



Ministry of Climate Change  
Government of Pakistan



# National Action Programme to **COMBAT DESERTIFICATION** in Pakistan



Sustainable Land Management Project II; Funded by GM-UNCCD and GEF, administered by UNDP.

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## Table of Contents

Abbreviations and Acronyms.....	iv
Acknowledgements .....	vi
Executive Summary .....	viii
<b>1. The Narrative .....</b>	<b>1</b>
<b>2. Geography.....</b>	<b>3</b>
<b>3. Physical features .....</b>	<b>4</b>
3.1 The Northern Mountains .....	4
3.2 The North-western Mountains .....	5
3.3 The Balochistan Plateau.....	5
3.4 The Pothowar Plateau .....	5
3.5 The Upper and Lower Indus Plains.....	5
3.6 The Deserts .....	5
3.7. The Coastal Areas .....	6
<b>4. Climate .....</b>	<b>7</b>
4.1 Climatic regions .....	7
4.2 Meteorology.....	8
4.3 Changing pattern of rainfall.....	12
4.4 Future climatic projections .....	13
<b>5. Agro-ecological zones .....</b>	<b>14</b>
5.1 The Indus Delta .....	14
5.2 The Southern Irrigated Plains.....	14
5.3 The Sandy Desert.....	14
5.4 The Northern Irrigated Plains .....	14
5.5 The Barani Lands .....	14
5.6 The Wet Mountains.....	15
5.7 The Northern Dry Mountains.....	15
5.8 The Western Dry Mountains.....	15
5.9 The Dry Western Plateau.....	15
5.10 The Sulaiman Piedmont .....	15
<b>6. Soils of Pakistan.....</b>	<b>16</b>
6.1 Sand Ridges.....	17
6.2 Abandoned Channels.....	17
6.3 Flood Plains.....	17
<b>7. Land capability .....</b>	<b>18</b>
<b>8. Aridity.....</b>	<b>20</b>
<b>9. Land use in Pakistan.....</b>	<b>21</b>
9.1 Area under forests .....	22
9.2 Other land uses .....	22

<b>10. Agricultural setting</b> .....	<b>23</b>
10.1 Land utilization .....	23
<b>11. Desertification – a global phenomenon</b> .....	<b>24</b>
11.1 Challenges of Desertification.....	24
11.2 The Dry lands .....	25
11.3 Causes of Desertification .....	25
11.4 Global status of desertification .....	25
<b>12. Desertification in Pakistan</b> .....	<b>26</b>
12.1 Soil erosion .....	27
12.2 Erosion by wind .....	27
12.3 Erosion by water.....	28
12.4 Salinity and Sodcity .....	29
12.5 Water-logging and Salinity .....	29
12.6 Poor management of surface and groundwater resources .....	30
12.7 Drought and Migration .....	30
12.8 Floods.....	31
12.9 Loss of soil fertility.....	31
12.10 Deforestation .....	32
12.11 Livestock grazing.....	32
12.12 Expansion of high-delta crops .....	32
12.13 Unsustainable harvesting of NTFPs .....	32
12.14 Climate Change.....	33
12.15 Loss of biodiversity .....	33
12.16 Socio-economic constraints & incidence of poverty .....	33
12.17 Warming Pakistan.....	33
12.18 Poverty.....	34
<b>13. Plans/Rules/Acts/ prepared in the past</b> .....	<b>36</b>
13.1 Forestry Sector Master Plan.....	36
13.2 National Conservation Strategy .....	36
13.3 Sarhad Provincial Conservation Strategy.....	37
13.4 Balochistan Conservation Strategy .....	37
13.5 Provincial Forest Resources Inventory .....	37
13.6 Hazara Community Participation Rules .....	37
13.7 The NWFP Forestry Community Acts .....	37
13.8 The NWFP Forest Policy .....	37
13.9 Punjab Forest Policy Statement.....	37
13.10 Draft National Forest Policy.....	37
13.11 NWFP Forest Ordinance.....	38
13.12 Biodiversity Action Plan.....	38
13.13 Ten-year National Perspective Plan .....	38
13.14 Sindh Sustainable Development Strategy.....	38
13.15 National Climate Change Policy.....	39
13.16 Action Plan for the Implementation of National Forest Monitoring System	39
13.17 Pakistan River Act .....	39
13.18 National Forest Policy .....	39

13.19 National Commission on Agriculture.....	40
13.20 The Draft National Food Security and Agricultural Policy.....	40
13.21 Climate Smart Agriculture .....	40
13.22 Livestock Policy.....	41
<b>14. Implementation of previous plans and policies .....</b>	<b>42</b>
14.1 Gaps in capacity.....	42
14.2 Analysis of National Action Programme.....	43
<b>15. National Action Programme, 2000 and Status of Implementation.....</b>	<b>47</b>
15.1 International Protocols .....	47
15.2 Financial Framework .....	47
15.3 Capacity for implementation .....	47
15.4 Pilot Phase Achievements.....	48
15.5 Successes of previous plans complementing UNCCD's objectives.....	50
<b>16. 10-Year Strategic Plan of UNCCD .....</b>	<b>53</b>
16.1 UNCCD 10-Year Strategy.....	54
<b>17. Sustainable Development Goals.....</b>	<b>57</b>
<b>18. Land Degradation Neutrality .....</b>	<b>58</b>
18.1 Monitoring of Land Degradation Neutrality.....	59
<b>19. Institutional Mechanism for NAP Implementation .....</b>	<b>60</b>
19.1 The bottom-up approach .....	61
19.2 Schematics for NAP Implementation .....	63
19.3 Constitution of NCCD.....	65
19.4 The need for Technical & Monitoring Sub-Committee.....	66
19.5 The need for Budget & Finance Sub-Committee.....	68
19.6 Technical Cooperation.....	68
19.7 National Desertification Control Cell .....	69
19.8 National Desertification Control Fund .....	69
19.9 Organizations that may be involved in NAP implementation.....	71
19.10 Stakeholders and their role in NAP implementation .....	74
<b>20. NAP to combat desertification in Pakistan .....</b>	<b>75</b>
20.1 The Vision .....	75
20.2 The Mission .....	75
20.3 The Goal .....	75
20.4 The Purpose .....	75
20.5 The Scope .....	75
20.6 Rationale for combating desertification .....	76
20.7 Programme Objectives, Impacts, Indicators, and Outcomes.....	76
20.8 Integrated Financing Strategy (IFS) to combat desertification in Pakistan..	79
<b>21. Possible projects to be launched under NAP .....</b>	<b>84</b>

## Abbreviations and Acronyms

ADP	Annual Development Programme
AJ&K	Azad Jammu & Kashmir
AZRC	Arid Zone Research Centre, Quetta
AZRI	Arid Zone Research Institute
BARI	Barani Agricultural Research Institute- Chakwal
CBO	Community-Based Organisation
CCD	Convention to Combat Desertification
CDM	Clean Development Mechanism
CDS	Comprehensive Development Strategy
COP	Conference of the Parties
CSO	Civil Society Organizations
DI Khan	Dera Ismail Khan
DLDD	Desertification, Land Degradation and Drought
ESCAP	(United Nations) Economic and Social Commission for Asia and the Pacific
FAO	Food & Agriculture Organization
FCCC	Framework Convention on Climate Change
G-B	Gilgit-Baltistan
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIS	Geographic Information System
GoP	Government of Pakistan
GSICS	Global Change Impact Studies Centre
IPCC	Intergovernmental Panel on Climate Change
LCD	Least Developed Countries
LDN	Land Degradation Neutrality
MDGs	Millennium Development Goals
NAP	National Action Programme
GDP	Gross Domestic Product
IFS	Integrated Financing Strategy
IPCC	Intergovernmental Panel on Climate Change
SO	Strategic Objectives
ICARDA	International Center for Agricultural Research in Dry Areas
IGF	Inspector General of Forests
IUCN	International Union for Conservation of Nature
KP	Khyber Pakhtunkhwa (Province)
M&E	Monitoring and Evaluation
MDGs	Millennium Development Goals
MoCC	Ministry of Climate Change
MoE	Ministry of Environment

MELG&RD	Ministry of Environment, Local Government and Rural Development
MTDF	Medium-Term Development Framework
NAP	National Action Programme
NCA	National Commission on Agriculture
NDCU	National Desertification Control Unit
NFP	National Focal Person
NGO	Non-Governmental Organization
NPC	National Programme Coordinator
NPD	National Programme Director
NRM	Natural Resource Management
NRSP	National Rural Support Programme
NTFP	Non-Timber Forest Products
NWFP	North-West Frontier Province
P&DD	Planning and Development Department
PARC	Pakistan Agriculture Research Centre
PCCCD	Provincial Coordination Committee to Combat Desertification
PCRWR	Pakistan Council of Research on Water Resources
PCU	Provincial Coordination Unit
PDWP	Provincial Development Working Party
PFI	Pakistan Forest Institute
PFRI	Punjab Forestry Research Institute- Faisalabad
PPAF	Pakistan Poverty Alleviation Fund
PPD	Provincial Programme Director
PSDP	Public Sector Development Programme
RRI	Range Research Institute
RS	Remote Sensing
SADP	Southern Area Development Project
SAWCRI	Soil and Water Conservation Research Institute- Chakwal
SDG	Sustainable Development Goals
SLM	Sustainable Land Management
SLMP	Sustainable Land Management Programme
UNCCD	United Nations Convention to Combat Desertification and Drought
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VDO	Village Development Organization
VO	Village Organization
WO	Women Organization
WAPDA	Water and Power Development Authority
WWF-P	World Wide Fund for Nature-Pakistan
WSSD	World Summit on Sustainable Development

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The process involved engaging key stakeholders at the federal and provincial levels. Through an interactive process along with the capacity building initiatives, the Provincial Action Plans were developed for the four provinces, AJK and Gilgit Baltistan. The provincial documents then contributed to compile the National Action Programme. A detailed implementation mechanism for the NAP and PAP documents was discussed during various meetings and documented. Terms of reference for the Provincial and National Coordination Committees were updated to ensure the ownership and implementation of NAP and PAP documents.

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## Executive Summary

Having majestic mountain ranges of the Himalayas, the Karakorum and the Hindukush, the exquisite intern-mountain valleys, the vast and rich irrigated expanse, the stark deserts and the impressively rock vastness, Pakistan can rightly boast to have a diversified landscape.

Pakistan has great climatic diversity due to variation in topography, altitude, and seasons. Four distinct seasons are recognized: cold winter from December to February; spring season from March to May; hot and rainy summer from May to August; and autumn beginning from late September until frost at the onset of winter.

The soils of Pakistan are derived from two types of parent materials: 1) Alluvium, loess and wind-reworked sands; and 2) Residual material obtained from weathering of underlying rocks. Most of the rocks are calcareous while in valleys like Swat, volcanic rocks have produced non-calcareous soil material, mostly non-saline. Aridity prevailing over the major part is the main climatic characteristic that affects the soils.

Most of the land in Pakistan falls in two capability classes – Class VII (24.3%) and Class VIII (46.7%), both when combined, come to approximately 71%. Soil Class VII consists of poor forests and rangeland soils while Class VIII soils are unfit for agricultural purposes. This leads to the conclusion that about three-fourth of the soils of Pakistan is unfit for agriculture, forests, even rangelands.

