically, Sindh faced the worst drought situation during 1871, 1881, 1899, 1931, 1942 and 1999-2002 and 2013-14.

The relative severity of various vulnerabilities / hazards per district-wise in Sindh is given as under (Taken from Provincial DRM Plan Sindh Province):

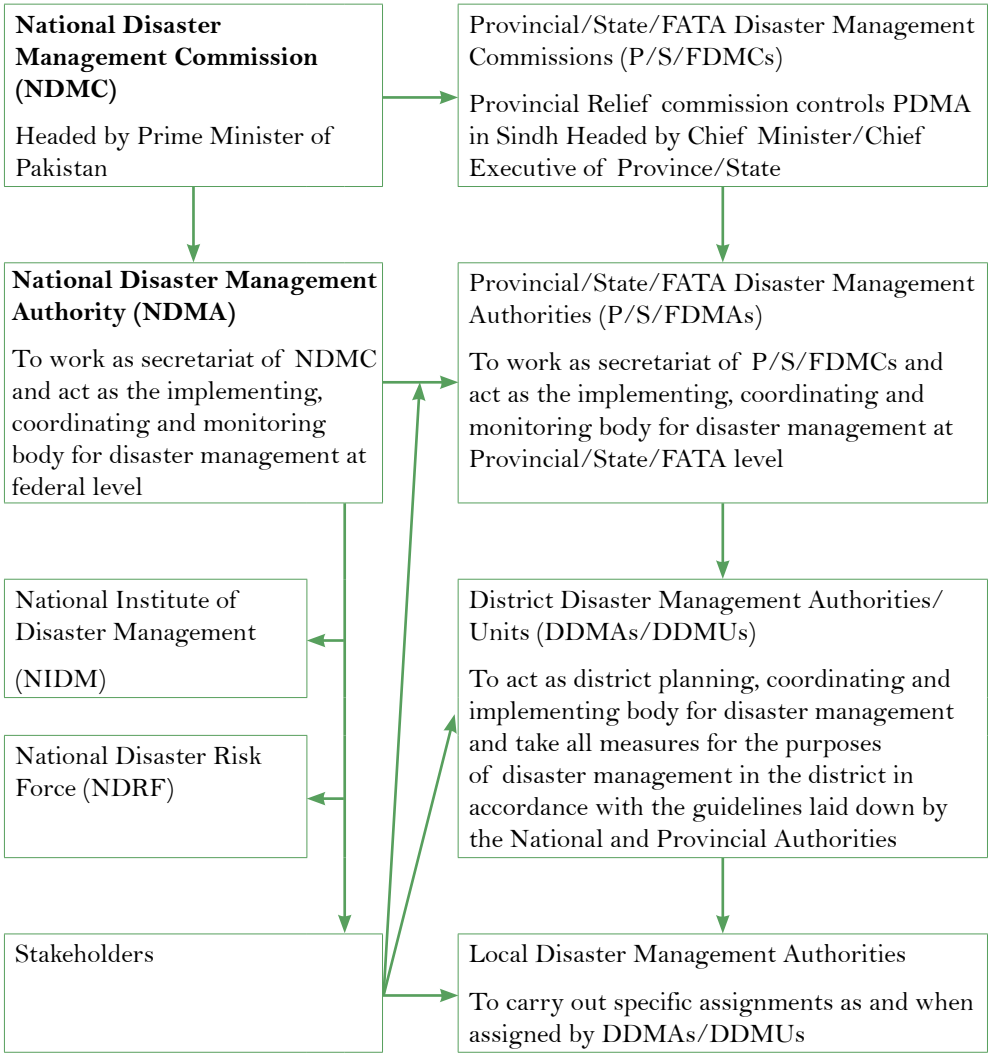
District	Drought	Floods / rains	Cyclones	Tsunami	Earthquake	Landslides	Communicable diseases	Fire	Locusts / pests	Crisis situation	Industrial & mines accidents cyclones	Refugees& IDP's
Karachi	4	3	4	4	3	1	3	5	---	5	5	3
Thatta	4	4	4	4	2	---	4	2	---	2	1	3
Badin	4	5	5	4	3	---	4	1	1	2	1	4
Tharparkar	5	3	3	3	4	---	4	2	4	3	1	1
Umerkot	5	3	2	1	2	---	3	2	3	1	1	2
Mirpurkhas	4	3	2	2	2	---	3	3	1	1	1	1
Tando allahyar	3	4	2	1	2	---	3	3	1	1	1	1
Tando m.k.	3	4	2	1	2	---	4	2	1	1	1	1
Hyderabad	3	3	1	1	1	---	3	3	1	3	3	3
Mitiari	3	4	1	1	1	---	3	1	1	1	1	1
Nawabshah	4	4	1	1	1	---	3	2	3	1	2	3
Naushahro feroze	3	4	1	1	1	---	4	1	1	1	1	1
Khair pur	4	4	1	1	1	---	3	2	4	1	2	1
Sukkur	3	3	1	1	1	---	4	2	4	2	2	1
Ghotki	3	4	1	1	1	---	3	3	4	1	3	3
Shikarpur	2	3	1	1	1	---	3	2	1	3	1	2
Kashmore	2	5	1	1	1	---	4	1	1	3	1	3
Jacobabad	3	5	1	1	2	---	4	1	1	4	1	3
Larkana	3	3	1	1	2	---	3	1	1	3	1	2
Kambar Shahdadkot	5	5	1	1	3	---	3	1	1	3	1	3
Dadu	5	4	1	1	3	---	4	1	1	3	2	3
Jamshoro	5	3	1	1	3	---	2	2	1	1	2	1
Sanghar	4	4	2	1	1	---	2	1	3	1	1	3

Earthquake

The recent earthquake that affected Sindh desert area was recorded in the year 2001 in Tharparkar district and the bordering Badin District was also badly affected. Due to this earthquake 12 people lost their lives, 115 persons got injured, 1989

Disaster Management System in Pakistan

National Disaster Management Act 2010 envisages following disaster management system in Pakistan:



houses were fully damaged, 43,643 houses partially damaged and 1406 public sector buildings got damaged. Loss in financial terms was recorded around Rs. 2.4 billion.

A geological tectonic line runs under Karachi through Khirthar Hills / Mountains to north-west of Sindh and Thar Desert, due to which Sindh has risk of a major earthquake in the future. The latest earthquake occurred on 16th April 2013 in Iran whose effects were felt in Pakistan but damages happened in Balochistan

only. It was recorded in Karachi at Richter scale at 5.5 which strongly jolted the entire province.

Sea Intrusion

Other than drought and cyclone/tsunami coastal area of Sindh is also badly affected by sea intrusion. Thatta and Badin districts are among the most vulnerable areas. The out flow of water downstream Kotri Barrage is continuously declining which has resulted in massive sea intrusion in coastal area of both the districts. This intrusion has wreaked havoc not only on human and fish population, but has also badly damaged the precious agricultural land. The sea intrusion is shrinking sea food market every year due to depletion of fish and shrimp population in the area. By one estimate coastal district of Thatta and Badin's 9 Taluka, 87 Dehs, 47 Irrigation Channel are affected. Area affected is 1.2 million acres.

National DRM Policies and Plans

National Disaster Management Plan (2012-2022)

National Disaster Management Authority (NDMA), with the cooperation of JICA, developed NDMP with the aim to enhance the capacity of the country to prepare for and respond to natural disasters and objective to develop overall Disaster Management Plan having following component:

- National Disaster Management Plan;
- Human Resource Development Plan;
- Multi-hazard Early Warning System Plan; and
- Community Based Disaster Risk Management

It presents 10 major interventions for DRM, envisages 41 strategies and 118 projects in the implementation time frame of 10 years with the cost of PKR 92.02 Billion.

The main volume of NDMP presents a 10-year master plan for DM (costing PKR 6,843.04 million), based on historical & scientific data collection and analysis, macro-zonation of the whole country and its documentation, hazard profiling supported with GIS mapping, prioritizing the most vulnerable districts, defining

disaster management measures for all hazards (Geological, meteorological, industrial, biological) and defining roles and responsibilities for all stakeholders during all the phases of disaster.

The first volume, *Human Resource Development Plan* (*HRDP*), with the cost of PKR 568.4 million, visualizes the systematic development of HR capacity of the DM System through strong institutional base for promoting DRM training, education, awareness & research and establishment of National Institute for Disaster Management (NIDM) for capacity building of DRM practitioners/officials, relevant government institutions for mainstreaming DRR into development and communities for public awareness and building disaster resilient societies.

