STRATEGIC ENVIRONMENTAL ASSESSMENT OF NATIONAL DISASTER MANAGEMENT PLAN OF PAKISTAN (2012-22) IN THE CONTEXT OF DROUGHT

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A thesis submitted in partial fulfillment of the requirements for the award of degree of Master Studies in Environmental Science of International Islamic University, Islamabad

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Dedicated to My Beloved Parents

For their endless affection, support and encouragement

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Awais Munir

List of Abbreviations

Acronym	Abbreviation
AJK	Azad Jammu & Kashmir
CC	Climate Change
CIDA	Canadian International Development Agency
DCCC	Drought Crisis Control Centre
DDMA	District Disaster Management Authority
DM	Disaster Management
DRM	Disaster Risk Management
DR	Disaster Risk
DRR	Disaster Risk Reduction
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
GB	Gilgit Baltistan
GHG's	Green House Gases
GoP	Government of Pakistan
HFA	Hyogo Framework of Action
IRSA	Indus River System Authority
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
KP	Khyber Pakhtunkhwa
LEAD	Leadership for Environment and Development
MDG's	Millennium Development Goals
MHEWS	Multi Hazard Early Warning System
NDM	National Disaster Management
NDMA	National Disaster Management Authority
NDMC	National Disaster Management Commission
NDMF	National Disaster Management Fund
NDMO	National Disaster Management Ordinance
NDMP	National Disaster Management Plan
NDMS	National Disaster Management System

NDRF	National Disaster Response Force
NDRMF	National Disaster Risk Management Framework
NDRRP	National Disaster Risk Reduction Policy
NEQS	National Environmental Quality Standards
NIAP	National Impact Assessment Program
NIDM	National Institute of Disaster Management
OECD	Organization of Economic Cooperation & Development
ODPM	Office of the Deputy Prime Minister
PDMA	Provincial Disaster Management Authority
PDMC	Provincial Disaster Management Commission
PDMF	Provincial Disaster Management Fund
PMD	Pakistan Meteorological Department
PPs	Plans & Programs
PPPs	Policy, Plan & Program
RR	Risk Reduction
SEA	Strategic Environmental Assessment
SEPSA	Strategic Environmental, Poverty & Social Assessment
UNISDR	International Strategy for Disaster Reduction
WAPDA	Water and Power Developmental Authority
WB	World Bank

Abstract

According to international reports, Pakistan remained among the top ten countries, most vulnerable to the impact of climate change, which is consequential in frequent floods and droughts. Drought although is a slow process but have long term impacts as compared to flood and is one of the major challenges faced by Pakistan particularly in Sindh and Balochistan provinces. It has been reported that Pakistan is expected to face severe drought around 2025. Therefore, management of risks of this natural calamity is essential by taking necessary preventative and mitigation measures to avoid massive losses. For this purpose, the Government of Pakistan first developed a five years National Disaster Risk Management Framework (2007-2012), which stimulated the promulgation of National Disaster Management Act of 2010 under which a National Disaster Management Authority has been established. This national authority development a ten-years National Disaster Management Plan 2012-22, which is supported by National Disaster Risk Reduction Policy of 2013. The approach adopted was development of objectives of strategic environmental assessment and an assessment framework for analyses of internal and external coherence of National Disaster Management Plan. First the integration of environmental considerations in the objectives of National Disaster Management Plan, 2012-22 was analyzed in the light of objectives of strategic environmental assessment. Then in the context of environment, the coherence in the objectives of National Disaster Management Plan 2012-22 was analyzed with the objectives of National Disaster Risk Reduction Policy of 2013, National Disaster Risk Management Framework, 2007-2012 and National Disaster Management Act of 2010. For external coherence, the objectives of National Disaster Management Plan 2012-22 were analyzed in relation to other relevant national policies like National Climate Change Policy of 2013, Draft National Water Policy of 2012, National Environmental Policy of 2005 and National Power Policy of 2013. The method adopted for this study was through an assessment framework, which involved screening, identification of environmental problems, scoping, setting objectives of strategic environmental assessment, identifications of measures for drought risk reduction, strategic alternative measures. Results of this study showed that a formal strategy for drought management in Pakistan is lacking. The National Drought Monitoring Centers only cover the prediction of drought. This study concluded that National Disaster Management Plan 2012-22 needs to be revised as there is no formal strategy for drought management in this plan. This study recomends that it is compulsory to build water reservoirs of all scales on urgent basis in at all feasible locations of catchments areas to catch and store rain water during monsoon period and also the flood water. It is hoped that this study will be useful to policy makers and disaster management agencies for preparation of contingency plans regarding drought in drought-prone areas of the country.

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Chapter 1

INTROCDUCTION

1.1Disaster: A Global Issue

A disaster is a swift event that critically disrupts the execution of a community or society and causes human, substance and financial or environmental damages that go above the society's capacity to deal with its special resources. A disaster is a severe disturbance of the performance of society, causing ubiquitous human, matter or environmental losses which go beyond the capacity of exaggerated society to deal with on its personal resources. (UNDHA, 2001).

Disasters can take place as a result of blow of a natural or a human-caused hazard. Natural hazards comprise phenomena such as volcanic activity, tsunamis, earthquakes, landslides and tropical cyclones, river, tornadoes, coastal flooding, wildfires, sand and dust storms, drought and infestations. Man-made hazards might be planned, such as the banned discharge of oil, or accidental such as venomous spills or nuclear render down.

Environment and the people both are anguish from the impact of natural disasters. There are many reasons for this such as rapid population growth, unpredicted urbanization sprawl and migration, environmental deprivation, probably most important one the global climate change. If we look at the past not far away but only in last two decades, The ratio of the people killed by natural and man-made disasters was slightly higher in decade of 80s (86,328 per year) than in the 90s of the twentieth century (75,252 per year). (IFRC, 2001). While additional people were affected by natural and man-made disasters in the 90s, 147 million per year in the 80s to 211 million people per year in the 90s of the twentieth century (IFRC, 2001).

In the countries of the Developed World, communities, governments and persons have better capacities and abilities to deal with the disasters by different means; the financial break is dealt by the diversification of the local economies and the insured property. Since 1991, fifty five percent of all type of disasters recorded occurred in countries with average levels of human development. Though, 2/3 of those killed came from countries with low levels of human growth, while only 2 % came from

well developed countries. (IFRC, 2001). The citizens of developing countries are anguish from numerous confined disasters such as wildfires, droughts, flash floods and pest infestations; these are frequently not recorded as disaster figures. Under developed countries with restricted financial variety and underprivileged road and rail network must not merely rely generally on outer assistance and if a disaster takes place then their economies require additional time to drag all the way through. Amongst the under developed countries, 24 of the 49 face high levels of disaster risk; at least six of them have been exaggerated by between 2 and 8 major disasters per year in the past fifteen years, with long-term penalty for human development (UNDP, 2001).

The most costly disasters which can damage materially are earthquakes and windstorms but drought and famine are more damaging to the human life. In 1999, global monetary losses from natural disastrous events were anticipated to surpass US$100 billion, the second maximum figure as evidence. A total seven hundred huge events were recorded compared to six hundred events in previous years (Re, 2001). From the year of 1995 to the year of 1997, the effects of natural hazards cost the United States at least US 50 billion dollars a year, or the equal amount of US 1 billion dollars a week. (IDNDR, 1999).

Japanese Cabinet (2011) described that Asian and Pacific countries keep on suffering unreasonably from disasters caused by natural events than that of the un-natural ones. Disasters cause death, financial and environmental harm, and brutal setbacks for societal development. Recent large-scale disasters, including the shocking earthquake and tsunami in Japan of March 2011, emphasize the worth of national attentiveness for disaster. The Asian and Pacific region is susceptible to a lot of types of disasters, including drought, earthquakes, floods, cyclones, storm surges and tsunamis. During the past decade, on average, more than two hundred million people were exaggerated and more than seventy thousand people were killed by natural disasters on yearly basis. Those statistics characterize ninety percent and sixty five percent of the world totals, correspondingly.

If we think about two sub-regions, that suffered the maximum impacts in east specially North-East Asia and in south specially South-West Asia. From the year 2001 to 2010, the mutual totals of victims in these two sub-regions were ninety four

percent of all those affected by natural and man-made disasters in Asia and Pacific. The quantity and ruthlessness of disasters caused by natural hazards varies from year to year. For example in the Pacific sub-region, the statistics shows that five hundred thousand were affected in 2010 and only nine thousand in 2006 (Raddatz, 2009).

In China, earthquakes, landslides, storms, floods, and other natural and man-made disasters killed a total of over seven thousand people and affected 145 million people. The Pacific sub-region was harshly affected in the year of 2009 when wildfires swept through Australian continent and an earthquake of magnitude 8.1 strikes Samoa islands, And at the end hit by tsunami. The year 2012 witnessed additional disasters in Himalayan region, largely in the states of Assam, Uttarakhand and Himachal Pradesh of India (Raddatz, 2009).

1.2 Disaster in Pakistan's perspective

In Pakistan 60,000 people were killed in one of the deadliest earthquakes to hit South-Asian region when a 7.7 magnitude earthquake nearly leveled the city of Quetta in Balochistan on May 31, 1935. A massive earthquake of the Makran coast generated a destructive 40-foot tsunami in northern Arabian Sea causing the death of 4 thousand people. A predictable 2,900 people were killed and over 100,000 homes were cracked parting 900,000 people on the streets during the monsoon season and consequential floods in Punjab in 1950. (Shahid, 2011). A tropical cyclone struck the previous East Pakistan (Bangladesh) on November 12, 1970 that left around 500,000 people dead, first and foremost as a result of the storm flow that cause flood. In 1974, a 6.2 on Richter scale earthquake hits Swat, Hunza and Hazara regions in northern or upper part of Pakistan. About 5,300 people were killed, 17,000 were wounded and 97,000 were exaggerated. (Shahid, 2011). At least 1.2 million people in Baluchistan were affected by drought & over hundred died, mostly because of thirst and lack of drinking water. **Kashmir Quake** on October 8, 2005, a 7.6 Richter scale quake hit the Kashmir region and several north-western parts of Pakistan. At least 73,000 natives were killed and more than 3.3 million were made on the streets. The most horrible affected areas incorporated Neelum Valley, Bagh district in AJK and Mansehra division. The year 2010 was particularly bad in terms of the quantity and harshness; the floods of Pakistan caused deaths due to natural disaster to over 2,100 with over 18 million people were affected. The record floods in Pakistan contributed to the great

financial damages and losses experienced by Pakistan in 2010 caused US7.4 billion dollars, making it the mainly costly year with respect to natural disasters in at least 20. (Shahid, 2011).

1.3 Most vulnerable Areas of Pakistan

- Thar Desert covers 320,000 km with 85 percent % with the neighbour country India.
- Pakistan's Thar desert extends approximately 50,000 km^2 across Tharparkar, parts of Umarkot, Khairpur, Sanghar and Ghotki. UmerKot and Mithi are constantly facing drought since last ten years and these natural events caused thousands of deaths in this local areas.
- Kirthar Range in Sindh extend up to 25,000 square kilo meters, it extends to Jamshoro, Dadu and several parts of district Thatta.
- Rangelands of Balochistan include 79% of the landmass; consist of some parts of Central Balochistan Quetta and Kalat, desert parts of Western Balochistan which are Chagai, Kharan, Lasbela, Gwado, Kharan, Zhob and Loralai regions of Eastern Balochistan.
- Cholistan Desert have 263000 ^{km2} along Bahawalnagar, Bahawalpur, Rahim Yar Khan and the Indian border.
- Thal Desert has some regions Bhakkar, Mianwali, Khushab and Leyyah between rivers of Jhelum and Indus.

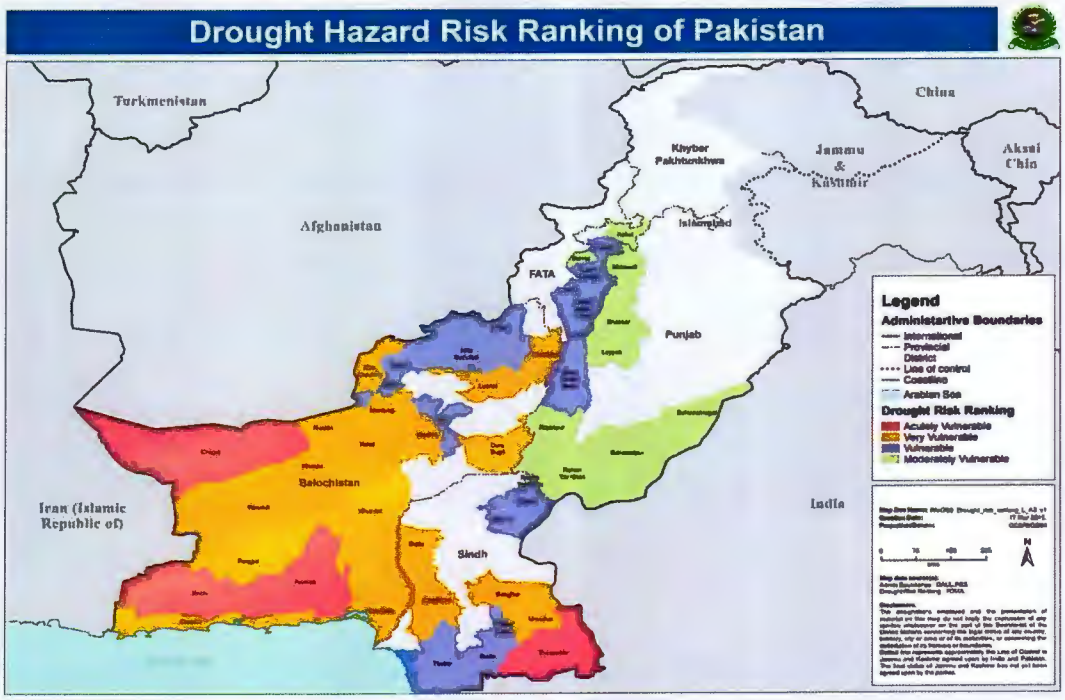


Fig 1.1 Drought Hazard Risk Ranking of Pakistan (LEAD, 2015)

1.4 Drought in World Perspective

Drought is caused naturally by the insufficiency of rainfall over a prolonged period in a region, in which the lack of natural water accessibility leads to impermanent deficiency (Vogt and Somma, 2013). It is probably the worst natural disaster, which influence and causes the largest economic loss, affecting different aspects of life with great successive and potentially hazardous consequences (Zheng, 2000). Drought is the slow start and quiet natural disaster that starts unseen and develops combining and their impacts are not straight away obvious, thus hampers lives and properties badly. Various dentitions of drought have the common elements of dryness in atmospheric condition and shortage of water; cause lower moisture content with unfavorable effects on vegetation, livestock and human over a considerable local area (Warwick, 1975). Droughts arise both in developed and developing countries with noteworthy impacts and are exacerbating in incidence, harshness and period. Over utilization of water regimes, weather unpredictability and climate change are mostly accountable for such exacerbation. The impacts of droughts include the global ecosystem as a one whole system but fluctuate from area to area. Least developed countries/ under

developed countries is becoming the most terrible sufferer of the impacts due to material, societal and financial as well as knowledge and skills differences.

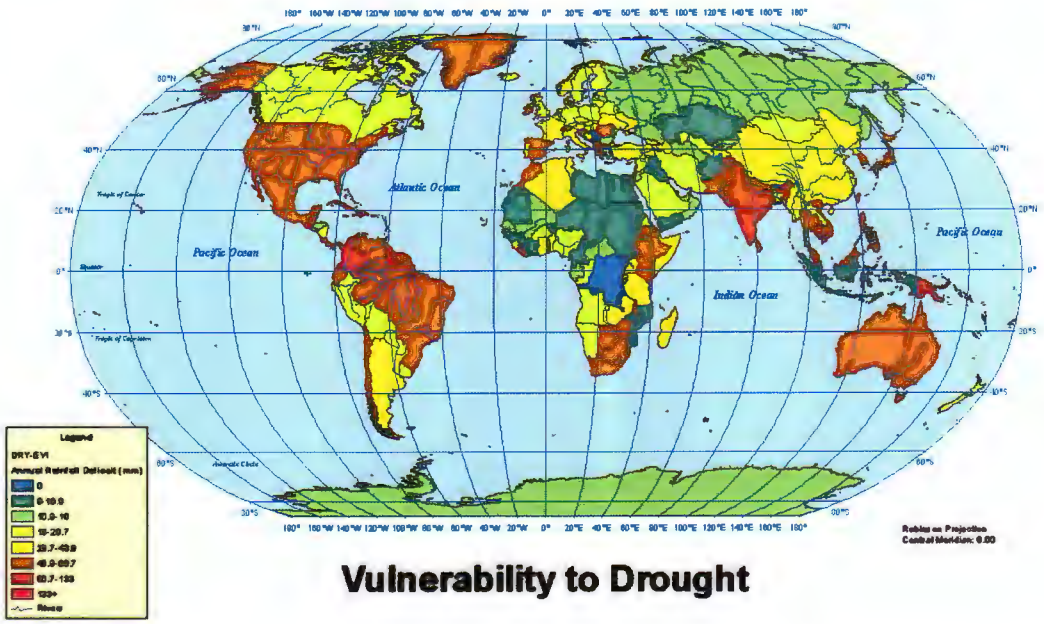
Drought is also to blame for increasing pollution, pests and diseases and required migration and famine. Information shows that monsoon has become unpredictable causal to up-scaling of droughts. Underdeveloped or developing countries like Bangladesh, Nepal, Bhutan, Cambodia and Lao PDR of the south and south-east regions of Asia under the monsoon have been anguish from rising droughts arising out of late and altering distribution patterns of precipitation. Extended dry spells amplify the frequencies of wild fire in grassy plots, forests, and range-lands. The rain-fed crops of the plain areas are counting challenges from soil-moisture stress with anticipated droughts. Droughts causing relocation of fishes, and marine species are having distasteful impacts on spawning their natural habitats. Reduction in annual surface runoff is declining the ground & surface water with negative effect on farming and water supply for industrial and household sectors. As droughts are increasing in numbers the costs are accelerating as well. (Miyan, 2015).

The National Drought Mitigation Centre (NDMC) of United States of America, categorized drought in three different types, meteorological, agricultural droughts and hydrological droughts. US Geological Survey added with it the socio-economic category which is really a result of loss of water due to the less rainfall. Meteorological drought causes severe hydrological imbalance in the pretentious areas (Huschke, 1959) and results in lower amount of precipitation, agricultural droughts badly affect production of useful crops. i.e. food production and agricultural and impacts of hydrological drought include low rainfall and less supply of water. Droughts have unwanted financial, societal developmental and environmental costs.

There is a drying trend in many regions especially in high northern latitudes internationally from 1970s (Trenberth et al., 2007). A widespread boost in droughts and spatially constant shifts in drought regimes are projected with varying global movement pattern at the same time (Dai, 2011). Many regions of Africa, Asia, Europe, Australia and America have practiced longer and severe droughts since 1950s (IPCC, 2012). Local weather simulations and high decree global atmospheric model simulations over Europe indentified that the Mediterranean region is horizontal to rigorous droughts.

The China drought from the year of 1876 to the year1878 affected 83 million natives; the America drought started in 1579 and extends above the south-western region and last for more than twenty years. The African Sahel was one of the most evil droughts in history ever recorded, started in the year of 1968 till the year of 1988, enforced to go hungry 150 million natives across the Sahel in countries of Senegal, Mali, Burkina Faso, Mauritania, Niger, Ethiopia, Sudan and Nigeria. Australian drought of years 2002-2003 affected 19 million natives and led to destructive wild fires and drought in the Niger affected 3.6 million people during 2004–2006. (Miyan A.M., 2015).

Severe droughts are constantly hitting China, Chile, Bolivia, India, Australia, Ethiopia, and the Philippines (Woods and Woods, 2007). From early 2000s to onwards severe droughts affected Gigantic area of South Asia, counting Western India, Southern and Central parts of Pakistan. (Miyan, 2015). The South Asian regions have been among those regions of the world which have been experiencing in last 50 years. Afghanistan, India, Pakistan and Sri Lanka have faced droughts minimum one time in every three year period in the past fifty areas, while Bangladesh & Nepal also suffer from drought regularly. (Miyan A.M., 2015).

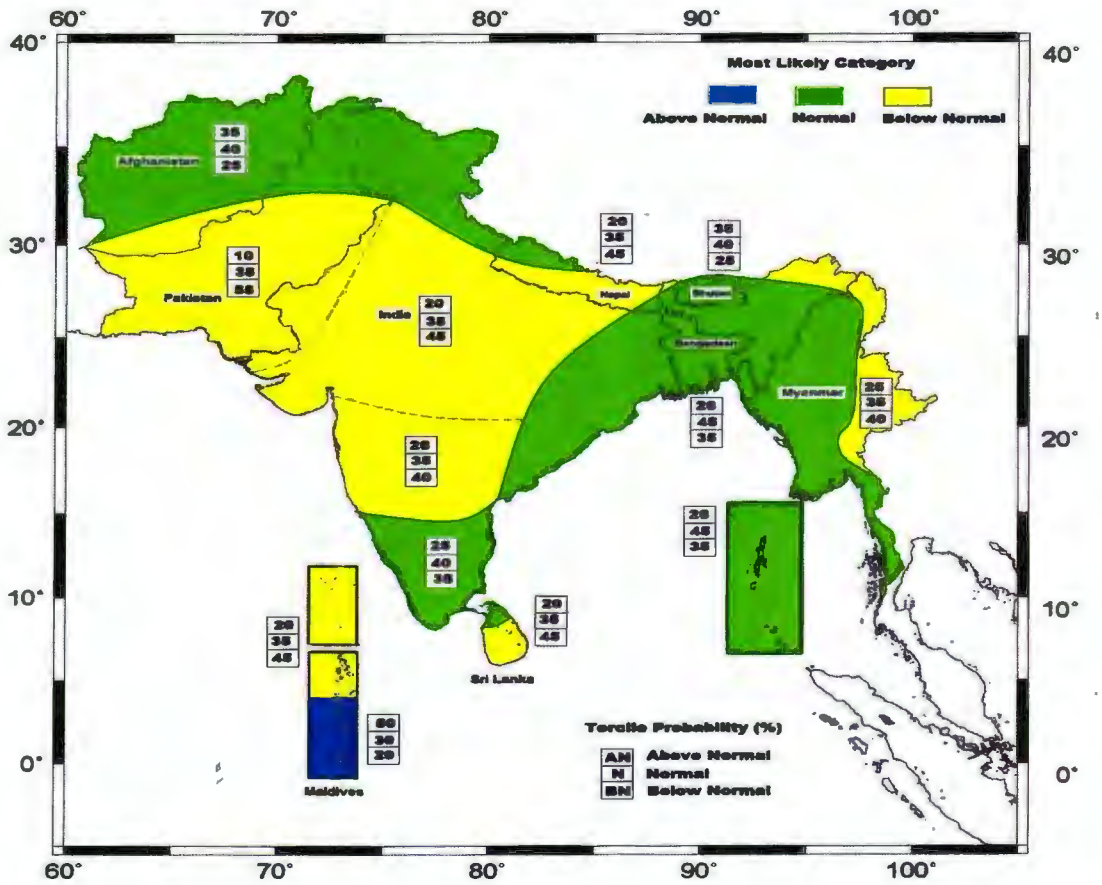


Source: Situating the Global Environment/Lewis & Clark College Environmental Studies Program, September 2012

Fig 1.2 Vulnerability to Drought in World Perspective

1.5 Droughts in South Asia

In 2012, Pakistan declared emergency in districts of Tharparkar and Mirpur Khas due to sever drought conditions and numerous people had to be relocated (Tareq, 2012). The current accepting of climate change in the monsoon areas remains one of the important uncertainties with relation to spread and rainfall (Hargel et al., 2007); while the Asian monsoon regions nourish almost 50% population of the world, and when the monsoon rainfalls not make the grade, people face harsh droughts and food shortage (Science Daily, 2010). Asia has a extended history of droughts, which has been related with other climate extremes– having ruthless impacts on the least development countries. There are 49 least development countries in the world which are spread over Asia and Africa. Least development countries approximately 34 countries are situated in continent Africa while Asia and Pacific has 14 countries and one in continent America. Asian least development countries mostly include Bangladesh, Nepal, Bhutan, Yemen, Myanmar, Afghanistan, Cambodia, and Lao PDR. Most of the climate models suggest less rainfall in dry season and a raise during the monsoon in South Asia (Christensen *et al.,* 2007). This causes tremendous droughts in this area; along with other disasters Bangladesh and Nepal have previously shown an enlarged occurrence of droughts in current years (NDMC, 2006). Rising utilization of water resources and subsequent water shortage accountable for future climate change will exacerbate the regularity, harshness, and duration of drought events and related impacts (Wilhite, 2005).



Source: Dawn News April 2015, Severe Drought expected in South Region of Country

Fig 1.3 Drought Vulnerability in South Asia

1.6 Droughts in Pakistan

Pakistan regularly experienced quite a few droughts. The Punjab province experienced the most terrible droughts in 1899, 1920 & 1935. The KPK hit by the worst droughts in the years of 1902 & 1951, while Sindh province had its deadliest droughts in the years of 1871, 1881, 1899, 1931, 1947 and 1999. The most severe droughts at the national scale were perhaps the most recent, which occurred in 1999-2000 extended up to 2002. (Ahmad et al., 2004).

The rainfall is erratic and river flows have dropped. Water in the Tarbela dam reaches the dead level in late February or early March almost every year. The current live reservoir capacity in the Indus basin has been reduced due to siltation. The recent

drought has also exposed the vulnerability of the Indus basin irrigation system and environmental issues in deltaic areas. Agricultural growth suffered a severe setback during 2001 as a result of drought. While major crops showed a negative growth of almost 10 %, the in general agriculture recorded a downward growth of 2.6%. The drought persisted throughout 2002, resulting in water shortage of up to 51% of normal supplies as in opposition to forty percent of the last year. The total flows of water in major rivers also declined to 109 billion m^3 against an average of 162 billion m^3. Rainfall has also been below normal. The canal head withdrawals have also witnessed significant decline. Notwithstanding severe water shortages, the farmers in Pakistan undertook various measures to minimize their adverse effects. These include sensible use of water, utilization of groundwater, purchase of water tube wells, improvements in cultural practices and better on the whole management. As a result, overall agriculture showed a positive growth of 1.4 % in 2002 as against a decline of 2.6% during 2000. Droughts have also affected the performance of non-agriculture sectors. (Ahmad et al., 2004).