Due to rapid growth of population, massive deforestation and anthropogenic activities, noticeable change in climate conditions have appeared. Increased aridity is a growing environmental problem of agricultural countries like Pakistan. It is, therefore, essential to assess and monitor aridity to combat the problems of land degradation, drought, and desertification. Identification of arid and semi-arid regions on climatic basis is the first essential step in any project of land reclamation for agricultural and other purposes.

Land use classification of Pakistan includes forest cover which is less than 5%. Agricultural land including irrigated, rain fed and Rodh Kohi agriculture is about 20%; excluding the fallow lands covering about 10% area of country. Rangelands cover over 27% of the area, while rock outcrops occupy another quarter of the country and snow/glacier coverage is about 2%. Deserts cover about 10% area and other uses including built-up area, waterlogged and saline lands and water bodies together account for a little more than 1%.

### **Desertification – a Global Perspective**

According to UNEP, about 70% of dry lands used for agriculture worldwide have been degraded with the result that desertification and land degradation

now affects almost 30% of land area of the world and one-sixth of the world's population. About 22% of Asia's dry lands and 15% of its other land area is affected by desertification and land degradation.

At the global level, more than 100 countries of the world including Pakistan are affected by desertification and are faced with problems of environmental degradation, loss of soil fertility, loss of biodiversity and reduced land productivity resulting in increased poverty of local communities.

### **Desertification in Pakistan**

Like many other developing countries, Pakistan is also severely affected by desertification and land degradation. Pakistan is predominantly a dry-land country where 80 percent of its land area is arid or semi-arid while two-third of its population depends on dry-lands for livelihoods mainly through agro-pastoral activities.

A variety of natural and human factors are contributing to desertification, including drought, overgrazing, overexploitation of land and water resources, over cultivation of marginal lands, deforestation, soil erosion, water logging and salinity and the use of inappropriate agricultural technologies such as excessive use of chemicals and irrigation water. Consequences of this being: abandoned croplands affected by waterlogging and salinity; abandoned villages; traditional irrigation systems and croplands desertified by deteriorated groundwater aquifers or lowering of water table; siltation of rivers, irrigation systems and reservoirs; and landslides in hilly areas. Desertification leads to losses in agricultural productivity and exacerbates poverty. It also causes significant reductions in carbon storage in soils, contributing to global warming and loss of biodiversity.

Various approaches have been attempted to combat the menace of desertification, for example, introduction of fast-growing tree species and grasses for stabilization of shifting sand dunes and creation of microclimates

through shelterbelt plantation. For sustainable land management (SLM), soil and water conservation, afforestation and rehabilitation of degraded land, repetitive high resolution satellite images, delineation and mapping of affected areas, are suitable tools for combating desertification. Efforts already underway to combat desertification need to be strengthened and integrated through a nationally supported, coordinated and monitored management system.

Recognizing the seriousness of the problem, the UNIP came up with the United Nations Convention to Combat Desertification (UNCCD). The Convention was opened for signatures in 1994 and Pakistan signed it in the same year (1994) and ratified in 1997. It urges the signatories to prepare and implement national action programmes, building on the existing relevant programmes, to combat desertification and mitigate the effects of drought.

Being a predominantly arid to semi-arid country and having an area of 68 million hectares where annual rainfall is rarely more than 300 mm, Pakistan developed its first National Action Programme (NAP) to combat desertification in 2002, in line with the UNCCD objectives. The programme was launched with the financial and technical support of United Nations Environment Programme (UNEP) and Economic and Social Commission for Asia and the Pacific (ESCAP). It calls for a systematic and comprehensive area development, bottom-up approach for sustainable management of natural resources to combat desertification and halt land degradation.

In this regard, certain major policy documents that have been prepared in the past for the improvement of environment, include Forestry Sector Master Plan (1992); National Conservation Strategy (1992); Sarhad Provincial Conservation Strategy (1996); Balochistan Conservation Strategy (2007); Provincial Forest Resource Inventory; Hazara Community Participation Rules (1996); The NWFP Forestry Commission Act (1999); The NWFP Forest Policy (1999); Punjab Forest Policy Statement (1999); Draft National

Forest Policy (2001); NWFP Forest Ordinance (2002); Biodiversity Action Plan (1999); Ten-year National Perspective Plan 2001-2011; Sindh Sustainable Development Strategy (2007); National Climate Change Policy (2012); Action Plan for the Implementation of National Forest Monitoring System (2015); Pakistan River Act, 2016 (Draft); and National Forest Policy, 2015 (Draft). On the agriculture side some of the policy documents include National Commission on Agriculture (NCA) 1988; The Draft National Food Security and Agriculture Policy 2013; Climate Smart Agriculture; and Livestock Policy.

After the implementation of 18th Amendment, the devolved Ministry of Environment (MoE) remained far below the targeted objectives because of a number of shortcomings, for example: (a) it could not establish an effective coordination mechanism for the implementation of NAP; (b) it remained inconsistent in its implementation strategy; (c) it could not develop coordination among various concerned institutions and organizations; (d) could not develop and implement any projects or programmes; (e) it adopted an ad-hoc approach; and (f) it could not appoint a National Focal Person (NFP) to coordinate the implementation of the provisions of NAP.

### **Analysis of National Action Programme**

The overall implementation of NAP was weak and as a consequence, its objectives, through half-hearted implementation, could not be achieved as envisaged. Major factors regarding ineffective implementation of NAP included:

- Failure to establish National Desertification Control Unit (NDCU) at federal and provincial levels, resulting in weak coordination among various organizations involved in executing NAP-related activities.
- Absence or weak capacity of federal and provincial focal organizations to coordinate planning, formulation, and implementation of projects addressing NAP-related activities.
- Though thrice reconstituted, the NCCD has remained almost non-functional in its tasks to

oversee, guide and review the NAP implementation.

- Weak departmental capacity to develop and implement projects related to desertification and land degradation.
- No procedure adopted to perform periodic assessment of resources
- Lack of the use of latest assessment tools, for example GIS-based maps
- Non-inclusion of SLM, at least as an elective subject, at higher secondary school level
- Non-availability of land use policy and plans at national and provincial levels

Nevertheless, a number of projects related to desertification and land degradation under the federal and provincial Public Sector Development Programme (PSDP) and Annual Development Programme (ADP) have been implemented during the last decade.

### **National Action Programme - 2002 and its Implementation status**

Pakistan has committed towards conservation of environment and natural resources by signing and ratifying a number of international environmental agreements and protocols. It is party to conventions on biodiversity; climate change; desertification; endangered species; hazardous waste; wetlands; etc. At the national level, many laws and legislations pertinent to the environment have been formulated and approved by the Federal and provincial governments.

To implement various programmes under NAP, Rs.27.62 million for Pilot Phase (January 2009-June 2012); Rs.20.83 million for Bridging Period (July 2012-December 2013); and Rs.317.58 million for Upscaling Phase (July 2015-June 2020) were allocated. Allocations were made to carry out technical interventions for natural resource management in seven land resource regions of Pakistan: (i) Northern Mountains; (ii) Barani Lands; (iii) Irrigated Plains; (iv) Sandy Deserts; (v) Suleiman Rodh Kohi irrigation system; (vi) Western Dry Mountains; and (vii) Coastal Areas. Allocations were also made for

human resource development; assessment and monitoring of desertification; strengthening meteorological network for monitoring; early warning system; and strengthening research capabilities for the improvement of arid lands.

Some of the prominent successes achieved during the implementation of pilot phase of NAP included: Range Utilization Model in Pothwar Plateau; Gully land management through soil conservation and water harvesting; Range improvement through community participation; Salinity control and reclamation of affected areas; Rehabilitation of desert ranges through reseeding; Forage reserve establishment in arid highlands of Balochistan; Reclamation of salt-affected areas; Desertification control in Cholistan desert; and Restoration of land productivity in Barani lands.

### **Institutional Mechanism for NAP Implementation**

Before the initiation of NAP, all the institutions at national, provincial, district, local and grass-root levels were already providing services for increasing productivity of lands and halting the process of land degradation. However, all of their efforts were implemented as “stand alone”- in isolation from others. Major reason for lack of coordination was that the “National Desertification Control Cell” was not established at the federal and the provincial levels.

From 2002 onwards, a new trend has evolved of ensuring consultations between different stakeholders and promoting joint initiatives for combating desertification. Within a few years, these institutions started frequently interacting and fast assuming the form and role of a national network on UNCCD.

Implementation of NAP requires inter-agency cooperation for joint programming, planning and in some cases, joint implementation and day-to-day operational coordination to achieve its objectives. For example, range improvement, development, and management cannot be carried

out without joint programming by Forest, Livestock, Agriculture and Soil Conservation departments besides the active involvement of herders and community-based organizations. Hence, a strong coordination between the departments /agencies to implement joint NAP-related programmes is required.

### **The Bottom-up Approach**

When local stakeholders participate in decision-making and prioritization, it leads to a bottom-up approach. To achieve better results, however, the bottom-up approach should not be used as an alternative to top-down approach, but rather to complement it. As such, strategies based on bottom-up approach should be designed and implemented in the way best adapted to the needs of the stakeholder communities. The most prudent way to do so would be to invite them to actively participate in the development. This becomes all the more important in places where there are structural problems in agriculture, forestry, environment and, livestock management. Needless to say, that the involvement of local population should be done through their Community-based Organizations (CBOs), Women Organizations (WOs), Civil Society Organizations (CSOs), economic and social interest groups (NGOs), local government representatives, etc. It may, however, be ensured that capacity-building is made an essential component of the bottom-up approach, involving:

- awareness raising, training, participation, and mobilization of community to identify the strengths and weaknesses of the concerned area;
- participation of different interest groups in drawing up a local development strategy; and
- establishment of criteria for selection of appropriate actions (projects) to deliver in accordance with the strategized priorities

Any interventions to be initiated in the rural areas under NAP should be harmonized in the local socio-cultural context following the bottom-up approach.



## 1 The Narrative

With a variety of landscapes, Pakistan has a diversified topography including the majestic high mountain ranges of the Himalayas, the Karakoram and the Hindu Kush having snow-covered peaks, and glaciers. Then it has valleys in the north, vast rich irrigated plains in the south – the Indus Basin – and finally, the stark deserts and impressively rugged rocky expanse of plateaus in the south-west of Balochistan.

The country is characterized by a continental type of climate, which is arid and semi-arid. There is an extreme variation in temperature depending on the topography of the country, which experiences an overall deficiency in rainfall. One fourth of the country's land area, which is suitable for agriculture, is seriously subjected to wind and water erosion, salinity/sodicity, water logging, flooding and loss of organic matter. Watersheds in upper Indus and its tributaries suffer from unfavorable soil and moisture regimes. Accelerated surface erosion due to deforestation in the catchments is reducing the life of Tarbela and Mangla reservoirs that provide water for 90% of food and fibre production.

Outside the Indus basin, water mining without groundwater recharge has resulted in a sharp decline in water availability in areas like Balochistan. Over-harvesting and misuse of rangelands extending over vast areas is seriously constraining livestock production, thus adversely affecting the livelihood of pastoral communities. Then there are the coastal strips and mangrove areas that are again under increased environmental stress from reduced freshwater flows, increased sewage and industrial pollution in addition to over-harvesting of other natural resources. The accelerating rate of land degradation in the fragile ecosystems like sandy deserts, Rodh Kohi, and coastal areas is rendering many areas unproductive and is threatening the agricultural economy of the country.