Multi-hazard Early Warning System Plan (*Volume–II*), with the cost of PKR 1,666.34 million, aims to reduce risks and societal vulnerabilities to them with multiple disasters – including floods, GLOFs, landslides, droughts, tsunamis and cyclones with storm surges, fires, epidemics, defines implementation strategies to strengthen weather forecasting and Early Warning System (EWS), prepare hazard maps at local scale for targeted locations, strengthen Early Warning (EW) dissemination system and develop capacity of EW and evacuation systems.

The fourth volume, **Community Based Disaster Risk Management** (**CBDRM**), with the cost of PKR 123.73 million, envisions conducting CBDRM activities in five pilot communities' sites, designing guidelines for instructors/facilitators to raise awareness and capacities, guidelines for communities to formulate strategies for local DRM activities, preparing community-based DRM plans, enhancing knowledge of DRM and ability to conduct drills and defining organizational structure of Community Disaster Risk Management Committees with defined roles of staff members.

National Disaster Risk Reduction (DRR) Policy (2013)

National DRR Policy envisions "A Pakistan that continuously builds up its resilience to shocks from natural and man-made hazards". The *Guiding Principles* are multi-hazard approach, promoting vulnerability and risk assessments as the basis of DRR, strengthening community participation and capacity in DRR, strengthening the resilience of vulnerable groups, subsidiary/strict and clearly defined division of roles, promoting inter-organizational partnerships and accountability and transparency. The *Key Objectives* of the policy comprise integrated national capacity to identify & monitor risks, local level risk reduction capacity, promoting resilient development planning, resilience of key infrastructure and lifelines, multi-hazard early warning capacity,

national disaster preparedness and response capacity ad systematic integration of DRR into recovery and reconstruction.

The proposed *policy interventions include risk knowledge, prevention and mitigation and preparedness.* For the intervention of *Risk Knowledge* risk atlas or index at national level would be developed, local/district level risk assessments would be carried out, damage and loss data-base would be maintained and climate change focused research would be facilitated. For the second intervention of *Prevention and Mitigation*, local level DRR systems would be developed in high-risk areas/communities, risk conscious & disaster resilient development would be promoted, key-infrastructure and life-lines would be made disaster resilient and risk awareness and knowledge would be spread. The third intervention of *Preparedness* visualizes multi-hazard EWS, integrated national preparedness capacity development and disaster risk financing mechanisms.

In line with NDM Act 2010, NDMP and National DRR Policy, NDMA, P/S/FDMA and DDMAs are supposed to prepare annual DRM plan after conducting detailed risk analysis and assessment and streamlining prevention and mitigation measures and frame strategies for DRR mainstreaming and capacity building of the communities with the aim to promote disaster resilient societies. Accordingly, monsoon contingency planning is being prepared at local and provincial levels and finally consolidated at national level for the last few years in Pakistan and the process has remarkably streamlined monsoon contingency procedures in the country.

After the massive losses caused by super floods in the years 2010, 2011 and 2012, not only disaster management system has been streamlined but also the procedures and processes has been put in place in government institutions. Accordingly Disaster Risk Management Plans and Monsoon Contingency Plans are prepared at district level by District Disaster Management Authorities (DDMAs). Then these plans are consolidated at relevant provincial P/S/FDMAs before finally being incorporated in National plans and approved by Prime Minister, the chief executive of the country. At all levels, these plans are an annual feature and include risk assessment, disaster risk reduction planning, relief and response planning and resource mobilization for the purpose. It also includes identifying the key stakeholders and assigns them specific roles and responsibilities for all DRM interventions before, during and after the disasters. It also defines the roles of the civil society, NGOs, INGOs, national and international donor agencies and the most importantly, community based organizations. The plan contains short and long term DRR mainstreaming strategies and carries out risk and resource mapping for effective implementation of these strategies.

DRR Initiatives in Sindh

- The National Disaster Risk Management Framework envisages a multi-hazard approach in dealing with disaster risks. Accordingly, the multi-hazard risk assessment exercise is being executed by the NDMA with an objective to develop Hazard Atlas of Pakistan. The pilot project has been completed in Sindh province and Multi Hazard Vulnerability Assessment for Sindh province has been prepared.
- A proposal has been prepared for Creation of Provincial Disaster Risk Management Fund in collaboration with UNDP.
- Provincial Emergency Operation Centre (PEOC) has been established.
- Disaster Risk Management Needs Report 2012 has been prepared.
- Provincial and District level SoPs for Flood / Rain / Cyclone emergencies have been prepared.
- A study has been conducted for Retrofitting of Health and Education Facilities of Public Sector
- Capacity Building Programs/workshops were conducted for Provincial, District officers, Civil Society and NGOs in DRM and DRR in collaboration with One UN DRM Joint Program.
- Development schemes have been launched for drought mitigation in desert areas of district Umerkot and Tharparkar.

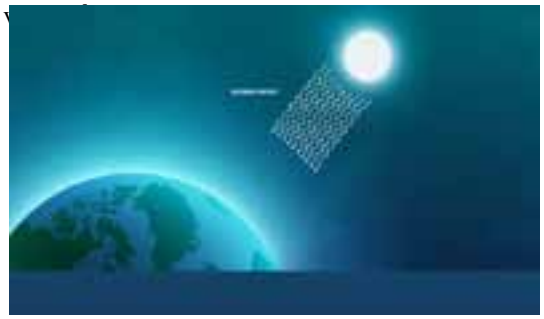
Though a few initiatives have been taken in Sindh province yet, seeing the gravity of the challenges ahead, sizable and meaningful efforts need to be undertaken in the province to make societies, infrastructure and economies disaster resilient. Although the communities and civil society plays a major role in achieving this objective yet the major burden has to be shared by the government departments and institutions.

Climate Change Adaptation (CCA)

The Greenhouse Effect

Keeping Our Planet Warm

The greenhouse effect is a process caused by greenhouse gases, which occur naturally in the atmosphere. This process plays a crucial role in warming the Earth's surface, making it habitable. However, human-generated greenhouse gas emissions upset the natural balance and lead to increased



Incoming Energy

First, the Sun emits energy that is transmitted to Earth. Because the Sun is very hot, the energy is emitted in high-energy short wavelengths that penetrate the Earth's atmosphere.

Absorption

About 30% of the Sun's energy is reflected directly back into space by the atmosphere, clouds, and surface of the Earth. The rest of the Sun's energy is absorbed into the Earth's system.

Emission

The Earth emits energy into the atmosphere. Because the Earth is cooler than the Sun, the energy is

emitted in the form of infrared radiation, at wavelengths longer than the incoming solar energy.

Role of Greenhouse Gases

Greenhouse gases in the atmosphere absorb much of the long-wave energy emitted from the Earth's surface, preventing it from immediately escaping from the Earth's system. The greenhouse gases then re-emit this energy in all directions, warming the Earth's surface and lower atmosphere

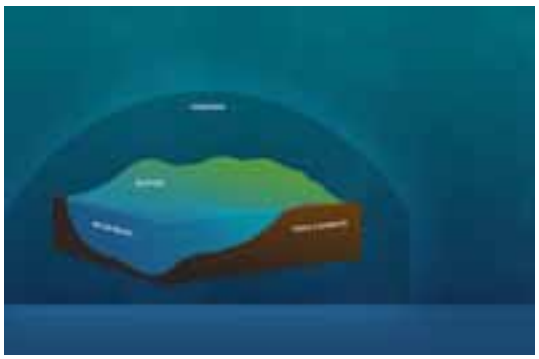
Human Role

The atmospheric concentration of greenhouse gases has increased over the past two centuries, largely due to human-generated carbon dioxide emissions from burning fossil fuels.

This increase has amplified the natural greenhouse effect by trapping more of the energy emitted by the Earth. This change causes Earth's surface temperature to increase.

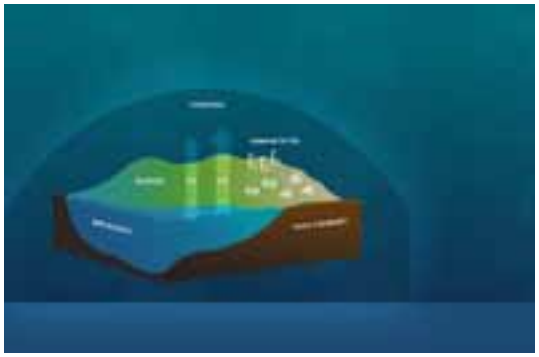
Carbon Cycle and Climate Forcing.