Nonagricultural of Pakistan GDP growth remained constant at around 4.3% in 2002. Therefore, when adjusted for drought impact, the real GDP is provisionally estimated to grow by 4.7% against 5.2% in 2001. (Ahmad et al., 2004). The slower growth in real GDP over these two years was caused by drought. If there had been no drought, Pakistan's economic growth would have been 5%. (Ahmad S., et al., 2004). Water harvesting, management and use are common practices for drinking or farming either directly harvesting the runoff or by storing it in small surface and subsurface reservoirs. The stored water is used for supplemental irrigation and other consumptive uses.

In non-irrigated areas, the majority of farmers are still practicing traditional water-harvesting systems, sailaba or spate irrigation and khushkhaba or runoff farming. These harvesting systems were adversely affected by the introduction of new technological interventions (like deep tube wells) and by recurring droughts Baluchistan provides a unique opportunity to the region in the assessment of the impacts of new technologies on the karez system.

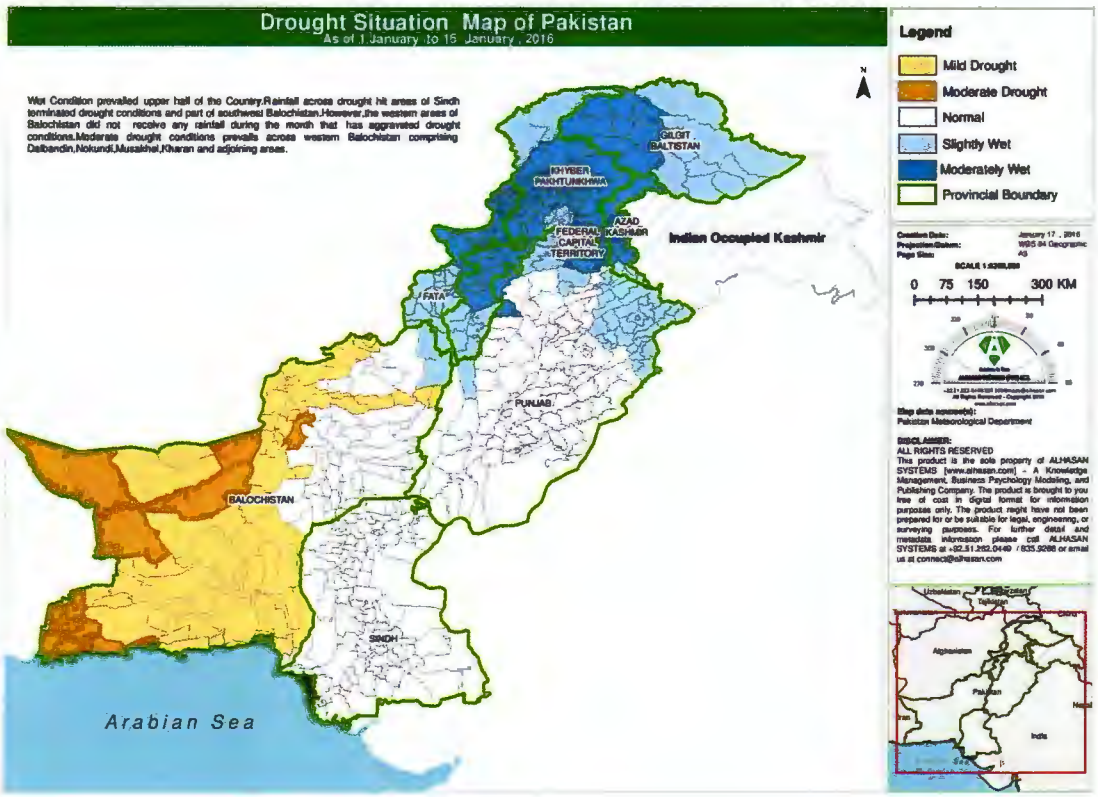
The institutional arrangements are reasonably well defined for the drought-relief activities, but there is hardly any institutional mechanism for drought preparedness

and mitigation to address the long-term issues. The approach for technological growth in Baluchistan and arid areas of Sindh should be based on the assessment of the potential resources available for development through integrating activities of spate irrigation with the objective of spreading of floodwater to enlarge the command area & recharging the regional groundwater resources. Monitoring and impact assessment are also limited among the countries of the region.

The El Niño and La Niña phenomena also cause drought conditions in Pakistan. For instance, the El Niño's on record occurred in 1982-1983 and 1997-98, and meteorological droughts occurred in these years in Pakistan (Ahmad *et al*., 2004).

The occurrence of drought is progressively more common in Pakistan with considerable costs upon sustainable development in sectors of food security, water resources, livestock, agriculture, environment and hydro-electricity. Less rainfall and intense variations in temperature distinguish the climate in Pakistan. Around 60 per cent of the total land area is described as arid, which receives less than 200 mm rainfall annually.

The main arid rangelands include Cholistan dessert, D. G. Khan, Kohistan, D.I. Khan, Tharparkar and Western parts of the Balochistan. Average annual rainfall in Balochistan and Sindh provinces is nearly 160 mm as compared with 400 mm in province of the Punjab and about 630 mm in KPK province. Rainfall inconsistency during different seasons is also significantly high. Climate in lower southern part of the country Pakistan is arid and hyper-arid. Some areas remain severely dry in each region and are always susceptible to drought with a small negative departure from low average rainfall. Confident areas experience two-three drought years in every decade. In recent times, drought disaster is causing hundreds deaths and affecting lives in Distrcit Umerkot, Mithi, Thaparkar in the province of Sindh. Approximately three thousand persons have been died in those areas due to drought in the last few years.



Source: Pakistan Meteorological Department

Fig 1.4 Drought Situation Map of Pakistan

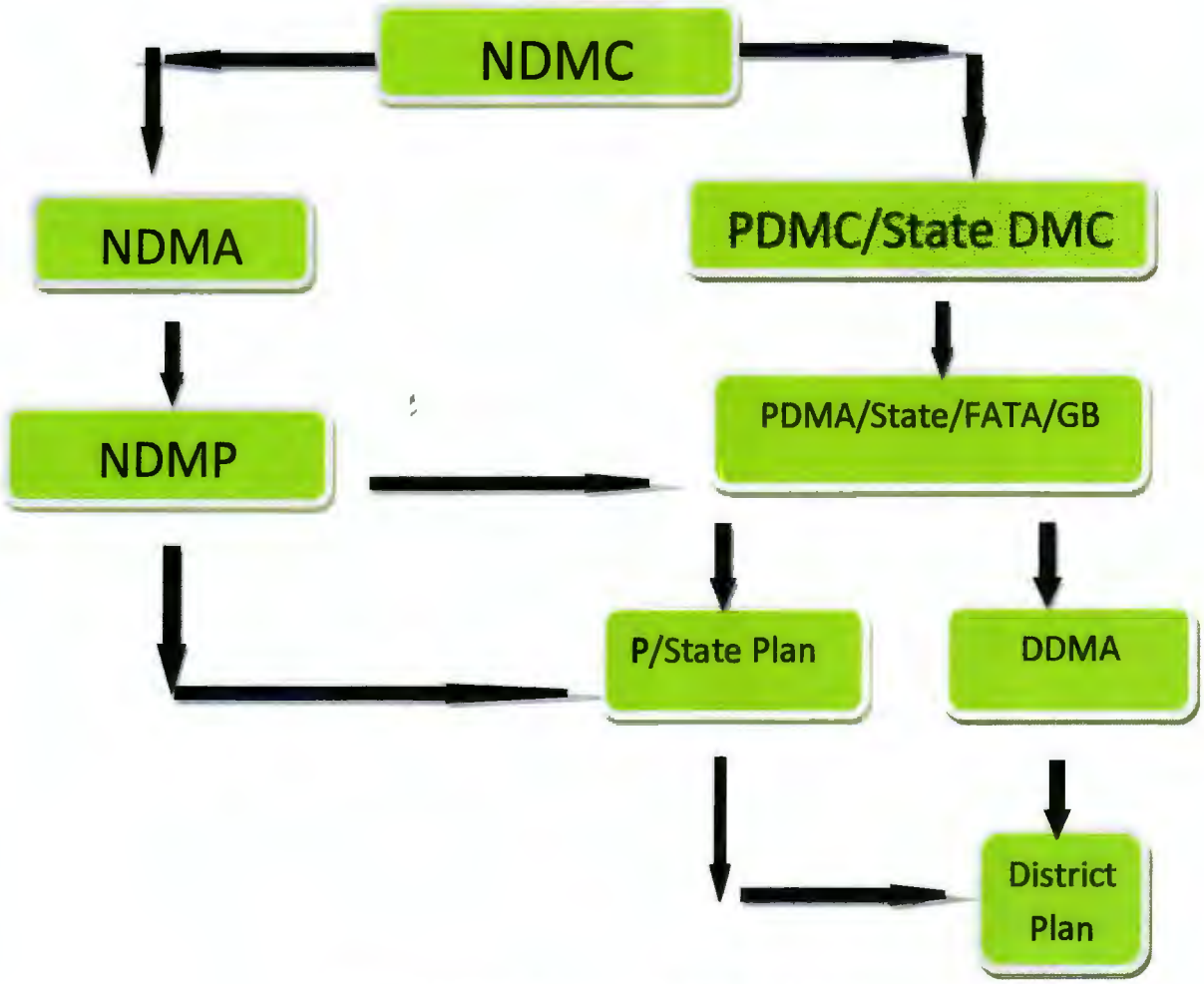
1.7 National Disaster Management Plan

The National Disaster Management Plan (NDMP), prepared based on the Act of parliament aims at enhancing the capacity of the country to prepare for and respond to disasters (floods, earthquakes, tsunamis, droughts, sediment disasters, avalanches, GLOFs, cyclones with storm surges, etc.) by defining the measures to be considered necessary for disaster management. The NDMP identifies the roles and responsibilities of the stakeholders, including federal, governments at provincial and district level, organizations within communities, NGOs, businesses, and inhabitants who are involved in the disaster management. Disaster management is one of the most important administrative measures for protecting the land and people's lives, welfare and property from disasters.

The objectives of the NDMP are:

1. to develop resilience among the public in opposition to disasters that our country has experienced in the past such as droughts, earthquakes, floods etc
2. to mitigate damages from chronic disasters such as meteorological, geological & industrial disasters.

3. reduction of disaster risks & vulnerabilities of the areas mainly those of the deprived & the marginalized groups of people in the country and
4. to illuminate the roles & responsibilities of the national & local governments, public agencies, corporations, NGOs, communities & inhabitants to reduce DR.



Source: NDMA Pakistan, NDMP 2012-2022

Fig 1.5 Disaster Management System in Pakistan

1.8 Strategic environmental assessment

Strategic environmental assessment (SEA) is the organized and inclusive process of evaluating the environmental sound effects of a policy, plan, or program and its alternatives. The stress is on investigating environmental effects, but most SEAs may also discover significant financial and societal effects (Therivel, 2004).

SEA is a systematic process for evaluating the environmental consequences of proposed policy, plan or programs actions in order to make sure they are completely incorporated and suitably addressed at the earliest appropriate stage of decision making on par with monetary and societal considerations (Sadler and Verheem, 1996).

According to the UNECE Protocol SEA is the evaluation of the likely environmental, including health effects which comprises the purpose of the extent of an environmental report and its preparation, the carrying-out of public contribution and discussion in a plan or program (art. 2, para. 6).The process of conducting SEA involves questioning and answering these questions during the improvement of a policy, plan, or program proposal. Explaining these questions, any potential negative impacts of the proposal can be recognized and mitigated. At the same time, potential positive impacts can be enhanced.

SEA Objectives are

1. Encourage environmental and sustainability integration (including bio-physical, social, institutional and financial aspects), setting enabling conditions to nest future development proposals;
2. Add-value to decision-making, discussing opportunities and risks of development options and turning problems into opportunities;
3. Change minds and create a strategic decision-making culture, promoting institutional cooperation and dialogues, avoiding conflicts.

1.9 Problem Statement

Pakistan is the most vulnerable country facing the risk of climate change regardless contributing very little to Green House Gas emissions. Maple croft's (2011), Index of vulnerability to climate change placed Pakistan 16th among 170 nations of the world. Extreme weather events are enhanced in their frequency and intensity in the state.

The key proposition for this research is based on the premise that by identifying incoherent areas with respect to National Disaster Management Plan (2012-2022) and other selected Disaster related documents within the context of drought. Moreover, suggested improvements in the existing policies may provide a knowledge base for policy development at provincial levels. Most importantly, the study will explore the potential of SEA as a tool for change in public policy.

1.10 Objectives

Present study aims at reviewing existing , National Disaster Risk Reduction Policy, National Disaster Management Plan, National Disaster Management Framework, National Disaster Management Act, National Climate Change Policy, Framework For Implementation Climate Change policy , National Water Policy draft, National Environmental Policy, National Sustainable Development strategy and Pakistan Vision 2025 etc, for identifying gaps and deficiencies in the context of environment and sustainability commensurate with National Environmental Policy, 2005 of Government of Pakistan

The concrete objectives of the study include:

1. Critical review of all related documents (Risk Reduction policy, water policy, food policy)
2. External coherence analysis (ECA)
3. Internal coherence analysis (ICA)
4. Compatibility assessment of objectives
5. Analysis of alternatives (AA)

1.11 Significance of the study

- It will reflect current situation of the policy, plan and programs that these documents are compatible with SEA or not.
- The suggested recommendation would provide the baseline data source for authorities to take in account when they are going for the intervention of the present policies or making of the new ones.
- It will identify the gaps and the coherence of the policy, plan and programs with other official documents.

Chapter 2

LITERATURE REVIEW

2.1 Strategic Environmental Assessment (SEA) in Global perspective

Strategic Environmental Assessment (SEA) is a systematic process for evaluating the environmental consequences of proposed policy, plan or programme initiatives in order to ensure they are fully included and appropriately addressed at the earliest appropriate stage of decision making on par with economic and social considerations (Sadler and Verheem, 1996).

SEA refers to the Strategic Environment Assessment of policy, plans and programs (PPPs) and has been in the position from the time when environmental impact assessment (EIA) was first introduced in 1969. SEA has developed, in part as a consequence of the emerging awareness that project EIA may occur too late in the planning process to make sure that all the alternatives and impacts appropriate to sustainable development goals are satisfactorily considered (Lee and Wlas, 1992). A lot of effort has been conceded by experts as well as organizations on developing its process, methodology, tools and application in various sectors however; unevenness in policies making processes, socio-economic conditions, administrative and governance mechanism has remained the limiting factors in the universal applicability of these methods, and processes. Moreover, examples related to application of SEA are more concentrated to programmes and plans with a limited number of SEA applied to policies particularly in disaster risk reduction.

SEA experiences in the UK for land use planning include Thrivel (1998), Russel (1999), Fischer (2003) and Short *et al.* (2004). In other sectors, Marshall (2003) reported SEA related to energy planning and Thamed Water (2000) on water management. Cart et al. (2009) confirmed the potential of SEA in reducing the risk of flooding from case studies in England.

2.2 Strategic Environmental Assessment in Pakistan

There is no formal SEA being experienced in Pakistan as it is not legally obligatory. The local and global experiences and lessons on SEA are being assessed to be adopted through two pilot SEA studies to make possible its corroboration under the National Impact Assessment Program. The National Impact Assessment Program (NIAP) is

being implied jointly by the Government of Pakistan (Planning Commission and Climate Change Division), all the Provincial, Azad Jammu Kashmir (AJK) and Gilgit Baltistan (GB)'s Environmental Protection Agencies and Environmental Departments and International Union for the Conservation of Nature Pakistan. The Program is being funded by the Royal Netherland Embassy and is aimed at amplification the Environmental Impact Assessment (EIA) mechanism and introducing SEA in the country (Khan, 2011). In Pakistan, the cost of environmental degradation to economy was estimated around Rs. 365 billion per year (World Bank, 2006). In addition, the cost of adaptation to Climate Change is estimated to be up to $1-I billion per year (Aslam, 2011). Socio-economic uplift in the country largely depends on sustainable development that is greatly dependent on planned evaluation of its policies, plans and programs. The environmental and climatic challenges were highlighted in Planning Commission of Pakistan's Task Force on Climate Change (GOP 2010) and the National Climate Change Policy of Pakistan (GOP, 2013). Strategic Environmental Assessment (SEA) is a systematic decision support process, aiming to ensure that environmental and possibly other sustainability aspects are considered effectively in policy, plan and program making. The National Conservation Strategy in 1992, the National Environment Action Plan in 2001 and Country Strategic Environmental Assessment in 2006 are few examples that assessed the environmental aspects in the country at policy and sectarian levels. Informally, the Medium Term Development Framework (GOP, MTDF, 2005-10) was assessed for environmental incorporation to make it allied with the National Environment Policy. However, all these efforts or practices were made without legal compulsion. The only SEA carried out in Pakistan was Strategic Environmental, Poverty and Social Assessment (SEPSA) of National Trade Corridor by the World Bank that has highlighted usefulness of the tool (Miglino, 2010). There is developing global accord that climate change is humanity's greatest threat in modern times and is expected to have thoughtful consequences for socio-economic sectors. The geological location and socio-economic weakness of Pakistan has made its position at highest risk to the environmental, social and economic penalty of climate change (German Watch, 2011).

Environmental integration in development planning is well thought-out crucial for sustainable growth in any country. It became more important for Pakistan due to rising fear of Climate Change impacts in the form of disasters like earthquakes, landslides, floods etc. causing a huge environmental, social and economic loss. EIA is

useful at the small scale project level and is obligatory under the current applicable laws in Pakistan for all the development projects that have potential for some environmental hazards due to their interventions. In practice, compliance has improved over the last decade; still a lot is to be desired. As far as the quantity or numbers of EIA is concerned, it is encouraging recently. However, its quality is average to poor in general. The tool of EIA alone may not be very cautious for environmental integration of SEA as a tool in an efficient and effective manner.

2.2.1 SEA of thermal power generation policy of Pakistan

In a competition to attract foreign investment the Government of Pakistan incentives has provided In return that guarantee high profit to investors in thermal power generation. the country stood to receive clear short term the Government economic gains. In pursuit of this goal, t up a Private Power d I p g infrastructure Board, based in Islamabad, with a mandate to facilitate the establishment of over 30 power stations throughout Pakistan. It entered into agreements for independent power plants (IPPs). The National Conservation Strategy (1992) recommends the location of highly polluting units away from populated and ecologically sensitive areas. According to the National Environmental Quality Standards (NEQS, 1993), oil-fired thermal power stations need to substantially reduce emissions, if installed in an already polluted environment. In 1994, with support from Canadian International Development Agency (CIDA), a National Power Plan was developed. However, the Government did not take this into account in negotiating agreements for foreign funding.

Government policy on thermal power generationgave investors the freedom to choose the site, the technology and the fuel. Contracts required investors in suchprojects to submit an EIA to the Government. Yet these EIAs had little influence on project location and design, and much less on the actual need for such projects. In 1994, IUCN-Pakistan undertook a study of a plan to meet the electricity needs of Karachi an already highly polluted city. This proposed several new oil-fired thermal power stations to meet projected power demand. The study found that, individually, each of the proposed stations was well within the NEQS maximum allowed limit of 500 tons of SO2 emission per day. But cumulatively, these stations would emit an additional 1000 tons of SO2 plus one ton of toxic metals daily.

Favorable terms were offered to foreign investors and soon led to an increase in electricity prices. As a consequence, many local industrialists pooled their resources

and established their own power generation plants for their own use (captive units). This reduced the load on the National Grid System. But many of these plants were installed with little or no pollution control devices. Other industrial consumers signed agreements with the private power companies, Due to public pressure, lobbying and a strong role by the media; several of the proposed plants (IPPs) were relocated. Use of SEA at an early stage would have avoided these problems to mitigate similar problems; training workshops on SEA were organized in Pakistan by IUCN. The Ministry of Environment wrote to IUCN-Pakistan giving an assurance that "because of the requirement for ElAs and the existence of the NEQS, the new IPPs would not pollute the environment". This prompted IUCN-Pakistan to undertaken an SEA of the thermal power generation policy. It involved a desk exercise to develop scenarios for a range of conditions. These drew from past experience of power plant developments, particularly the preferences and tendencies of entrepreneurs in selecting sites (e.g. in or close to Karachi, or in remote areas close to water for cooling) and the problems of transporting oil to remote plants and connecting them to the national electricity grid. A working document set out the environmental consequences under these scenarios. It was presented to staff of the Planning and Development Department senior officers from sections dealing with agriculture, industry, irrigation, population welfare and the power sector, etc. They had experience of dealing with thermal power plant issues and other large development projects. Subsequent discussion focused on the cumulative impacts on both a local and country-wide scale. The SEA revealed that whilst the Government was fully aware of the environmental dimensions associated with thermal power generation, assessment was based only on EIA.

The SEA made it clear to the policy-makers that EIA alone was not sufficient to guarantee sustainable development. EIA was used as a downstream decision-making tool applicable to individual projects, especially after deciding the site, technology and fuel. So its scope was very limited and missed the big picture. As a consequence, many thermal power stations using high-Sulphur furnace oil became clustered in one city and added to the already polluted air. Alternatively, they were developed in a scattered way in remote places. This made it difficult to supply them with furnace oil and to connect them with the National Grid System. This SEA was used as a case study to illustrate the need for an SEA as an upstream decision-making tool and to minimize all the foreseeable problems at the policy formulation stage. Following a training programme, the Planning and Development Department is beginning to

request that SEAs are undertaken for major national and provincial-level initiatives at the policy level, Naim (1997, 1998, personal communication 1998).

2.3 Disaster resilience indicators

Several parameters have been tested to measure the resilience of individual, community institutional capacity, economic feasibility and physical and technical viability. Joerin et al, (2012) have applied ecological, social, economic, institutional, infrastructure and community competency as disaster resilience indicators. While assessing resilience from the perspective of ecological parameter, the ecological system is usually influenced by factors like biodiversity, response diversity, spatiality and governance and management plans (Adger, 2000).

In social resilience, key sub-indicators are demography, social networks, risk knowledge and risk communication, social norms and values and effectiveness of faith-based organizations (Joerin et al., 2012). I3uilding social resilience requires enhancement in risk communications, risk awareness, preparedness, emergency response and recovery process (Paton and Johnston, 2006). Similarly, the economic resilience to hazard events has so far been measured on the basis of impacts of disasters and the extent of recovery resilience (Joerin et al., 2012).

In building economic resilience, stress should always be made on how to minimize monetary losses from the impacts of disasters, which can be effectively reduced through adoption of prevention, mitigation, preparedness, response and early recover mechanism. Cutter et al. (2008) has included income level, employment status, property value, wealth source, finances and revenue status as sub-indicators of economic resilience.

Institutional and organizational resilience includes the community involvement in hazard reduction initiatives, hazard mitigation plan, zoning regulations and building codes, inter-operable communication, emergency services and response plan and consistency of operational plan. It also requires assessment of organization and physical properties including number of technically trained personals, communication network, and emergency response assets. The organization should have hierarchical control, command system and horizontal coordination mechanism with sister organizations and integration in the disaster risk reduction (DRR) policies and plans.

Organization resilience is sometimes judged that how the organization manage and respond to a particular extreme event.

Resilience of infrastructure includes the physical systems including transportation and communication life lines, irrigation and water storage system, water supply, electricity and s, sewage and sewerage system, residential and housing stocks, gas supply networks, sewage system, residential and housing stocks, commercial, Institutional and industrial establishments (Joerin et al., 2012). Community competence is an important form of disaster resilience indicator and related to population witness, local understanding of risk counseling services, education, health and quality of life. In disaster resilience context, the community competence is measured that how effective community functions in pre, during and post-disaster phases,

2.4 Disaster resilience and climate risk

in Pakistan, there is dearth of information and analysis about the impacts of climate change on sea level rise, increasing glacier ablation, increase in acid rains, extremes in precipitation and temperature etc. Such increasing frequency of weather related events is partially attributed and endorsed as an impact of global climate change scenario (Rahman and Khan, 2013).

In Pakistan, there were record breaking wet spell of rainfall in the year 2010, which has caused devastating century worst flood and terrible damages to socio-economic and physical environment (Rahman, 2010). Climate change experts attribute this unusual phenomenon with a medium confidence level to climate change (Rahman and Khan, 2013). The latest literature reveals that there has been increase in the climate variability and extreme weather episodes with high monetary losses (Kreft and Eckstein, 2013). Due to the global climate change, it has been confirmed that less developed countries suffered more than the industrialized nations (Rahman and Khan, 2013).

2.5 Disaster resilience, sustainability and environment linkages

The community vulnerability and disaster resilience is directly linked with the sustainable utilization of resources and man-environment interaction. It is therefore, sustainability is a central point in the framework of hazards vulnerability and disaster resilience. In the context of disasters, sustainability can be defined as the capacity to bounce back and tolerate the potential adverse impacts of extreme phenomenon

relying on locally available resources without jeopardizing the environment to reduce its potential for the succeeding generations and devoid of any assistance from outside. Most often the environment is intensively utilized by unsustainable practices which as a result triggered more severe extreme environmental events. A cursory example of extensive deforestation is one of the key factor in increasing the flood runoff and resultant damages and similarly degradation of wet coastal resources is another major factor responsible for coastal hazards. Such efforts not only required for minimizing the impacts of environmental hazards, but they are also much more in line with the generational equity concerns inherent in sustainability science (Cutter et al., 2008). This calls to shift our DliR. related reactive policies and strategies to more proactive one.

Around the globe, land use and land cover changes are eroding the natural buffers that protect communities from hazard risk. These same changes often erode people's capacity to recover from disaster. Other environmental changes, such as anthropogenic global warming, promise to create new challenges to the security and sustainability of communities around the world. There are, however, opportunities to reduce disaster risk, and enhance community resilience. The impacts of disasters, whether natural or man-made, not only have human dimensions, but environmental ones as well (UNEP, 2005).

2.6 History of Droughts in Pakistan

Pakistan frequently experiences several droughts. The Punjab province experienced the worst droughts in 1899, 1920 and 1935. The North-West Frontier Province (NWFP) experienced the worst droughts in 1902 and 1951, while Sindh had its worst droughts in 1871, 1881, 1899, 1931, 1947 and 1999. The most severe droughts at the national scale were perhaps the most recent, which occurred in 1999-2000 prolonging up to 2002.