Desertification is triggered by environmental and climatic factors and anthropogenic activities that ultimately give rise to increased poverty of local communities. The United Nations Convention to Combat Desertification (UNCCD) demands from the signatories to develop and implement relevant action programmes to address the menace of desertification and land degradation. Such programmes shall be updated through the participatory process on the basis of lesson learned and results of research and be closely interlinked with other national policies and plans for sustainable development.

The Convention emphasizes the national action programmes to identify factors contributing to desertification, measures necessary to combat desertification and mitigate the effects of drought. It also specifies the roles of governments, local communities and land users, incorporates long-term strategies to combat desertification, and integrates it with national policies for sustainable development. The Convention expects the signatories to allow modification in the approaches to changing circumstances and remain flexible to cope with different socio-economic, biological and geo-physical conditions. Particular attention is expected from the signatories to adopt preventive measures for lands not yet degraded, enhance national climatological, meteorological and hydrological capabilities, provide for early warning system, develop institutional framework for implementation and coordination, and to provide effective participation at the local, national and regional level of NGOs and local populations, both women and men, particularly farmers and pastoralists.

Pakistan being a water scarce country has serious issues of desertification whereby three-fourth area of the country is either arid or semi-arid where annual average rainfall hardly reaches 300 mm. With this justification, Pakistan resolved to develop a programme in line with the UNCCD directives. Keeping in view the growing problems of desertification and land degradation, the need to address the twin menace was seriously felt. As a result, the National Action Programme (NAP) to combat desertification in Pakistan was prepared with the financial and technical support of United Nations Environment Programme (UNEP) and

Economic and Social Commission for Asia and the Pacific (ESCAP).

Pakistan Agricultural Research Council (PARC) through its Range Research Institute (RRI) was entrusted to develop NAP for Pakistan. A multi-disciplinary team comprising experts from various relevant disciplines drafted the NAP after a series of discussions and consultations with UNIP/ESCAP, relevant federal and provincial agencies and NGOs. First draft of NAP was discussed in a national workshop organized jointly by Pakistan Agricultural Research Centre (PARC) and Rice Research Institute (RRI) and attended by all the relevant organizations. Recommendations of the workshop were incorporated in the draft and submitted to the then Ministry of Environment, Local Government and Rural Development (MELG&RD). The draft was again discussed in a national seminar organized by the Ministry that proposed certain suggestions according to the changing environment and ecological scenarios which were subsequently incorporated in NAP. The second draft was circulated to more than 60 relevant organizations for views and comments in writing. The written input received was again incorporated in the third draft which was sent to the MELG&RD in January 2001. The draft was finalized in line with the UNCCD guidelines

The National Action Programme calls for a systematic and comprehensive area development approach with people's participation at grassroots level with a bottom-up mechanism for sustainable management of natural resources especially in fragile ecosystems so as to combat desertification and halt land degradation.



## 2 Geography

The geography of Pakistan is a profound blend of landscapes varying from plains to deserts, forests, hills, and plateaus and ranging from the coastal areas of the Arabian sea in the south to the mountains of the Karakoram range in the north. Pakistan geologically overlaps both with the Indian and the Eurasian tectonic plates where Sindh and Punjab provinces lie on the north-western corner of the Indian plate while Balochistan and most of the Khyber Pakhtunkhwa lies within the Eurasian plate comprising the Iranian Plateau. Gilgit-Baltistan and Azad Kashmir lie mainly in Central Asia along the edge of the Indian plate and hence are more prone to violent earthquakes where the two tectonic plates collide.

## 3 Physical Features

Pakistan is a land of many splendors. The scenery changes ranging from high mountains interspersed with breathtaking lush green valleys, snow-clad mountains and gigantic glaciers in the north to sandy deserts, vast plateaus, and fertile plains formed by soft and rich soil brought by rivers in the middle, and coastal beaches and lagoons in the south. The variety of landscapes in Pakistan can be divided into seven major natural regions:

- 1) The Northern Mountains;
- 2) The North-western Mountains;
- 3) The Balochistan Plateau;
- 4) The Pothwar Plateau and Salt Range;
- 5) The Upper and Lower Indus Plains
- 6) The Deserts; and
- 7) The Coastal Area

### 3.1 The Northern Mountains

The Himalayas run across 2,500 km from east to west, and form a significant part of the mountain range in Pakistan. The range comprises of the Siwaliks (600-1800m), the Pir Panjal Range/The Lesser or Outer Himalayas (1,800-4,500m), and the Central Himalayas (over 4,500m). The Pir Panjal Range is where some of the more popular hill stations like Murree and Bhurban are located. Topography of the Himalayas consists of snowcapped peaks with valleys rich in natural vegetation. The highest peak of this range in Pakistan is the Nanga Parbat (8,126m).

The Karakoram mountain range has an average height of 6,000m and is located above the Central Himalayas. The highest peak of the Karakoram range in Pakistan is the Mount Godwin Austin (K-2) which stands at 8,610m. The Karakoram mountains are very inhospitable and the population in these mountains is very sporadic where a nomadic lifestyle is seen. Some agriculture is practiced in the valleys, but mostly, the Karakoram range comprises steep peaks, and narrow valleys often with a fast flowing river taking up most of the space. The Karakoram Highway that links Pakistan with China has been a major development in the Range.

The Hindu Kush mountain range runs from north-to-south and is located in the region where the border of Pakistan meets the borders of Afghanistan and China. Topography of the Range is similar to the Karakoram range. Hindu Kush is famous for mountain peaks like Tirich Mir (7,708m). The Hindu Kush

Range boasts a special culture because many of the greatest invaders (Alexander the Great, Mahmud of Ghazni, etc.) had crossed the mountain passes of the Hindu Kush.

### 3.2 The North-western Mountains

The northwestern ranges of our country are also known as western branches of the Himalayas mountains consisting of a series of parallel ranges, though lower in altitude than the northeastern mountains. As most of these ranges lie outside the course of summer monsoons coming from Arabian Sea, the rainfall is low and mountains are almost bare of natural vegetation. These mountains act as a boundary between Afghanistan, Iran and Pakistan.

### 3.3 The Balochistan Plateau

It is a vast plateau in the west of Kirthar and Sulaiman mountains with an average height of 600 to 900 metres. Mountains in the northeastern Balochistan are higher on the south than those on the west side. It is also dry plateau and its Toba Kakar and Xhagai ranges separate it from Afghanistan. To its north-western side, lies the Kharan desert. There are many temporary lakes in this sandy area that have water only in the rainy season otherwise they remain dry and are called 'Hamuns'. Its climate is severely cold in winters and extremely hot in summers, except in the mountainous areas.

### 3.4 The Pothowar Plateau

It is a plateau in northeastern Pakistan, forming the northern part of Punjab. It borders the western parts of Azad Kashmir and the southern parts of Khyber Pakhtunkhwa (KP). The region was once the home of the ancient Soanian culture, which is evidenced by the discovery of fossils, tools, coins, and remains of ancient archaeological sites.

Most of the hills and rivers in the Plateau are bordered by dissected ravine belts. The streams, due to constant rejuvenation, are deep set and of little use for irrigation. Agriculture is dependent

largely on rainfall, which averages 380 to 510 mm annually; rainfall is greatest in the northwest and declines to arid conditions in the southwest.

### 3.5 The Upper and Lower Indus Plains

In the upper plains of Indus, rivers Indus, Sutlej, Chenab and Jhelum flow. This range is spread from the Himalayas and the south of Salt Mountain and Solomon Mountain to Arabian Sea in the east of Khet Kher. Its upper plains are very fertile due to the existence of many rivers. Although all the food crops are grown here but wheat and rice amongst the food crops and cotton amongst the cash crops are the main crops. The lower plain of Indus is composed of Sindh in the south, Kirthar range in the west while the desert of Rajasthan is spread in the east.

### 3.6 The Deserts

Pakistan hosts four major deserts: Tha, Cholistan; Thal and Kharan Desert

#### 3.6.1 The Thar Desert

It is a large arid region with an area of 320,000 km<sup>2</sup> and 90% of it lies in India. It covers eastern Sindh and the southeastern portion of the Punjab Province. It is bounded on the northwest by the Sutlej River, on the east by the Aravalli Range, on the south by the salt marsh known as the Rann of Kutch (parts of which are sometimes included in the Thar), and on the west by the Indus River. Its boundary to the large thorny steppe to the north is ill-defined.

#### 3.6.2 The Cholistan Desert

The word Cholistan is derived from the Turkish word Chol, which means Desert. Cholistan thus means Land of the Desert. It is spaced over a vast area of 26,300 km<sup>2</sup>. The people of Cholistan lead a semi-nomadic life, moving from one place to another in search of water and fodder for their animals. The dry bed of the Hakra River runs through the area, along which many settlements of the Indus Valley Civilization have been found.

### 3.6.3 The Thal Desert

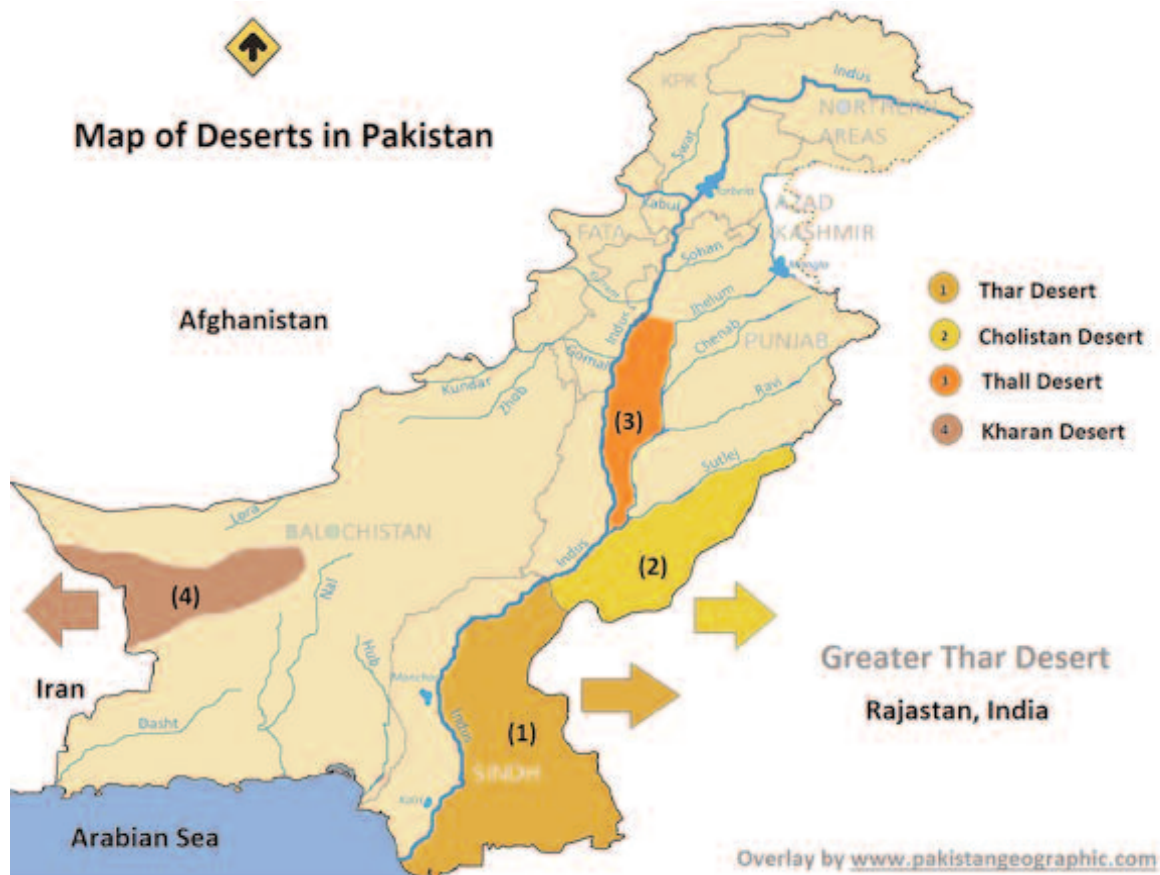
It is situated in Punjab and covers a vast area covering 20,900 km<sup>2</sup>. It is mainly located between the Jhelum and Sindh rivers near the Pothohar Plateau. Its total length from north to south is about 300km, and its maximum breadth is 110km. Geographically, it resembles the deserts of Cholistan and Thar.