Carbon Cycle Components



Two of the primary greenhouse gases, carbon dioxide (CO_2) and methane (CH_4), include the element carbon in their atomic structure. Carbon is a naturally-occurring element that can be found in the Earth's atmosphere, biosphere, water bodies, and rocks and sediments. The questions are how is carbon exchanged among these different components and how is this exchange affected by human-generated emissions?

A Balanced Cycle

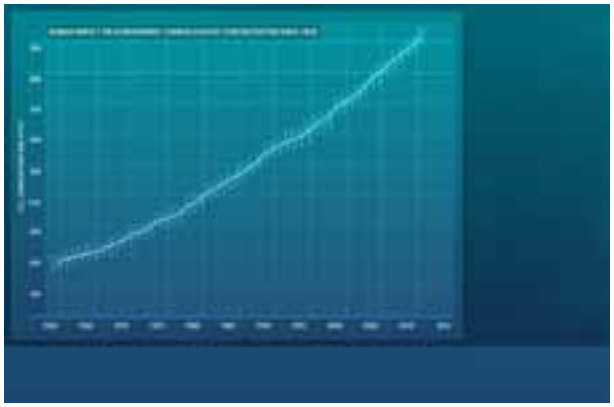


The exchange of carbon among the Earth's components involves processes that remove carbon from the atmosphere, such as photosynthesis; processes that release carbon into the atmosphere, such as respiration; and other exchanges, as between the ocean and atmosphere. Prior to the industrial revolution, these exchanges were approximately in balance.

Upsetting the Carbon Balance

Certain human activities release carbon into the atmosphere as carbon dioxide (CO_2) and methane (CH_4). Carbon that was gradually stored in coal, oil, and gas over millions of years is being released back to the atmosphere in only a few centuries due to human activities. About half of the carbon dioxide is absorbed by the biosphere and oceans. The rest remains in the atmosphere.

Record of Human Impact-The Keeling Curve



The CO2 that humans have added to the atmosphere has caused an increase in the atmospheric concentration of CO2. The graph shown here, called a Keeling Curve after the scientist who first developed it, represents the record of increased global atmospheric carbon dioxide concentration.

Altering the Energy Balance

The power of a process to alter the climate is estimated by its "radiative forcing," the change in the Earth's energy balance due to that process. Some climate forcings are positive, causing globally averaged warming, and some are negative,

causing cooling. Some, such as from increased CO_2 concentration, are well known; others, such as from aerosols, are more uncertain.

Natural Forcing

Natural forcing include changes in the amount of energy emitted by the Sun, very slow variations in Earth's orbit, and volcanic eruptions. Since the start of the industrial revolution, the only natural forcing with any long-term significance has been a small increase in solar energy reaching Earth. However, this change is not nearly enough to account for the current warming.

Human-Induced Forcing

Climate forcing can also be caused by human activities. These activities include greenhouse gas and aerosol emissions from burning fossil fuels and modifications of the land surface, such as deforestation.

Climate and Climate Change

Climate

Climate in a narrow sense is usually defined as the "average weather," or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands of years. The classical period is 3 decades, as defined by the World Meteorological Organization (WMO). These quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system. Climate Change

Climate change refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer.

Climate Lag

The delay that occurs in climate change as a result of some factor that changes only very slowly. For example, the effects of releasing more carbon dioxide into the atmosphere occur gradually over time because the ocean takes a long time to warm up in response to a change in radiation.

Deforestation

Deforestation means those practices or processes that result in the conversion of forested lands for non-forest uses. Deforestation contributes to increasing carbon dioxide concentrations for two reasons: 1) the burning or decomposition of the wood releases carbon dioxide; and 2) trees that once removed carbon dioxide from the atmosphere in the process of photosynthesis are no longer present.

Desertification

Desertification is Land degradation in arid, semi-arid, and dry sub-humid areas resulting from various factors, including climatic variations and human activities. Further, the UNCCD (The United Nations Convention to Combat Desertification) defines land degradation as a reduction or loss, in arid, semi-arid, and dry sub-humid areas, of the biological or economic productivity and complexity of rain-fed cropland, irrigated cropland, or range, pasture, forest, and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns, such as: (i) soil erosion caused by wind and/or water; (ii) deterioration of the physical, chemical and biological or economic properties of soil; and (iii) long-term loss of natural vegetation.

Dry land Farming

Dry land farming is a technique that uses soil moisture conservation and seed selection to optimize production under dry conditions. These techniques can be very useful for Sindh province especially.

Salt Water Intrusion/Sea Intrusion

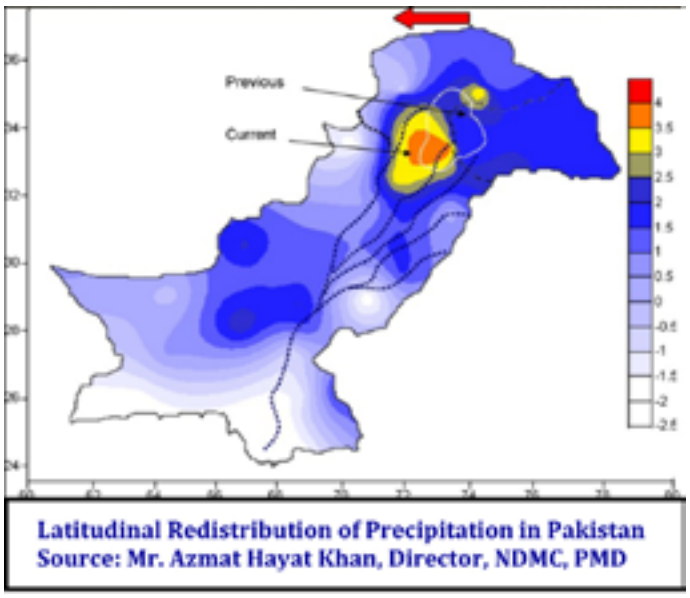
Salt Water Intrusion is displacement of fresh or ground water by the advance of salt water due to its greater density, usually in coastal and estuarine areas.

Climate Change and Disasters

Human interference with the climate system is occurring and climate change poses risks for human and natural systems. Climate change involves complex interactions and changing likelihoods of diverse impacts. A focus on risk supports decision making in the context of climate change and complements other elements. People and societies may perceive or rank risks and potential benefits differently, given diverse values and goals. The IPCC Fourth Assessment Report (2007) concluded that warming of the climate system is unequivocal, as is now evident from observations of increases in air and ocean temperatures, widespread melting of snow and ice, and the rising global average of sea level. Due to certain changes in climate, the maximum area covered by seasonally frozen ground has decreased by about 7% in the Northern Hemisphere since 1900, with a decrease in spring of up to 15%. Also significantly increased precipitation has been observed in northern and central Asia. Drying has been observed in parts of southern Asia and the frequency of heavy precipitation events has increased over most land areas due to climate change.

These climate changes are expected to increase the frequency and intensity of hydro-metrological disasters in the country because snow cover is projected to contract and widespread increases in thaw depth are projected over most permafrost regions. It is very likely that extreme heat, heat waves and heavy precipitation events will continue to become more frequent. It is expected that future tropical cyclones will become more intense, with larger peak wind speeds and heavier precipitation associated with ongoing increases of tropical sea surface temperatures. Because of these consequences climate change is a significant concern regarding disaster management, especially in relation to floods in Pakistan. The decrease of glaciers in northern areas will attribute to the reduction of floodwater capacity volume in each dam. Further, heavy precipitation events and the intensification of tropical cyclones will result in increased havoc due to flash floods and river floods. One of the significant features caused by climate change is the increase of river flow. A study shows that river flow discharges in Pakistan may increase by approximately 10% in the years 2081-2100. Therefore disaster management and climate change must be studies together to formulate a comprehensive strategy to counter the both at national and international level.