The rainfall is erratic and river flows have dropped. Water in the Tarbela dam reaches the dead level in late February or early March almost every year. The current live reservoir capacity in the Indus basin has been reduced due to siltation. The recent drought has also exposed the vulnerability of the Indus basin irrigation system and environmental issues in deltaic areas.

.Agricultural growth suffered a severe setback during 2001 as a result of drought. While major crops registered a negative growth of almost 10%, the overall agriculture recorded a negative growth of 2.6%. The drought persisted throughout 2002, resulting in water shortage of upto 51% of normal supplies as against 40% of the previous year. The total flows of water in major rivers also declined to 109 billion m3 against an average of 162 billion m3. Rainfall has also been below normal. The canal head withdrawals have also witnessed significant decline. Notwithstanding severe water shortages, the farmers in Pakistan undertook various measures to minimize their adverse effects. These include judicious use of water, exploitation of groundwater, purchase of water from tube wells, improvements in cultural practices, and better overall management. As a result, overall agriculture registered a positive growth of 1.4% in 2002 as against a decline of 2.6% during 2000. Droughts have also affected the performance of non-agriculture sectors.

Pakistan's nonagricultural GDP growth remained stable at around 4.3% in 2002. Therefore, when adjusted for drought impact, the real GDP is provisionally estimated to grow by 4.7% against 5.2% in 2001 reference. The slower growth in real GDP over these 2 years was caused by drought. If there had been no drought, Pakistan's economic growth would have been 5%.Water harvesting, management and use are common practices for drinking or farming either directly harvesting the runoff or by storing it in small surface and subsurface reservoirs. The stored water is used for supplemental irrigation and other consumptive uses.

In non-irrigated areas, the majority of farmers are still practicing traditional water-harvesting systems, sailaba or spate irrigation and khus hkhaba or runoff farming. These harvesting systems were adversely affected by the introduction of new technological interventions (like deep tube wells) and by recurring droughts Baluchistan provides a unique opportunity to the Region in the assessment of the impacts of new technologies on the karez system.

The institutional arrangements are reasonably well defined for the drought-relief activities, but there is hardly any institutional mechanism for drought preparedness and mitigation to address the long-term issues. The strategy for technological development in Baluchistan and arid areas of Sindh should be based on the assessment of the potential resources available for development through integrating activities of spate irrigation with the objective of spreading of floodwater to increase

the command area and recharging the regional groundwater resources. Monitoring and impact assessment are also limited among the countries of the region.

The El Niño and La Niña phenomena also cause drought conditions in Pakistan. For instance, the El Niños on record occurred in 1982-1983 and 1997-98, and meteorological droughts occurred in these years in Pakistan. (Ahmad S., et al, 2004).

The incidence of drought is becoming increasingly common in Pakistan with substantial consequences upon sustainable development in sectors of food security, livestock, agriculture, water resources, environment and hydro-electricity. Low rainfall and extreme variations in temperature characterize the climate in Pakistan. About 60 percent of the total land area is classified as arid, which annually receives less than 200 mm rainfall. The main arid rangelands include Cholistan, D. G. Khan, D.I. Khan, Kohistan, Tharparkar and Western Balochistan. Average annual precipitation in Balochistan and Sindh provinces is about 160mm as compared with 400 mm in Punjab while around 630mm in KPK province. Rainfall variability during different seasons is also considerably high. Climate in lower southern half of the country is arid and hyper-arid remain drastically dry in each region and are always vulnerable to drought with a small negative deviation from low mean rainfall. Certain areas experience two-three drought years in every decade. In recent time drought disaster causing hundreds deaths and effecting lives in Distrcits Umerkot, Mithi Thaparkar of Sindh province. Round about 3000 persons have been died in that areas due to drought till 2016.

2.7 Drought management and institutional setup

These are institutional setup for drought management in Pakistan.

2.7.1 National Calamity Act 1958

The National Calamities Act of Pakistan 1958 was the only legal document to regulate the relief, rehabilitation and reconstruction. This was only the reactive legal document functioned throughout the country for a long time. Under this regulation, there was an emergency relief cell within the cabinet division. Again it is refereeing just relief /compensation in either disaster or post-disaster phase. Under the Calamity Act, in each province there were relief commissioners, who supervised and coordinate the relief and rehabilitation efforts. Few provinces have also developed Disaster Plan such as NWFP Disaster Plan 1978, where list of hazards are available to which the

province is susceptible (Rahman, 2010). Similarly, it has also elaborated the government line departments and their primary and secondary responsibilities in the disaster phase. The Provincial Board of Revenue has been made responsible of collecting damages data and record of compensation.

2.7.2 UNISDR and HFA (2005-2015)

The United Nations General Assembly has created UNISDR (International Strategy for Disaster Reduction) in 1999. The secretariat of UNISDR is the focal point in the UN system for the coordination of disaster risk reduction (DRR) and implementation of the international DRR— the "Hyogo Framework for Action (HFA) 2005— 2015: Building the resilience of nations and communities to disasters". It was adopted under the "Hyogo Declaration" in the World Conference on Disaster Reduction, held in Hyogo prefecture Kobe, Japan in 2005. Its core areas includes ensuring DRR is applied to climate change adaptation, increasing investments for DRR, building disaster-resilient cities, schools and hospitals, and strengthening the international system for DRR. UNISDR's vision is based on the three strategic goals of the Hyogo Framework for Action: integrating DRR into sustainable development policies and planning, developing and strengthening institutions, mechanisms and capacities to build resilience to hazards, and incorporating risk reduction approaches into emergency preparedness, response, and recovery programmes. The UNISDR introduced new concept to shift from a reactive to a proactive approach. The HFA (2005-2015) signed by 168 countries including Pakistan.

2.7.3 Sendai framework for disaster risk reduction 2015 -2030

The Sendai Framework for DRR 2015-2030 was adopted at the third United Nations World Conference on DRR, held 14-18 March 2015 in Sendai, Miyagi, Japan. Pakistan is also a signatory of this framework. It represented a unique opportunity for countries:

- to adopt a concise, focused, forward-looking and action-oriented post 2015 framework for DRR;
- to complete the assessment and review of the implementation of the HFA 2005— 2015: Building the Resilience of Nations and Communities to Disasters.

- to consider the experience gained through the regional and national strategies/ institutions and plans for DRR and their recommendations, as well as relevant regional agreements for the implementation of the FIFA;
- to identify modalities of cooperation based on commitments to implement a post 2015 framework for DRR; and
- to determine modalities for the periodic review of the implementation of a post 2015 framework for DRR.

The goal of this framework is "to Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience". The Framework Priorities for Action are understanding disaster risk, strengthening disaster risk governance to manage disaster risk, investing in DRR for priority understanding disaster risk resilience and last is enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction.

2.7.4 National Disaster Management Ordinance 2006

After 2005 Kashmir earthquake and HFA, the Government of Pakistan was stimulated towards institutionalization for DRR. There was high time for capacity building of the disaster related agencies at national, provincial, district, local and community level. As after the earthquake, numerous challenges emerged and encounter the situation. Keeping in view this alarming state the president of Pakistan promulgated the National Disaster Management Ordinance (NDMO) in 2006 (GoP, 2011). Under this ordinance, National Disaster Management System was introduced in the country. Similarly, the National Disaster Management Commission (NDMC) was established at the national level. The NDMC was assigned the task of preparing guidelines, policies and plan for DRR. Eventually, the National Disaster Management Authority (NDMA) was established in 2007.

2.7.5 National Disaster Risk Management Framework 2007-2012

The 2005 earthquake led to promulgation of the National Disaster Management Ordinance 2006 (NDMO), which was the first step towards integrated (proactive) disaster management in the country. In 2007, National Disaster Risk Management Framework (NDRMF) was formulated by involving different ministries, UN agencies, national agencies and authorities all stakeholders are expected to undertake following actions to promote disaster risk management system in the country.

1. Integrate risk assessment in the planning and design stages of all new infrastructure/projects.
2. Assess vulnerability of people, infrastructure, assets and services related to their sector.
3. Develop disaster risk management plans.
4. Integrate vulnerability reduction measures in their programmes.
5. Develop technical capacities of their departments/sectors to implement disaster risk management strategies.
6. Allocate funds for disaster risk management in annual development budgets.
7. Conduct post disaster damage and loss assessments.
8. Organize emergency response, recovery and rehabilitation as per the mandate of the different departments.

In Pakistan, the NDMC was established at national level and its entities at regional level. The regional commissions namely: Punjab Provincial Disaster Management Commission, Sindh Provincial Disaster Management Commission, KPK Disaster Management Commission, Baluchistan Disaster Management Commission, Gilgit-Baltistan Disaster Management Commission, State Disaster Management Commission and FATA Disaster Management commission. Each regional commission is headed by chief executive of respective region; Lich as in case of province, the Chief Minister. This was a paradigm shift in disaster management system from active approach to proactive one. Beside these regional entities, the National Disaster Management Authority was set a focal body and held responsible to effectively promote the DRR agenda, develop close liaison and implement the same in coordination with the regional and local disaster management authorities. The framework provides guidelines to coordinate activities of numerous stakeholders, sets

out priorities for mobilization of resources from donors and development partners of Pakistan to implement strategic activities during the next five years.

2.7.6 National Disaster Management Act, 2010

The Pakistan National Disaster Management Ordinance was approved by the parliament in December 2010 and became the Act called as Pakistan National Disaster Management (NUM) Act 2010. The NDM Act has established three levels for the disaster risk management in the country i.e. national, provincial and district levels. National disaster management authority is working at federal level, provincial /state disaster management authority at provincial/state level and district disaster management authority/unit at the district level. The Act provides the establishment of national disaster management system in Pakistan. The NDM Act provides the comprehensive guidelines and legislative backup for entire disaster risk management system in the country. Chapter 2 of the DM act highlight the power and function of national disaster management commission and establishment of national disaster management authority, whereas Chapter 3 focuses on the power and function of provincial disaster management commission and establishment of provincial disaster management authority (PDMA). However, Chapter 4 is related to third tier namely district disaster management authority. The Act further elaborates the measures to be taken by the government for disaster management function of local authorities, establishment of national institute of disaster management, establishment of national disaster response force, provision of budget and audit, offences and penalties.

The Act consists of eleven chapters and forty eight sections and provides the establishment of NDMS in Pakistan. Section 1 provides the title, extent, and commencement of the Act and Section 2 defines various terms. Sections 3-36 deal with issues that can be broadly divided into three categories, i.e., establishment of institutions and development of plans (Sections 3-28), finances, Accounts including audit in (Sections 29-32), offences and penalties (Sections 33-36). The establishment of institutions and development of plans (Section 3-28) provide a three-tier hierarchical framework. At the top of the hierarchy, a unified national commission, known as the National Disaster Management Commission (NDMC), headed by the Prime Minister and its members include all provincial chief ministers, Prime Minister AJ&K the key federal cabinet ministers and some other members (Section 3). The NDMC have the responsibility for making the Policies, Plans and guidelines in the

country for disaster management (Section 6). For implementation of the PPs at the national level, NDMA headed by a Director General is constituted to act as the executive arm (Section 8), which is to serve as a focal point for the coordination and implementation of disaster management policies in the country (Section 9). The Act requires drawing a national plan for DM, suggesting measures fbr the prevention of disasters, integration of the measures in development plans, and defining roles and responsibilities of relevant federal government ministries and departments (Section 10). At the second tier, PDMC (Section 13) and at the third tier, PDMA (Section 15) and DDMA (Section 18) are suggested. The PDMAs draw provincial plans (Section 17) and DDMAs draw district plans (Section 21) for disaster management at in Sections provincial and district levels, respectively. In addition, the Act provides establishment of a N1DM for training, research and development (Section 26), and a National Disaster Response Force (N DIU) (Section 27). In addition, the Act suggests establishment of a NDM fund for meeting any threatening disaster situation or disaster (Section 29). Similarly, provinces are asked to establish PDM fund for dealing with disaster issues (Section 30). Moreover, miscellaneous items are covered 37-48 of the Act.

2.7.7 National Disaster Management Plan (2012-2022)

The Pakistan faces wide ranges of hazards and risks, which requires the ability to effectively handle these challenges through comprehensive national approach of disaster risk management. During 2008-2009 on the request of government of Pakistan, JICA has studied the entire legal and administrative setup of DRM in the country and project document on formulation of National Disaster Management Plan for Pakistan. NDMP was prepared with the technical support of JICA in 2012. NDMP is a comprehensive plan, having a total investment cost of USD 1040.9 million (PKR 92.02 Bn with 1 USD = PKR 88.4), with a long span of ten years (2012-2022). The Plan aimed at enhancing the capacity of the country response by proactive approach to disasters by defining the measures to be considered necessary for disaster management and risk reduction in line with the provision of the National Disaster Management Act 2010. The Plan consisting of the "Main Plan" document along with three supporting volumes in addition to an Executive Summary, which identifies implementation of ORR, U the provincial and district level. One of the objectives of the National Disaster Risk Reduction Policy of Pakistan is "to Strengthening the

structural and non-structural resilience of key infrastructure and lifelines in Pakistan". The intervention 3.2 (Prevention and Mitigation) emphasis on resilience key-infrastructure and life-lines. Key infrastructure and lifelines include those facilities, structures and services whose disruption or destruction would seriously affect peoples' lives and livelihoods including those whose functioning is crucial in a post disaster situation i.e. educational and health Facilities, key government buildings, water supply and sanitation, irrigation and flood protection.

This policy document introduces a proactive and anticipatory approach by laying special emphasis on risk assessment, prevention, mitigation and preparedness, with the aim of creating a resilient nation. The document is divided into four chapters:

Chapter # 1. Assesses risk awareness and preparedness in Pakistan, finding that Pakistan's current disaster risk reduction (1)10() capacity is insufficient.

Chapter # 2. Outlines the National Disaster Management Authority's (NDMA) vision for capacity development in Pakistan, with a focus on vulnerable populations.

Chapter # 3. Explains NDMA's plan for policy interventions, particularly for development in the areas of risk knowledge, mitigation, and preparedness.

Chapter # 4. Explains NDMA's implementation framework to mainstream DRR in Pakistan, including plans for financing, monitoring, and educating students on disaster preparedness.

The main objectives of the Disaster Management Policies of Pakistan are:

- creating an integrated national capacity to identify and monitor vulnerability and hazard trends including potential climate change impact.
- creating Multi-Hazard Early Warning capacity while building upon existing systems and emphasizing the information and warning needs of vulnerable end-users.
- strengthening an integrated disaster preparedness and response capacity from the local to the national level.
- promoting development planning that considers and addresses disaster risks alongside environmental and climate change concerns.
- strengthening the structural and non-structural resilience of key infrastructure and lifelines in Pakistan.

- strengthening capacity at national and provincial levels to facilitate and provide support to the implementation of DRR policies, plans and programs across sectors and in high-risk areas; and
- strengthening Local Level Risk Reduction capacity focusing upon communities, and supportive linkages with Union Councils, tehsils and districts. Ensuring DRR is systematically integrated into recovery and reconstruction programming, "building better, safer and stronger" and informing DRR mainstreaming in general.

2.8 History of Droughts Indian Sub-Continent

The Indian sub-continent is predominantly characterized by a tropical monsoon climate and entire regime is distinguished mainly by the differences in rainfall both in quantity and distribution. The most important feature is the regional and temporal alteration of atmospheric flow patterns associated with monsoon. There are two rainfall systems operating in the region (a) the southwest or summer monsoon and (b) the northeast or the winter monsoon. Fortunately Pakistan also falls in this region which receive heavy amount of rainfall in summer due to SW monsoon and in winter due to western disturbances. The summer monsoon accounts for 70 to 80% of the annual rainfall over major parts of South Asia (IMD, 2009). In Pakistan, summer monsoon accounts 60 to 70% of the annual rainfall during July to September (Chaudhry, 1992). There is a large variability in the monsoon rainfall on both space and time scales. Droughts in Pakistan region are mainly due to various kinds of failures of rains from southwest monsoon. Also there seems to be some association between El Nino and La Nina events and weak monsoons. Pakistan frequently experiences several droughts. The Punjab province experienced the worst droughts in 1899, 1920 and 1935. Khyber Pakhtunkhwa (KPK) experienced the worst droughts in 1902 and 1951, while Sindh had its worst droughts in 1871, 1881,1899,1931,1947 and 1999. Over more than hundred year's period between 1871-1988, 11 out of 21 drought years were El Nino years. The El Nino phase of the Southern Oscillations (ENSO) has direct impact on drought in Pakistan as it poses mainly negative impact on summer monsoon. Due to climate change, wet and dry cycles some years we receive more rains in wet spell and in dry spell we receive less rain. Due to less rain

we have drought and heavy rain we have floods (flash flood, urban flood, costal flood and river flood)

2.9 Old Institutional Setup for Drought Monitoring and Assessment in Pakistan

Old institutional setup for drought monitoring and assessment of Pakistan was same as following .

2.9.1 Drought Monitoring

Monitoring of drought-related hydro meteorological and other variables in Pakistan is carried out by several agencies, including the Pakistan Meteorological Department, Water and Power Development Authority, Provincial Irrigation and Drainage Authorities and District Governments. (Ahmad S., et al., 2004)

2.9.2 Pakistan Meteorological Department (PMD)

PMD is a federal agency under the Ministry of Defense, with a mandate to monitor and analyze meteorological parameters including drought events. It maintains a network of about 200 meteorological stations across the country. A Drought and Environmental Monitoring Centre (DEMC) has been established within the organizational setup of the PMD. This center has planned to install 350 additional meteorological stations, particularly to strengthen the existing drought monitoring system in the country. The DEMC has also established the Regional Meteorological Centers in each of the four provinces to provide support for monitoring of drought at the provincial level. The Regional Meteorological Centers collect the real-time data of meteorological parameters and communicate these to the PMD headquarters for analysis (PMD 1999, 2000, 2003).

Regional Meteorological Centers are located in Quetta (Baluchistan), Karachi (Sindh), Lahore (Punjab) and Peshawar (NWFP). At PMD headquarters, data and information received from the Regional Meteorological Centers and shared with WMO are processed and synthesized using established methodologies and criteria related to drought indices to generate information related to drought hazards. If the numerical values computed using the drought indices indicate that a certain area has been engulfed in drought conditions, then PMD asks the respective meteorological station(s) to supplement the climatic findings with the physical surveys and ground-

truth analysis in the drought-affected areas. If the ground-truth surveys also support the empirical findings, then PMD communicates the drought-alert signals the Home Secretary of the respective provinces and the Emergency Relief Cell within the Cabinet Division of the Government of Pakistan to take necessary measures in the affected areas.PMD explores drought characteristics like intensity, magnitude and extent (spatial and temporal).For the assessment and characterization of drought events and drought-affected areas, PMD has been using Percent Normal Method, Aridity Index and Standardized Precipitation Index as drought indicators (PMD 1999, 2000, 2003).Percent Normal is the simplest drought indicator and can be calculated by dividing the actual precipitation of any station with normal precipitation (typically based on 30-years' mean). If the rainfall is less than 40% of seasonal normal rainfall at any station for two consecutive seasons (winter and summer under Pakistani conditions), the drought conditions are set on for that particular station. PMD has identified drought-prone areas of the country by analyzing the historical precipitation data (1931–1988) of important locations. Time-series charts of the seasonal rainfall amounts thus developed have revealed that the higher the seasonal normal values, the lesser the chances of drought incidence and vice versa. As a result, Gilgit Baltistan, KP and parts of the northern Punjab have seldom experienced droughts, where seasonal normal is higher due to the presence of western disturbances. Contrary to these, the areas lying in the south and southwestern side of the country (Sindh and Baluchistan and Southern Punjab) have lower seasonal normal and, consequently, have more drought-prone features. Aridity Index (AI) was used by the PMD as a criterion to evaluate drought-severity conditions (light, moderate or severe). The Aridity Index is defined as a ratio of 50% probability of rainfall to the actual crop evaporation and transpiration. The computation of Aridity Index requires data on precipitation and reference crop evaporation and transpiration. Meteorological data of temperature, humidity, wind speed and sunshine hours are needed to compute the reference evaporation and transpiration.

Standardized Precipitation Index (SPI) quantifies the precipitation deficit for multiple time scales. These time scales reflect the impact of drought on the availability of different water resources. The SPI calculation for any location is based on the long-term precipitation records for a desired period. This long-term precipitation record is fitted to a probability distribution, which is transformed into the normal distribution

so that the mean SPI for the location and desired period is zero. Positive SPI values indicate greater-than median precipitation, while negative values indicate lesser-than median precipitation. Because the SPI is normalized, wetter and drier climates can be represented in the same way, and wet periods can also be monitored using SPI.A drought event occurs any time when SPI is continuously negative and reaches intensity where the SPI is −1.0 or less. The event ends when SPI becomes positive. Each drought event, therefore, has a duration defined by its beginning and end, and intensity for each month that event continues. The accumulated magnitude of drought is a positive sum of SPI for all the months within a drought event. PMD (2003) has analyzed the last drought episode in the country by using SPI as a criterion at 48 locations of the country with different time scales.

2.9.3 Water and Power Development Authority (WAPDA)

WAPDA is a federal agency responsible for collection of river flows, hydro meteorological data in the Indus basin and its catchments and for analyses of the impacts of any climatic changes in the river flows, storage-reservoir levels and groundwater levels in the country. WAPDA maintains the largest number of hydro meteorological and stream-gauging stations in the country. The processed information is made available to the concerned federal and provincial agencies through fax and on the website in case the country is facing a drought. They also provide such information to the Indus Rivers System Authority (IRSA), to the Federal Committee on Agriculture and, in addition, to the PMD and the drought-relief and mitigation-related agencies. In the recent drought, such information was made available to all the concerned parties on a daily basis through fax by the IRSA.

2.9.4 Provincial Irrigation and Drainage Authorities

These authorities are responsible not only for managing the canal deliveries but also for monitoring the canal diversions and distributing water within the canal network in the Indus basin. They are also responsible for sharing this information with all the concerned institutions in the country and work on an emergency basis during the drought periods. They also exercise the practices and schedules for managing the shortages in the canal supplies. During the drought period of 1998-2002, provincial Irrigation and Power Departments (IPDs) implemented comprehensive interventions

including a) conservation of water releases from storage reservoirs during slack demand period and their reallocation during critical stages, b) canal water allocations on a priority basis to canal commands having brackish groundwater, and c) operating canals on revised rotations.

2.9.5 The District Governments

District Governments now include Departments of Agriculture, Livestock, Public Health, Revenue, etc. The field staff reports to their respective district headquarters and the provincial departments any unusual changes due to a prolonged dry spell, i.e., reduced water availability for agriculture, livestock and for rural population. They also report such happenings to the District Governments, as these departments have been devolved and now their district staff is directly under the control of the district administration. The District Coordination Officer and the Nazim (District Public Representative) coordinate the information provided by various line departments and keep the provincial administration informed accordingly. The devolution system certainly has an edge to coordinate the monitoring information at the local level. The major limitation in the monitoring of the drought is the integration of the hydrological, meteorological and socioeconomic information, as no single institution is responsible for the monitoring of drought in the country.

2.9.6 National Calamity Act

The Federal Government is responsible for developing a framework and undertakes necessary mitigation measures and relief support for the social and economic revival of calamity-stricken areas (due to floods, droughts, earthquakes) and communities. The West Pakistan National Calamities (Prevention and Relief) Act, 1958, provides the required legislative basis and framework to counter the effects of various hazards. According to this Act, whenever a province or any part thereof is affected or threatened by calamities (droughts, floods, earthquakes, fire epidemic or any other disaster), the Government, by notification declares the whole or any part of the province as a calamity-affected area (GOP 1958).This Act entrusts the provincial Board of Revenue to appoint a Relief Commissioner (which most of the time, is the senior-most member of the Revenue Board) for calamity-declared areas including the drought-affected areas. The primary role of the Relief Commissioner as outlined in the 1958 Act is reproduced as follows "Collect field reports about losses of life,

livestock and property and apprise the provincial and federal governments of these losses. Suggest compensatory fiscal amount for the calamity-affected areas, to the provincial and federal governments including postponement of land and other government taxes, tariffs, revenues, etc. Provide approved compensation to the affected population through District Relief Officers. The focus of the Act is therefore on relief measures."

2.9.7 Drought-Relief Measures

Whenever, under the National Calamity Act of 1958, any part of the country is declared as a drought affected area, the federal provincial and district governments have to respond to the situation by initiating a variety of relief and mitigation measures. The emergent relief measures for the severely affected communities include distribution of food, fodder, water, tents, blankets, medical supplies, and mobile medical and vaccination teams. Relief expenditures are supported through emergency budgetary allocations by both the federal and the provincial governments. Depending on the drought severity, as suggested by the drought-monitoring and assessment, and resulting vulnerabilities, the Government of Pakistan may designate an area as either drought affected or severely drought-affected. The relief plans initiated for the rehabilitation of these two categories vary. The government allocates more funds and undertakes extensive relief measures on a priority basis in the severely affected areas compared to the less-affected areas. Furthermore, in severely affected areas, the government may either waive off the land and other revenue taxes, postpone or even write-off the loan recoveries, may extend the special cash grants from the higher authorities (President, Prime Minister or Governor) along with the emergency relief supports of subsidized or free ration and water supplies, public and veterinary health facilities and fodder for livestock. Problems observed in relief operations during the latest droughts in Baluchistan and Sindh included a lack of a database on assessment and impacts of drought; b) lack of an appropriate analysis of the records and data collected; c) the attitudinal and behavioral problems; d) lack of commitment and devotion in relief operations and distribution of materials; e) lack of service orientation, especially in the health services; f) lack of awareness and culture of the relief camps; g) clear-cut role of the public and private-sector institutions and interdependencies; h) lack of public participation and media support; i) moral values of the society; and j) lack of coordination among the line departments.