### 3.6.4 The Kharan Desert

This is also called the 'Sandy Desert' and is located in the Province of Balochistan. It covers an area of about 48,000 km<sup>2</sup>. It is basically covered with sand dunes, scrub vegetation and weathered rocks. Rainfall is very scarce leaving it with dry lakes. The largest dry lake of Balochistan is located in this desert called Hamun-i-Mashkel (seasonal desert lakes or marshlands). The water of Kharan basin is entirely used for agriculture and domestic use and thus it is also called 'closed basin'.

### 3.7. The Coastal Areas

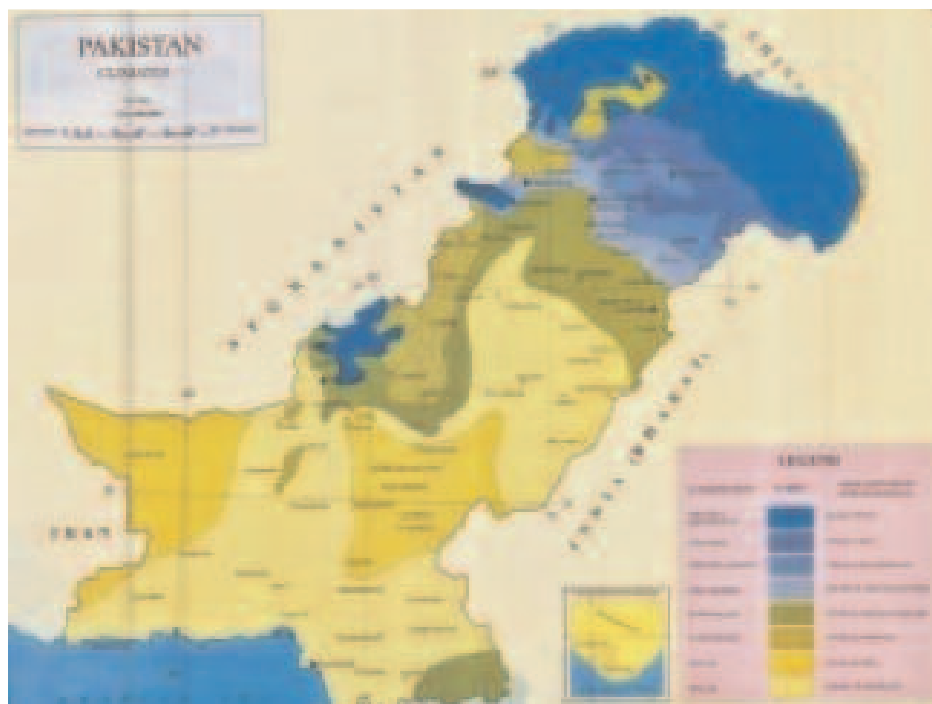
The Sindh coastal region is located in the southeastern part of the country between the Indus border along the Sir Creek on the east, and the Hub River along the Balochistan coast on the west. This coastal region is about 350 km long and can be divided into the Indus Delta/Creek and Karachi coast.



## 4 Climate

Pakistan has great climatic diversity due to variation in topography, altitude, and season. Most of the rangelands of Pakistan are in arid and semi-arid zones characterized by low precipitation, extremes of temperature and low humidity. Moreover, droughts also occur frequently in these areas which exacerbate the effects of overgrazing resulting in complete and permanent loss of some species of vegetation.

The northern areas of Pakistan are located out of the monsoon rain shadow. The natural environment is harsh, arid with alternating temperatures which are low in winter and high in summer.



### 4.1 Climatic Regions

Following are the five major climatic regions of Pakistan:

#### 4.1.1 Arid and Hyper Arid Regions

A large area of Pakistan possesses this type of climate and constitutes a major climatic region. The rainfall in these regions is less than about 250 mm. An area is considered arid on the basis of the amount of rainfall it receives, irrespective of how much ground water is available. Examples are Layyah,

Muzaffargarh, Mianwali, Lodhran, Vehari, Larkana, Hyderabad, Bannu etc.

Then there is another climate falling in this category which is even more extreme than the arid. It is the hyper arid climate characterized by less than 150 mm of annual rainfall that may also be called as desert climate. Deserts make a large share in the climatic regions of Pakistan. Pakistan has some great desert areas. These include Thar desert in Sindh, Cholistan in Punjab, Bahawalpur, Rahim Yar Khan, Jacobabad and central parts of Northern Areas.

#### 4.1.2 Semi-Arid Regions

Semi-Arid regions receive greater amount of rainfall than arid areas. The annual precipitation here is 250-500 mm. A large amount of area of our country is under this climate. Some cities with this type of climate are Faisalabad, Gujranwala, Lahore, Sargodha, Sheikhupura, Peshawar, Mardan, Central and North Western Dir, Kohat, etc.

#### 4.1.3 Sub-Humid Regions

There is abundant rainfall in these areas and most of the agriculture is possible without irrigation. These areas receive rainfall of about 500-1000 mm annually and sometimes more than 1000 mm. Examples of such areas are Rawalpindi, Islamabad, Chakwal, Sialkot, Abbottabad, Attock, Jhelum, Parachinar.

The areas like Gilgit, Baltistan in north possess very cool sub-humid and arid climate since rainfall is not much there and intense cold prevails during most of the year.

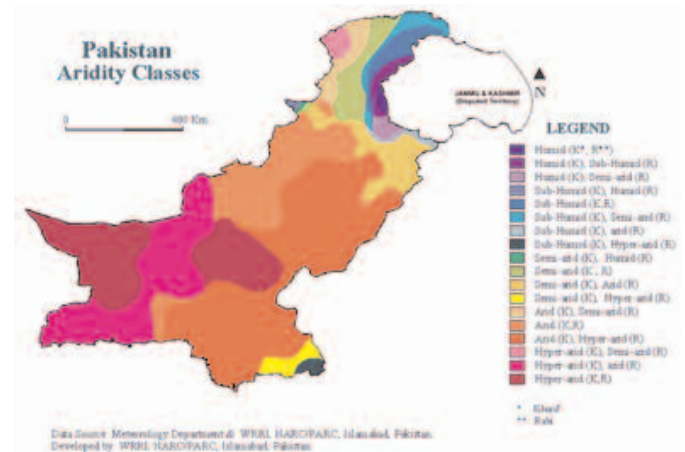
#### 4.1.4 Humid Regions

The North-east mountainous and sub-mountainous areas fall in this category. The rainfall here is very high. Among all the climatic regions of Pakistan, these areas receive the highest rainfall. Usually these areas receive more than 1700 mm of rainfall annually, a major share of which is in monsoon (1000 mm). Cities of Swat, Murree and upper Hazara division come

under such climate. The winters are extremely cold here.

#### 4.1.5 Sub-tropical Regions

The sub-tropical regions are present in the North-west of Pakistan. The rainfall average in summer is 95mm and in winter it is 63-95 mm. Examples of sub-tropical climate are the cities of Quetta and Kalat



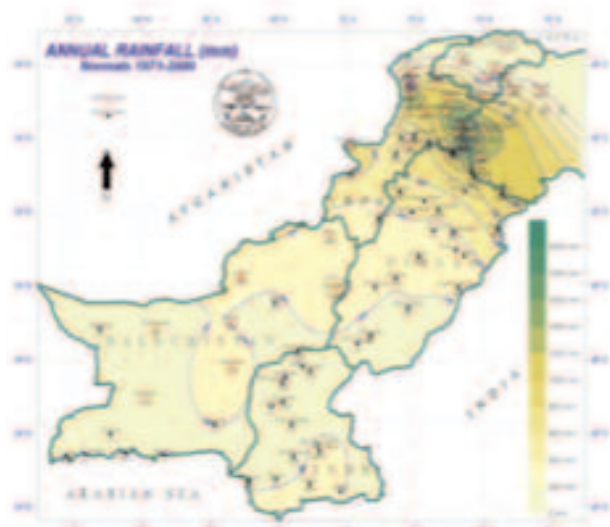
More than three-fourths of the area of Pakistan lies in semi-arid (in southern KP, Punjab and Sindh) to hyper arid in Sindh and Balochistan.

## 4.2 Meteorology

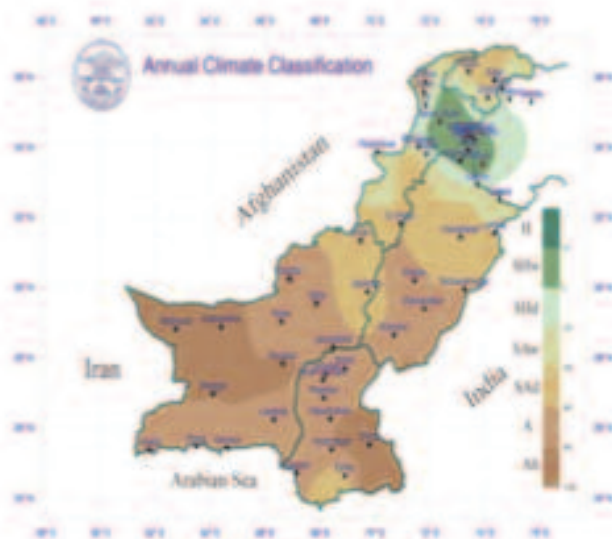
Pakistan receives monsoon rainfall in summer and in winter it receives rainfall due to western systems. Most of the country is arid to semi-arid except southern slopes of Himalayas and sub Mountain region where the annual rainfall ranges from 760mm to 2,000mm. The Balochistan province is the driest part which receives 210mm on the average. Three-fourth part of the country receives rainfall less than 250mm and 20% of it receives up to 125mm. Normal annual rainfall is displayed in Fig. A. Pakistan has four well marked seasons: Cold, from November to February; Pre-monsoon (Hot), from March to mid of June; Monsoon, from mid of June to mid of September; Post-monsoon, from mid of September to October. Summer season is extremely hot and the relative humidity ranges from 25% to 50%. Day-time temperature in this season remains 40°C and beyond in plain areas. The average

temperatures in winter range from 4oC to 20oC. Mercury sometimes falls well below freezing point in Northern parts of the country. Normal Annual Maximum and Minimum Temperatures are shown in Figs. C & D respectively. Fig. B shows the annual climate classifications on the basis of

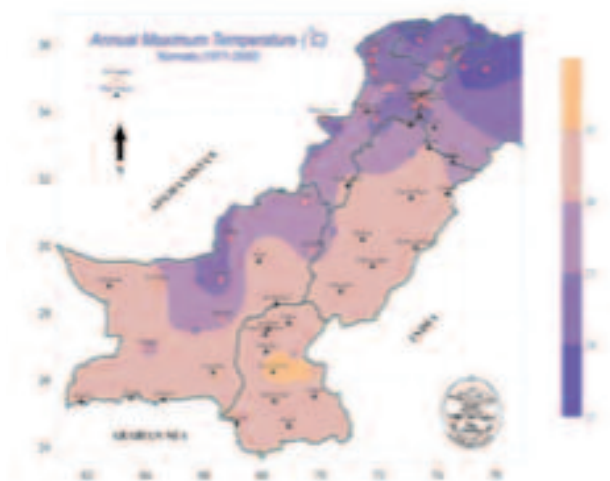
evapotranspiration. The major part of Pakistan is arid to semi-arid with large spatial variability in the temperature.