Pakistan and Climate Change



Latitudinal Redistribution of Precipitation in Pakistan
Source: Mr. Azmat Hayat Khan, Director, NDMC, PMD

A Task Force on Climate Change (TFCC) was established in the Planning Commission of Pakistan in October 2008. The National Climate Change Policy, formulated by the Ministry of National Disaster Management (now Ministry of Climate Change) in April 2011, provides a framework for addressing the issues that Pakistan faces or will face in the future due to the changing climate. Climate change is likely to increase climate related natural disasters with a projected increase in the frequency and intensity of extreme climate events, including floods, droughts, cyclones, landslides triggered by heavy rains and urban flooding due to congestion on storm drainage. Particularly in Pakistan, climate change is intensifying the above-mentioned hazards. Most disasters or hazards that lead to destruction cannot be prevented; thus, neither can be their impacts.

Most of the assessments and future projections grade Pakistan as one of the most vulnerable countries as far as probability of climate change related disasters are concerned. Changing Monsoon patterns and super floods in 2010 & 2011 are already showing the signs of what future has in store. Being agriculture based economy, Pakistan in general and Sindh in particular, has people, livelihoods and infrastructure exposed and vulnerable to climate change related disasters and with their rising frequency and intensity, the dangers will be manifold in the times to come and it requires prevention, mitigation and adaptation strategies at local, provincial and national levels to promote disaster and climate change resilient societies in the future.

The province of Sindh is feeling the heat of changing climatic patterns. The province is not only getting increasingly vulnerable to devastating floods, but some parts of it are constantly under the threat of drought. On one hand cyclones threaten the populations in coastal areas, and on the other hand, sea intrusion is engulfing precious resource of fertile agriculture land. All these threats are aggravated by ineffectiveness of disaster management and climate change systems in the province.

Climate Change Policy & Institutions of Pakistan

Foreseeing the ensuing catastrophes of Climate Change and Pakistan's peculiar vulnerabilities, Pakistan first established *Pakistan Environment Protection Agency* (*EPA*) in 1997 to support the already established Zoological Survey of *Pakistan Department and Pakistan Environmental Planning and Architectural Consultants* (*PEPAC established in 1983*) and then established *Global change impact study center* (*GCISC*) in 2003 for quality research on the subject. Then a high level Prime Minister's Committee on Climate Change was established in 2006. On the recommendation of this committee, high powered Planning Commission's Task Force on Climate Change was established in 2008 to take stock of the looming challenges and recommend future course of action. The report of the Task Force laid foundation for subsequent policy intervention by the government in the form of National Climate Change Policy. Over the course of next five years the country witnessed Climate Change disasters striking Pakistan with unthinkable ferocity and unimaginable frequency. The super floods of 2010 alone displaced twenty million people from their homes in just one stroke, making it by far the biggest human displacement caused by any climate induced single event in the history of human memory. The shocking floods of 2011 only underscored the enormity of challenge posed by the Climate Change and utter haplessness of peoples of Pakistan to adapt to the bitter reality. The back-to-back floods of 2010 and 2011 prompted government of Pakistan to mobilize all resources to secure Pakistan from the impending Climate Change catastrophes.

In 2012, Government approved National Policy of Climate Change, in addition to the setting up of the World's first full-fledged National Ministry of Climate Change. The *National Climate Change Policy* comprehensively addresses all possible challenges of Climate Change adaptation and mitigation in foreseeable future; and is sure to provide rock solid foundational framework for ensuing Climate Change Action Plans, Programs and Projects. National Climate Change Policy Suggested Policy

Measures regarding capacity building, institutional strengthening, awareness raising, international & regional cooperation, financing climate change adaptation, relevant technological transfer, implementation mechanism and research and development. The policy suggests mitigation measures in the form of intervention or policies to reduce the emissions or enhance the sinks of greenhouse gases. The current international legal mechanism for countries to reduce their emissions is the United Nations Framework Convention on Climate Change (UNFCCC). Mitigation measures contain interventions in energy, transport, agriculture & livestock, forestry, town planning and industries. It also proposes adaptation measures adaption in the shape of responses to the changing climate (e.g., acclimatization in humans) and policies to minimize the predicted impacts of climate change (e.g., building better coastal defenses). Adaptation measures address the major vulnerable sectors which include water resources, agriculture and livestock, health, forestry & biodiversity, disaster preparedness and vulnerable ecosystems.

Climate Change Mitigation & Adaptation

Fifth IPCC report points out that Adaptation of freshwater resources to climate change can be identified as developing adaptive/integrated water resource management of the trade-offs balancing water availability against increasing demand, in order to cope with uncertainty and change. During the second half of the 20th century, Asia built many reservoirs and almost tripled its surface water withdrawals for irrigation. Reservoirs partly mitigate seasonal differences and increase water availability for irrigation. Water management in river basins would benefit from integrated coordination among countries. For example, water management in the Indus and Ganges-Brahmaputra-Meghna river basins concern Bangladesh, India, Nepal and Pakistan.

National Climate Change Policy 2012 envisages mitigation, as well as, adaptation measures in different sectors for fighting dangers posed by climate change. Energy sector mitigation measures include changing energy mix to increase the ratio of and promote renewable energy. It also suggests energy efficiency and conservation. Mitigation measures regarding transport include steps to improve road transport, introduction of effective mass transit systems for big cities and promoting fuel efficiency. In agriculture and livestock sector, it suggests reducing GHG emissions from rice cultivation, reducing release of nitrous oxide from agricultural soils/ nitrogenous fertilizer, reducing GHG emissions from enteric fermentation and

mmanure management. For forestry sector it advises carbon sequestration, develop national REDD+ strategies and programs and accessing carbon markets.

Climate change adaptation measures, as proposed in National Climate Change Policy 2012, place water resources adaptation at first priority. Water resources adaptation measures contain water conservation strategies, water management by building small and large water reservoirs and capacity building of farmers and irrigation officials. The adaptation steps recommended for agriculture and livestock sectors are introduction of technology in the sector, adequate resource management and genetic modification as per modern day practices. Adaptation policy measures for forestry and biodiversity sectors include forest management, habitat conservation and active community participation in all these activities. The policy also endorses adaptation steps in the field of disaster management and these comprise forecasting and warning systems, preparedness, management and recovery and rehabilitation. The adaptation strategy encompasses health initiatives which contained monitoring and forecasting of epidemic outbreak, preparing plans and policies regarding that, training and capacity building of the health sector operatives and efficient resource mobilization and management.

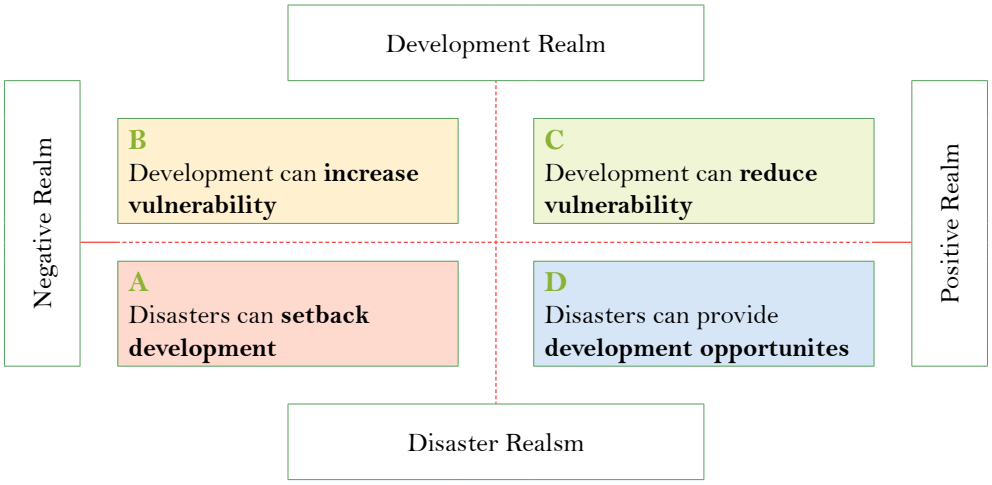
Understanding Mainstreaming DRR, CCA & Development

Disaster & Development

With the increasing frequency of disastrous events, their effects on development are becoming increasingly evident. The relationship between the two is categorized in following four ways:

Disasters can Setback Development because of the following reasons:

- Diversion of manpower and resources to rescue, relief, rehabilitation and reconstruction activities.
- Postponement or cancellation of development programs due to lack of available funding.
- Loss of resources, infrastructure, agriculture and livestock.
- Negative impact on general investment climate in the country.
- Disruption in non-formal sector.
- Political destabilization in case of a major disaster and poor post-disaster response.