2.9.8 Assessment of Required Relief

To estimate the worth of these relief-support programs as well as to prioritize the specific requirements of drought-affected areas, under the present legislative framework, the Provincial Relief Commissioners have the responsibility for drought assessment and to apprise the Federal and Provincial Governments of the required relief support. Most of the time, Relief Commissioners accomplish this task through the Provincial Board of Revenues and Revenue Departments. To evaluate the impacts of drought on the livelihood of the rural and urban population and on the availability of water resources for domestic, water and irrigation purposes, extensive field visits and surveys are carried out by the Provincial Revenue Departments in drought-affected areas (GOB 2003). Similarly, the impacts of drought on health, sanitation and nutrition conditions in the drought affected areas are also assessed through extensive field surveys and visits. In addition to the official field surveys and visits, NGOs and international donor agencies (UNDP, WFP, FAO, WHO) also conduct studies and surveys for the assessment of food and nonfood requirements in the drought affected areas with an objective to provide information on the assessment of the severity of drought impacts. The Relief Support Programs of donor agencies are structured on the basis of the requirements given by the government. Such surveys were conducted by FAO and UNDP during 1999–2002, which provided a realistic assessment of the damages of droughts and assessment of requirements for the Relief Support Programme (UN 2001; WB 2001; UNDP 2003).The Board of Revenue of the Sindh Government carried out an assessment of the recent drought during 1999–2002 in the Sindh province while NGOs (Pattan, Action Churches together) and donor agencies (FAO, WFP, WHO) carried out independent surveys to evaluate the food, health and sanitation conditions in the drought-affected areas (PDO 2001; UN 2001; WB 2001,UNDP 2003).

The Bureau of Statistics, under the overall supervision of Planning and Development Department, Government of Baluchistan, carried out an assessment of the impacts of drought during 1998–2002 while the UNDP, FAO, OXFAM, and Islamic Relief carried out independent surveys in drought-affected areas of the province to evaluate food- and nonfood-supply assessments in the province. Based upon these survey results, the Relief Commissioners of the concerned provinces rationally quantify and

prioritize the relief-support measures, so that optimal compensation (both in cash and kind) for the affected communities can be ensured. To coordinate various relief measures for social and economic revival and rehabilitation of the drought-affected areas in the country as well as to maintain the liaison with the international donors, the Federal Government has established the institution including the following:

(i) Federal Drought Emergency Relief and Assistance (DERA) Unit

(ii) Emergency Relief Cell (ERC) in the Cabinet Division of the federal government; and

(iii) National Steering Committee

2.9.9 Drought Emergency Relief and Assistance (DERA) Program

For rehabilitation of the drought-affected areas of the country during the latest drought, the Government of Pakistan commissioned the DERA Program. For the execution of the activities of the DERA Program, funding was sought from the international donor agencies. The ADB and WB responded to the request of GOP and a total loan of US$140 million was approved (ADB contributed US$100 million and the WB contributed US$40 million). In addition to the loan, the government allocated US$20 million (mainly in the form of services) for the DERA Program. Out of a total DERA finding of US$160 million, the share of Sindh and Baluchistan provinces was 30% each, while allocations for Punjab and NWFP were 25% and 15%, respectively. The focus of the program is on the provision of sustainable drinking-water supplies, water management and conservation for sustainable livelihood (agriculture and livestock), support for construction of roads and restoration of drought-affected orchards. The program also provides essential social services. Based on the source of funding, the DERA Program has been subdivided into the Drought Impact Mitigation and Recovery Component (DIMRC) and the DERA component. The sectors identified for investment under WB funding (DERA component) in drought-affected areas of the country are irrigation, road construction, agriculture and rural water-supply schemes. However, the major thrust was on the provision of water supply, road construction and irrigation facilities, where 36, 35 and 23% of the total allocation under the DERA component were invested. In the Sindh province, the priority sectors were road construction and water-supply schemes for which 76 and 23% of the provincial allocations were utilized while, the situation was altogether different in the Baluchistan province, where irrigation was the top priority sector and where 54% of

the provincial share was spent in the water sector. The funding of the ADB (DIMRC) is mainly focused on water, agriculture, health, road construction and community welfare schemes in the drought-affected areas of different provinces. However, different provinces have different priority sectors. For example, the emphasis of the Government of Sindh is more on road construction in drought-affected areas, where 75% of the provincial DIMRC allocations were invested. In the Baluchistan province, the main thrust was on schemes related to water development. Installation of tube wells, rural water-supply schemes, construction of delay-action dams and improvement and renovation of karezes were accomplished in drought-affected areas of the province.

2.9.10 Federal Institutional Arrangements

The Emergency Relief Cell is a part of the Cabinet Division, Government of Pakistan. The history of this Cell dates back to 1970, when a catastrophic cyclone caused widespread devastation in the former East Pakistan. This Cell prepared a "National Disaster Plan" in 1974. The purpose of the Disaster Plan was to establish procedures, prescribe an organizational setup, fix primary responsibilities and support functions of the implementing agencies involved and standardize procedures for monitoring of the disaster operations. Being action-oriented, functional and flexible, the plan is capable of meeting disaster situations of various intensity as well as multiple contingencies. Despite being small, the Emergency Relief Cell is playing a substantial role in mitigation of disaster including drought:

- provide assistance in cash and in relief materials to supplement the resources of provincial governments during droughts.
- maintain liaison with international aid-giving agencies, volunteer organizations and donor countries for drought-relief measures.
- administer the Prime Ministers Food Relief Fund at the federal level; and
- provide mobility including helicopters for rescue of the affected people and for relief operations.

To accomplish these responsibilities/operations in drought-affected areas the following infrastructure is available with ERC. The Emergency Control Room of the Emergency Relief Cell goes into operation during the flood or drought season or other natural disasters. It maintains constant liaison with the Engineers Directorate of Pakistan Army, Federal Flood Commission, Pakistan Meteorological Department,

Provincial Governments Relief Commissioners and Relief Officers. Daily situation reports are received from the drought-stricken areas through the Provincial Governments and the concerned Federal Agencies, and a comprehensive report is compiled depicting the latest position of the drought affected area. Such reports help in decision making and in channelizing the relief operations. Warehouse of the Emergency Relief Cell is located at Islamabad for stockpiling of essential relief items to be used during emergency situations. The Warehouse has basic nonperishable medicines and nonperishable goods (blankets, clothing and tents, etc.) that can be rushed to the affected areas at short notice. A Deputy Director, located at Karachi, heads the relief Goods Dispatch Organization of the Emergency Relief Cell. This organization is responsible for making arrangements for receipt and dispatch of all relief goods from foreign and local agencies in the event of a disaster. The organization is also responsible for clearance and making flight arrangements at airports, seaports, refueling of planes, and reception of crews, custom clearance and all other related formalities. The Aviation Squadron of the Emergency Relief Cell maintains a fleet of six helicopters out of which three are nonoperational due to the no availability of spare parts. These helicopters are detailed for rescue operations during disaster and visits of relief officials to the drought affected areas. For the effective coordination and monitoring of the DERA program at the federal level, the Government of Pakistan has appointed Secretary, Planning and Development Division as the Federal Drought Coordinator. To assist the Federal Drought Coordinator, the National Steering Committee was established during November 2001. The steering committee is chaired by the Deputy Secretary, Planning and Development Division and has representation from various federal, provincial and international donor agencies. The Steering Committee has constituted the DERA Unit as its Secretariat, which is headed by the National Project Director. The primary function of the Steering Committee is to analyze and approve the relief schemes as submitted by the provincial DERA Units.

2.9.11 Provincial Institutional Arrangements

To coordinate, monitor and implement the drought-response strategy at the provincial level, the Relief Commissions were established under the instruction of the Federal Government. In addition to these, the provinces also have their own mechanisms to strengthen the relief-support activities within provincial jurisdictions. Similarly, to

execute and monitor the DERA activities, provincial Steering Committees and Secretariats in the form of DERA Units have been constituted in all the four provincial headquarters. The specific institutional arrangements of the Baluchistan province (established during the latest drought) include the following:

- Relief Commission, Quetta
- Drought Crisis Control Centre (DCCC)
- Provincial Drought Management Committee (PDMC)
- Provincial DERA Unit, Quetta The specific institutional arrangements of the Sindh province (established during the latest drought) include the following:
- Relief Commission, Karachi
- Provincial Steering Committee
- Provincial DERA Unit Karachi

The structure and role of the district-level institutional arrangements in the form of District.Drought Control Committees have also been included in the DERA manifesto, but these are practically either nonexistent or inactive.

2.9.12 Political Aspects of Drought Declaration and Mitigation

Drought is not a sudden event but rather a process, which accumulates slowly over time in any region or area. As a result, it provides ample time for the state managers to undertake preemptive measures to minimize the vulnerabilities of the regions that are at risk. However, since governments have to initiate extensive programs at huge investment costs, they tend to ignore the issue at its emerging stage. Similar politics/tactics are being practiced in Pakistan, where economic stability is always questionable. The Government of Sindh, with an objective to avoid the rigorous pressure exerted by the extensive relief measures on limited fiscal resources, tries to ignore the dilemma being developed in the drought-affected areas. However, when the national and international media and NGOs highlight the sufferings in the drought-affected areas, and also the government perceives the green signals of donations from the international community, the initiatives are taken by the authorities. The other interference of the politicians is to get their own districts declared as drought-affected to seek relief support. Therefore, politics also plays a critical role in the declaration of the drought affected areas. The media and local NGOs also play a vital role in documenting the impacts of droughts and the assessment of the needs of the relief measures. Political considerations also affect the

measures, which are planned to reduce the distress and havoc of the drought-affected regions through several ways. First, if a drought-affected area belongs to a public representative who is from a ruling party, it may get relief support on a priority basis, even if the situation is not "that bad." On the other hand, if the drought-affected area is under control of a public representative of the opposition group, the relief may come late and be insufficient; and consequently, the disaster becomes inevitable. Similarly, some pressure groups within the government oppose relevant plans, which may alleviate droughts in the longer run. Strong opposition to the construction of new surface storage dams on the Indus is just one example.

2.10 Current Institutional setup for Drought management in Pakistan

Present institutional setup for drought management/assessment of Pakistan is existing as following.

2.10.1 National Disaster Management Authority (NDMA)

National Disaster Management Authority (NDMA) was established in 2007. The NDMA was held responsible for coordinating, implementing and monitoring body for DIZR in the country level. Under the Ordinance (now Act), the National Disaster Risk Management Framework (NDRMF) was prepared by the NDMA in March 2007 (GoP 2012), which serves an overall guideline for disaster risk management at national, provincial and district levels. This necessitates NDMA to directly interact/ communicate with all stakeholders, including Ministries, Divisions, and Departments. In March 2010, the NDMA formulated the National Disaster Response Plan (NDRP) for identifying specific roles and responsibilities of the key relevant stakeholders in emergency response including Standard Operation Procedures (SOPs). In addition to this, the NDMA, in collaboration with national and international partners had been in the process of strengthening the DRM system in the country. As per National Disaster Management Authority Act-2010, the main functions of NDMA are as under:

a) Act as implementing, coordinating and monitoring body for management;
b) Prepare the National Plan to be approved by the National Disaster Management Commission;
c) Implement, coordinate and monitor the implementation of the national policy;
d) Lay down guidelines for preparing Disaster Management Plans by different ministries or departments and the provincial authorities;

e) Provide necessary technical assistance to provincial government and provincial authorities for preparing their Disaster Management Plans in accordance with the guidelines laid down by the NDMC;

f) Coordinate response in the event of any threatening disaster situation or disaster;

g) Lay down guidelines for or give directions to the concerned ministries or provincial governments and provincial authorities regarding measures to be taken by them to response to any threatening disaster situation or disaster;

h) For any specific purpose or for general assistance requisition the services of any person and such person shall he co-opted as member and exercise such power as conferred upon him by the authority in writing;

i) Promote general education and awareness in relation to disaster management;

j) Perform such other functions as the National Disaster Management Commission may require performing.

2.10.2 Provincial Disaster Management Authority and relief organizations

The National Disaster Management Act insisted for the establishment of a Provincial Disaster Management Commission (PDMC) as well as Provincial Disaster Management Authority (PDMA) to cope with the challenges of Disaster Management in a professional and efficient manner. Both the organizations have been mandated to effectively set up a system to look after disasters and calamities whether natural or man induced and coordinate with the key players. Previously, the Provincial Relief Commissioner ate had been responsible for the relief, compensation and rehabilitation of people affected by natural disasters. With the establishment of PDMA, the functions of the Relief Commissioner ate have been incorporated into the new organization.

Provincial Relief Organizations (now Provincial Disaster Management Authorities) are responsible for disaster preparedness, preparation of emergency response plan, rescue and relief measures and rehabilitation plan and its approval from Provincial Government before implementation; examine the vulnerability of various parts of the province to different disasters and specify prevention or mitigation measures; lay down guidelines for preparation of disaster management plans by the Provincial Department and District Authorities; evaluate preparedness at governmental levels to respond to disaster and enhance preparedness; coordinate response in the event of

disaster; give directions to DDMAs regarding actions to be taken in response to disaster; and promote general education, awareness and community training etc. pertaining to all disasters including floods. Relief functions at the District and Tehsil/union Council level are now performed through the District Disaster Management Authorities, who coordinate with the concerned departments to carry out the disaster management functions at the district level.

2.10.3 District Disaster Management Authority/Unit

In order to involve local organization in DRR planning and implementation, district disaster management authority (DDMA) has been in the process of establishing at district level. In KPK there is district disaster management unit instead of authority. As per plan, the head of the local council at the district level shall be the chairperson, Deputy Commissioner /District Coordination Officer as secretary, whereas District Police Officer and Executive District Health Officer are the ex-officio members. The power and function of District Authority include preparation of district disaster management plan, coordinate and monitor the implementation of the National Policy, Provincial Policy, National Plan, Provincial Plan and District Plan. In addition to this, DDMA shall ensure that the vulnerable areas in the district are identified and measures have been taken for their prevention and mitigation at district level (GoP, 2012).

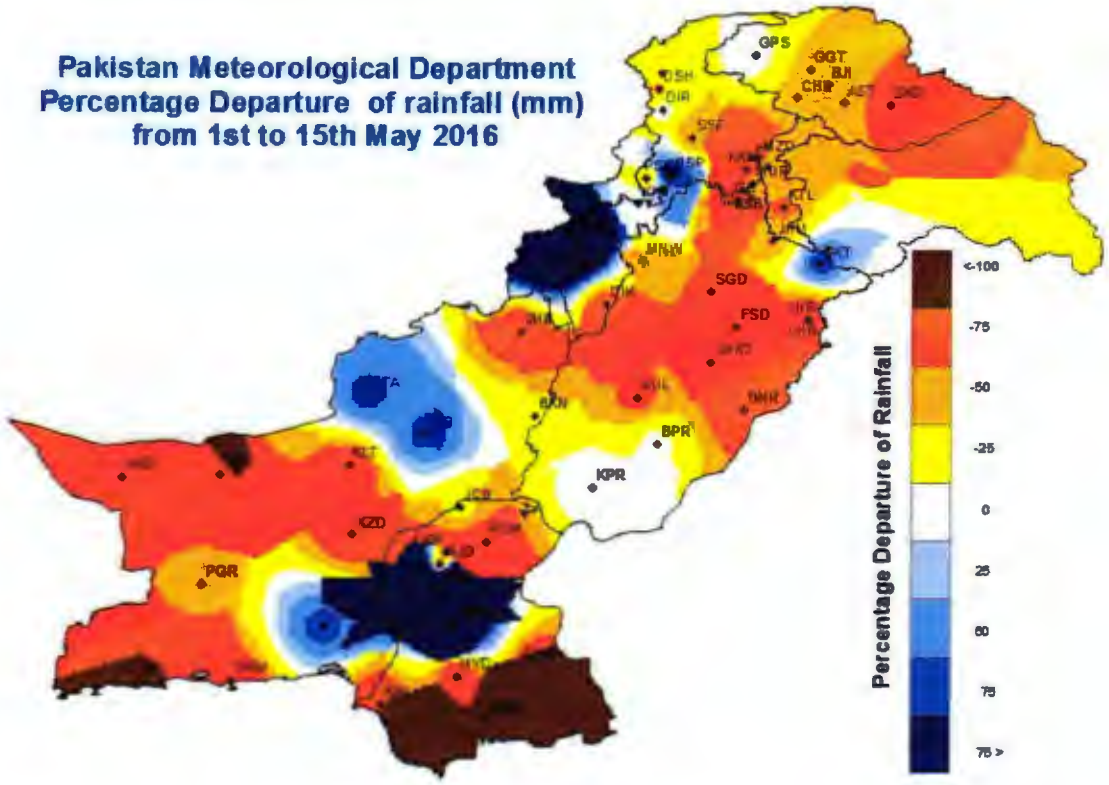
2.10.4 Pakistau Meteorological Department

Pakistan Meteorological Department (MD) is both a scientific and a service department, and functions under the Cabinet Secretariat (Aviation Division) PMD is responsible for providing meteorological service throughout Pakistan to wide variety of interest and for numerous public activities and projects which require climatic information Apart from meteorology, the department is also extending services in the fields of Hydrology, Earthquake Seismology and Geomagnetiam.PMD operates under World Meteorological Organization (RMO) umbrella as 198 member states of the world and act as National Meteorological and Hydrological Service of Palo.= IMP has divided We globe in to 8 meteorological regions and Pakistan lies in Region ga known as Regional Association II (RA-11) which includes Asia and Pacific Director General of PMD is vice president of RA-1I and Permanent Representative of Pakistan

2.10.5 National Drought Monitoring Centre

Droughts in Pakistan region are mainly due to failures of rains from southwest monsoon. Also there seems to be some association between El Nino and La Nina

events and weak Monsoon. Pakistan frequently experiences droughts in southern parts of country. The Study conducted at National Drought Monitoring Centre (NDMC) of PMD revealed that the Province of Sindh and Balochistan are the more vulnerable to drought. The long term data analysis of past sixty years (1951-2010) different intensity (mild to extreme) of drought were experienced in the country i.e. 31 in Sindh, 23 in Balochistan , 22 in Punjab and 18 in KPK. The longest episode of drought was experienced during 1999-2002. The Punjab province experienced the worst droughts in 1899, 1920 and 1935, 1969, 1987-88, 2000-01,. Khyber Pakhtunkhwa (KPK) was in the grip of the worst droughts in 1902 and 1951, while Sindh had its worst droughts in 1871, 1881,1899,1931,1947 and 1999-2001, 2003-04. While Balochistan had 1952,1963-64,1965,1968,1970-71,1983-84,1987-88,1999-2002,2004 and 2006. Over more than hundred year's period between 1871-1988, 11 out of 21 drought years were El Nino years. PMD established National Drought/Environment monitoring and Early Warning Centre (NDMC) in 2004-05 after the worst drought during 1999-2001 in Pakistan. The main objective is to monitor drought situation in the country and issue advisory before time. Its national centre is in Islamabad while four Regional Drought Monitoring Centers (RDMC's) are in Lahore, Karachi, Peshawar and Quetta. These four RDMC's cover provincial landscapes which comes under their jurisdiction. These centers serve as a hub for the monitoring, collection, consolidation and analysis of drought related data from all the possible sources in the country. In order to strengthen the network, 50 Automatic weather stations (AWS) have been installed in different regions particularly the drought prone areas of the country. The data of 11 meteorological parameters (air temperature, humidity, wind speed, wind direction, dew point, sea level pressure, station level pressure, solar radiations, soil moisture at standard depths (5,10,20,50,100)cm and snow level are transmitted through satellite and GPRS technology. NDMC has installed 335 Ordinary Rain gauges at districts level in four provinces. NDMC using different indices like Standardized Precipitation Index (SPI), Normalized difference Vegetation Index (NDVI), Cumulative Precipitation Anomaly (CPA), Rainfall Anomaly Index (RAI), Rain Percentiles, Probability of occurrence, Percentage departure and soil moisture analysis etc to monitor drought. NDMC issues fortnightly drought bulletin of the country which can be accessed easily for Public.



Sources: National Drought Monitoring Centre, 22-05-2016

Fig 2.1 Percentage Departure Rainfall of Pakistan

2.10.6. Ministry of Planning, Development & Reforms

The Prime Minister is the Chairman of Planning Commission which apart from the Deputy Chairman, comprises of nine Members including Secretary, Planning & Development Division/ Member Coordination, Chief Economist, Director, Pakistan Institute of Development Economics, Executive Director, Implementation and Monitoring, and Members for Social Sectors, Science and Technology, Energy, Infrastructure, and Food and Agriculture. The Planning Commission works under the overall direction of a Policy Board chaired by the Prime Minister and including the Deputy Chairman, 10 Federal Ministers and Members of the Planning Commission. The Planning Commission is responsible to perform the functions as indicated in Schedule II of the Rules of Business 1973 under the heading of Planning and Development Division, which inter-alia include

- preparing the National Plan and review and evaluating its implementation.
- formulating annual plan and ADP.

- monitoring and evaluating implementation of major development projects and programmes.
- stimulating preparation of sound projects in regions and sectors lacking adequate portfolio.
- continuously evaluating the economic situation and coordinate economic policies and
- organizing research and analytical studies for economic decision making.(CBD April,2006)

2.10.7 Water and Power Development Authority

WAPDA is a federal agency responsible for collection of river flows, hydro meteorological data in the Indus basin and its catchments and for analyses of the impacts of any climatic changes in the river flows, storage-reservoir levels and groundwater levels in the country. WAPDA maintains the largest number of hydro meteorological and stream-gauging stations in the country. The processed information is made available to the concerned federal and provincial agencies through fax and on the website in case the country is facing a drought. They also provide such information to the Indus Rivers System Authority (IRSA), to the Federal Committee on Agriculture and, in addition, to the PMD and the drought-relief and mitigation-related agencies. In the recent drought, such information was made available to all the concerned parties on a daily basis through fax by the IRSA.

2.10.8 Ministry of climate change

In terms of institutional development, the Cabinet Committee on Climate Change was formulated in 1995 to provide a policy coordination forum for dealing with climate change. In 2004 this was changed to the Prime Ministers Committee on Climate Change (PMCCC), which also aimed for establishing high-level inter ministerial linkages and proved to be extremely effective in initiating the country's entry into the global carbon market. The autonomous Global Change Impact Studies Centre (GCISC) was established to act as the secretariat of the PMCCC and is now the primary scientific research body engaged in conducting research on impacts of and adaptation to climate change in the country and the regional level. The PMCCC needs to be activated and utilized to provide a forum for integrating climate change into mainstream policy making (GOP and UNFCCC, 2011). The Climate Change Division, which also looks after the Environment is the designated national focal

point for UNFCCC and the Kyoto Protocol. The Division has been coordinating with other concerned agencies and institutions on various technical aspects, including the National Energy Conservation Centre (ENERCON), the Alternative Energy Development Board and the Pakistan Council of Renewable Energy Technologies. As an autonomous research organization on climate change, GCISC is also working under the umbrella of the Climate Change Division. The current focus of research at GCISC is on: (i) projection of change in climate for Pakistan over the next several decades based on a) world level coarse resolution projections made by various GCMs, and b) dynamic downscaling of the outputs of selected GCMs using Regional Climate Models to obtain high resolution projections; (ii) Assessment of past temporal changes in the Karakoram glaciers using Remote Sensing data from satellites; (iii) Monitoring Assessment of the impacts of projected climate change on a) glacier melt and water inflows in main rivers of Pakistan, and b) productivity of various agricultural crops in different climate zones of the country, using respectively Watershed Models and Crop Growth Simulation Models; (iv) identification and assessment of appropriate adaptation measures; (v) development of indicators and indices for extreme weather events and development of methodological tools for projecting the occurrence of such events; (vi) Seasonal predictions and climate forecasts for decadal and inter-annual periods; (vii) RS/GIS based studies of temporal changes resulting in deforestation, land degradation, inundation of deltaic region, glacial lakes formation and associated flooding; and (viii) assessment of alternative energy supply strategies for Pakistan with focus on GHG mitigation and preservation of local environment. Other major relevant organizations in the country working on research in climate change and sea level rise include the Pakistan Meteorological Department, the Water and Power Development Authority (WAPDA), the National Agriculture Research Centre (NARC), the National Institute of Oceanography (NIO) and the Space and Upper Atmosphere Research Commission (SUPARCO). There are several other organizations including universities in the country, with mandates and activities that cover climate change related issues and which have either some highly relevant climate change related capacities or are pursuing climate change related projects. Oxfam (2009b) published the results of a survey of these organizations in a report.

2.10.9 Ministry of National Food Security & Research

The Ministry of National Food Security & Research is mainly responsible for policy formulation, economic coordination and planning in respect of food grain and agriculture. It also includes procurement of food grains, fertilizer, and import price stabilization of agriculture produce, international liaison, and economic studies for framing agricultural policies.

2.10.10 Public Service Massage Campaign by NDMA for Drought vulnerable areas

This document massage is also available in Urdu language at NDMA website www.ndma.gov.pk

2.11 Public Service Message on Drought

Drought, unlike other abruptly occurring disaster, is an onset disaster that gives ample response time to prepare against its odds unlike other abruptly occurring disasters i.e, earthquake, flash flood, cyclones etc. Indeed the devoid of rain in a particular region/zone makes the phenomenon of drought imminent, however, its intensity and devastating impact can certainly be reduced through timely and inter harmonious actions by the concerned stakeholder. Following are some of the critical tips that the individuals and community can do to reduce the risks of drought and mitigate its impact.

2.11.1 Before the Drought

2.11.2 Water and food/fodder

Water Conserving and economical use in household activities, e.g.

- Keep water and the water storage means under shade.
- Secure timely storage of water.
- Ensure the use of water purification tablets in drinking water.
- Avoid wastage of water such as loose running water tap, broken/leaked water pipes/tanks.
- Drip watering to mixed planting during evening hours to avoid evaporation.
- Use scientific means for making minimal use of water for harvesting.
- Use brackish water than sweet for washing, bath or other purpose etc.
- Construction of reservoirs to hold emergency water supplies. Rehabilitation of Tarais (community pond)

- Harvest rain water for use in agriculture.

2.11.3 Human Food

- Ensure scientific harvesting for human food (e.g, sweet potato, cassava, indigenous vegetable & legumes) that give more productivity with less water consumption
- Ensure timely storage of food
- Ensure economical use food items
- Establish nurseries/seed banks to ensure a stable supply of seeds and other essential plant materials.

2.11.4 Animal Food/Fodder

- Ensure scientific harvesting for animal food and fodder that give more productivity with less water consumption.
- Avoid unnecessary cutting of local trees, shrubs and plants grazed/eaten by the animals.
- Ensure preserving and flourishing of vegetation around the villages/areas through scientific means

2.11.5 Medical and Health care

2.11.6 Health Care Human

- Ensure (i) regular vaccination to the family members. (ii) use of clean drinking water and water purification tablets (iii) regular and uninterrupted visits to medical centers for necessary checkups. (iv) regular vaccination of pregnant women and newly born children either at medical centers or during the visits of medical teams. (v) provision of nutritious food to the pregnant women and newly born children.
- Install, regulate and maintain the drinking water purification plants.
- Report the civil administration on the spread of viral disease.