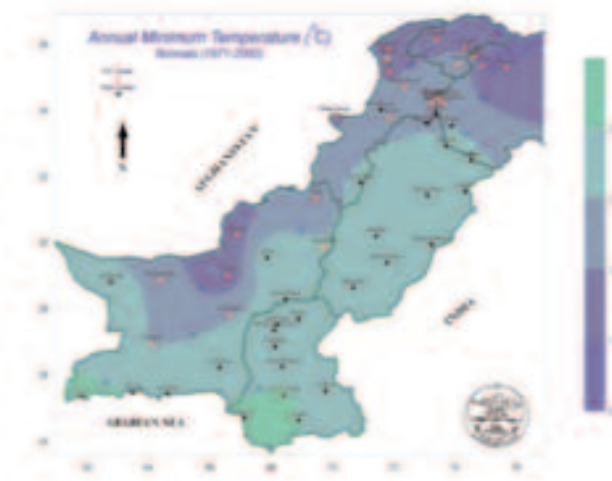
**A: Annual Precipitation**



**B: Annual Climate Classes**



**C: Annual Maximum Temperature**



**D: Annual Minimum Temperature**

Source: Pakistan Meteorological Department

The main findings of climate indicators and signals of climate change in Pakistan are explained below:

#### 4.2.1 Temperature of Pakistan

- Mean annual temperature has increased by 0.57°C from 1901 to 2000
- It has risen by 0.47°C in the period from 1960 to 2007
- Rise in temperature is even faster in the last decade of the period 1901 – 2007
- The rate of increase has been 0.057°C per decade in 20th century
  - It has been 0.099°C increase per decade from 1960 to 2007
- There is high variability of climate such that the change is not linear: the highest rate of increase occurred in the last decade
- The average annual temperature of the last decade remained 0.6°C above normal
- The warmest year on record for Asia was 2004
- The second warmest year was 1988
- The other warmest years (with anomaly +0.4°C) in the order of anomaly were 2006, 2001, 2002, 2000, 2007, 1999, 1970, 1963, 1977, 1971, 1969, 1985, 1998
- The summer mean temperature has increased by 0.89°C in Balochistan; 0.22°C in Punjab; and 0.02°C in Sindh
- The summer mean temperature has decreased by 1°C in G-B; 0.26°C in KP; and 0.04°C in AJK, respectively
- The increase is in the range 1.12°C – 0.52°C
- The annual maximum temperature has increased by 0.87°C in the period from 1960 – 2007
- The annual minimum temperature has increased by 0.48°C in period from 1960 – 2007
- There has been increase of 31 days in Heat Wave duration for the above period; heat waves have increased in all parts of the country
- There has been a non-significant increase of 4 days in Cold Wave, with spatial variability across the country

- The cold waves have increased significantly in western and north-western parts of the country, and decreased in north-eastern and south-eastern parts

#### 4.2.2 Precipitation in Pakistan

- The annual precipitation has increased, significantly, by 61mm from 1901 to 2007
  - The monsoon precipitation has increase by 22.6mm and winter precipitation has increased by 20.8 mm; both being non-significant
- 1) **Precipitation in Punjab**
    - The annual precipitation of Punjab has increased by 228mm over the 1901-2007 period
    - The summer monsoon precipitation has increased by 111.2mm and winter precipitation has increased by 59.6mm
    - The annual precipitation of Balochistan has increased by 8.5mm which is non-significant
    - There is also non-significant increase in summer monsoon by 3.6mm, and winter by 2.2mm from 1901 to 2007
  - 2) **Precipitation in Sindh**
    - The annual precipitation of Sindh also has non-significant increase of 15mm for the period from 1914 to 2007
    - The summer monsoon has had almost no change and winter precipitation also has non-significant increase of 7.5mm over the period mentioned
  - 3) **Precipitation in Khyber Pakhtunkhwa**
    - The annual precipitation of KP has significantly increased by 73.5mm from 1901 to 2007
    - There is almost no change in summer monsoon precipitation and a significant increase of 70.6mm in winter precipitation

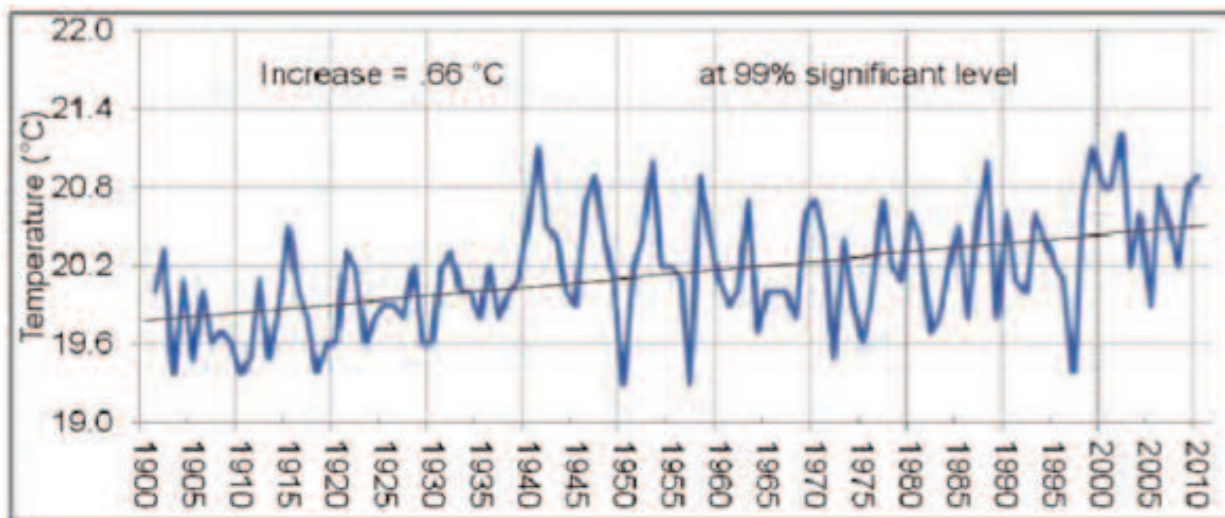
The 110 years of mean temperature and precipitation data (1901-2010) of Pakistan reveal an increasing trend of about 0.66°C in temperature (Fig. 5) and an increasing trend of about 106 mm in precipitation (Fig. 6). Monsoon



precipitation has increased throughout the country except in Balochistan province and coastal belt of Sindh and Balochistan where it has decreased significantly. Increase of precipitation from western disturbance is greater

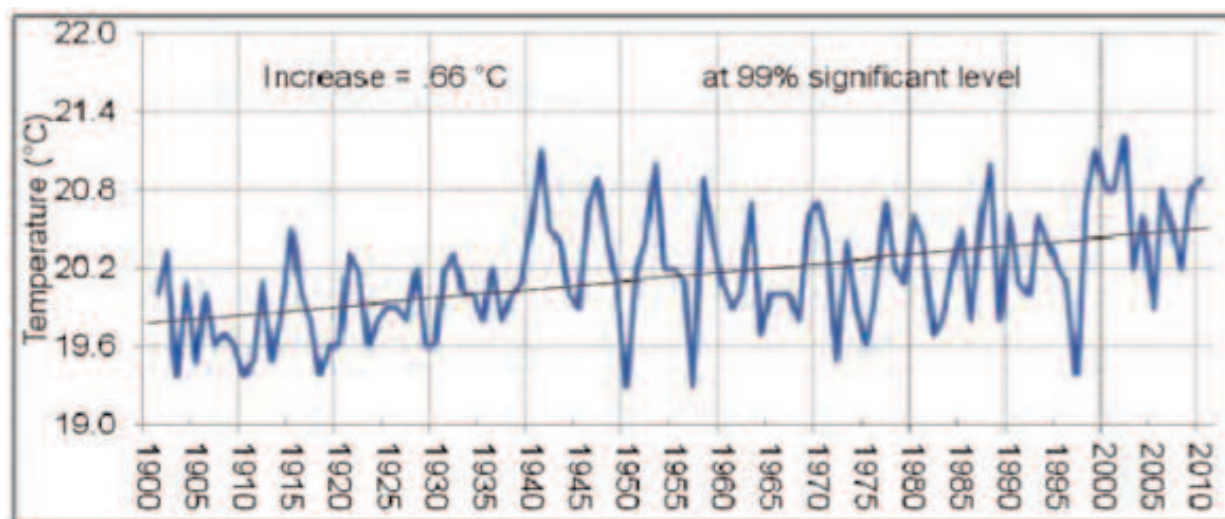
than that of monsoons within the country. This western disturbance contributes precipitation to the western part of Balochistan and the entire Sindh province.

**Fig. 5: Mean Annual Temperature of Pakistan and its Trend during 1901-2010**



Source: Climate Change and Precipitation in Pakistan – a Meteorological Prospect

**Fig. 6: Mean annual total precipitation (mm) of Pakistan and its trend during the periods 1901-2010**



Source: Climate Change and Precipitation in Pakistan – a Meteorological Prospect

### 4.2.3 Conclusions

The water and thermal regimes may change the climate of Pakistan. The higher variability of precipitation regime will increase the frequency and severity of floods and droughts in Pakistan. Thermal regime changes are anticipated to be accompanied by much increased impacts on extreme events, precipitation patterns, melting of glaciers on Himalayan, Hindukush and Karakoram ranges, which will lead to a rise in Arabian Sea

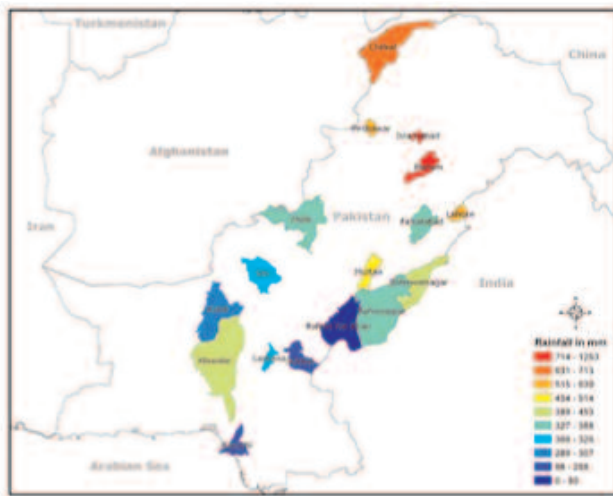
level in the next couple of decades.

Subsequently, a reduction in river flow will ensue and water scarcity in the country will become more intensified.