Development can Increase Vulnerability in following scenarios:

- If new development projects are planned in hazard prone areas without catering for the possible disasters.
- Massive unplanned urban development can increase vulnerability:
- High population densities and crowded housing.
- Housing on hazard prone sites.
- Unsafe construction due to absence of building codes.
- Programs designed to increase employment can increase population density in high risk areas (e.g. marine and coastal zone development).
- Failure of dams can increase flood risk if disaster risk is not catered for before construction.
- False sense of security can lead to massive loss in case of disasters.
- Under-provision of basic services means that many communities are made more vulnerable to all hazards because they do not have access to essential services which support life, such as fresh drinking water, electricity for cooking, heating and lighting, sanitation for the removal of waste water, etc.
- Under-regulation is the state of having insufficient government and civil society structures to enforce and implement regulations set by government and other public bodies.
- Environmental degradation is the result of ongoing development which does not protect the environment

Development can reduce vulnerability in following ways:

- Structural measures, like Earthquake, flood or cyclone resistant buildings and houses reduce vulnerabilities.
- Flood control measures (contingency planning, capacity building, etc.) are taken which prove effective.

- Critical Facilities such as health centers, schools and government facilities are improved to reduce the risk and resultant losses.
- Land use planning is improved and risks are reduced.
- With road infrastructure improvement communication is improved and it helps in provision of rescue, relief, rehabilitation and reconstruction efforts.
- Agricultural and forestry programs can reduce erosion, land sliding, flash flooding, change of cropping patterns reduce effects of droughts.
- Public awareness programs can help people and communities know what to do to protect them.
- If root causes of marginalization are addressed that force people to live in hazard prone regions and unsafe houses, then vulnerabilities decrease.
- Institutional Development at all levels, from community level to district, provincial and federal levels, to strengthen people's livelihoods, organizational capability and coping mechanisms.
- Incorporation of hazard and vulnerability analyses in local, Regional and national level development planning can reduce vulnerabilities.
- Urban development with adoption and enforcement of building and zoning codes can reduce disaster risks.

Disasters can provide Development Opportunities

- During the reconstruction and recovery phase that would follow a disaster, DRR strategies can be implemented where it may not have been possible or practical to do so before.
- Examples of implementing DRR strategies in this stage include implementation of building codes and land use regulations, adoption of new technologies so that new constructions are adequately disaster resistant to future events, relocation of dwellings, office buildings, or infrastructure to less hazardous locations and diversification of economy leading to employment generation.
- After disasters the planners have a clean slate to start with and build back better.
- Introduction of mitigation measures increase a country's capacity to cope with disasters.

Residential Complex-
MUZAFARABADD
(Turky)

Source:

- Institutional capacity building initiatives improve the coping and managing capacity of the departments. Establishment of DM offices in Pakistan, Thailand, Bangladesh, India, Bangladesh, and Sri Lanka after mega disasters are a proof.

Development vs Sustainable Development

Development is the sustained, concerted actions of policy makers and communities that promote the standard of living and economic health of the area; while sustainable development is that Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. People concerned about sustainable development suggest that meeting the needs of the future depends on how well we balance social, economic, and environmental objectives--or needs--when making decisions today. Development, without mainstreaming DRR into it, remains disaster prone development; even at times it results in increased disaster risk. Any development cannot be sustainable till the time it caters for disaster risks. For example, a poorly planned and built dam can be a serious hazard to the local population and infrastructure; hence any sustainable development would have to be disaster resilient development.

Disaster Resilient Development

In light of the alarming global trend of rising disaster losses, disaster and climate risk management is increasingly at the core of governance business. Investments are helping to protect millions of lives and livelihoods and safeguard growth in key socio-economic sectors. The World Bank, with the UN and some bilateral donors, founded the Global Facility for Disaster Reduction and Recovery (GFDRR) in 2006 to leverage new investment, generate knowledge and expertise, and build a global partnership for mainstreaming DRM. The only solution is building resilience, incorporating disaster resilient development and integrating climate change and disaster risk into development.

Disasters trap people into poverty. Poor and marginalized households tend to be less resilient and face greater difficulties in absorbing and recovering from disaster impacts. Disaster risk is increasing mainly as a result of growing exposure of people and assets to natural hazards and hence development and development process needs to be made disaster resilient. Detailed analysis shows that the biggest driver of disaster risk in recent years has been the substantial growth of population and assets in at-risk areas. Hydro-meteorological disasters accounted for 74% (US$2.6 trillion) of total reported losses, 87% (18,200) of total disasters, and 61% (1.4 million) of total lives lost. Looking ahead, climate change will have major implications on ecosystems, agriculture and water supply, sea level rise and storm surges in Sindh province. Historical patterns alone will no longer be a good basis for planning. Effective risk management strategies help in reducing disasters in the short to medium-term, while reducing vulnerability over the longer term. The challenge of reconstruction also presents an opportunity to promote disaster risk management through integrated resilient recovery and reconstruction planning that will drive longer-term resilient development. Disaster- and climate-related risks are related cross-cutting development issues. These are best addressed by a joint approach, which should normally be implemented through the policies and plans of the economic and social development sectors, including in the context of addressing other cross cutting considerations such as poverty reduction, gender mainstreaming, human rights, humanitarian assistance, and ecosystem management. This is especially true in the case for development planning in a region which is prone to climate change related disasters because no sustainable development is possible without mainstreaming DRR into development planning process at all levels and hence promoting disaster and climate change resilient development. Failure to better integrate climate and disaster risks, across various sectors and various levels, seriously compromises all efforts to develop sustainably.

Climate Change and Development

Climate change is an inevitable and urgent global challenge with long-term implications for the sustainable development of all countries. The 2007 Intergovernmental Panel on Climate Change (IPCC) warns of changing weather patterns and rising sea levels due to accelerating GHG emissions from human activities. For many, a warming climactic system is expected to impact the availability of basic necessities like freshwater, food security, and energy, while efforts to redress climate change, both through adaptation and mitigation, will similarly inform and shape the global development agenda. The links between climate change and sustainable development are strong. While climate change will know no boundaries, poor and developing countries, particularly Pakistan, will be among those most adversely affected and least able to cope with the anticipated shocks to their social, economic and natural systems.

Climate change implicates adverse effects on the development and these risks, coupled with the problems like unequal distribution of wealth, increasing poverty, inapt coping capacities of the communities and limited fiscal space for government development program, the development process should be climate resilient. A country like Pakistan in general and Sindh province in particular has large populations, infrastructures and economies at the risk of climate change related disasters and for any development to be sustainable, climate change mitigation and adaptation must be mainstreamed into all development processes at all levels of development planning in the country.

Mainstreaming DRR and CCA into Development Processes

Mainstreaming DRR is a process of integrating DRR and CCA at all levels of decision-making including national, provincial and local government & community levels, empowering for evidence based decision-making for hazard assessment and vulnerability assessment at all levels, creating appropriate incentives, including regulatory and incentive based instruments for disaster management, for risk reduction, creating appropriate public-private partnerships at different levels and creating direct linkages with international and regional commitments like HFA, MDG, etc. It aims at mainstreaming DRR and CCA into development policies and frameworks and programs - global, regional, national, provincial and local, in

A heavy task

Source:

all disaster interventions including pre and post disaster interventions and in all program and project phases including appraisal, project design, implementation, monitoring and evaluation.

It is an accepted fact all over the world that sustainable development is not possible without mainstreaming disaster risk reduction into the whole process of development; from policy making, planning and implementation to monitoring and evaluation. The pace and effects of climate change and disasters in Pakistan are touching the alarming levels and with large population below poverty line, it is one of the most vulnerable countries. Water, in case of scarcity as well as abundance, is a problem here. Factors, like change in climate, affect changed frequency and magnitude of natural hazards. Also, vulnerability to such hazards has increased owing to rising poverty, fast growing population in the country, armed conflicts and extremism and other related development issues (*Pakistan Floods 2011 caused the country an overall annual loss of over US $ 7.5 Billion*). Hence development process should incorporate awareness, understanding, assessment, mitigation and possible reduction of disaster and climate risks in the country for a sustainable socio-economic development.