2.11.7 Health Care Animal

- Ensure (i) regular vaccination of animals at the prescribed time determined by the Local Health Departments. (ii) immediate medical treatment to the animals on determination of some disease, (iii) immediate segregation of animals caught with some spreading

infectious disease from the healthy ones (iv) immediate burial of animals who dies particularly due to some spreading disease

- Do not eat meat or take milk of sick animal.
- Report the civil administration on the spread of viral disease in the animals.

2.12 During the Drought

2.12.1 Rescue

- If survival is difficult/not possible then immediately migrate to the nearest Communication Centers (village or town) along with live stocks that have no or least drought effects for continuous and sustained water/food/fodder/health support

2.12.2 Water and Food / Fodder

- Conserve water during the drought period
- Optimum use of all available water (both surface and ground) for irrigation.
- Purify drinking water by boiling.
- Use water purification tablets for clean drinking water.
- Except drinking do not use sweet water for other purposes
- Use brackish water for other needed usages.
- Conserve ration/food during the drought period.
- Use healthy food/dry ration including pulses/rice/chickpeas/in stockpiling.
- Propagation of drought resistant crops (e.g crops that require less water such as root crops - sweet potato, cassava, and indigenous vegetables and legumes).
- Education & information drive to generate community appreciation of water management and crop life-saving techniques.
- Use healthy food to avoid children malnutrition.
- Ensure scientific harvesting for human food (e.g, sweet potato, cassava, indigenous vegetable & legumes) that give more productivity with less water consumption
- Timely storage of food
- Availability/provision of fodder
- Economical use of water and food items

- Scientific harvesting for animal food and fodder that give more productivity with less water consumption.
- Preserving and flourishing of vegetation around the villages/areas through scientific means
- Avoid unnecessary cutting of local trees, shrubs and plants grazed/eaten by the animals.

2.12.3 Medical and Health care

Ensure (i) immediate vaccination of the family members. (ii) use of clean drinking water (iii) use of water purification tablets (iv) visits to medical centers for necessary checkups. (v) vaccination of pregnant women and newly born children either at medical centers or during the visits of medical teams. (vi) provision of nutritious food to the pregnant women and newly born children. (vii) Immediate/timely vaccination of animals/livestock (viii) immediate medical treatment of the animals upon determination of some disease. (ix) immediate segregation of animals caught with some spreading infectious disease from the healthy ones (x) immediate burial of animals who dies particularly due to some spreading disease

- Install, regulate and maintain the drinking water purification plants.
- Report the civil administration on the spread of viral disease/outbreak of epidemic in the animals.

2.14 After the Drought

Close coordination between all stakeholders, agricultural scientists, meteorologists, irrigation engineers and agricultural field staff to inform and assist farmers to adapt agricultural practices.

- Increase production in favorable areas to make up for losses in seriously affected areas.
- Carryout mixed mitigation and preventive measure on the activities mentioned under "Before & During" drought measures

2.15 Drought Service Message for Civil Administration

As the drought is a dawdling onset disaster that do renders ample response time to prepare against its odds, unlike other abruptly occurring disasters i.e, earthquake, flash flood, cyclones etc. Indeed the devoid of rain due to climatic change in a

particular region/zone makes the phenomenon of drought unavoidable to be prevented; hence its intensity and devastating impact through inter-harmonious actions by the concerned stakeholder departments can certainly be reduced. It is imperative to mention the critical elements of such disaster than other disasters in consonance to avert/prevent or reduce the impact its affects

- It is slow/gradual in occurrence
- It provides ample response time to handle
- It involves long term continued supervision and relevant sustained support
- It implies more responsibility of Civil Administration deliver than general masses / public of the area
- Most of the actions and activities overlaps all the three phase of drought i.e, before, during & after Following are some of the critical tips that the individuals and community can do to reduce the risk and mitigate the impact of looming/impending drought.

2.15.1 Before the Drought

2.15.1.1 Planning, Coordination and Development

- Ensure following strategic and tactical level of planning and development of field sector projects Communication (roads, tele transportation means etc)
    1. Water (sweet water wells, water purification, water points etc)
    2. Health (medical/health care, nutrition, vaccination etc)
    3. Food & Fodder (wheat , hay etc)
    4. Power (Electricity, coal , POL etc)
- Carryout close coordination mechanism network between following departments
        1. Meteorological
        2. Agricultural
        3. Irrigation - Health
        4. Food
        5. Forest
        6. Telecommunication
        7. Road & Transport
        8. Energy
- Check & ensure:

1. Updated "Food Security Plan"
2. Availability of stocks as per policy in the established god owns.
3. Establishment of "Public Service Committees"
4. Village to village "Public Service Announcements & Awareness Program" that helps to create consciousness among masses about vital conservation issues.
5. Establishment of "Emergency Operation Centers" to monitor the situation and address needs of the people/affectees.
6. Community training on drought preparedness & emergency response
7. Timely provision of food and fodder.

- Provincial Government to assist District Administration in above assignments in kind and coin and as well in mega projects like
    1. Exploration of water sources, creating water points and laying the water supply lines for the provision of water from other locations.
    2. Construction of reservoirs for emergency water supplies/storage.
    3. Maintaining the food (wheat) and Fodder stocks.

2.15.1.2 Food Campaign

- **Human Food**
    1. Ensure provision and maintaining of stock, includes wheat and other basic necessary dry food items.
    2. Calculate needed and timely distribution of wheat and other food items to the people.
    3. Propagation of drought resistant crops (e.g., crops that require less water such as root crops
    4. sweet potato, cassava, and indigenous vegetables and legumes).
    5. Educate & information drives to generate community appreciation of water management and crop life-saving techniques.
- **Animal Food/Fodder**
- Ensure provision and maintaining of animal fodder, including wanda, green fodder, grazing and other feed stock.
- Calculate needed and timely distribution of basic food & fodder to the affected areas.
- **Health Care Human**

- Ensure regular vaccination of locals at the described time determined by the Local Health Departments.
    - Ensure regular and uninterrupted visits of medical teams for vaccination.
    - Ensure regular vaccination of pregnant women and newly born children.
    - Ensure provision of nutritious food.
    - Establish and existence of Heath Center BHU including their specialized staff.
    - Ensure provision of water tablets to the locals on regular bases for ensuring clean drinking water.
    - Install, regulate and maintain the drinking water purification plants.
    - Health Care Animal - Ensure regular vaccination of animals at the described time determined by the Local Health Departments

2.15.2 During the Drought

2.15.3 Planning, Coordination and other Arrangement Efforts

- Establishment of "Emergency Operation Centres" to monitor the situation and address needs of the people/ affectees.
- District Administration to coordinate the relief and rescue efforts renders by various national and international outfits (govt departments, military, local NGOs, INGO, CSRs, Embassies, UN agencies and other partners etc).
- Arrange transport for people's evacuation and relief distribution to the affected areas.
- Deployment of Heath Teams.
- Ground implementation to ensure any financial.

2.15.4 Relief and Rescue Efforts

- Immediate provision & dispatch of following relief efforts
- Food, fodder and water
- Medical teams with necessary medical assistance.
- Immediate arrange for following rescues efforts

- Evacuate of the sick and affected people to the nearest health facility (hospitals, health care centers) for medical treatment.
- Dispatch of medical teams and para medics for medical assistance and vaccination.
- Controlled shifting /migration (when inevitable) to other areas during drought period to avoid deaths due to hunger, water, health and malnutrition reasons.
- Provision of transport means to evacuate the sick and affected people to the nearest health facilities (hospitals, health care centers)

2.15.5 Educational/Promotional Campaigns

- Conserve water during the drought period
- Purify drinking by boiling water for drinking.
- Use water purification tablets for clean drinking water.
- Accept drinking o not use sweet water turned to brackish for other needed usages.
- Conserve ration/food during the drought period.
- Include/ healthy food/dry ration including pulses/rice/chickpeas/in stockpiling.
- Propagation of drought resistant crops (e.g., crops that require less water such as root crops - sweet potato, cassava, and indigenous vegetables and legumes).
- Education & information drive to generate community appreciation of water management and crop life-saving techniques.
- Use healthy food to avoid children malnutrition.

2.15.6 Provision and Storage of food and fodder efforts

2.15.7 Human Food

- Dispatch of food through already maintained stock, includes wheat and other basic necessary dry food items.
- Ensure uninterrupted and timely distribution of wheat and other food items to the people.

2.15.8 Animal Food/Fodder

Dispatch of food through already maintained stock of animal food & fodder, including wanda, green fodder, grazing and other feed stock.

- Timely dispatch and distribution of basic food/fodder for the animals of affected areas.

2.15.9 Health Efforts

2.15.10 Health Care Human

- Ensure immediate dispatch of medical teams for vaccination and other medical assistance.
- Ensure vaccination of pregnant women and newly born children.
- Ensure provision of nutritious food.
- Augment the Heath Center including their specialized staff.
- Ensure provision of water tablets to the locals on regular bases for ensuring clean drinking water.
- Ensure operational worthiness of clean drinking water plants.
- Health departments to ensure vaccination and avoidance of outbreak of epidemics and local diseases e.g., (Malaria, Skin diseases, Sukha, and TB).

2.15.11 Health Care Animal

- Ensure dispatch of medical & para medic teams for the vaccination of animals by the Local Health Departments and others partners.

2.15.12 After the Drought

- Ensure the mixed mitigating and preventive measure on the actives mentioned under "Before & During" drought measures

Chapter 3

METHODOLGY

3.1. Methodology

The Guidelines do not establish rigid requirements for SEA. Rather, departments are encouraged to work within the broad framework of guidance to adapt the process to suit their requirements and make use of existing mechanisms. As stated in the Guidelines (Government of Canada, 2004, 6).

"There is no single "best" methodology for conducting a strategic SEA of a policy, plan & program proposal. Federal departments and agencies are encouraged to apply suitable frameworks or techniques & to develop approaches tailored to their particular needs & circumstances."

Although not necessary to do so, some departments & agencies have established their own internal guidance or policy processes to govern SEA. Others continue to rely on the advice in the existing guidelines.SEA is an iterative process & some process stages may need to be reconsidered at numerous points when the plan is under developed.

SEA process (According to ODPM, 2005)	**How climate change could be considered in the procedure**
Stage A: Setting the context & objectives, establishment of baseline & deciding on the scope	
• Identifying other relevant plans, programs & environmental protection objectives and issues	• To establish how the plan or program is affected by external factors, to suggest ideas for how any limitation can be addressed, and to help protection objectives to identify SEA objectives.
• Collection of baseline information	• To provide an evidence base for environmental problems, prediction of effects, and monitoring; to help in the development of SEA objectives.
• Identify the environmental	

problems • To develop SEA objectives • Consulting on the scope of the SEA	• To help focus the SEA and streamline the subsequent stages, including baseline information analysis and setting of the SEA objectives, forecast of effects & monitoring. • To provide a means by which the environmental performance of the plan or program & alternatives can be assessed. • To ensure that the SEA covers the likely considerable environmental effects of the plan and program.
Stage B: Developing and refining alternatives & assessing effects • Testing the plan and program objectives against the SEA objectives • Developing strategic alternatives • Predicting the effects of the plan and program, including (realistic) alternatives • Evaluating the effects of the plan or program, including pragmatic alternatives	• To identify potential synergies or inconsistencies between the objectives of plan or program and the SEA objectives and help in developing objectives alternatives. • To develop & refine strategic alternatives. • To predict the significant environmental effects of the plan or program & alternatives. • To evaluate the predicted effects of the plan or program, including alternatives & assist in the

	refinement of the plan or program.
• Avoiding and minimizing adverse impacts	• To ensure that adverse effects are identified & potential mitigation measures are considered
• Proposing measures to monitor the environmental effects of plan / program implementation	• To detail the means by which the environ program can be assessed mental performance of the plan or
Stage C: Preparing the Environmental Report	
• Writing the draft Environmental Report, including the results of the assessment	• To present the predicted environmental effects of the plan or program, including alternatives, in a form suitable for public consultation & use through decision makers
Stage D: Consulting on the draft plan or program and the Environmental Report	
• Consulting the public & Consultation Bodies on the draft plan / program & the Environmental Report	• To give the public and the Consultation Bodies an opportunity to express their opinions on the results of the Environmental Report and to use it as a reference point in commenting on the plan or program. To gather more information through the opinions and concerns of the public.
• Assessing significant changes	• To ensure that the environmental implementation of any significant

	changes to the draft plan or program at this stage are assessed and taken into account.
• Making decisions & providing information	• To provide information on how the Environmental Report and consulter's opinions were taken into account in deciding the final form of the plan or program to be adopted.
Stage E: Monitoring the significant effects of implementing the plan or program on the environment	
• Developing aims & methods for monitoring	• To track the environmental effects of the plan or program to show whether they are as predicted; to help identify adverse effects.
• Responding to adverse effects	• Preparation for appropriate responses where adverse effects are identified

Table 3.1 ODPM Annual Report and Accounts 2005

The present study does not cover all the steps of SEA due to time constrain and unavailability of national indicators/parameters required for this study, so assessment framework of the proposed Study will be establishment and shown in Fig 3.1. The study was done by adopting a holistic/variety of different methods to conduct SEA which included:

- ✓ Detailed Analysis and review, meeting with experts to discuss Strategic Environmental Assessment experience, awareness, opportunities and constrains.
- ✓ Semi-structured interviews with key personalities.

- ✓ Round table meeting to discuss issues, with different stakeholders and players during workshops and conferences.
- ✓ Participants include representatives from different government departments and agencies, business and industrial communities, non-governmental organizations, academics, disaster effected representative and other potential stakeholders consist of experts who have been involved in Environmental Impact Assessment/Strategic Environmental Assessment, those have (or might have) formal responsibilities for Environmental Impact Assessment/ Strategic Environmental Assessment and with concern or potential interest in Strategic Environmental Assessment. In this research a blend of such methodologies are used. Such interviews and round table meetings in workshops/international conferences and events are useful to identify coherence and suitable recommendation for the Dm system/selected DM documents of Pakistan.

3.2. Assessment Framework Steps

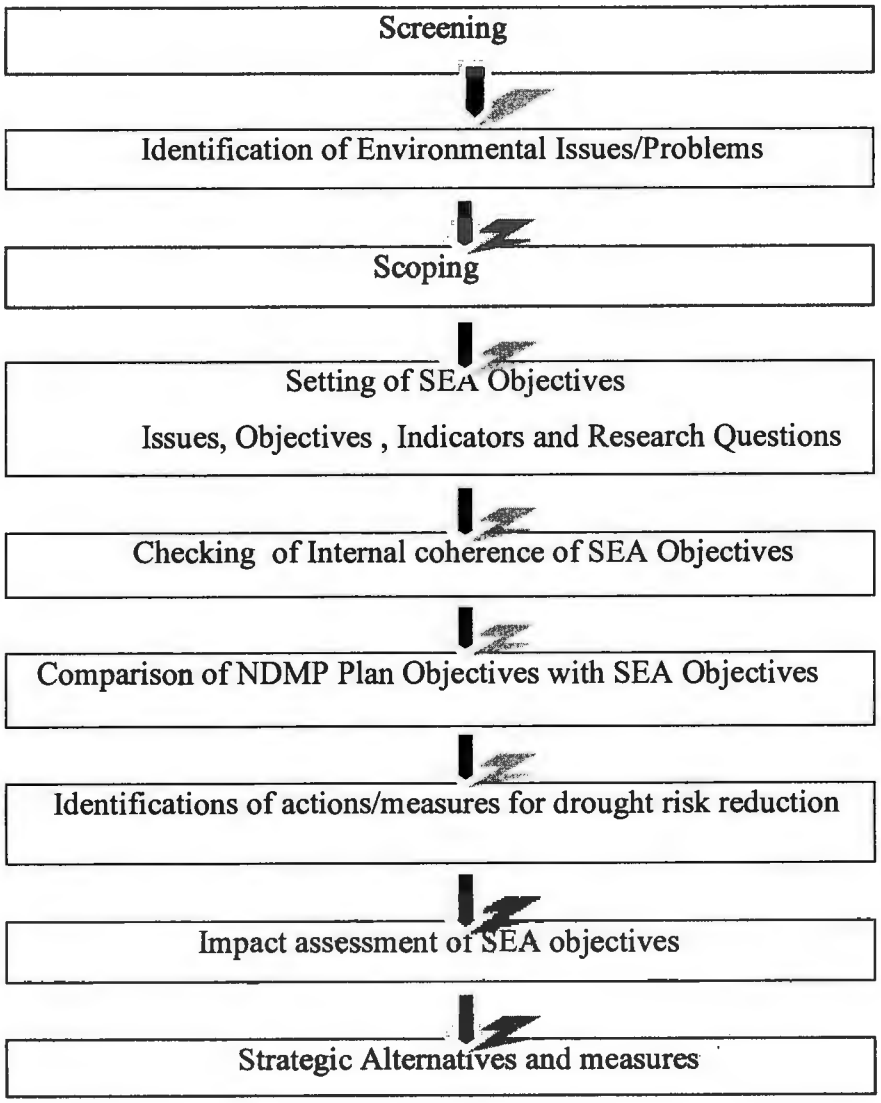


Fig 3.1. Framework steps for proposed study.

To check the sustainability of Framework following steps will be opted.

- **Environmental Assessment of SEA Objectives**
  - ❖ Internal compatibility of SEA analysis
  - ❖ Compatibility of SEA objectives with National Environmental Objectives
- **Coherence Analysis**
  - ❖ Internal Coherence (In between policy, plan & program)
  - ❖ External Coherence(Plan with other Related department's documents)
- **Analysis of Alternatives (AA)**

3.2.1 Compatibility assessment of objectives

The compatibility of the SEA objectives with the National Disaster Management Plan (2012-22) was assessed by using the following matrix (Table No. 3.2). Objectives of National Disaster Management Plan (2012-22) were tested against the SEA objectives to identify both potential synergies and inconsistencies. This information was also helpful in the development of alternatives.

NDMP (2012-22) objectives / SEA Objectives	1	2	3	4	5
1	Y			N	Y
2		0			
3			N		0

Y= Coherent, N = Distortion, 0= No linkage

3.2.2 Internal coherence analysis (ICA)

Basic objective of SEA is to assess whether the proposed Policy, Plan and Programs are environmentally sustainable (Mc Cluskey and Joao, 2011), through the improvement of coherence analysis is to verify the NDMP (2012-22) general objectives are effectively fit with the environmental objectives. A double entry matrix was used for the assessment of this aspect, in which in the rows were listed the Strategic Environmental Assessment (SEA) goals of sub ordinate plans and programs while in the columns the NDMP (2012-22) objectives & goals.

NDMP (2012-22) objectives / Objective of PPPs	1	2	3	4	5
1	+			+	–
2			0		
3	–	+		–	0

(+ = Coherent) (- = Distortion), (0= no linkage),

3.2.3 External coherence analysis (ECA)

Basic objective of SEA is to assess whether the proposed Policy, Plan and Programs are environmentally sustainable (Mc Cluskey and Joao, 2011), through the improvement of coherence analysis is to verify the NDMP (2012-22) general objectives are effectively fit with the other corresponding official documents of state. A double entry matrix was used for the assessment of this aspect, in which in the rows were listed the environmental objectives of other official policies & plans of relevant departments of state while in the columns the NDMP (2012-22) objectives & goals will be placed.

NDMP (2012-22) objectives / Objective of Relevant PPs	1	2	3	4	5
1	Y			N	Y
2		0			
3			N		0

Y= Coherent, N = Distortion, 0= No linkage

3.2.4 Analysis of alternatives (AA)

The environmental indicators were carefully selected for the purpose of evaluating the potential impacts of the alternatives that are being considered for the national disaster management plan 2012-2022. With the assessment criteria classically arrayed as the columns of the matrix while the indicators in the rows (Table No. 3.4), the cells are

contained of numbers which provide a measure of the expected impacts of the indicators when measured against the assessment criteria (Pastakia and Jensen, 1998).

	Option 1				Option 2		
SEA objectives	**Short term**	**Medium term**	**Long term**	**Comments/ explanation**	**Short term**	**Medium term**	**Long term**
	+/–	–	++/– –		?		O

+ = Positive, – = negative, 0 = neutral, ? = Uncertain, +/– = minor, ++/– – = major

Chapter 4

RESULTS AND DISCUSSION

4.1 Screening and Scoping

Screening is a process which determines that environmental assessment is essential for certain categories of all plans and programs. According to the SEA directive environmental assessment shall be carried out for all plans and programs, which are prepared for Food security, climate change, Water and Power Development Authority (WAPDA), Ministry of Planning, Development & Reforms, Pakistan Meteorological Department (PMD), DDMA & PDMA, relief organizations which will set the framework for the future strategies & response plans of the drought impact areas. National Disaster Management Plan 2012-22 will be qualifying to through the SEA.

4.2 Identification of Environmental Issues

Pakistan frequently experiences numerous severe droughts. The Punjab province faced the worst droughts in 1899, 1920 & 1935. Khyber Pakhtunkhwa (KPK) faced the worst droughts in 1902 & 1951, while Sindh had its worst droughts in 1871, 1881and 1999. The El Nino phase of the Southern Oscillation ENSO has straight impact on drought in Pakistan as it poses mainly harmful impact on summer monsoon. Due to climate change, wet & dry cycles some years we receive much rains in wet spell & we receive less rain in dry spell. There is evidence to propose that global warming and weather pattern shifting has harmfully effected on the atmosphere of Pakistan, for example causing loss of biodiversity, shifts in weather patterns & reduced fresh water supply. Climate change trends are the same with climate variability in terms of flash floods, drought occurrence & Prevalence of El Nino situation. The Literature review shows that Pakistan is facing two major related issues with the water resource management first one is the Water scarcity & flooding. If there is less precipitation then it will lead to the drought condition & vice versa.

4.3 Scoping

Once screening process is over then the next step is scoping. Scoping is the process which develops boundaries and context for the SEA. (OECD, 2006). This stage of SEA plays crucial role in deciding what impacts should be included with particular Policy, Plan or Program and what is the option left behind to play with the tools. (Wood, 2003). And scoping is done through the proper techniques and tools like

surveys, checklists and overlay maps. Further, scoping in SEA has advantage as compared to EIA where cumulative impacts are not properly addressed. While in the case of SEA scoping considers the relevance or conflicts of other PPPs with the proposed one to identify cumulative, synergistic or conflicting impacts.

Strategic Environmental Assessment (SEA) Topics	Impacts of NDMP (2012-22) Strategies	Scope
Human Health & Safety	Drought risk can affect healthy human life style, NDMP strategies will improve the Human health and safety	IN
Biotic Factors	NDMP strategies may have impact positively/ negatively on Biological factors through changes to Drought hazard and through implementation of actions	IN
Soil	NDMP strategies may have impact on soil through land use change and irrigation system	IN
Water	NDMP strategies have significant impact on the terrestrial environment	IN
Air	NDMP strategies will not have measurable effect on Quality of air	OUT
Climatic Conditions	NDMP strategies aimed to improving resilience of affected areas	IN
Material Assets	NDMP strategies will not have significant effect on material assets	OUT
Landscape	The actions contained in NDMP strategies have not impacts on landscape structure	OUT

Table 4.1 Scoping of Assessment criteria

4.3 Setting of Strategic Environmental Assessment (SEA) Objectives

After the screening, Identification of environmental problems and the scoping stages, next stage is the setting of the environmental objectives and indicators which are illustrating the reason why the objective has been included in the assessment criteria. The SEA objectives are used to confirm the right level of consideration is accomplished. SEA objectives are developed from the review of the of baseline information and environmental problems related to the National Disaster Management Authority. The SEA objectives and research questions were developed based on the identified environmental problems. Further, SEA Objectives can be improved by reviewing baseline and scoping and considering concerns of general public, drought and expert views.

Table 4.2 SEA Objectives

SEA topic	Sea Objectives	Indicators	Research questions
Human Health & Safety	Protect human health, lessen health inequalities and encourage fit lifestyles	• Number of people suffering from dehydration and Mental health effects • Yearly death due to droughts	Do the NDMP 2012-22 ? • Improve the health, livelihood and environment communities
Biodiversity	Conserve habitats, enhance species richness, where possible and avoid damages to biodiversity.	• Status, percentage and coverage of protected areas • Status and number of species • Status of the forest cover	• Avoid the adverse effects? • Support healthier ecosystems? • Help promote habitat connectivity?

Soil	Protect & where suitable improve the purpose and superiority of the soil source.	• Agricultural land areas and Soil pollution. • Nutrient poor soil near the water treatment plants	• Safeguard soil quality& function, including valuable soil resources? • Reduction of soil erosion? • Management of agricultural land
Water	To prevent unavailability and Managing all possible water sources possible.	• Water Quality and availability of rivers, canals, wells and especially karez tube wells • Drinking water purification plants • Water supply through domesticated pipelines	• Avoidance of alterations in the water bodies • Management of the tube wells • Repairing of the pipelines before/after Monsoon season
Climatic Factors	Contribution to improvement and variation to climate change conditions	• The prediction about the yearly rainfall. • Seasonal forecast of the Pakistan Meteorological Department (PMD)	• Improve adaptability of the effects of climate change • Contribution in energy efficiency.

Material Assets	Contribute to protecting Infrastructure for water management And promote efficient use of water & resources	• Adaptations to water accessibility by water managing infrastructure	• Protect material assets infrastructure for the conservation of water like dams and tube wells
Landscape	Identify the potential threats on the land use change on the ecological zone and protect water resources and species of particular area	• Increasing forest cover as significant impact. • Valuable areas, protected areas, and climatic conditions.	Protect and enhance the landscape ecology and avoid the adverse impacts of the protected landscapes.