### 4.3 Changing Pattern of Rainfall

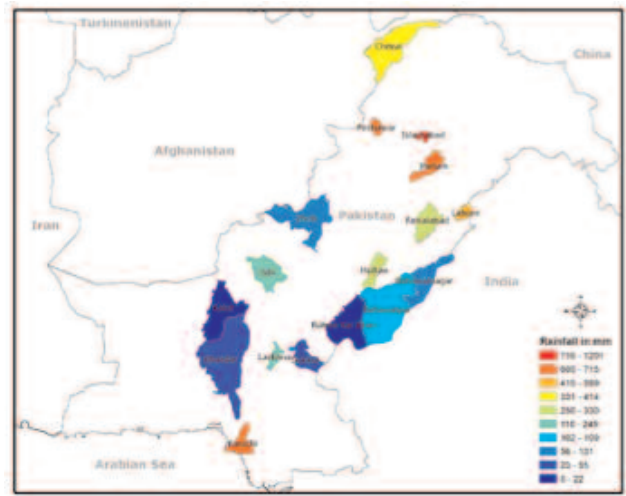
The following figures have been included to give an idea of the changing pattern of rainfall in a few selected cities of Pakistan:

**Fig. 7: Rainfall in Pakistan, 1992**



Source: National Environmental Management System

**Fig. 8: Rainfall in Pakistan, 2010**



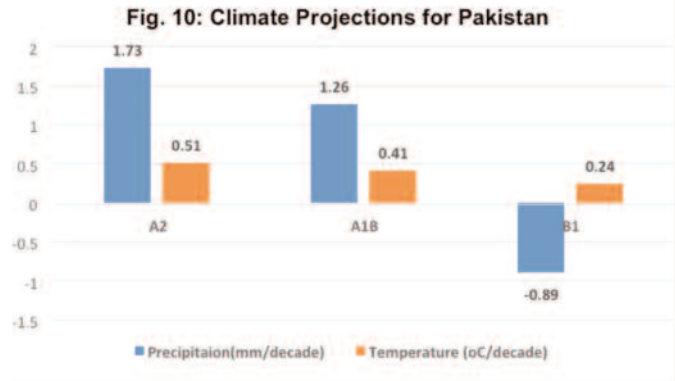
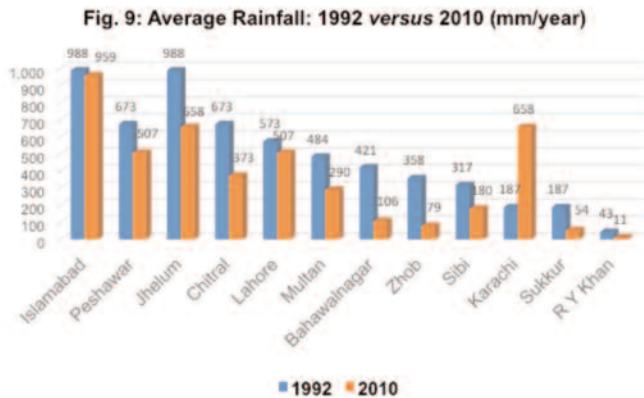
Source: National Environmental Management System

Pakistan receives an average annual rainfall of 367 mm. The wettest month for all stations was marked as July and the driest month as November. Further, the analysis shows decreasing trends of precipitation for Khyber Pakhtunkhwa, Punjab and Balochistan, whereas for Sindh, no remarkable increase or decrease in rainfall trend has been found except for Karachi that has shown a phenomenal increase in rainfall. It may be of interest to compare average annual rainfall of 1992 and 2010 to see if there has been any significant change in the pattern and trend of rainfall. For this purpose, some cities were selected from both the periods and the following diagram developed:

A general look at the figure indicates that there has been considerable reduction in rainfall during

the 18-year period (1992-2010). There are, however, some exceptional reductions in rainfall: Chitral where more than 45% reduction occurred, while Peshawar, having similar rainfall average as Chitral's in 1992, experienced more than 25% reduction. Outstanding of all the reductions is the one observed for Zhob: its rainfall reduced from 358 mm down to a mere 78 mm – a massive reduction of more than 78%. On the other end of the spectrum, Karachi has experienced a great increase in rainfall: from 187 mm up to 658 mm – an increase of more than 250%.

A more pronounced comparison could be made once more data is available and more cities included. Even the present trend exhibits the enormity of situation because of dwindling rainfalls. Under such a situation, measures to



Source: Climate Change Indicators for Pakistan

offset the adverse impacts of reduced rainfall, would be a gigantic task.

#### 4.4 Future Climatic Projections

A project on future climate change was carried out jointly by Pakistan Meteorological Department and Global Change Impact Studies Center. The study revealed that almost all the temperature indices show significant changes over the region. Trend in temperature indices reflect an increase in both maximum and minimum temperature. There is a much larger percentage of land area showing significant change in minimum temperature than the maximum temperature. Percentile-based

spatial change shows that the daily minimum temperature will become warmer as compared to the increase of daily maximum temperature in summer whereas in winter, the change in maximum threshold temperature is high.

Three scenarios - A2<sup>1</sup>, A1B<sup>2</sup> and B1<sup>3</sup> - were chosen for interpolation on 1°X1° grid resolution using multi-model ensemble output. Future climate projections of Pakistan have been calculated keeping in view these scenarios. The rate of change of precipitation and temperature in different future scenarios is given below:

1 Regionally-oriented economic development: 2.0 - 5.4 °C increase in temperature

2 Rapid dynamical changes in ice flow: 0.21 - 0.48 °C increase in temperature

3 Global environmental sustainability: 1.1 - 2.9 °C increase in temperature

## 5 Agro-ecological Zones

Pakistan can be divided into the following ten agro-ecological zones:

### 5.1 The Indus Delta

The climate is arid tropical with moderately hot summers and very mild winters. The mean daily maximum temperature range is 34-45°C in summer and 19-20°C in winter. The mean monthly summer rainfall (July-September) is approximately 75 mm and in winter (December-February) it is less than 5 mm.

### 5.2 The Southern Irrigated Plains

The climate is arid subtropical and continental with hot summers and mild winters. The mean daily temperature range is 40-45°C during May to July. The mean daily minimum temperature in winter is about 8.5°C. The mean monthly rainfall is only about 16-20 mm in summer, with little rain in winter.

### 5.3 The Sandy Desert

The climate is arid (desert) subtropical with very hot summers and mild winters. The mean daily summer maximum temperature range is 39-41°C and in winter, the mean daily minimum temperature is about 7°C. The monthly rainfall varies from 32 mm in the north to 46 mm in the south. The winter is practically rainless. Dust storms are common during summer.

### 5.4 The Northern Irrigated Plains

This zone has a semi-arid subtropical continental climate. The mean daily maximum temperature in summer is 39.5°C, and in winter, the mean daily minimum temperature is 6.2°C. The mean annual rainfall range is 300-500 mm. Mean monthly summer (July, August, September) rainfall varies from 108 mm in the east to 75 mm in the southwest, while in winter, it varies from 14-22 mm per month.

### 5.5 The Barani Lands

The climate of this zone is semi-arid with hot summers and cold winters and with a short dry season in early summer. In summer, the mean daily temperature is 38°C. In winter, the mean daily temperature range is 3-6°C. The mean monthly rainfall is approximately 200 mm in summer and 36-50 mm in winter (December-February).

### 5.6 The Wet Mountains

The extreme eastern part of this zone could be classified as humid, with mild summers and cold winters. In summer, the mean daily maximum temperature is about 35oC. The monthly rainfall in summer is about 236 mm and in winter 116 mm. The western part of the zone is sub-humid Mediterranean, with dry summers and rainfall confined to the winter and spring seasons only.

### 5.7 The Northern Dry Mountains

This zone consists of high mountains covered with snow. The mean daily minimum temperature varies from 1-7oC. The mean monthly rainfall ranges from 25-75 mm in winter and from 50-100 mm in spring. In summer, it varies from 10-20 mm.

### 5.8 The Western Dry Mountains

The greater part of this area is semi-arid highland with mild summers and cold winters. Rainfall and snowfall is confined mostly to the winter season. The mean monthly rainfall in summer varies from 5-15 mm increasing to 45-95 mm in the northern

region. In summer, the mean daily maximum temperature range is 30 to 39oC and in winter, the mean daily minimum temperature varies from -3oC to +7.7oC.

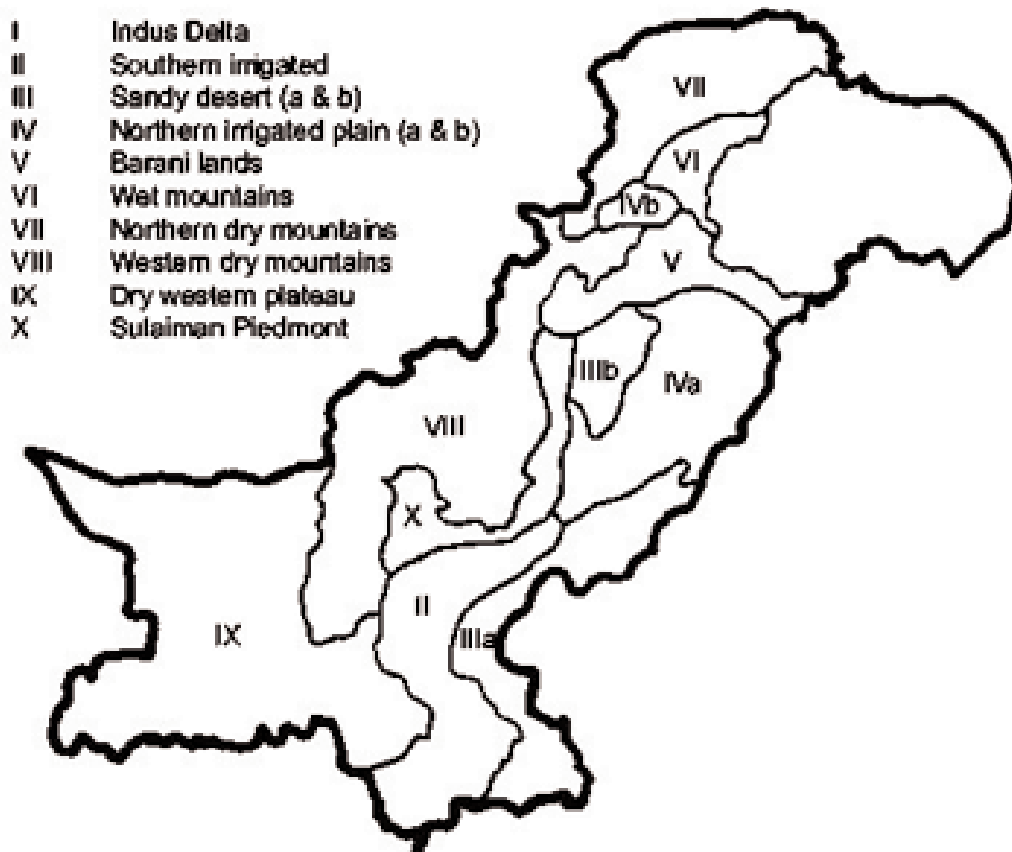
### 5.9 The Dry Western Plateau

This region has an arid (desert) tropical climate with constant dry season. The mean monthly maximum temperature range is 38-44oC. In winter, the mean daily minimum temperature range is 3- 6oC in the north and 11.5-15oC along the coast. The mean monthly rainfall in summer is meagre (2-4 mm) except in the extreme southeastern part where it is about 36 mm.