Disaster Risk Reduction (DRR) in Sindh Province

DRR Needs of Sindh Province

According to Disaster Risk Management Needs Report 2012, Sindh Province identified following DRR needs:

Institutional and Legal Arrangements

PDMA Sindh needs to maximize PDMA Sindh outreach in the field and remain relevant to the needs on ground and increase its response capacity. It also needs to strengthen DDMA's and establish Taluka Disaster Management Authorities (TDMA's) and community based organizations (CBOs) for managing the risk of disaster. PDMA has to frame the strategy for the implementation of the existing building codes and come up with new building codes where required. The process will include compilation of existing building codes by all agencies and coming up with its implementation plan in consultation with all relevant stakeholders. PDMA, in the short run, requires synchronizing all existing DRM laws in the province in order to make an umbrella law to harmonize and align laws to the NDM Act of 2010.

Provincial Risk Assessment

PDMA Sindh has identified the need to carry out a vulnerability assessment of the province on stage-by-stage basis resulting in preparation of a digitized vulnerability atlas of the province in the long run. PDMA is laying emphasis on conducting study on climate change, which has subjected Sindh to two consecutive years of flooding. Technical vulnerability assessments of critical buildings are required throughout the province especially in the districts that were severely hit by the monsoon floods.

Capacity Building and Awareness

PDMA Sindh plans to build the capacities of government officials and CBO's through provision of necessary training to them. In addition, it has to hold specialized training for the Civil Defense officials and preparation of manual of instructions and SOPs for their efficient functioning. In the long run, PDMA must conduct research in application of DRR policies and techniques through national and international institutions. It also must mainstream DRM into education systems through curriculum and train academics in DRR/DRM. Awareness and sensitization workshops and

seminars for the policy makers and politicians is another proposed area of intervention by PDMA. This will also include orientation for the media persons in hazard and disaster management reporting.

Disaster Risk Management Planning and Development

PDMA is laying emphasis on development of provincial and district level DRM plans based on the vulnerabilities in light of coping capacities locally available. It should review these plans where they already exist, in light of the super floods of 2010 and rains of 2011. The process of risk assessment is to be taken to the community level by assessing local village level risks and devising community based disaster risk management interventions based on the risks so identified. CBDRM interventions can further be enhanced by the creation of UC level Disaster Management Committees, which PDMA plans to establish in the coming years. Construction and retrofitting of large and community physical infrastructure schemes are also proposed to generate and boost the economic activities in the affected and vulnerable districts. In the long run PDMA plans to initiate small DRR schemes and insurance schemes in key sectors such as health and agriculture to provide income support to vulnerable populations. Establishment of Tsunami, floods and cyclone early warning system, in line with latest technologies, is proposed to meet the provincial needs. In the long run, a Communicable Disease Surveillance System for Health and Agriculture sectors is also part of PDMA's future plans. Establishment and strengthening of well equipped Emergency Operation Centers (EOC's) at all tiers and creating their linkages with key organizations and institutions capable of responding to the disaster are proposed. Strengthening and establishing the search and rescue teams in the province is another area of focus by PDMA Sindh. Another important activity is to develop a common and speedy damage and needs assessment methodologies for all stakeholders to follow.

Risk Assessment Process (Hazard, Vulnerability and Capacity Assessment)

Risk Assessment consists of the processes and techniques to gauge the probability of harmful consequences, casualties, damaged property, lost livelihoods, disrupted economic activity, and damage to the environment resulting from interactions between natural or human-induced hazards and elements at risk. This is a methodology to determine the nature and extent of risk by analyzing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed

elements (such as people, property, services, livelihoods and the environment on which they depend).

The Purpose and Process of Risk Assessment

- Understanding of current situation, needs and gaps to assess what already exists, avoiding duplication of efforts, and build on existing information and capacities. This is done through a systematic inventory and evaluation of existing risk assessment studies, available data and information, and current institutional framework and capabilities.
- To identify possible hazards, vulnerabilities, exposure and capacity of communities.
- Hazard assessment to identify the nature, location, intensity and likelihood of major hazards prevailing in a community or society.
- To analyse these and to estimate and assess both the probability of occurrence and the possible potential damage by the present hazards.
- Exposure assessment to identify population and assets at risk and delineate disaster prone areas to identify elements at risk and evaluate the extent of risk by judging their exposure level.
- Vulnerability analysis to determine the capacity (or lack of it) of elements at risk to withstand the given hazard scenarios to identify and study possible weaknesses and gaps in existing protective and adaptive strategies.
- Risk profiling and evaluation to identify cost-effective risk reduction options in terms of the socio-economic concerns of a society and its capacity for risk reduction to assess the available resources with the community and their capacity to help reduce the risk.
- Formulation or revision of DRR strategies and action plans that include setting priorities, allocating resources (financial or human) and initiating DRR programs to formulate realistic recommendations for measures to overcome weaknesses and reduce the identified and assessed disaster risks and to agree these with those affected.
- To ensure and enhance the feasibility, effect and efficiency of protective measures by working from the risk assessment to:
- Balance various interests in the groups in communities,
- Consider the reasonability, cost effectiveness and practicality of measures

- Make possible social agreements on measures to reduce disaster risks.
- To develop disaster risk reduction and risk management plan by using the findings of hazards, risk, exposure and capacity assessments.

Multi-Hazard Vulnerability & Risk Assessment (MHVRA) of Sindh

A detailed Multi-Hazard Vulnerability and Risk Assessment (MHVRA) pilot project was initiated in Sindh province, with the purpose to provide dynamic planning tools for disaster management in the province on a broader scale. The activity was carried out at the following two scales:

- Macro level for the whole of the province.
- Micro level focused on five districts, Thatta, Badin, Tando Muhammad Khan, Tando Allah Yar Khan and Mir Pur Khas.

The ten month project (Nov 2012-Aug 2013) was taken on by national consulting firm M/s Network of Disaster Management Practitioners with the funding from United Nations World Food Program (UN-WFP) under One UN DRM Joint Program and technical support by Asian Disaster Prepared Centre (ADPC), Bangkok.

The TORs of the project included undertaking cataloging the past hazard events, developing specific methodologies for collection and assessment of required data and information of the project area. Major deliverables of the project were:

- Inventory of historical natural hazard events, in Sindh Province.
- MHVR Atlas
  - Sindh Province Atlas (scale 1:1,000,000 or better)
  - District Maps for each of the five districts(scale 1:50,000 or better)
- Interactive GIS web portal (uploaded with province & district data layers) training module for the update & application of MHVRA.

Accordingly, hazard, risk, vulnerability and exposure maps of MHVRA atlas have been developed along with other deliverables. A final project report, to be handed over to NDMA and PDMA along with soft and hard copies of the project deliverables covering detailed methodology report, is in the final stages and will be delivered and subsequently uploaded on the web portal to be used by all the tiers of disaster management system.