Table 4.3 Internal Coherence of Strategic Environmental Assessment Objectives

Strategic Environmental Assessment (SEA) Objectives	Protect human health, lessen health inequalities and encourage fit lifestyles	Conserve habitats, enhance species richness, where possible and avoid damages to biodiversity.	Protect & where suitable improve the purpose and superiority of the soil source.	To prevent unavailability and Managing all possible water sources possible.	Contribution to improvement and variation to climate change conditions	Contribute to protecting Infrastructure for water management & promote efficient use of resources	Identify the potential threats on the land use change on the ecological zone and protect water resources and species of particular area
Protect human health, lessen health inequalities and encourage fit lifestyles	Y						
Conserve habitats, enhance species richness, where possible and avoid damages to biodiversity.	Y	Y					
Protect & where suitable improve the purpose and superiority of the soil source.	Y	Y	Y				
To prevent unavailability and Managing all possible water sources possible.	Y	Y	Y	Y			
Contribution to improvement and variation to climate change conditions	Y	Y	Y	Y	Y		
Contribute to protecting Infrastructure for water management & promote efficient use of resources	Y	Y	Y	Y	Y	Y	
Identify the potential threats on the land use change on the ecological zone and protect water resources and species of particular area	Y	Y	Y	Y	Y	Y	Y

(Y= Coherent, N = Distortion, 0= No linkage)

Table 4.4 Internal Coherence between SEA Topics

Strategic Environmental Assessment (SEA) Topics	Human Health & Safety	Biodiversity	Soil	Water	Climatic Factors	Material Assets	Landscape
Human Health & Safety	Y						
Biodiversity	Y	Y					
Soil	Y	Y	Y				
Water	Y	Y	Y	Y			
Climatic Factors	Y	Y	Y	Y	Y		
Material Assets	Y	Y	Y	Y	Y	Y	
Landscape	Y	Y	Y	Y	Y	Y	Y

(Y= Coherent, N = Distortion, 0= No linkage)

Table 4.5 Compatibility of SEA Objectives with National Environmental Objectives

Strategic Environmental Assessment (SEA) objectives / National Environmental Objectives	Protect human health, lessen health inequalities and encourage fit lifestyles	Conserve habitats, enhance species richness, where possible and avoid damages to biodiversity.	Protect & where suitable improve the purpose and superiority of the soil source.	To prevent unavailability and Managing all possible water sources possible.	Contribution to improvement & variation to climate change condition	Contribute to protecting Infrastructure for water management & promote efficient use of resources	Identify the potential threats on the land use change on the ecological zone and protect water resources and species of particular area
Conservation, restoration and proficient management of env-resources	Y	Y	Y	Y	Y	Y	Y
Integration of env-considerations in policy making & planning processes	Y	Y	Y	Y	Y	Y	Y
Capacity building of government agencies & other stakeholders at all levels for better env-management	Y	Y	Y	Y	Y	Y	Y
To meet international obligations efficiently in line with the national Aspirations	Y	Y	Y	Y	Y	Y	Y
Creation of a demand for environment through mass awareness & the public recruitment	Y	Y	Y	Y	Y	Y	Y

Prevent/reduce Air & Noise Pollution	Y	Y	Y	Y	Y	Y	Y
To ensure economic growth, food security & safety	Y	Y	Y	Y	Y	Y	Y
To provide sustainable approach to clean drinking water & manage water resources of country	Y	Y	Y	Y	Y	Y	Y
To Reduce & prevent from Liquid & Solid waste sources	Y	Y	Y	Y	Y	Y	Y
Promote the protection & efficient use of biodiversity & effected management of protected areas	Y	Y	Y	Y	Y	Y	Y
Prevention of climate change through protection of Ozone layer	Y	Y	Y	Y	Y	Y	Y
Promotion of renewable energy to make our env-friendly	Y	Y	Y	Y	Y	Y	Y
To achieve sustainable agriculture & livestock growth	Y	Y	Y	Y	Y	Y	Y

NDRR Policy 2013 objectives / SEA Objectives	Creating an integrated national capacity to recognize & monitor liability and hazard trends including potential CC impact	Creation of MHEWS while building upon current systems & emphasizing the information & warning needs of vulnerable peoples	Strengthening an incorporated disaster preparedness & response capacity from the local level to nationwide	Promoting development planning that considers & addresses DR along environmental & CC concerns	Strengthening the structural & non-structural resilience of key infrastructure & lifelines in Country	Strengthening capacity at provincial to national level facilitate & implementation of DRR policies, plans & programs in high-risk areas	Strengthening Local Level RR capacity focusing upon communities, supportive linkages with Union Councils, districts & tehsils	Ensuring DRR is systematically incorporated into rehabilitation programming, "built better, safer & stronger" & informing DRR mainstreaming in general
Protect human health, lessen health inequalities and encourage fit lifestyles	Y	Y	Y	Y	Y	Y	Y	Y
Conserve habitats, enhance species richness, where possible and avoid damages to biodiversity.	Y	Y	Y	Y	Y	Y	Y	Y
Protect & where suitable improve the purpose and superiority of the soil source.	Y	Y	Y	Y	Y	Y	Y	Y
To prevent unavailability and Managing all	Y	Y	Y	Y	Y	Y	Y	Y

possible water sources possible.								
Contribution to improvement and variation to climate change conditions	Y	Y	Y	Y	Y	Y	Y	Y
Contribute to protecting Infrastructure for water management And promote efficient use of water and resources	Y	Y	Y	Y	Y	Y	Y	Y
Identify the potential threats on the land use change on the ecological zone and protect water resources and species of particular area	Y	Y	Y	Y	Y	Y	Y	Y

Table 4.6 Compatibility of SEA Objectives with NDRR Policy 2013

Table 4.7 Compatibility of SEA Objectives with NDMP Plan (2012-22)

NDMP Plan (2012-22) objectives / SEA Objectives	Promote resilience in society against disasters that Pakistan has faced such as the Earthquake, Pakistan Flood 2010 & Tharparkar Drought	To reduce damage from chronic disasters such as earthquakes, floods & droughts etc	Look after of vulnerable public such as females, children, old people	To clearly mention the roles of local & national level govts. public agencies, corporations & residents for every type of disaster	To achieve sustainable socio economic and environmental development through reducing DR & vulnerabilities for all communities of people in the country	To enhance the country's ability to deal with natural disasters using a comprehensive approach.	To manage the complete range of disasters by development of DRR policies, plans strategies, measures and actions	Increase institutional capacities, human & material resources for mitigation, prevention and preparedness, rehabilitation, response and recovery
Protect human health, lessen health inequalities and encourage fit lifestyles	Y	Y	Y	Y	Y	Y	Y	Y
Conserve habitats, enhance species richness, where possible and avoid damages to biodiversity.	Y	Y	Y	Y	Y	Y	Y	Y
Protect & where suitable improve the purpose and superiority of the soil source.	Y	Y	Y	Y	Y	Y	Y	Y
To prevent unavailability and Managing all possible water	Y	Y	Y	Y	Y	Y	Y	Y

sources possible.								
Contribution to improvement and variation to climate change conditions	Y	Y	Y	Y	Y	Y	Y	Y
Contribute to protecting Infrastructure for water management And promote efficient use of resources	Y	Y	Y	Y	Y	Y	Y	Y
Identify the potential threats on the land use change on the ecological zone and protect water resources and species of particular area	Y	Y	Y	Y	Y	Y	Y	Y

Table 4.8 Compatibility of SEA Objectives with NDRM Framework 2007

NDM Framework (2007) objectives / SEA Objectives	To achieve suitable, social, economic and environmental development in Pakistan through the reduction of risk and vulnerabilities.	To manage complete spectrum of disaster by adopting a disaster risk reduction perspective in development planning at all levels.	Enhancing Institutional capacities for disaster preparedness, recovery and response.	Develop Institutional arrangements and technical capacities of key national, provincial and local stake holders to undertake risk assessment.	Develop coordinated disaster risk management plans at national, provincial and local level.	Integrate & implement DRR strategies in development plans & programs of line ministries and departments.	Promote community and local level preparedness culture through print and electronic media.	Promote sustainable livelihood practices in area at high risk from multiple hazards.
Protect human health, lessen health inequalities and encourage fit lifestyles	Y	Y	Y	Y	Y	Y	Y	Y
Conserve habitats, enhance species richness, where possible and avoid damages to biodiversity.	Y	Y	Y	Y	Y	Y	Y	Y
Protect & where suitable improve the purpose and superiority of	Y	Y	Y	Y	Y	Y	Y	Y

the soil source.								
To prevent unavailability and Managing all possible water sources possible.	Y	Y	Y	Y	Y	Y	Y	Y
Contribution to improvement and variation to climate change conditions	Y	Y	Y	Y	Y	Y	Y	Y
Contribute to protecting Infrastructure for water management And promote efficient use of resources	Y	Y	Y	Y	Y	Y	Y	Y
Identify the potential threats on the land use change on the ecological zone and protect water resources and species of particular area	Y	Y	Y	Y	Y	Y	Y	Y

4.5 Internal Coherence & Distortion of Disaster Management System of Pakistan

To check distortion and coherence between internal Disaster Management System documents following comparison procedure are followed. These results explain the coherence and non coherence between NDM systems in Pakistan.

Table 4.9 Internal Coherence & Distortion between the objectives NDRR Policy 2013 and NDMP 2012-22

NDRR Policy 2013 objectives / NDM Plan (2012-22) Objectives	To create integrated national capacity to identify & measure vulnerability & hazard trends including potential CC impact	Creating MHEW capacity while building on existing systems & highlight the information & warning needs of vulnerable public	Promote an integrated disaster preparedness with response capacity from the local to national level	Strengthening development planning that considers & addresses disaster risks alongside environmental & CC concerns	To Make strong the structural & non-structural resilience of key infrastructure & lifelines in country	Strengthening capacity at national, provincial levels to facilitate the implementation of DRR policies, plans & programs across scommunities and in high-risk areas	To make strong Local Level RR capacity focusing on communities, supportive linkages with Union Councils, tehsils & also in districts	To make sure DRR is systematically integrated into recovery & reconstruction programming, "building better, safer & stronger"
Development of resilience in the public against disasters of the type that Pakistan has Experienced in past.	+	+	+	+	0	+	+	+
To mitigate damage from chronic disasters such as earthquakes, tsunamis, floods, droughts etc	+	+	+	+	0	+	+	+
To take care of vulnerable public such as females, marginalized people, elders, disabled people	+	+	+	+	0	+	+	+
Clarification in the responsibilities of the national & local govts, public agencies, corporations and	+	+	+	+	0	+	+	+

residents for every type of disaster								
Achievements of sustainable social, economical & environmental progress in country by reducing disaster risks & vulnerabilities for all groups of people	+	+	+	+	+	+	+	+
To increase the country's capacity to face natural disasters using a comprehensive national approach.	+	+	+	+	+	+	+	+
To manage the complete range of disasters by development of DRR policies, strategies, measures & actions	+	+	+	+	+	+	+	+
To increase institutional capacities, human & material resources for mitigation, protection and preparedness, response, recovery & rehabilitation	+	+	+	+	+	+	+	+

Table 4.10 Internal Coherence & Distortion between Intervention & strategies NDRR Policy 2013 and NDMP 2012-22

NDRP Policy (2013) Intervention & Strategies NDMP Plan (2012-22) Interventions & Strategies	Risk Knowledge ▪ Risk or vulnerability atlas at national, Local/ district level risk assessments ▪ Damage & loss catalog & CC focused research	Prevention & Mitigation ▪ Creating more resilient societies ▪ Improving "risk conscious" with resilient growth ▪ Integrate DRR into development planning (Micro Level) ▪ Put into place adequate regulatory regimes to promote DRR ▪ Integrate DRR into development planning (micro-level projects) & the whole spectrum of post-disaster interventions ▪ Resilient key-infrastructure and life-lines ▪ Promoting risk awareness and knowledge through DRR education	Preparedness & Quick Response ▪ Multi-hazard EWS, Integrated disaster preparedness and response capacity, Disaster preparedness and response plans & Hazard- and sector-specific plan ▪ Response force & financial protection
Create the institutional & legal system for disaster management	+	+	+
Prepare disaster management plans at different levels	+	+	+
Establish a national hazard & vulnerability assessment system	+	+	+
Establish a multi-hazard early warning system	+	+	+
Encouragement of training, education & awareness related to disaster management	+	+	+

Strengthen the awareness campaigns on disaster risk reduction at local to national level	+	+	+
Infrastructure development for disaster risk reduction	+	+	+
Mainstreaming DRR into development	+	+	+
To Establish a national emergency & quick response system	+	+	+
Capacity building development for post-disaster recovery & rehabilitation	+	+	+

Table 4.11 Internal Coherence & Distortion between the objectives of NDRR Policy 2013 and NDRM Framework 2007

NDRM Framework (2007) Objectives / NDRR Policy 2013 Objectives	To achieve suitable, social, economic and environmental development in Pakistan through the reduction of risk and vulnerabilities.	To manage complete spectrum of disaster by adopting a disaster risk reduction perspective in development planning at all levels.	Enhancing Institutional capacities for disaster preparedness, recovery and response.	Develop Institutional arrangements and technical capacities of key national, provincial and local stake holders to undertake risk assessment.	Develop coordinated disaster risk management plans at national, provincial and local level.	Integrate & implement DRR strategies in sectoral development plans and programs of line ministries & departments.	Promote community & local level preparedness culture by print & electronic media.	Encourage sustainable livelihood practices in area at high risk from multiple hazards.
Creation of integrated national capacity to identify & monitor vulnerability & hazard trends including potential C.C impacts	+	+	+	+	+	+	+	+
To create Multi-Hazard Early Warning system while building upon existing systems and emphasizing the information & warning needs of vulnerable peoples	+	+	+	+	+	+	+	+
Strengthening an integrated disaster preparedness & response capacity from the local to the national level	+	+	+	+	+	+	+	+
To promote development planning that considers & addresses DR beside env-climate change concerns	+	+	+	+	+	+	+	+
Stronger the structural & non-structural resilience of key infrastructure & lifelines in Pakistan	+	+	+	+	+	+	+	+

Strengthening capacity at national & provincial levels to assist and provide support to the implementation of DRR policies, plans & programs in high-risk areas	+	+	+	+	+	+	+	+
Strengthening Local Level RR capacity focusing on communities, & helpful linkages with Union Councils, tehsils & districts	+	+	+	+	+	+	+	+
Ensuring DRR is systematically integrated into recovery, renovation program, better and safer & stronger & informing DRR mainstreaming in general	+	+	+	+	+	+	+	+

Table 4.12 Internal Coherence & Distortion between the interventions and strategies of NDRR Policy 2013 and NDRM 2007

NDRR Policy 2013 Intervention & Strategies / NDRM Framework (2007) Interventions and Strategies	Risk Knowledge ▪ Risk and vulnerability atlas & index at national level ▪ Local/ district level risk assessments ▪ Damage, loss record & CC based research	Prevention & Mitigation ▪ Creating extra resilient communities ▪ Endorse "risk aware", resilient progress ▪ Integrate DRR into development planning (macro/ mega/ national level) ▪ Put into place sufficient regulatory regimes to promote DRR ▪ Integrate DRR into micro level planning & the whole spectrum of post-disaster interventions ▪ Resilient key-infrastructure and life-lines ▪ Promoting risk awareness & knowledge through DRR education and skills	Preparedness & Response ▪ Multi-hazard EWS, incorporated disaster preparedness , quick response capacity, Disaster preparedness & response plans & Hazard- and sector-specific plan ▪ Emergency Response force & financial protection
Institutional & Legal arrangement for DR management	+	+	+
Hazard & vulnerability assessment	+	+	+
Training, education & awareness	+	+	+
Disaster risk management planning	+	+	+
Community & local level programming	+	+	+
Multi-Hazard early warning system	+	+	+
Mainstreaming DR reduction into development	+	+	+
Emergency response system	+	+	+

Capacity development for post disaster recovery	+	+	+

Table 4.13 Internal Coherence & Distortion between the objectives of NDRM Framework 2007 and NDMP 2012-22

NDRM Framework (2007) Objectives / NDMP Plan (2012-22) Objectives	To achieve suitable, social, economic and environmental development in Pakistan through the reduction of risk and vulnerabilities.	To manage complete spectrum of disaster by adopting a disaster risk reduction perspective in development planning at all levels.	Enhancing Institutional capacities for disaster preparedness, recovery and response.	Develop Institutional arrangements and technical capacities of key national, provincial and local stake holders to undertake risk assessment.	Develop coordinated disaster risk management plans at national, provincial and local level.	Integrate & implement DRR strategies in development plans & programs of line ministries & depts.	Promote community and local level preparedness culture through print and electronic media.	Promote sustainable livelihood practices in area at high risk from multiple hazards.
To build up resilience in society against disasters that Pakistan has experienced like earthquake, droughts etc	+	+	+	+	+	+	+	+
To mitigate damage from chronic disasters such as earthquakes, tsunamis, floods, droughts	+	+	+	+	+	+	+	+

To take care of susceptible peoples such as females, marginalized people, elders, disabled people, etc	+	+	+	+	+	+	+	+
To clarify the roles & responsibilities of the national & local governments, public sectors, corporative sectors & people for every type of disaster	+	+	+	+	+	+	+	+
To achieve sustainable social, economic & env-development in Pakistan through reducing DR & vulnerabilities for all communities in the country	+	+	+	+	+	+	+	+
Enhancement of country's ability to manage expected disasters using comprehensive national approaches.	+	+	+	+	+	+	+	+
To manage the whole spectrum of disasters by development of DRR policies, strategies, measurements & actions	+	+	+	+	+	+	+	+

Enlarging institutional capacities, human & material resources for mitigation, prevention, preparedness, response & recovery	+	+	+	+	+	+	+	+

Table 4.14 Internal Coherence & Distortion between the intervention &strategies of NDRM Framework 2007 and NDMP 2012-22

NDRM Framework (2007) Intervention & Strategies / NDMP Plan (2012-22) Interventions and Strategies	Institutional & Legal arrangement for DRM	Hazard & vulnerability assessment	Training, education, technical skills & awareness	DRM planning	Community & local level programming	Multi-Hazard early warning system (MHEWS)	Mainstreaming DRR into development	Emergency response system (ERS)	Capacity improvement in post disaster recovery
Establish the institutional & legal system for DM	+	+	+	+	+	+	+	+	+
Prepare DM plans at different levels	+	+	+	+	+	+	+	+	+
To Establish a national hazard & vulnerability assessment system	+	+	+	+	+	+	+	+	+
To Establish early warning system For multi hazards	+	+	+	+	+	+	+	+	+

purpose									
Encouragement of training, education & awareness in relation to DM	+	+	+	+	+	+	+	+	+
Strengthen the awareness activities & programs on DRR at local level	+	+	+	+	+	+	+	+	+
Infrastructure development for DRR	+	+	+	+	+	+	+	+	+
Mainstreaming DRR into development & progress	+	+	+	+	+	+	+	+	+
To establish a national emergency response system	+	+	+	+	+	+	+	+	+
Capacity development for post-disaster recovery	+	+	+	+	+	+	+	+	+

Table 4.15 Internal Coherence & Distortion between NDRR Policy 2013 and NDM Act 2010

NDRR Policy 2013	**Risk Knowledge** ▪ Risk or vulnerability atlas & index at Pakistan level ▪ Local & district level risk assessments measures ▪ Damage & loss data-base research having main focused on climate change
NDM Act 2010	**Prevention & Mitigation** ▪ Creating more resilient communities ▪ To promote "risk conscious" & resilient development, Integrate DRR into development planning (macro-level: national level plans & strategies; mega-projects) ▪ Put into place adequate regulatory regimes to promote DRR, Integrate DRR into development planning (micro-level projects) & the whole spectrum of post-disaster interventions ▪ Resilient key-infrastructure, life-lines & Promoting risk awareness and skills through DRR education **Preparedness** ▪ Multi hazard Early Warning System, Integrated disaster preparedness, quick response capacity, Disaster preparedness, response plans & Hazard- and sector-specific plan ▪ Response force & financial protection **Policy Objectives** ▪ Creating an integrated national capacity to recognize & monitor vulnerability, hazards & Multi-Hazard Early Warning capacity while building upon existing systems ▪ Increase an integrated disaster awareness and quick response capacity from the local to the national level ▪ Strengthening capacity at national & provincial levels to assist and provide support to the implementation of DRR policies, plans & programs across sectors also in high-risk areas ▪ Strengthening Local Level RR capacity focusing upon communities & helpful linkages with Union Councils or tehsils also in districts ▪ Ensuring DRR is completely integrated into recovery, reconstruction & rehabilitation campaigns To make better, safer & stronger while informing DRR mainstreaming in general

Section 2 Describes different terms including DM, Preparedness ,response & recovery, Rehabilitation & reconstruction , national & federal authority , district units	+
Section 3. Establishment of NDMC **Section 6.** Powers and functions of NDM Commission	–
Section 8. Establishment of the NDMA **Section 9.** Powers & functions of the NDMA	–
Section 10 (2) The National Plan shall be prepared by the NDMA having regard to the national policy & in consultation with the Provincial Govt. & expert bodies or organizations in the field of DM, and approved by the	+

National Commission. (3)National Plan shall include: (a) actions to be taken for the avoidance of disasters or the mitigation of their effects; (b) actions to be taken for the assimilation of mitigation measures in the development plans	
Section 10 (3) (c) measures to be taken for preparedness & capacity building management to effective and quick respond to any threatening disaster situations, conditions or disaster; and (d) Roles & responsibilities of different Ministries, Divisions of the Federal Govt. in respect of measures specified in clauses c, b and a.	+

Section 10 (4) The national plan shall be reviewed and updated annually.	+
Section 23. Federal Government to take measures; : **2 (a)** co-ordination of actions of the Ministries & Divisions of the Federal Govt, Provincial Govts, National Authority, Provincial Authorities, governmental & non-governmental organizations in relation to DM. **2 (b)** co-operation & assistance to Provincial Govt., as requested by them or if not deemed appropriate by it	–
Section 26. National Institute of Disaster Management **(2) NIDM** shall be responsible for planning, promoting training, research and developing core competencies in the area of DM, documentation &	+

development of national level information base relating to DM policies, prevention mechanisms & mitigation measures. (3)(a) develop training modules, undertake research & documentation in DM & organize training programs; (b) formulate and implement a comprehensive human resource development plan covering all aspects of DM (c) provide assistance and support in national level policy formulation	
Section 27. Establishment of National Disaster Response Force. – (1) There shall be established a NDR Force for the purpose of professional and expert response to a threatening disaster situation or disaster condition. (2) Subject to the requirements of this Act, the force shall	+

be constituted in such way & the conditions and situation service of the members of the Response Force shall be such as may be described.	
Section 29. National Fund for Disaster Management (2)NDMF shall be financed from the given sources (a) grants made by the Federal Govt (b) loans, aid & donations from the national or international donors or agencies & (c) Donations received from any other private of govt. source. (3) On initiation of this Act, the following funds shall become part of the NDM Fund (a) Prime Minister's Disaster Relief Fund (b) any other fund related to natural disaster established at Federal level as the Federal Govt may determine	

Section 30. deals with establishment of funds by Provincial Govts (1) The Prov Govts. shall, instantly after notice issued for constituting the PDMA in provinces & the District Units in districts, establish for the purposes of this Act a fund to be called the Provincial Disaster Management Fund. (PDMF) (2) PDMF shall be financed from the described sources, namely: (a) grants made by the Federal Govt or Provincial Govts (b) loans, aid & donations from the national or international agencies/ donors provided in accordance with approved procedure. (3) The PDMF shall be kept in one or more than one account maintained by the PDMA, in national or foreign currency, in any planned bank in	

Pakistan & shall be operated in accordance with the directions and orders of the Prov Authority. (4) The PDMF shall be administerd by the PDMA towards meeting the expenses for its establishment & operation, Emergency preparedness, quick response, mitigation, relief & reconstruction & rehabilitation in the Province.	
Section 31 Allocation of funds by Federal & Provincial Govts. The Federal Govt & Provincial Govts shall, in their annual budgets, make provisions for funds for the activities & programs set out in its DM plan.	

Section 41. Annual report. (1). The NDMA shall prepare one time in each year, in such form & at such time as may be described by rules, an annual report giving a true & full account of its activities during the past year and copies therefore shall be forwarded to the Federal Govt which shall lay it before the National Assembly and the Senate.	–

Table 4.16 Internal Coherence & Distortion between NDMP Plan 2012-2022 and NDM Act 2010

NDMP Plan (2012-2022)	**Objectives:** i) To develop resilience in society against disasters that Pakistan has experienced in the past, such as earthquakes, floods, droughts ii) To mitigate damages from recurring disasters such as floods, urban flooding, earthquakes, droughts, landslides, sediment disasters, avalanches, cyclones with storm surges, etc. iii) To reduce DR & vulnerabilities, particularly those of the poor & the minorities groups of people in the country. iv) Clarification in the roles & responsibilities of the national and local governments, public agencies, corporations, NGOs, communities and residents to reduce disaster risk. **Mission:** To achieve sustainable social, economical & env-development in Pakistan by reducing DR and vulnerabilities for all groups of people in the country; and to enhance The country's ability to manage natural disasters by using a broad national approach.
NDM Act 2010	**Chapter # 3: Institutional Systems for Disaster Management** 3.1. Evolution of DM Systems in Pakistan 3.2. Roles and Functions of DM Organizations 3.3.DM Planning System 3.4.DM Drills and Training 3.5 Disaster Management Fund 3.6 National Disaster Response Force **Chapter # 5, 6, 7,8 Disaster Management Measures for Geological, meteorological, Industrial & Biological Hazards** • Pre disaster measures (Excluded in Biological hazards) • Emergency response measures • Post disaster measures **Chapter # 01** • **Monitoring of Plan** • **1.4 Disaster Risk Management Approach** According to the National Disaster Management Act 2010, the following measures would be included in the National Plan: • Measures to be taken for the prevention of disasters and/or the mitigation of their effects.