### 5.10 The Sulaiman Piedmont

The climate of this region is sub-tropical continental and is arid and hot. The mean daily maximum temperature in summer is 40oC. The mean daily minimum temperature in winter varies from 5.7-7.6oC. The monthly rainfall in winter is about 13 mm, whereas in summer it is about 21-38 mm.

**Fig. 11: Ecological Zones of Pakistan**



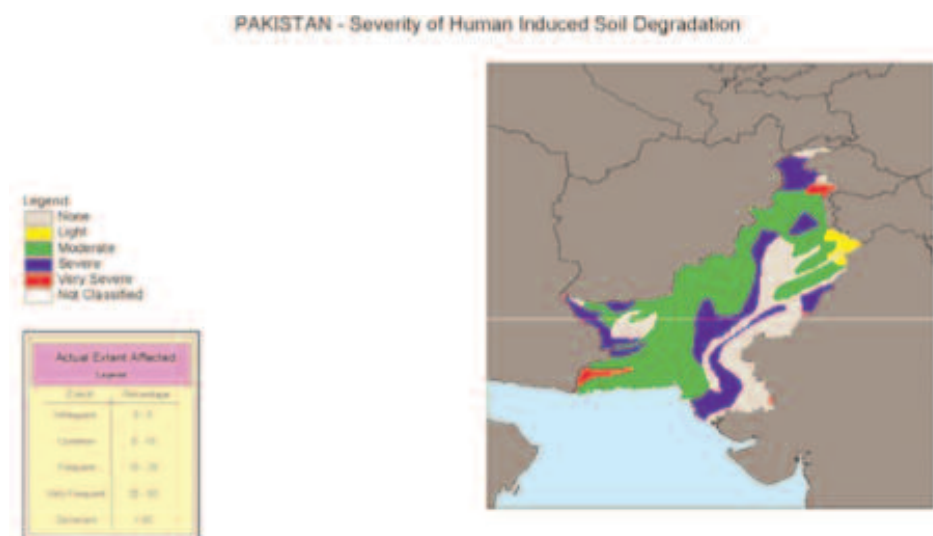
## 6 Soils of Pakistan

The soils of Pakistan are derived from two types of parent materials:

- Alluvium, loess and wind-reworked sands and
- Residual material obtained from weathering of underlying rocks

Most of the rocks are calcareous (limestone or calcareous shale). In some localized areas like Swat volcanic rocks such as granites have produced non-calcareous soil material. Very small quantities of salts are released from most rocks and soils are, therefore, non-saline. Saline playa lakes which are of small areal extent are exceptions. Aridity prevailing over the major part of Pakistan is the main climatic characteristic that affects its soils. This has resulted in paucity of soil water and scantiness of vegetation cover. Soil alkalinity and salinity have been encouraged. The soils are rich in basic (alkaline) but poor in nitrogenous matter. Similar conditions with slightly less intensity are experienced in the sub-humid regions. Humid areas are relatively smaller in extent. In the extreme- north, there are areas with a perpetual cover of snow where development of soil has not taken place. State of soil degradation due to human activities has been shown in the following map published by FAO.

**Fig. 12: Soil Degradation of Pakistan**



In most of the rain-fed areas of Pakistan, soils have developed from wind and water transported materials and consist of loess, old alluvial deposits, mountain out-wash and recent stream valley deposits. Some are derived from shales and sand-stones while the soils in central irrigated Punjab, KP and Sindh vary from clay loam to silty loam. The soils of the huge Thal desert, Cholistan, and Tharparker belt are alluvial with sandy textured sand dunes covering 50 to 60 per cent of the area and consist of the following land forms:

### 6.1 Sand Ridges

Over most of the Thal desert, the alluvium has been blown into sand ridges and hollows. The soils of the ridges consist of very deep, structureless fine sand of varying degrees of calcareous and colour gradations. All the sand ridge soils are excessively drained and have an average pH value of 8.3.

Fine material from the ridges has been washed into the hollows and, where allowed to accumulate, has formed very deep, moderately

calcareous, weakly structured soils. The soils of hollows are mainly well drained and have an average pH value of 8.4.

### 6.2 Abandoned Channels

The soils of the abandoned channels are deposited materials with a wide range of textures (loamy fine sands to silty clays), and are moderately calcareous with pH values from 8.3 to 8.8.

### 6.3 Flood Plains

Soils of sub-recent flood plains are moderately deep, dark greyish brown, silty clay loams, and silty clays with weak to moderate structures and weak lime profile. In southern areas, reduced annual flooding and high water table have resulted in alkalization. These soils are dense and strongly saline with a pH value of more than 9.

In Balochistan, about 80% of the area can be classified as inter-mountainous. The remaining 20% consists of flood plains and alluvial deposits with a high potential for cultivation.

## 7 Land Capability

Land capability classification is a system of grouping soils primarily on the basis of their capability to produce common cultivated crops and pasture plants without deteriorating over a long period of time.

It shows the suitability of soils for most kinds of crops. Here, soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive land forming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation interventions.

The following table shows all the eight land capability classes prevalent in Pakistan:

Land Capability Class	Punjab	Sindh	KPK + FATA	Balochistan	G-B	AJ&K	Total	%
I	3,487	1,105	187	599	2	0	5,380	6.6
II	3,679	2,336	525	481	145	14	7,180	8.8
III	2,395	1,499	666	315	77	201	5,153	6.3
IV	1,440	838	582	929	106	226	4,121	5.1
V	0	0	70	0	101	0	171	0.2
VI	262	8	827	85	115	306	1,603	2.0
VII	4,611	2,454	2,604	9,295	869	21	19,854	24.3
VIII	4,160	3,372	2,974	22,700	4,364	510	38,080	46.7
	20,033	11,614	8,434	34,403	5,780	1,279	81,543	100.0

Source: Soil Survey of Pakistan, Lahore

Most of the land in Pakistan falls in two capability classes – Class VII (24.3%) and Class VIII (46.7%), both when combined, come to 71%.

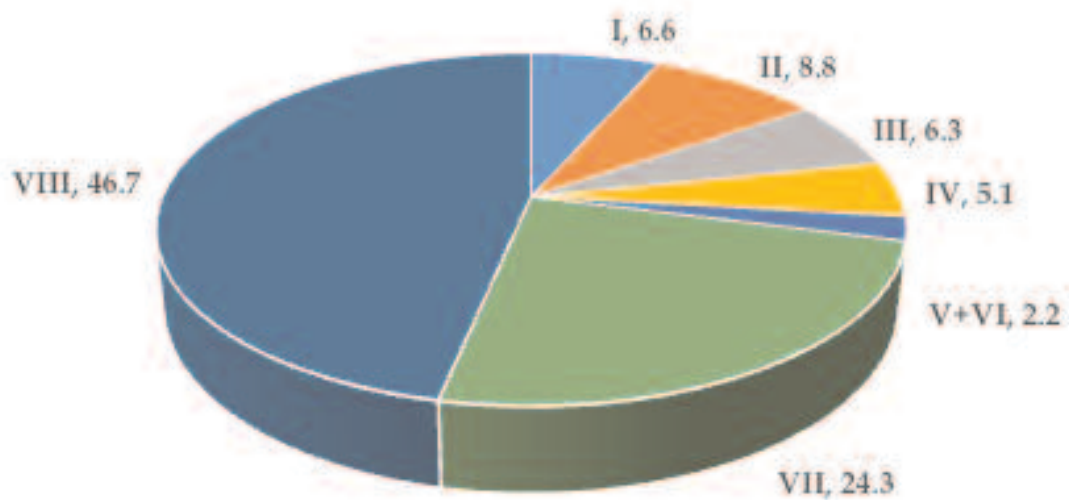
Soils in Class I form very good agriculture land while the rest of the number till VIII are indicative of certain limitations. For example, Soil Class VII makes for poor forests and rangeland soils while Class VIII soils are unfit for agricultural



purposes. This leads to the conclusion that about three-fourth of the soils of Pakistan are unfit for agriculture, forests, and rangelands.

The following diagram is intended to depict the overall situation regarding the land capability in Pakistan:

**Fig. 13: Land Capability Classes (% of Land Area)**



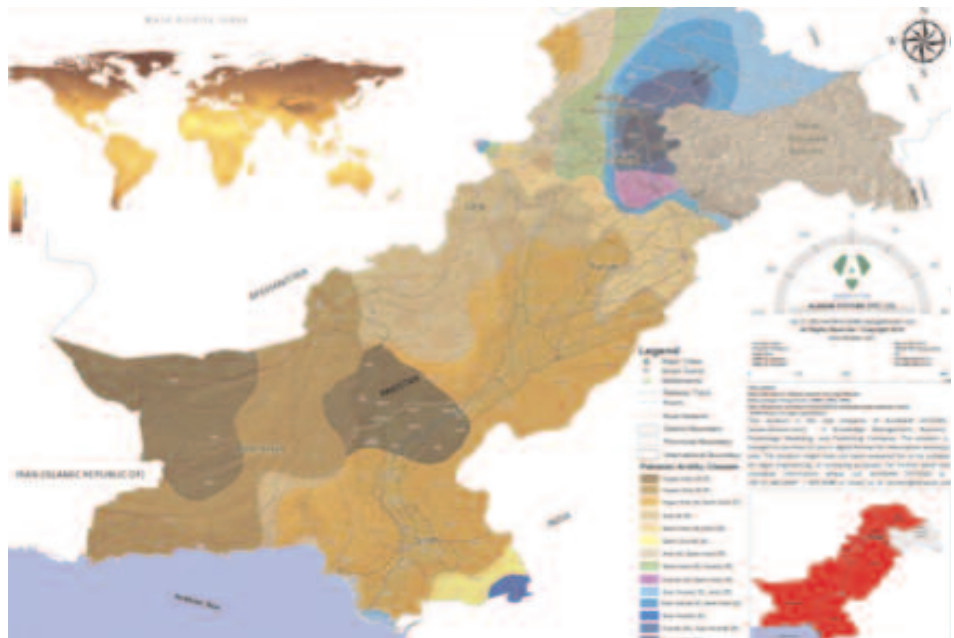
## 8 Aridity in Pakistan

Due to rapid growth of population, massive deforestation and anthropogenic activities, noticeable change in climatic conditions is being observed in Pakistan. Increased aridity due to climate change is a growing environmental problem of an agricultural country like Pakistan. It is essential to assess and monitor aridity to combat the problems of land degradation, drought, and desertification. Identification of arid and semi-arid regions on climatic basis is the first essential step in any project of land reclamation for agricultural and other purposes.

Almost 75 to 85% of the total area of the country is arid in which most part lies in the south while less than 10% area is humid which lies in the north of the country. The Land Capability Classification will be a good predictor for agronomists to plan according to the given capability of a given soil.