Mainstreaming DRR and CCA into Development Process at District Level

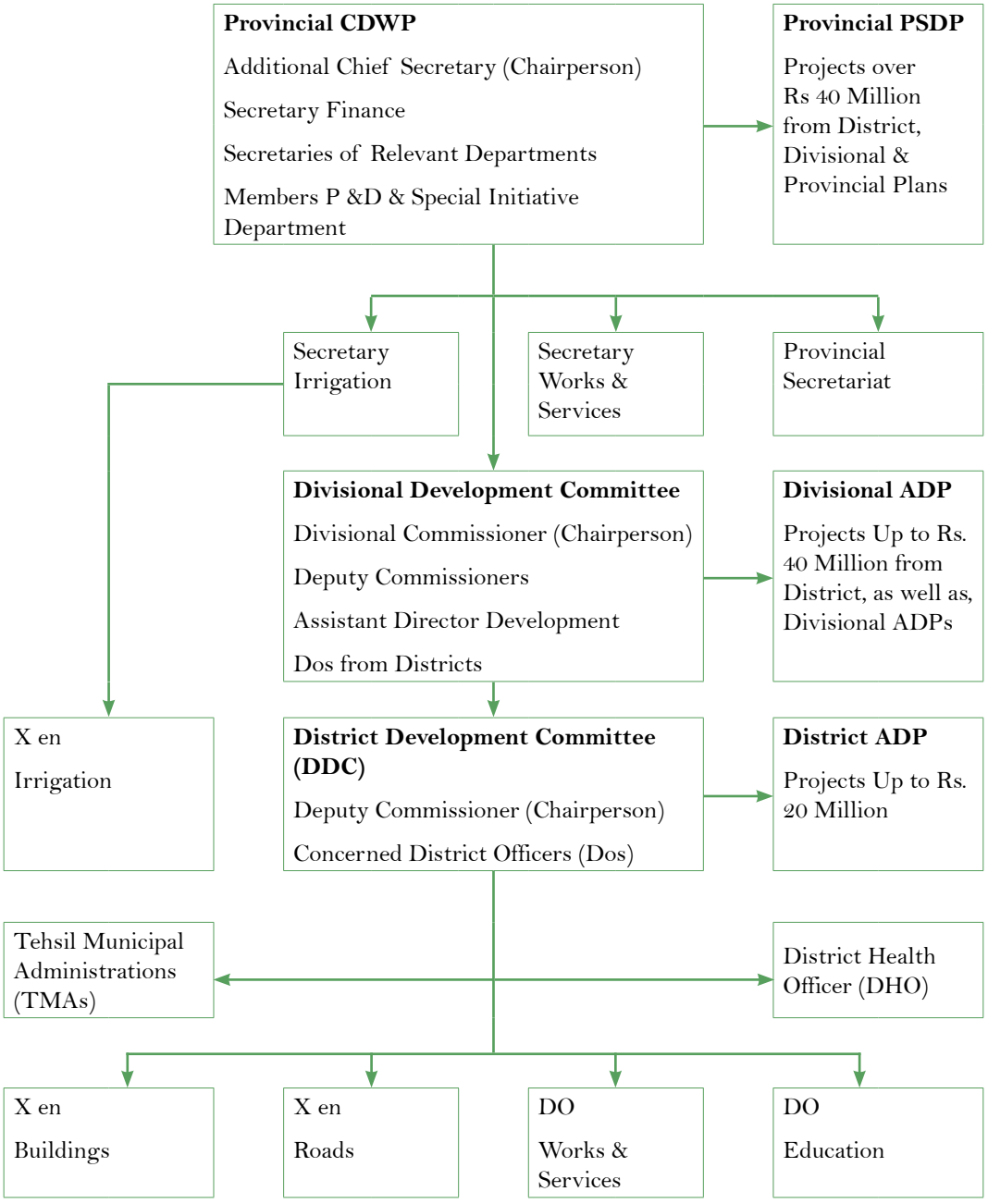
Development Planning at District Level

Sources of funding at district level

- Federal PSDP allocates funds to every MNA and member of Senate and the same is spent in the respective districts. The amount of these funds varies from 10 Million to 100 Million rupees.
- From provincial PSDP, provincial government allocates funds to the MPAs and the same are spent in the relevant districts. Its amount varies depending upon the influence the MPA has in the provincial government.
- Provincial grants are allocated to each district and these district packages form a part of provincial PSDP. The amount of these funds varies from Rs. 500 Million to 1000 Million.
- Provincial government allocates funds for District Annual Development Plan (ADP). This includes funds from the province, as well as revenue generated by the district itself. Its amount varies from Rs. 30 to 300 Million.

District and Provincial Development Planning Process in Sindh

Following a July to June financial year, Provincial Planning and Development and Special Initiatives Department (P&D) and Deputy Commissioner, in Districts, kick start annual development planning process by issuing a circular to all the departments for identification of development projects in their relevant departments. The departments submit the project proposals, with all the requisite documents, survey reports, need assessments and feasibility studies, to the concerned authorities by March 31st each year. These projects are scrutinized at different levels and finally placed before Development committees for approval in accordance with development priorities. After approval, the projects are forwarded to Finance Department for allocation of funds on annual and sectoral basis. Different tiers of development committees have different financial powers for approval of projects. The process is explained in the following diagram:


Provincial CDWP
Additional Chief Secretary (Chairperson)
Secretary Finance
Secretaries of Relevant Departments
Members P &D & Special Initiative Department
Provincial PSDP
Projects over Rs 40 Million from District, Divisional & Provincial Plans
Secretary Irrigation
Secretary Works & Services
Provincial Secretariat
Divisional Development Committee
Divisional Commissioner (Chairperson)
Deputy Commissioners
Assistant Director Development
Dos from Districts
Divisional ADP
Projects Up to Rs. 40 Million from District, as well as, Divisional ADPs
X en
Irrigation
District Development Committee (DDC)
Deputy Commissioner (Chairperson)
Concerned District Officers (Dos)
District ADP
Projects Up to Rs. 20 Million
Tehsil Municipal Administrations (TMAs)
District Health Officer (DHO)
X en
Buildings
X en
Roads
DO
Works & Services
DO
Education

Major Stakeholders and their Roles

Key players for DRR and CCA mainstreaming into development process at district level:

- *NDMA*, for research and development on the subject, formulation of strategies and guidelines, coordination and information management for DRR financing through international donor coordination and national level policy advocacy.
- *PDMA*, for research and development on the subject, formulation of province specific DRR strategies and guidelines and their implementation, coordination and information management for DRR financing and provincial level policy advocacy.
- *Provincial Planning*, Development and Special Initiatives Department, for formulating DRR and Climate Change mitigation measures including building codes, formulation of checklists and mainstreaming DRR at provincial level development programs.
- *Department of Agriculture & Livestock*, for identification of vulnerabilities in development projects in agriculture & livestock department and introducing changing cropping patterns in the wake of climate change.
- *Department of Education*, for detailed research and risk assessment of new education projects and detailed risk assessment of the present education infrastructure and recommendation of mitigation measures.
- *Department of Health*, for detailed research and risk assessment for new health projects and detailed risk assessment of the present health infrastructure and recommend mitigation measures accordingly. Also assess future health related hazards due to climate change and make necessary strategies accordingly.
- *Department of Revenue*, especially offices of Deputy Commissioner and Assistant Commissioner, for spearheading mainstreaming efforts in the district.
- *Planning Office*, for doing all the spade work and coordination of all the mainstreaming strings with all the stakeholders.
- *Department of Irrigation*, for detailed research and risk assessment for new irrigation projects and detailed risk assessment of the present irrigation infrastructure, recommend mitigation measures and monitor mitigation and mainstreaming initiatives.

- *Office of Ministry of Water and Power*, for detailed research and risk assessment for new electricity related projects and detailed risk assessment of the present infrastructure, recommend mitigation measures and monitor mitigation and mainstreaming initiatives.
- *Department of Building and Roads*, for detailed research and risk assessment for new development projects and detailed risk assessment of the present infrastructure, recommend mitigation measures and monitor mitigation and mainstreaming initiatives.
- *TMAs*, for detailed research and risk assessment for new development projects at tehsil levels and detailed risk assessment of the present infrastructure, recommend mitigation measures and monitor mitigation and mainstreaming initiatives.
- *Rescue Service* (rescue service is still not there in Sindh Province), rescue and emergency office must be set up at the province and district level.
- *Department of Fire brigade*, for fire risk assessment of the present infrastructure and formulation and implementation of fire safety codes.

District DRR & CCA Mainstreaming Working Groups

Functions of District DRR & CCA Mainstreaming Working Groups

- To develop the district framework for DRR for promoting disaster resilient development in all sectors of the development program.
- To strengthen and institutionalize the ongoing DRR efforts in the district.
- To identify and build the mechanism for standardization of DRR knowledge-building process in the district.
- To develop a comprehensive framework for strengthening "Community Based Disaster Risk Reduction".
- To provide a clearer understanding of DRR in a humanitarian emergency situation and targeting various needs, by focusing on the impact of DRR on food security, agriculture and non-agriculture infrastructure related activities
- To identify how the group members can assist in specific DRR related areas.

- To promote collaboration and coordination with development actors and line departments.
- To enhance livelihood and resilience in the ongoing DRR activities in the district.
- To share DRR best practices, lessons learnt, guidelines research manual and road maps with members/line departments.

Composition of the Working Groups

Following can be a possible composition of the district mainstreaming working groups for effective DRR and CCA mainstreaming into development process at district level:

- Department of Agriculture & Livestock
- Department of Education
- Department of Health
- Department of Revenue
- Planning Office
- Finance and Accounts
- Civil defense Office
- Department of Irrigation
- Office of Ministry of Water and power
- Department of Building and roads
- TMAs
- Rescue (rescue service is still not there in Sindh Province)
- Department of Fire brigade
- CBDMOs
- NGOs

Identifying Entry Points for DRR Mainstreaming

Recommendations for Legal Measures

- DRR & CCA sections to be established in Planning, Development & Special Initiatives Department.
- Inclusion of DRR & CCA modules in syllabi at primary and secondary levels.
- Introduction of BS & MS programs at college and universities level.
- DRR and CCA inspecting mechanism at district level.
- DRR & CCA mainstreaming be given legal cover.