	• Actions to be taken for integration of mitigation measures and actions in the development plans. • Measures to be taken for preparedness & capacity building to efficiently respond to any disaster condition or disaster. • Roles & responsibilities of various ministries or divisions of the federal government in respect to measures specified National Intervention and Strategies for DM Key issues for DM in Pakistan include: 1. Strengthen DM administration at the national, provincial and local levels. 2. Enhance the DM system in the stages of pre-, during and post-disaster periods. 3. Establish mechanisms for monitoring and assessment of DR. 4. Promote mechanism for mainstreaming DRR measures into development planning processes. 5. Promote DRM at local and community levels. 6.Strengthen capacity of all relevant players in DM
Section 2 Describes different terms including "DM", Preparedness ,response, recovery, Rehabilitation, reconstruction , national &	+

federal authority , district units	
Section 3. Establishment of NDM Commission Section 6. Powers & functions of NDM Commission	+
Section 8. Establishment of the NDMA National Disaster Management Authority Section 9. Powers and functions of the NDMA	+

Section 10 (2) The National Plan shall be prepared by the NDMA having regard to the national policy & in consultation with the Provincial Govts & expert bodies or organizations in the field of DM & approved by the NDM Commission. (3)NDM Plan shall include: (a) actions to be taken for the prevention of disasters or the mitigation of effects after the disasters; (b) actions to be taken for the integration of mitigation measures in the development plans	

Section 10 (3) (c) actions to be taken for preparedness & capacity building to effectively respond to any threatening disaster situations or disaster (d) roles & responsibilities of different Ministries or Divisions of the Federal Govt in respect of measures specified in clauses a,b,c.	+
Section 10 (4) The NDM Plan shall be reviewed & updated annually.	+
Section 23. Federal Govt to take actions **2 (a)** co-ordination of actions of the Ministries & Divisions of the	–

Federal Govt, Provincial Govts, National Authority, Provincial Authorities, governmental & NGO's in relation to DM **2 (b)** collaboration & assistance to Provincial Govts, as requested by them	
Section 26. National Institute of Disaster Management (NIDM) **(2) NIDM** shall be responsible for planning, promoting training, research & developing core competencies in the area of DM, documentation & improvement of national level	

information base related to DM policies, prevention mechanisms & mitigation measures. **(3)(a)** develop training modules, undertake research & documentation in DM and organize training programs **(b)** formulate and implement a detailed human resource (HR) development plan covering all aspects of DM **(c)** provide assistance to national level in policy formulation	

Section 27 deals with Establishment of NDR Force. – (1) There will be established a NDR Force for the purpose of specialist response to a threatening disaster situation or disaster. (2) Subject to the requirements of this Act, the force shall be constituted in such manner & the conditions or situation of service of the members of the Force will be such as prescribed.	

Section 29. National Fund for Disaster Management (2)NDM Fund will be financed from the following given sources (a) grants made by the Federal Govt. (b) loans, aid & donations from the national, international agencies (c) Donations received from any other governmental or private source. (3) On implementation of this Act, the following funds shall become part of the NDM Fund (a) PM's Disaster Relief Fund (b) Any other fund related to	

natural calamities or disasters established at Fed Govt. level as the Fed. Govt. may determine	
Section 30. Establishment of Disaster Management funds by Provincial Governments (1) The Provincial Govt will, immediately after notifications issued for constituting the PDMA & the District Units, establish for the purposes of this Act a fund to be called the PDM Fund. (2) The PDM Fund will be financed from the given sources, namely:	+

(a) grants that made by the Federal Govt or Provincial Govts (b) Loans, aid & donations from the national or international agencies provided in accordance with given procedure. (3) The PDM Fund shall be kept in one or more accounts managed by the PDMA, in local or international currency, in any regular bank in Pakistan & shall be operated in according to the directions of the PDMA. (4) PDMF shall be managed by the PDMA to meet the expenses for its establishment & operation,	

emergency preparedness, quick response, mitigation, relief & reconstruction & rehabilitation in the Province.	
Section 31 Allocation of funds by Federal and Provincial Govts. The Federal Govt and Provincial Govts will , in their annual budgets, make supplies for funds for the purposes of carrying out the activities & programs set out in its DMP.	

Section 41. Annual report. (1). The NDMA shall prepare once every year, in such form & at such time as may be approved by rules, annual report will show a true & complete account of its activities during the past year and copies therefore will be forwarded to the Federal Govt which shall lay it before the National Assembly & Senate.	–
Sections 33. Punishment for obstruction, etc **Sections 34.** Punishment for false claim **Sections 35.** Punishment for false warning.	–

Section 36. Failure of officer in duty or his connivance at the ignorance of the provisions of this Act	

Table 4.17 External coherence and distortion between NDM Plan 2012-2022 with relevant department's policies and plans

NDMP Plan (2012-22) Objectives / Appropriate National Department's Policies	To develop resilience in society against disasters of the type that Pakistan has experienced such as the 2005 Earthquake and Pakistan Flood 2010	To mitigate damage from recurring disasters such as earthquakes, tsunamis, floods/sediment disasters, and other natural disasters	To take care of vulnerable peoples such as women, marginalized people, elderly people, disabled people, etc	To clarify the roles of the national and local governments, public agencies, corporations and residents for each type of disaster	To achieve sustainable social, economic and environmental development in Pakistan through reducing disaster risks and vulnerabilities for all groups of people in the country	To enhance the country's ability to manage natural disasters using a comprehensive national approach.	To manage the complete spectrum of disasters by development of disaster risk reduction policies, strategies, measures and actions	Enhancing institutional capacities, and human and material resources for mitigation, prevention and preparedness, response and recovery
• **National Climate Change Policy 2012** To chase sustained economic growth by properly addressing the challenges of climate change	Y	Y	Y	0	Y	Y	Y	Y
To incorporate climate change policy with other national policies	Y	Y	Y	0	Y	Y	Y	Y
To focus on pro-poor gender sensitive adjustment while also promoting mitigation to the	Y	Y	Y	0	Y	Y	Y	Y

extent possible in a cost-effective manner								
To ensure water, food, & energy security of the Pakistan in the face of the challenges posed by climate change	Y	Y	Y	0	Y	Y	Y	Y
To minimize the risks arise from the estimated increase in frequency & intensity of extreme weather events such as droughts, floods & tropical storms	Y	Y	Y	0	Y	Y	Y	Y
To make stronger inter-ministerial decision making & coordination mechanisms on C.C	Y	Y	Y	Y	Y	Y	Y	Y
To facilitate efficient use of the opportunities, specially financial, available at both national & international level	Y	Y	Y	Y	Y	Y	Y	Y

To promote the development of suitable economic incentives to encourage public & private sector investment in adaptation actions	Y	Y	Y	Y	Y	Y	Y	Y
To enhance the awareness, skill & institutional capacity and power of related stakeholders	Y	Y	Y	Y	Y	Y	Y	Y
To promote conservation of natural resources and long term sustainability	Y	Y	Y	Y	Y	Y	Y	Y
• **National Water Policy 2012 (Draft)**								
To provide sufficient & safe drinking water for all public	Y	Y	Y	Y	Y	Y	Y	Y
Providing food security for all over the country & feed security for livestock	Y	Y	Y	Y	Y	Y	Y	Y

To provide hygienic sanitation facilities for urban population & rural population	Y	Y	Y	Y	Y	Y	Y	Y
Maintaining water quality & protecting water resources by preventing from pollution	Y	Y	Y	Y	Y	Y	Y	Y
Treatment & possible reuse of waste water, domestic waste water and agricultural, industrial effluents	Y	Y	Y	Y	Y	Y	Y	Y
Restoring and recovering the health of the environmental ecology	Y	Y	Y	Y	Y	Y	Y	Y
Flood management to mitigate and response to floods & minimize flood damages	Y	Y	Y	Y	Y	Y	Y	Y
Increase Hydro-energy development for economic growth in country	Y	Y	Y	0	Y	Y	0	Y

Security of beneficial streams of the water related structures for sustainable provision of services	Y	Y	Y	Y	Y	Y	Y	Y
Conservation, Protection and optimizing water use efficiency	Y	Y	Y	Y	Y	Y	Y	Y
• **National Power Policy 2013**								
Build a power generation capability that can meet Country's energy needs in a sustainable way.	0	0	0	0	Y	Y	0	Y
To Create a culture of energy conservation, efficiency and responsibility	0	0	0	Y	Y	Y	0	Y
Ensure the generation of low-cost and affordable electricity for domestic use, commercial & industrial use by	N	0	0	Y	Y	Y	0	Y

managing original and actual resources such as coal and hydro-energy								
Minimize thefts & corruption in fuel supply	0	0	0	0	Y	Y	0	Y
Promote world class ways of efficiency in power generation	0	0	0	0	Y	Y	0	Y
Creation of cutting edge transmission network in country	0	0	0	0	Y	Y	0	Y
Minimize inefficiencies in the distribution and supply system	0	0	0	0	Y	Y	0	Y
Minimize financial & economical loss across the whole system in Pakistan	0	0	0	0	Y	Y	0	Y
Line up the ministries involved in the energy sector & improve the governance of related federal & provincial depts. as well as regulators	0	0	0	0	Y	Y	0	Y

• **National Environmental Policy 2005**								
Protection, restoration & efficient and effective management of environmental resources	Y	Y	Y	Y	Y	Y	Y	Y
Integration of env-considerations in policy making & planning processes in all projects	Y	Y	Y	Y	Y	Y	Y	Y
Capacity building of govt. agencies & other stakeholders at all levels for better env-management	Y	Y	Y	Y	Y	Y	Y	Y
To meet international obligations effectively in line with the national Spirit	Y	Y	Y	Y	Y	Y	Y	Y
To serve environment by mass awareness and community	Y	Y	Y	Y	Y	Y	Y	Y

mobilization								
• **National Forest Policy 2015 (Draft)**								
Promoting ecological, social & cultural meaning of forests through sustainable use, management & development & use of forest produce including wood & non-wood forest goods	Y	Y	Y	Y	Y	Y	Y	Y
Implementing a national level mass forestation program to expand and maintain optimum forest cover	Y	Y	Y	Y	Y	Y	Y	Y
Maximize forest area by investing in available communal lands/ shamlat, Guzara forests &	Y	Y	Y	0	Y	Y	Y	Y

urban forestry								
Facilitating and harmonizing inter-provincial movement, trade and commerce of wood and non-wood forest products through the Federal Forestry Board	Y	Y	Y	0	Y	Y	Y	Y
Inter-linking natural forests, protected areas, wetlands and wildlife habitats to reduce fragmentation	Y	Y	Y	Y	Y	Y	Y	Y
Enhancing role and contribution of forests in reducing carbon emissions and enhancing forest carbon pools	Y	Y	Y	Y	Y	Y	Y	Y
Facilitating implementation of international conventions and agreements related to Forestry, Wetlands ,	Y	Y	Y	Y	Y	Y	Y	Y

Biodiversity and Climate Change								
Promoting reliable & coordinated technical forest planning, research & educational skills including for local community & population based management	0	Y	Y	Y	Y	Y	Y	Y
• **National Agriculture & Food security policy 2013 (Draft)**								
To create a modern, efficient & diversify agricultural sector that can ensure a stable & sufficient supply of basic food supplies for the country's population, provide high quality products to its industries & for export	Y	Y	Y	0	Y	Y	Y	Y

To ensure smart incomes & decent employment for those public who live & working in rural areas	0	0	0	0	0	0	0	0
Use the resource base in an efficient & sustainable way	Y	Y	Y	Y	Y	Y	Y	Y
Flexibly adapt to C.C & be resilient enough to quickly recovery from shocks and emergencies	Y	Y	Y	0	Y	Y	Y	Y
Ensure that all sects of the population have easy and stable access to sufficient, nutritious and safe foods necessary for a healthy life	Y	Y	Y	Y	Y	Y	Y	Y
• **National Drinking Water Policy 2009**								
Provide access to safe & sustainable drinking water	Y	Y	Y	Y	Y	Y	Y	Y

supply to the entire population of country by 2025								
Ensure protection and conservation of water resources	Y	Y	Y	Y	Y	Y	Y	Y
Promote actions for treatment & safety of clean drinking water	Y	Y	Y	N	Y	Y	Y	Y
Encourage local community participation & empowerment in planning, achievement, monitoring, operations & preservation of water supply systems	Y	Y	Y	Y	Y	Y	Y	Y
Promote cost effective & suitable technological options for water supply and storage systems	Y	N	Y	0	Y	Y	0	Y
Increase community awareness about water safety, safe hygiene practices & water conservation	Y	Y	Y	0	Y	Y	Y	Y

Enhance capability of line ministries, depts., agencies & govt. & NGO's organizations at all levels in planning, implementation & monitoring of water supply programs & sustainable operation & maintenance of water supply systems	Y	Y	Y	Y	Y	Y	Y	Y
Enhance public-private-partnership for enhancement of access of safe drinking water & sustainable operation & maintenance of water supply systems	0	Y	Y	0	Y	Y	Y	Y
Encourage research & development for increase access, effectiveness & sustainability of water supply interventions	Y	Y	Y	Y	Y	Y	Y	Y

Encourage Inter-sectoral association to maximize the impacts of water supply interventions	Y	Y	Y	Y	Y	Y	Y	Y
• **National Sustainable development strategy 2012 (Draft)**								
Conserving & enhancing the natural resource, protecting and preservation of biodiversity & managing delicate ecosystems through an integrated natural resource management system approach	Y	Y	Y	Y	Y	Y	Y	Y
Increasing the life support system by reducing air & water pollution and reducing the ecological footprint of growth by strengthening the regulatory	N	N	N	N	N	N	N	N

framework & community-based interventions								
Preparing for C.C and its associated uncertainties by comprehensive adaptation & mitigation planning & solid implementation measures	Y	Y	Y	Y	Y	Y	Y	Y
Mitigation of poverty & promoting equity culture amongst society, in particular, by providing universal coverage of basic needs, specially health, education, welfare and using them as engines for an fair green economy	Y	Y	Y	N	Y	Y	Y	Y
Give social protection & safety nets for the poorest & most vulnerable specially women	N	N	N	N	N	N	N	N

Promoting cleaner production and encouraging sustainable consumption patterns in society	Y	Y	Y	0	Y	Y	Y	Y
Promoting comprehensive & sustainable growth by engaging the poor, women & youth, improved value addition chains, fair trade & public-private partnership	N	N	N	N	N	N	N	N
Prioritizing a removal of inefficiencies in the water, energy and agriculture sectors	Y	Y	Y	Y	Y	Y	Y	Y
Internalizing true environmental consideration in all economic decision & linking with global financial architecture to motivation for a green economy & aim to generate new job opportunities	Y	Y	Y	0	Y	Y	Y	Y

• **Pakistan Vision 2025**								
Protecting natural resources and addressing climate change.	Y	Y	Y	Y	Y	Y	Y	Y
An entrepreneurial private sector that can generate the required number of jobs	N	N	N	N	N	N	N	N
A responsible and accountable government and public sector	N	N	N	N	N	N	N	N
Meeting the basic needs of this growing population, including in particular their access to essential services—health, education, energy, water, and sanitation	Y	Y	Y	Y	Y	Y	Y	Y
Providing the social, legal, and physical infrastructure	N	N	N	N	N	N	N	N

needed to empower people and ensure that they are able to live their lives with dignity, and that human rights are protected, lives are secure, there is full employment								
Ensuring that the economy can engage effectively with and benefit from the opportunities emerging outside the borders, especially regional opportunities	0	0	0	0	0	0	0	0
Ensuring competitiveness in the modern world that has shifted towards a knowledge economy.	0	0	0	0	0	0	0	0
• **National Rangeland Policy 2010 (Draft)**								

To increase the productivity & the related functions and services for the rangeland ecosystem	Y	Y	Y	Y	Y	Y	Y	Y
To promote rangeland activities for the source of revenue by improvement of the rangeland dependent communities	Y	Y	Y	0	Y	Y	Y	Y
To preserve & maintain rangeland biodiversity	Y	Y	Y	Y	Y	Y	Y	Y
Mitigation of negative impacts of global warming & C.C especially related to the desertification	Y	Y	Y	Y	Y	Y	Y	Y
To enhance the skill & capability of the key stakeholders for the sustainable supervision of the rangeland management	Y	Y	Y	Y	Y	Y	Y	Y

To undertake functional & action research on the key problems of the rangelands	Y	Y	N	N	N	Y	Y	Y

4.6.1 Climate change Policy 2012

The National Climate Change Policy approved by the National Assembly in the month of September, of year 2012, gives an manual for managing the risks posed due to change in the current climatic conditions. It's main objective to encourage climate flexible way to better development and make sure that the measures to challenge climate change are incorporated in the future development plans related to economy and society. The actions to cope with these challenges coat thick ranging departments of water, livestock, agriculture, forestry, disaster preparedness, human health, energy and transport. The financial support for the future projects in the climate change policy could be obtain from the International green climate fund which has the aim to raise one hundred billion dollars by the year of 2020 and it also gave suggestion about National Climate Change Fund. Pakistan is susceptible to broad range of threats could be result of weather extremes, geophysical, geo-physical and human made disasters. In recent past, there has been raise in the speed of reappearance and concentration of hydro-meteorological disasters including droughts, extreme heat waves, heavy and extended rainfall, floods and storms. In this watch, hard work has been done by the government to support disaster and climate change education. And to the present day diversity of steps and actions have been intended and a number of these have been actually implemented. Hyogo Framework for Action from 2005 to 2015, put stress on the character of information and education, while put pressure on getting both formal and non-formal education which is a basic part of the NDMP plan. Keeping in mind this altering situation, the Pakistan's government has proposed the national climate change policy of year 2012, which undoubtedly shows the urgent need for disaster and education about the climate change and development of syllabus with exclusive stress on disaster and climate change, and its preamble in the state education system. The policy also tinted to promise totaling of climate change training and learning as an necessary subject in the forest connected departments. In order to boost the

communal ability in the area of disaster and climate change education, both NDMP Plan and NCC Policy are consistent in reverence to the actions i.e. for referring youthful researchers and scholars to alleged institutes of rest of the world for higher studies. In adding to this, it is relevant to give confidence and make stronger the existing disaster and climate change science, in the linked institutions and universities through scientific and monetary support. The NDMP 2012-2022 and NDRR Policy 2013 also tinted that investigation is needed on the challenges of disasters and climate change. These actions if taken care off well in further improvement policy, plans and programs will absolutely guide to alleviate and diminish the degree of compensation in expectation to the changing climate condition. The climate change policy's hub of attention is on the climate change adjustment and alleviation throughout energy preservation, improve energy competence, and encouragement of renewable energy making etc. to support international efforts for green house gas emissions reduction but NDMP Plan be short of actions to reduce green house gas emissions. There is a grim need to amalgamate the measures associated to climate change alleviation and adjustment into NDMP Plan because the state faces regular disaster like droughts and climate change conditions.

4.6.2. National Power Policy 2013

The Government has approved a national power policy to maintain the current and upcoming energy necessities of the whole country. The Policy's vision is "to develop the majority well-organized and customer centric power production, conduction and allocation system that fulfill the requirements of its inhabitants and enlarge its market in a sustainable and reasonably priced manner'. The Policy is unswerving to using coal (Thar coal) and hydel, while building of medium and long-term hydel capacity for energy production. 6 projects to be completed by the February, in 2015. The smaller hydropower schemes are anticipated to be completed in December, 2017 and will add 247 Mega Watts. An extra 969 Mega Watts is probable from the Neelum-Jhelum FIPP project in November, 2016. Many hydel projects are predictable to come operational in the year of 2017 which have the latent to add 1,910 Mega Watts. The government also claims to make public a coal strip with an capability to produce 6000 to 7000 Mega Watts in the near future. The power production and irrigation necessities intend to fill the dams to its full capability at the end of the monsoon season in August every year. In terms of discharge, most favorable power production require maintaining the elevated water level throughout the whole phase of process,

while irrigation supply need utmost level in August and lowest amount water level in June next year, therefore enabling full use of the stored water for farming purposes. If some level of main concern is given to flood, space would require to be held in reserve at a confident level underneath the full capacity. Another alternative would be to authorize elasticity in operational rules relying upon immediate information that is probable from the more efficient communication system; by storing flood peaks in the occasion when the dams are full at the end of August and a flood is experienced in early September. Under the present system no flood mitigation is considered. This aspect desires to be known grave thought in NDMP Plan, National Climate Change policy, national power policy, agriculture and national water policy and food security policy.

4.6.3. National Water Policy draft 2012

Draft National Water Policy 2012 gossips the entire water associated problems in the country, counting the catastrophe like droughts. It deals a environment whereby drought controlling in the state can be improved through required institutional and authorized reforms. The Water Policy draft is a landmark document and can go a elongated way in cleansing flood supervision in Pakistan. The Policy recognizes all deficiencies in the existing policy formation and describe reorganization a range of pieces of legislation to diminish go beyond. It put advance to create a federal water commission integrating FFC, part of plan sector of water and power development authority and office of the chief engineering advisor. It also describe the substitute of many water related regional acts with a modest consistent law that assists clear accepting and later appliance of the law. The Policy based on up-to-date shape and shows all the required non-structural and structural actions for drought and flood risk reduction. The policy put pressure on contribution of stakeholders in the drought management process and developing drought risk reduction awareness in the area. The Policy also stress on amplification of information managing and research in the area of droughts management.

The Water Policy draft stating a obvious and logical institutional schema of policy, provides due deliberation to climate change should be implemented at the early stage. The resultant policy may unite various elements as well as practical improvements and social and environmental concerns to water management. Draft National Water Policy gives the following drought management strategy.

4.6.4. National Forest Policy 2015 (draft)

The Policy have a arrangement for the sustainable managing of forests and associated natural capitals. It's objective is to develop, conserve, restore and sustainably manage the woodlands and associate natural possessions to make sure sustainability of ecological unit functions, services for current and upcoming generations of the state. following measures and procedures are well thought-out in National Forest Policy which straightforwardly and indirectly not only decrease the drought risk but also help to defend human health, and encourage well lifestyles, guard and raise the role and worth of the soil reserve, preserve and increase species, habitats and biodiversity, and habitat connectivity, avoid corrosion, keep and improve the aquatic environment, contribution to climate change in the area of adjustment and alleviation, secure and increase the nature, diversity and abilities of cultural inheritance countryside and the significant environment through:

- Serious protection and increase of watersheds in highlands, and manage of encroachments.
- Sustainable Management in reticent, secluded, and personal forests tree planting, soil improvements and watershed managing.
- Afforestation campaigns under business social liability to seize green house gas release from the manufacturing processes.
- To encourage restricted grazing, stand feeding and variety improvement.
- To deal with the new responsibilities like climate change, deforestation and forest degradation.
- The preservation and reinstatement of the:
  - highland forests, protected areas, mangrove forests for preservation of their environmental and biodiversity functions;
  - protection and sustainable management of Juniper forests;
  - protection and reinstatement of sub-alpine and high-altitude rangelands and meadows;
  - restoration and management of semi or arid rangelands;
  - Sustainable land management to battle land deprivation and desertification.
- To cheered incentives for farmers to increasing trees on farm plots.

- To encourage linear plantations of trees along canals, infrastructure and railway tracks.
- At least ten percent of control area of fresh canals shall be allocated for raising plantations. Road side plantations of trees shall become an essential part of all the projects of new motorways and motorways.
- District authorities will give due focus on town forestry by their local expansion programs.
- inhabitant tree type will be encouraged, and governments will make sure that extraterrestrial insidious species are not introduced and propagated.

Approximately each and every one objective of the NDMP Plan and national forest policy are coherent and play an important role in drought risk reduction apart from the objective of NDMP plan associated to the structural measure for drought risk reduction can depressingly affect the objective of national forest policy, because construction can cause habitat disintegration, degradation of aquatic environment and increase soil erosion etc. So it is recommended that proper alleviation measure and substitute should be well thought-out in case of any building like dram or bank or dams.

4.6.5 National Rangeland Policy 2010 (draft)

Rangelands comprise natural grass lands, savannas, alpine plants communities, deserts, tundra, costal marshes and wet meadows etc. Over Fifty two million ha land is confidential as rangelands. Out of this eighteen and half million hectors is well thought-out to be fruitful and can be used for grazing. The Vision declaration of National Rangeland Policy is that rangelands of Pakistan are managed to achievable efficiency level, contributing considerably to improve livelihood circumstances of the reliant communities towards development of domestic animals share in national economy as well maintaining environmental functions and extenuating impacts of climate change and loss of biodiversity". The general objective of the state rangelands policy is to restore the ruined rangelands and pastures close to their latent for amplified output enhance their ecological and rigid functions and services, enhanced management preserve rangeland biodiversity as well extenuating the harmful impacts of worldwide through joint and holistic rangeland possessions to make a payment to economy. The policy is dedicated to dispose of the non-palatable and toxic as they are ready to shed the seed, to boost penetration for sustainable water flow and lessen

soil erosion, wildlife management and supervision and the local communities in case of catastrophe will be helped in their coping machinery and survival strategy.

Almost all objectives of the NDMP Plan and national rangeland policy are consistent and play an significant role in drought risk reduction apart from the objective of NDMP Plan linked to the structural quantify for drought risk reduction can harmfully influence the national rangeland policy. So appropriate alleviation measure and option should be well thought-out in case of any building like dam or bank.

4.6.6 National Environmental Policy 2005

The main purpose of the strategy is protection, reinstatement and well-organized supervision of environmental assets. The policy comprises of 6 sections and objectives and almost one hundred and seven rules for environmental issues for only one sector and thirty five for issues of interlinked issues. The policy also provides 6 techniques for achieving the goals and twenty nine guiding principle associated to the instruments. The environmental issues for particular sectors are pollution of fresh water bodies, deficiency of suitable solid waste management, coastal, air, noise, damage of biodiversity, natural disaster deforestation, desertification and climate change are tinted in the policy. So National Environmental Policy 2005 is coherent to NDMP Plan 2012-22 by addressing natural disaster, desertification, deforestation and issues connected to climate change because these issues are straightforwardly and circuitously associated to the causing of droughts in Pakistan.

4.6.7 National Agriculture and Food Security Policy 2013 (Draft)

Policy is devoted to utilization of the source in a efficient and sustainable way, focusing agriculture aids to society and economy for the particular groups. If the aids are given in phrase of free water withdrawal and inexpensive fertilizers than it may reason environmental deprivation in form of the underground water table loss and soil pollution in that order. The NDMP and NDRR policy is loyal for the building of dams to defend flood which can develop the reaction and fertilizer in agriculture and food protection agriculture while subsidy for water can boost the agriculture without any serious environmental problem. wild and free pumping of underground water is ensuing in rapid loss of the underground water table. Agriculture Food Security Policy is wholly missing the incorporation of Disaster Risk Reduction Strategy. Literature review shows that under changing climate conditions, agriculture is a segment which is at high danger. As Pakistan is an agro-based state and serving hand of the national economy is agriculture. The agriculture division contributes about 24

percent to Gross Domestic Product (GDP) and provide jobs to almost 47 percent of the country labor force. The recent disasters of drought (1997 to 2003), the common cyclone and storm, the flash floods of 2001 to 2008 & the super-floods of 2010 to 2014 and the severe heat waves of 2010 and 2015 are some of the indications of serious implications of climate change on Pakistani province. During massive 2010-flood, in addition other compensation, agriculture sector also received marvelous losses to standing crops about 2.3 m hectors. Agriculture is a helping hand of the state economy but at the same time it is highly vulnerable to climate change. Due to change of climate patterns and changes in rainfall, cultivation is at severe risks. Hence, it is a key sector that insist the addition of DRR and effective adaptation approaches to deal with frequent disasters/floods and climate change. Mitigation prudent also there is a considerable "win-win" chance in this sector in terms of protection of precious input such as water and agrochemicals, which can endorse cost savings as well as reduce green house gas emissions.