Documentation Requirements

- Risk identification Performa in PC-II form.
- Risk Assessment and CCA form in PC-I.
- PC-III & PC-IV activity to include DRR & CCA mainstreaming progress and compliance reports.
- DRR & CCA compliance be made part of TORs of development consultants.

Processes

- CBDRM to be promoted at local level and communities be made part of mainstreaming DRR & CCA initiatives.
- DRR & CCA should be mainstreamed through gradual cultural adaptation.
- Risk identification at feasibility study level by the respective departments.
- Detailed risk assessment and mitigation recommendations at PC-I preparation level for all new development projects at all levels.
- During approval of the project proposals at District, Divisional or Provincial level development committees, adequate scrutiny and assessment of mitigation measures suggested in PC-I by professionals recruited for the purpose in Planning, Development and Special Initiatives Department, Divisional and District Headquarters.

- DRR & CCA compliance should be part of consultants' TORs and be monitored consistently during progress and completion phase.
- Detailed risk assessment of the present infrastructure by the respective departments.
- Disaster prevention and mitigation and CCA initiatives implemented for the existing development projects, on the basis of risk assessment carried out.
- DRR and CCA awareness be mainstreamed in education curriculum at all levels.
- Rescue and emergency services be established at district and Taluqa levels.
- TMAs and city development authorities to ensure compliance of relevant building codes for all disasters and CCA.
- Special initiatives must be undertaken by agriculture department at all levels for affecting climate change adaptations in agriculture and creating alternative livelihood options.

Action Planning for DRR and CCA Mainstreaming at District Level

PC-II Feasibility Study

- Performa for Disaster Risks Identification may be included.
- Identification of all possible Disaster Risks to the development schemes in all sectors' development projects.
- Disaster Risk identification and suggestion of Disaster mitigation measures may be added to the ToRs of consultants hired for all development works.
- Local communities must be consulted and taken on board regarding risk assessment.

PC-1 Form

- Disaster Risk Assessment Performa may be added to PC-I format for detailed assessment of all risks identified in PC-2 by the consultants.
- Mitigation measures to be suggested accordingly and quality and adequacy of these measures should be certified by Planning, Development and Special Initiatives

Department at province level and Planning Commission at federation level for their effectiveness.

- Divisional and District Development Committees must have the capacity and should assess and certify development schemes for being DRR resistant and CCA compliant.
- Environment Impact assessment Performa should be made a part of PC-I and should be certified by provincial Environment Protection Agency.
- Disaster Risk reduction professional and Environment and rehabilitation officer should be part of each Project management Unit (PMU) in case of mega projects and a specialized DRR section may be included in Planning, Development and Special Initiatives Department in provinces and Planning Commission at federal level.
- DRR and CCA officer must be a part of Divisional and District development Committees.

PC-III (Periodical Progress Reports)

- Progress and Assessment of Recommended Mitigation measures may be reported regularly to the relevant sections in all tiers of government.

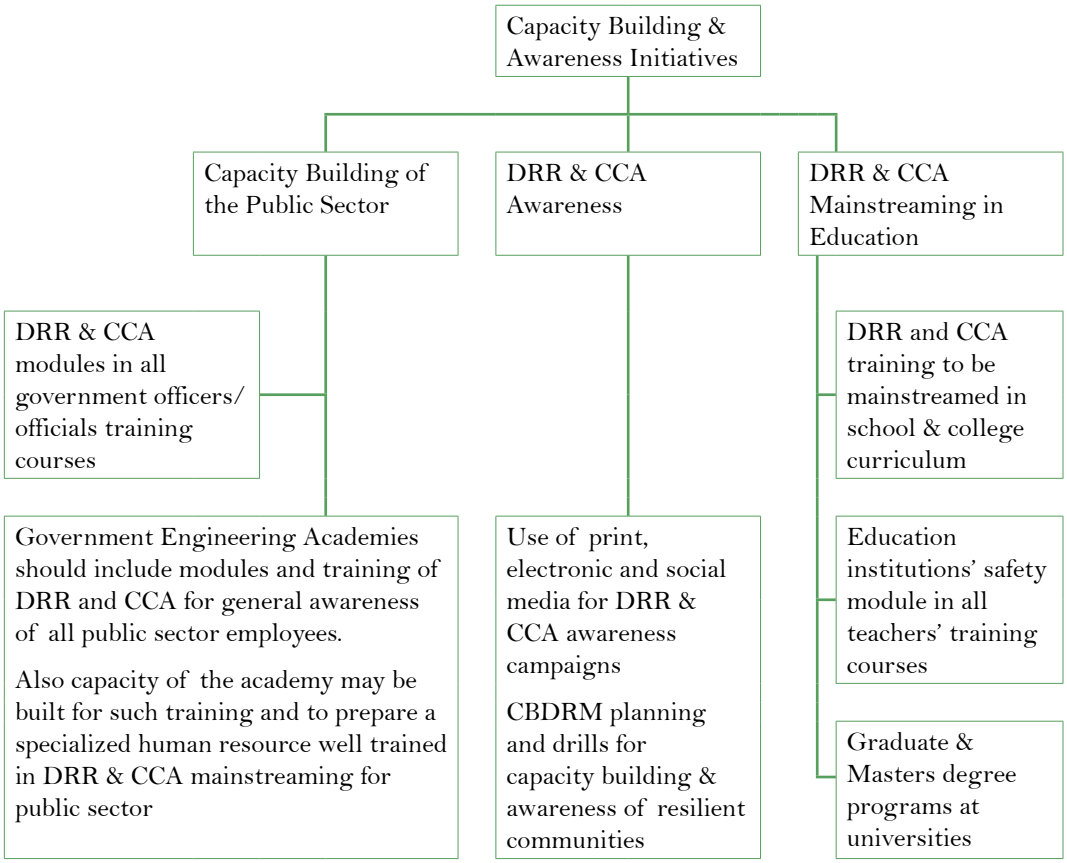
PC-IV (Completion Report)

- Assessment and Evaluation of structural & non-structural mitigation measures suggested in PC-1, for their effectiveness and efficacy.

Overall Recommendations

- Relevant departments must carry out detailed disaster risk assessment of existing infrastructure in the district. This will help in identification and mitigation of disaster risks to the existing infrastructure and will also be helpful in carrying out the same exercise with the future development plans.
- Annual District Disaster Risk Management Plan should encompass all departments at district level and district annual development plan should be made DRR and CCA compliant.

Capacity Building and Awareness Initiatives



Coordination and Information Management

Coordination

Coordination is a process of sharing information and planning together in pursuit of shared and agreed-upon goals. The aim of coordination is to ensure participation of the community and effective executions of plans through it. Effective coordination can contribute to raising standards and upholding the rights of the vulnerable and displaced communities.

Components of coordination

- Building positive attitudes.
- Providing leadership.

- Delegation of power to lower tiers of government and empowering the communities.
- Clearly identified roles and responsibilities.
- Specific & clearly stipulated goals.
- Community at large.
- Accurate, relevant and updated data.
- Sharing information effectively.
- Joint planning.
- Flexibility and providing alternatives.
- Holding actors accountable.
- Defining mechanisms and tools.

Coordination Mechanism

- Meetings
- Emails, phone calls
- Teleconferences
- Website platforms
- Working groups
- Task force

Coordination Tools

- Agenda setting
- Minutes of the meetings
- Establishing distribution lists
- Memorandum of Understandings with different parties
- Terms of Reference of consultants
- Action planning at all levels

- Who does what matrixes
- Data bases
- Monitoring Performa

Information Management

Information Management (IM) is capturing, handling, storage, analysis and dissemination of data, including demographic and statistical information, pertaining specifically to operations and to populations of concern. It involves information on needs and conditions as well as geo-referenced information. It also involves information on protection and sector-specific concerns related to needs, delivery and impact.

Importance of Information Management

- It helps evidence-based decision-making in humanitarian operations.
- It establishes a common language in which to discuss things.
- It makes planning process more realistic, pragmatic and effective.
- It makes advocacy better and effective.
- Deciding interventions are made easier.
- It makes operations management efficient.
- Coordination becomes easy and systematic.
- Measuring impact is facilitated.

Common Challenges in Data Collection

- If volume of data is more, it becomes hard to collect.
- Data collection fatigue often results in inaccurate data collection.
- Well designed and field tested questionnaires are hard to prepare.
- Staff needs to be trained constantly.
- Confidentiality and privacy are vital.

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