4.6.8 National Sustainable Development Strategy 2012 (draft)

National Sustainable Development Strategy talks about the developing pleasant-sounding society in the state throughout progression of thrilling and justified economic growth without over-exploitation of usual capital with balanced distribution of growth to all; in precise to the marginalized, underprivileged and susceptible people and to subsequently generations. The focus has been on incorporating not only throughout three general dimensions of sustainable development but also integrating the objectives with the obtainable expansion prototype with the aim of irregular it on to a more sustainable way. The NSDS seats an adaptive system and come within reach of that can answer to developing challenges like climate provoked natural disasters and NDMP. The NSDS defined the three dimensional environmental, social and economic challenges of Pakistan. Environmental sustainability is in the NSDS by unlike strategies to improve air or water quality and pollution in these regions, waste supervision, land and forest deprivation and biodiversity security etc. All the above related to environmental sustainability in NSDS directly and indirectly talk about strategies 2012-22. Reduce the drought risk hence coherent to NDMP Plan 2012-22.

4.6.9 Pakistan Vision 2025

Me Pakistan 2025 vision is to make Pakistan the next Asian Tiger". To become the next Asian Tiger seven priority areas are identified that are:

1. Rising human & social assets. 2. Attaining continued, native & worldwide development; 3. nominated governance, official improvement and upgrading of the public sector; 4. Water, energy and food security; 5. Private sector and private project led development; 6. Developing a spirited knowledge economy through value adding up; 7. Modernizing transportation, infrastructure and greater local connectivity.

The final goal of Pakistan vision 2025 is to make out country in the midst of the ten major economies of the world by the year of 2047. Climate change and disasters are also described in Vision 2025 as in the form of global warming & the C.C; resultant in important and everlasting change in climate patterns is having a stern blow on Pakistan including increased incidence and harshness of usual disasters. This has a straight and main impact on water, energy and food security of the state.

The vision 2025 is devoted to optimize energy generation of oil, gas, hydrological, coal, nuclear, solar, wind and biomass with suggestion to risk evaluation and environmental impact. Functioning the huge potential of Thar coal with 6600 Mega Watts capability is also well thought-out in the vision. The energy production from coal can increase GHGs emission, which can reason climate change, more disasters and droughts in the country therefore indistinct to the NDMP Plan 2012-22 objectives which are devoted to make flexibility in the state against drought. NDMP should be incorporated in the Pakistan vision for reform with special reference to disaster risk reduction.

Activity / Agency	1. Developing a County and Cities Safer from Meteorological Disaster	2.Safety Measures for Important Facilities and Infrastructure	3.Promoting Culture of Disaster Management	4. Disseminating Disaster Management Knowledge and Trainings	5. Improving the Environment of Citizen's Participation in Disaster Prevention Activities	6. Collecting Information and Correspondences	7. Establishing Emergency Response System	8. Rescue/First Aid, Medical Treatment and Fire Extinguish Activities	9. Activities on Emergency Transportation	10. Activities on Evacuation and Accommodations	11. Activities on Procurement and Supply of Food, Water and Daily Commodities	12. Temporary Recovery Activities on Buildings and Utilities	13. Activities on Distributing Appropriate Information to Disaster Victims	14. Activities on Preventing Secondary Disasters	15. Activities on Accepting Foreign Assistance	16. Implementing Disaster Management Drills by the Relevant Agencies of Disaster Management	17. Preparing for Disaster Rehabilitation and Reconstruction
NDMA	•		•	•	•	•	•						•		•	•	•
Ministry of communication		•															
Ministry of Disaster Management	•		•	•	•	•	•						•		•	•	•
Ministry of Foreign Affairs															•		
Ministry of Housing and Works										•		•					
Ministry of Interior								•									
Ministry of Petroleum and Natural Resources														•			
Ministry of Science and Technology																	
Ministry of Water and Power														•			
Federal Flood Commission	•	•															
Space and Upper Atmosphere Research Commission (SUPARCO)	•																
Water and Power Development Authority (WAPDA)	•	•															
Hospitals								•									
Province (F/G/S/PDMAs			•	•	•	•	•	•	•		•	•	•	•	•	•	•
District (DDMA)			•	•	•	•	•	•	•		•	•	•	•	•	•	•
Research Institutes/ Universities																	

• = Major Responsible

Table 4.18 Role & Responsibilities of Related Ministries/Departments in Pre-Disaster for Drought Measurements / Planning

Activity / Agency	1. Measures against Disasters just before Occurrence	2. Securing Information Collection, Dissemination and Communication	3. Securing Emergency Response Operation System,	4. Rescue/ First aid, Medical Treatment, and Fire Extinguish Activities	5. Securing transportation network and function for emergency transportation activities	6. Activities on Evacuation Center	7. Activities on Provision of Food, Water and Daily Commodities	8. Activities on Sanitation, health, Epidemic Prevention , Treatment of Human Remains	9. Activities on Safety Control, and Stabilization of Commodities Price	10. Temporary Recovery Activities on Buildings, Utilities, and Others	11. Activities on Distributing Appropriate Information to Disaster Victims	12.Activities on Preventing Secondary Disasters
NDMA	•	•	•				•			•	•	
Ministry of communication					•					•		
Ministry of Disaster Management	•	•	•				•			•	•	
Ministry of Petroleum and Natural Resources					•							
Ministry of Ports and Shipping												•
Civil Defense & Fire services				•							•	
Federal Flood Commission	•											
Pakistan Armed Forces									•			
Pakistan Meteorological Department	•										•	
Pakistan Railways									•			
Water and Power Development Authority	•											
Landline Telecommunication Companies		•										
Mobile Telecommunications Companies		•										
Province (F/G/S/PDMAs) & District (DDMA)	•	•	•	•	•	•	•	•	•	•	•	•

• = Major Responsible

Table 4.19 Role & Responsibilities of Related Ministries/Departments in Emergency-Disaster for Drought Response

Activity / Agency	1. Deciding Fundamental Orientation of Rehabilitation and Reconstruction	2.Rehabilitating Damaged Facilities	3. Treatment of Debris	4. Formulating Reconstruction Plan	5. Developing Cities Safe from Disasters	6. Assisting Livelihood Restoration of Disaster Victims	7. Assisting Reconstruction of Small and Medium-sized Enterprises and Economic Recovery
NDMA	•	•		•		•	
Ministry of Disaster Management	•	•		•		•	
Ministry of Industries			•				
Province (F/G/S/PDMAs	•	•	•	•	•	•	•
District (DDMA)	•	•	•	•	•	•	•

• = Major Responsible

Table 4.20 Role & Responsibilities of Related Ministries/Departments in post-Disaster for Drought Management / Mitigation

Experts Opinions and Views

1. According to Member NDMA, Pakistan expected to face severe drought around 2025. Pakistan's coastline continuously threatened from 2007 to onward from disaster's like tsunami. From 2010-2015 Pakistan wasted 115 million acre feet water from Kotri Barrage to Arabian Sea. We needs more barrages, reservoirs & dams for water storage so that we will be able to supply more water to drought prone areas. We need water efficient use and conservation technologies from house level to national level for water conversation as we are adopting solar energy system that is good initiate in Pakistan. Comprehension Action Plan is presented for implementation of climate change policy. Pakistan will face severe seismic and hydrological disasters in future as to active fault lines are locating in Pakistan, one in northern areas and second in coastal areas. For rehabilitation and recovery from disasters Disaster Management Fund has been established with the coordination of Asian Development Bank, international donors and government. This fund will be issue for the purpose of disaster risk reduction, capacity building awareness, disaster risk insurance, rehabilitation and reconstruction. MHVR (Multi Hazard Vulnerability and Risk assessment) has been functional in 15 districts and NDMA aimed to extend it to 39 districts till 2018. So NDMA is becoming more efficient day by day and now we are facing disaster more than previous but loss is much less than previous disasters. National Contingency Response Directive has issued responsibilities to all disaster related national/ provincial / local institutes and departments for pre, emergency response, and post disaster conditions. NDMA and PMD will monitor this directive.
2. According to Former Head PMD, due to Paris agreement on climate change it is expected to change world's concern over climate change and we will see till 2020 world will be fully aware with climate change and its impacts. For first time 196 countries agreed on same point as previously Kyoto protocol divided world in to 2 parts one was developed countries and second was under developed countries. Then globally we have faced many negative impacts of this division as many big countries like China, India & Brazil were free from

emission responsibilities. And only developed countries were responsible declared. Now good part of this Paris agreement is all countries declared responsible equally so no one is free from this responsibility. China is now on top in emissions and while other hand Pakistan is in top 10 most vulnerable of climate change due to neighboring countries China and India. World is using two strategies to face climate change 1st is Adaptation and 2nd is Mitigation. So Pakistan's climate change policy of Pakistan has 2 strategies to fight with climate change. 1st Adaptation and 2nd Mitigation. In Adaptation we are focusing on water conservation, rain harvesting, and sustainable irrigation system while in Mitigation we are focusing on energy production in sustainable ways, promoting renewable energy and focusing on energy efficient technologies. As Pakistan is an agricultural country and 65 % population are affiliated with agriculture sector. Major crops of Pakistan are wheat and cotton and these two are threatened by climate change. As we considered climate change as an opportunity so we are focusing on rain harvesting in which we use rain water for crops and it is giving us better output. Deforestation should be stop in every condition otherwise all other strategies will be useless.

3. According to Director Recovery & Rehabilitation NDMA, Drought is slow process and have long term impacts than flood. It will not bad if we say drought is same as flood disaster because we have faced biggest economical and environmental loss due to Tharparkar drought during 2013-2016. Tharparkar is providing 37 % of cattle production when drought came in that areas 20% of cattle production decreased so price increased due to huge loss of economy. So we needs to focus to short period crops and water resistance crops which can bear the shortage of water and continues their growth in less water availability. We need to extend canals and water supply through pipelines and flood water should be management and supply to drought prone areas. For rehabilitation and recovery of people effected from drought we are focusing on job creation in that areas, promoting local handicrafts and making public skillful. 49 districts are facing vulnerability conditions in Pakistan. Overpopulation is also main part of disaster as birth rate in Pakistan is now about 10000/day which is shocking for authorities as we have less resources and much population. For example Quetta is city which was planned for half

million population but now population of Quetta is 2.5 million due to this Quetta is facing severe water shortage issue and this condition remains same then there will be urgent need of biggest migration from Quetta to other cities. In 2010 flood 1/3 of Pakistan was underwater. So there is urgent need of dams and other water reservoirs for water storage. To manage the drought we have to establish National Drought Management Centre same like National Institute of Disaster Management is established and fully active. We are also focusing on Uniform Rate of Compensation (Draft Prepared) through which we are focusing on justice between all disaster effected peoples and will be treat same and equally with minimum same cash amount. NDMA is also focusing and engaging young boys & girl scouts for quick response to disaster and engaging NGO's and institutes for quick recovery. Last year NDMA generates and circulated 5,60,000,00 SMS for pre disaster campaign due to this campaign we have faced less loss than past as peoples were aware. Safe Heaven project are coming soon in every city. Pakistan is on 8th number on disaster prone countries. NDMA is focusing on recovery by Cash Compensation instead of giving other daily routine items. NDMA is basically policy making, coordination and backup support authority. We need to revise National Disaster Management Plan 2012-22 as some disasters like drought are missing or having no clear strategy, for that purpose we are discussing in our meetings. USART Urban Search And Rescue Team has been established and handover to all provincial and federal authorities for quick response and recovery in urban areas.

4. According to Assistant Director PMD/ Meteorologist there is no strategy for drought management in Pakistan. NDMC National Drought Monitoring Centre in Pakistan covering only prediction of drought so there is urgent need of National Drought Management Centre in Pakistan. In NDMP National Disaster Management Plan 2012-22 even did not show the clear vulnerable areas of droughts in map as Sakurdu and other northern areas are shown as drought free in this plan. But in past recent research by NDMC Sakurdu is also vulnerable to drought in low level. Southern part of Sindh province depends on Moonsoon while in Balochistan province eastern part have summer rains and western part have winter rains. So, NDMC monitor the precipitation index and predict for drought. In Punjab southern part is most vulnerable due to dry

atmospheric conditions and less precipitation. Interesting and amazing point is Pothohar region of Punjab is also in drought vulnerable list. Karachi is on 2nd number after Tharparkar in drought vulnerability due water shortage and overpopulation. In Pakistan moonsoon rain gives us 45 % of total rain. The first drought plan (Draft) in Pakistan is prepared by Cholistan Development Authority, Bahawalpur. But this plan is still awaiting for approval. This is valuable achievement and need to extend to all other drought prone districts. Drought in Tharparkar region is caused by mainly the seasonal migration of local people from Indus River to desert side and this is country's biggest seasonal migration and continuously being neglected. Sugar cane crops & Sugar Industry in Southern Punjab and Sindh continuously declining ground water table and causing agent in drought prone areas. As Tharparkar region and interior Sindh depends on rain so NDMC focus to measure precipitation index if rain did not reported till 25th August than NDMC issues alerts for drought in that areas but now NDMC thinking to revise this date till 10th September as rain is noticed around 5th September in Tharparkar.

Conclusion and Recommendation

On the basis of information gathered by visiting relevant organizations/departments, discussions with experts and review of the literature, following conclusions have been drawn:

1. Drought management needs a strategy to mitigate & manage the drought but there is absence of formal strategy for drought management in Pakistan.
2. National Drought Management Centre has been observed in Pakistan while there is lacking to National Drought Management Centre in Pakistan
3. Integrated Drought Management System needs to be established in Country.
4. Lack of awareness regarding drought/ disaster management in drought prone areas.
5. Formal national policy regarding drought preparedness/management is absent which is the main barrier in providing facilitate & relief in drought prone districts.
6. Only National Drought Monitoring Centre is observed while there is a big gap in Implementation of National Disaster Management Plan.
7. The existing system of monitoring drought and its impacts on various sectors needs to improve for more efficient results.
8. Most of the macro projects are ignoring the SEA perspectives of social, economical & environmental.
9. National Disaster Management Fund and National Institute of Disaster Management have been established and actively working.
10. Cholistan Development Authority Bahawalpur prepared a Drought Plan (Draft) recently which is the first formal drought plan of Pakistan and this plan is awaiting for approval.

Recommendations

Natural Drought and other disasters could not be stopped. Each drought /disaster gives us a message to improve our policy, planning & management and taking some precautionary measures to minimize its impacts on future. Following are some recommendations to manage the droughts in Pakistan

1. There is urgent need of drought policy and plan on national, provincial and districts level.

2. It is need of hour of this country to establish National Drought Management Centre to mitigate and recovery from drought.
3. Pakistan Environmental Protection Act 1997 should need to be revise as it does not deal with SEA.
4. Water storage capacity of Dams in Pakistan is much less than the bordering countries like India. Therefore it is compulsory to built large & small dames on urgent bases in catchments areas especially to catch rainfall water during monsoon period and flood water.
5. We have to manage the floods and store the water as our many districts are drought prone.
6. DDMA's are working effectively but need to extent to more districts for more efficiency of Disaster Management.
7. The stored water will guard food security especially fulfill the water necessities of crops in drought period of the country.
8. The storage water will also be supportive in generating hydropower energy which is important requirement of country and reduce the unemployment in the country.
9. National Disaster Management Plan (NDMP 2012-22) needs to be revise as there is no formal strategy for drought management.
10. There is a need to develop regional R&D Program for Drought Mitigation and Water Management through active involvement of international organizations and NARS. It should be aimed at a) sharing and exchange of existing knowledge and information between participating countries, b) studying the policy and institutional aspects under each participating-country National Program and encouraging testing & adoption of successful interventions in the participating countries, and c) Analysis of the impacts of social, economical & political changes on the policies of drought & water management in the region.
11. A drought-mitigation plan is necessary for the drought-prone districts of the Sindh & Baluchistan provinces. This should also include climatic changes impacts on the accessibility of the water resources & to expand coping mechanisms to address the drought impacts. In fact, such a plan has to be integrated in the overall perspective development plan so that all the sectoral

development plans should look into drought-mitigation aspects in their routine development activities.

12. Farmers should be encouraged, motivated and trained in the adoption of efficient water-use technologies such as sprinkler and drip irrigation, laser leveling, raised-bed planting, rainwater harvesting, watercourse lining and water-storage tanks, which have proven successful in different arid environments of Pakistan. Involvement of the private sector in the provision of services to farmers is the only workable option, as the public-sector institutions are not tuned to provide services in this regard.
13. Currently, there is no comprehensive drought-mitigation policy and plan at the federal and provincial levels. Contrary to the well-established flood mitigation with adequate institutional arrangements, the drought-mitigation activities are, by and large, managed on an informal basis. Institutional arrangements and their capacities are insufficient at the federal and provincial levels to effectively launch the early warning systems, preparedness and contingency plans, and rehabilitation measures, while such arrangements are nonexistent at the district level. In fact, this is the weak area in the region as a whole. This justifies a regional initiative to evaluate the existing institutional setup and mechanisms for drought mitigation and build an effective structure and mechanisms, which can be adopted by the countries of the region.
14. To mitigate the drought impacts, it is essential to formulate and adopt a National Drought Policy on a priority basis. The suggested guiding principles for the formulation of the National Drought Policy include the following:

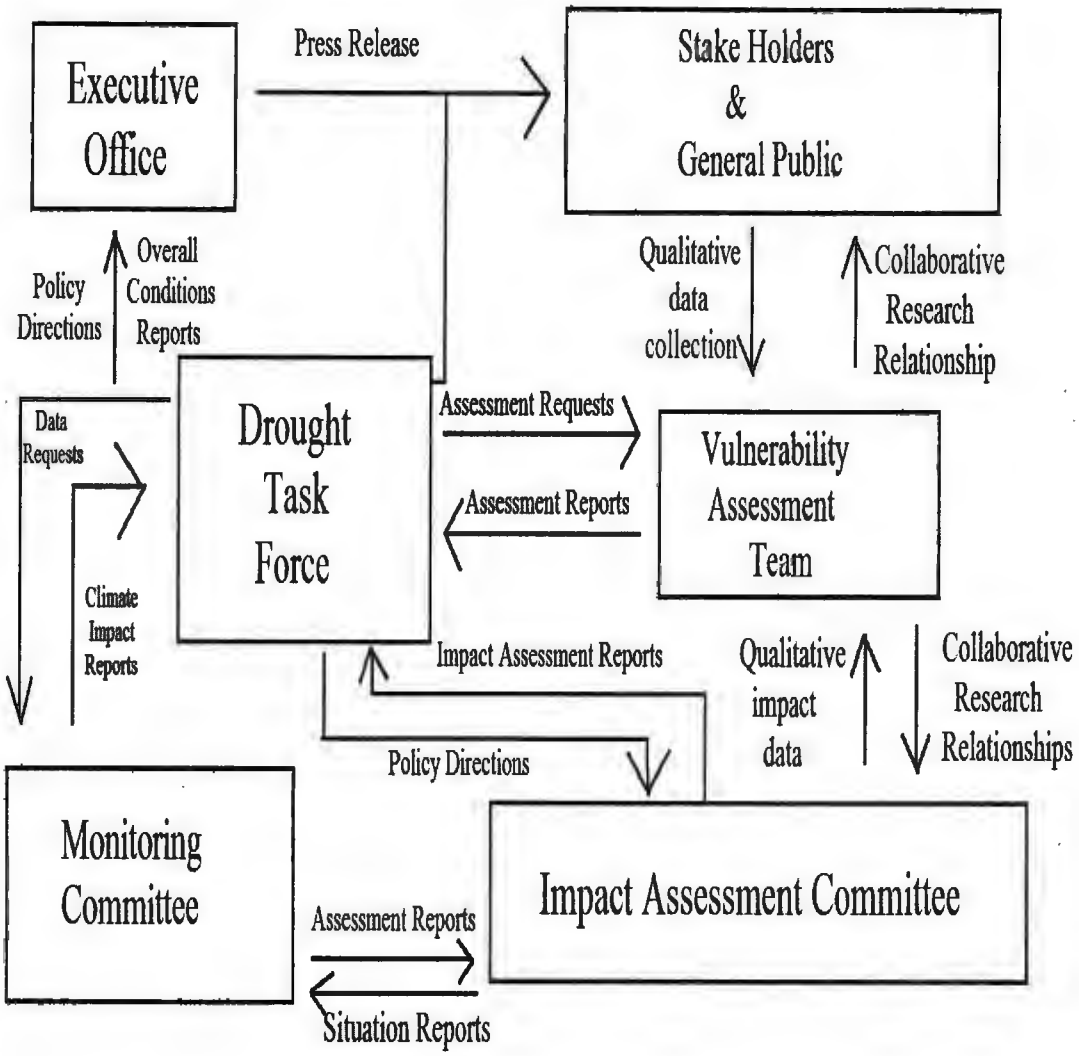
- Manage the activities of the drought-mitigation services at the federal, provincial and district levels.
- Participation of public representatives & the civil society is an essential element of any policy.

15. A consultation and communication strategy should be formulated while developing the National Drought Policy. The purpose is to build understanding and ownership of the Policy by all the stakeholders. Sharing experiences is necessary from countries having similar weather conditions.
16. Preparedness, which includes drought planning, plan implementation, proactive mitigation, risk management, stewardship of resources,

consideration of environmental issues and public education, should be the elements of the new policy. This policy would require a shift from the current emphasis on ad hoc relief measures to the proactive risk management.

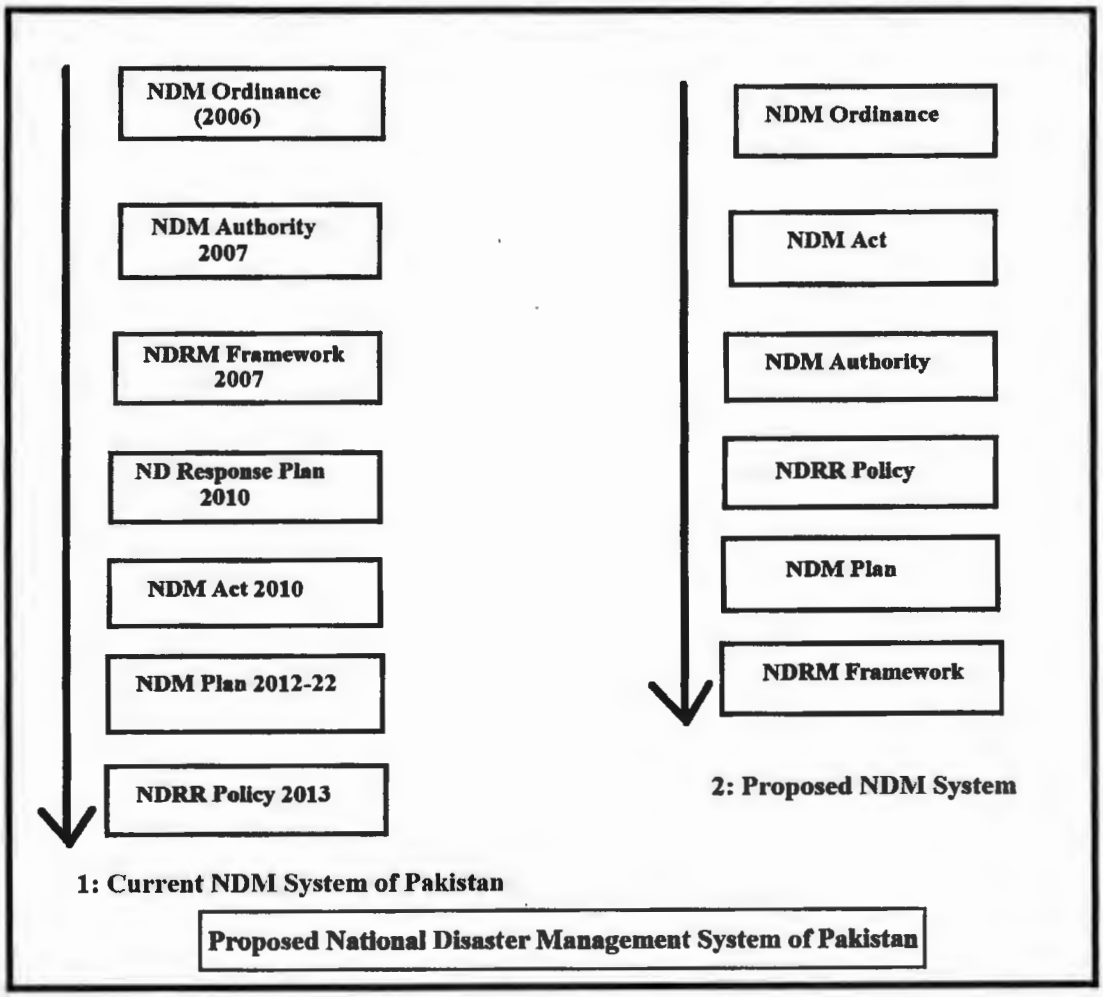
17. For implementation of the National Drought Policy, there is a need to establish an head organization for the planning, coordination & monitoring of the policy interventions at the federal level. This organization may be entrusted with the responsibility for providing an enabling framework to the provincial governments, where they are motivated to establish a similar organizational setup at the provincial levels to provide linkages and coordination among the line departments and the district governments. A consultant input will be required to prepare the outline for the proposed organization at the federal and provincial levels. At the district level, a District Drought Mitigation Committee would be required to implement and monitor the programs as envisaged by the federal and provincial governments.

Fig 4.1 Proposed Organizational Structure of Pakistan for Drought Planning to Improve Vulnerability Assessment



Proposed Organizational Structure of Pakistan for Drought Planning to Improve Vulnerability Assessment.

Fig 4.2 Proposed National Disaster Management System of Pakistan.



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