The following map shows the extent of aridity in Pakistan:

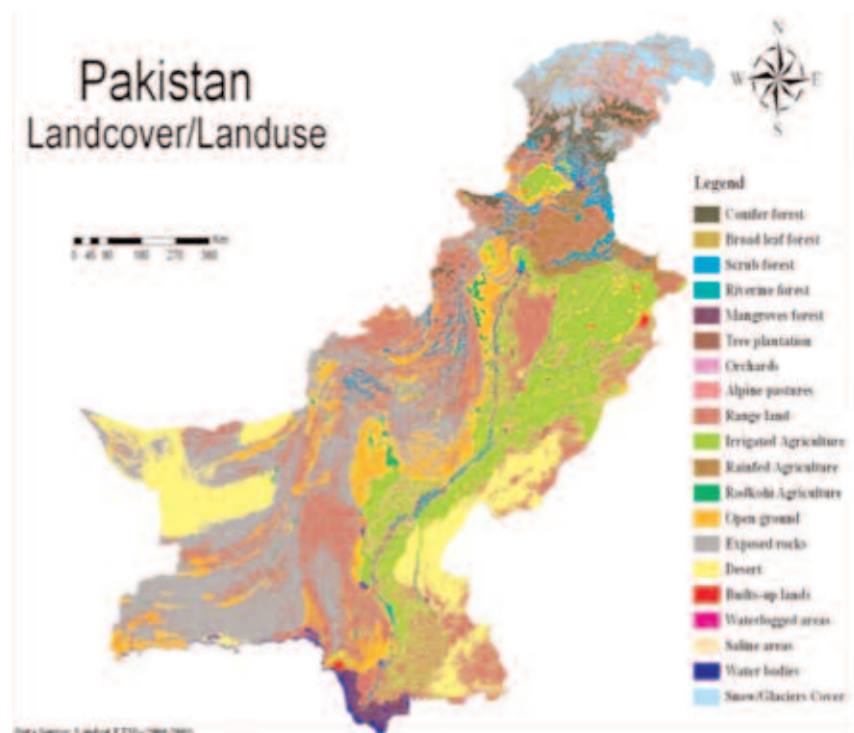
**Fig. 14: Aridity Classes of Pakistan**



## 9 Land use in Pakistan

Land use classification using ten categories in Pakistan has been developed for 2004. Forest cover including scrub, riverine, mangroves and plantation is about 5.4%. Agricultural land including irrigated, rain fed and rodh Kohi agriculture extracted from spectral reflectance of crop cover is about 20%. It does not include the fallow land which has been covered under open space/ground class (covering about 10% area of country). Rangelands covered over 27% areas, while rock outcrops occupied another quarter of the country. The snow/glacier coverage was recorded at about 2%. Deserts have about 10% area and other uses (built up area, waterlogged and saline land and water bodies together accounted for a little more than one percent).

Patterns of land use in Pakistan have evolved through centuries, influenced by environmental and physical factors such as landform, soil, climate, water availability etc. as well as human factors such as population, economic demands, and cultural practices or customs. The interprovincial variations clearly depict the influence of these factors. For example, in KP and G-B,



Source: Source: Land cover Atlas of Pakistan, Pakistan Forest Institute, Peshawar (2012).

which are comparatively high altitude hilly regions, with relatively higher precipitation, show a higher level of snow and glacier coverage (13%), compared to none in other provinces. Likewise, KP also has higher forest coverage about 17% as against 4% in Punjab, 1.5% in Balochistan and about 6% in Sindh. Balochistan, on the other hand, has a comparatively larger grazing area. On the other hand, about half the area of Punjab and about a third of Sindh have agriculture primarily because of the extensive canal irrigation system.

### 9.1 Area under Forests

The following table shows the extent of forest area under various types:

**Table 2: Forest Types of Pakistan**

Forest Types	Area (m ha)	% of Forest Area
Dry Temperate Forests	1.279	28.6
Moist Temperate Forests	0.573	12.8
Oak Forests	0.174	3.9
Sub-Tropical Chir pine Forests	0.357	8.0
Sub-Tropical Broad-leaved	1.109	24.8
Evergreen		
Tropical Thorn	0.218	4.9
Plantations	0.197	4.4
Riverine Forests	0.216	4.8
Mangroves	0.355	7.9
<b>Total</b>	<b>4.478</b>	<b>100.0</b>
Land Area	88.430	
Forest area as % of land area		<b>5.06</b>

Source: Land cover Atlas of Pakistan, Pakistan Forest Institute, Peshawar (2012).

Pakistan has barely 5.06% of its land area covered under forests.

### 9.2 Other Land uses

The following table presents the status of other land uses in Pakistan:

**Table 3: Other land uses of Pakistan**

Landuse	Area (million ha)	%
Alpine/sub-Alpine Pastures	1.447	1.7
Shrubs and bushes	3.066	3.7
Rangelands	39.923	47.6
Agricultural Lands	25.525	30.4
Fruit Orchards	0.260	0.3
Barren Lands	7.687	9.2
Settlements	0.973	1.2
Snow and Glaciers	3.395	4.0
Water Bodies	1.677	2.0
<b>Total</b>	<b>83.953</b>	<b>100.0</b>

Source: Land cover Atlas of Pakistan, Pakistan Forest Institute, Peshawar (2012).

**Fig. 16: Land cover map of Pakistan**



Source: Source: Land cover Atlas of Pakistan, Pakistan Forest Institute, Peshawar (2012).

## 10 Agricultural Settings

### 10.1 Land Utilization

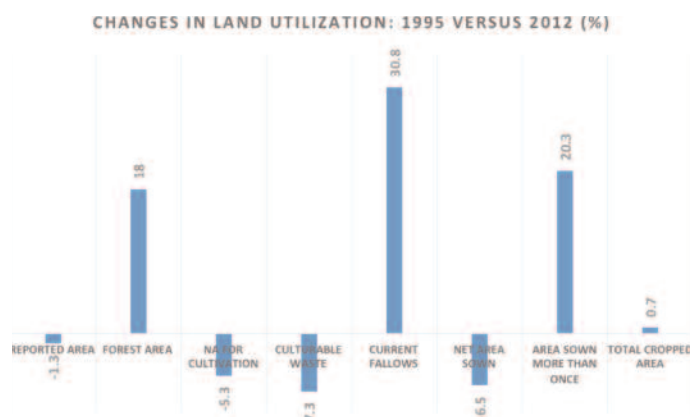
The following table indicates land utilization in Pakistan between 1995-96 and 2012-13:

**Table 4: Land utilization of Pakistan (million ha)**

Land use Category	1995-96	2012-13
Reported area	58.51	57.73
Forest area	3.61	4.26
NA for cultivation	24.35	23.06
Culturable waste	8.87	8.22
Current fallows	5.19	6.79
Net area sown	16.49	15.41
Area sown more than once	6.10	7.34
Total cropped area	22.59	22.75
Total area	79.61	79.61

#### 10.1.1 Changes in Land Utilization

Based on the above table, the following bar diagram indicates changes occurring in land use status during 17 years:



There are three outstanding features apparent from the above chart:

- There was a significant increase in forest area which is good.
- There was a very significant increase in “Current fallows” which means that it was practiced on lesser area, though there should have been an increase in land under agriculture because of exploding population.
- If on the one hand, current fallows increased, there was an appreciable increase in intensification of agriculture by sowing crops more than once.

## 11 Desertification – a Global Perspective

According to UNEP, about 70% of dry lands used worldwide for agriculture are already degraded with the result that desertification/land degradation now affects almost 30% of the total land area of the world and one-sixth of the world's population. About 22% of Asia's dry lands and 15% of its other land area is affected by desertification/land degradation. Developing countries are the most affected, but developed countries also face these problems but with lower intensity.

### 11.1 Challenges of Desertification

Following are the challenges of desertification that we have to contend with:

- Dry lands are spaced over 5.2 billion ha the world over (40% of earth's area)
- About 2.6 billion people (44% of world population) live in dry lands
- More than 110 countries have dry lands that are threatened by desertification
- 40% of Asia's land area is prone to desertification
- Land degradation affects 1.341 billion ha of agriculturally-productive dry lands in Asia that comes to 70% of total dry land area of the world
- About 35% of irrigated lands, 56% of rain-fed croplands and 76% of rangelands are degraded in Asia

**Fig. 18: Classification of Dry lands**

Hyper-arid region	$P / PET < 0.05$
Arid region	$0.05 < P / PET < 0.2$
Average annual precipitation is less than 200mm (Rain season in Winter)	
Average annual precipitation is less than 300mm (Rain season in Summer)	
Semi-arid region	$0.2 < P / PET < 0.5$
Average annual precipitation is less than 500mm (Rain season in Winter)	
Average annual precipitation is less than 800mm (Rain season in Summer)	
Dry sub-humid region	$0.5 < P / PET < 0.65$
Aridity Index (AI) is defined as dryness ratio, which is ratio of P and PET.	
P: Average annual precipitation, PET: Average annual potential evapotranspiration	

UNEP (United Nations Environmental Program)

Source: Presentation by Mitsuhiro INOUE

- Each year, 20 million ha agricultural lands are converting in to deserts
- Salinity alone is annually causing a loss of 11 billion USD
- Wind and water is eroding 75 billion tons of soil causing a loss of 12 billion ha annually
- On the whole, desertification causes a loss of 42 billion US\$ worldwide

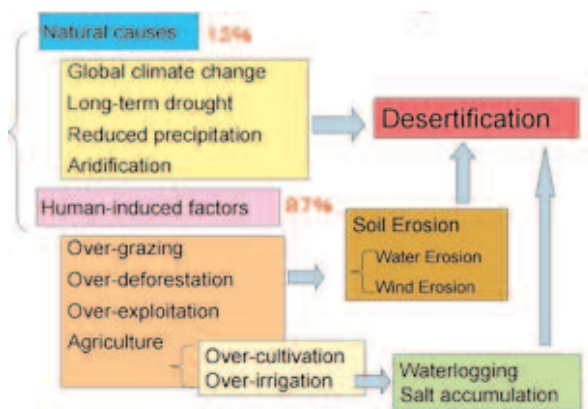
## 11.2 The Dry lands

The following figure is intended to clarify the yardstick on which to measure the extent of aridity<sup>4</sup> and how to define it:

## 11.3 Causes of Desertification

The following chart effectively explains the different causes responsible for desertification:<sup>5</sup>

**Fig. 19: Major causes of desertification**



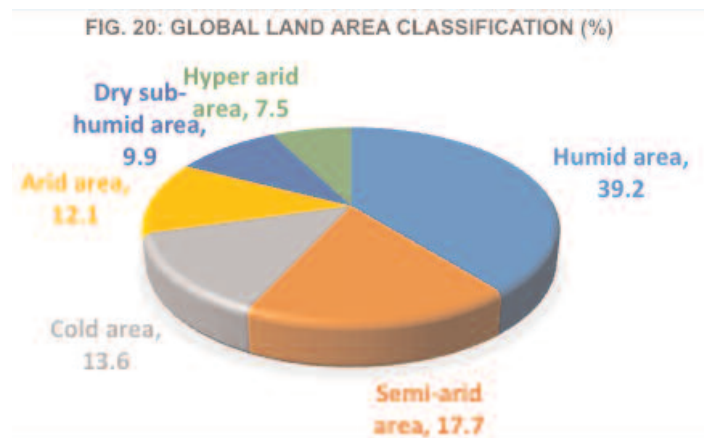
Source: Presentation by Mitsuhiro INOUE

To sum it up, it is the man who does the most harm to the environment - to the extent of 87% - by resorting to over-grazing, deforestation (causing soil erosion), over-cultivation and over-irrigation. It is just 13% of the total desertification that is caused naturally and consists of climate change, drought, reduced rainfall, and aridity. There is obviously a need to pay far greater attention to human-induced desertification than blaming nature for it.

## 11.4 Global status of desertification

Of the 14.96 billion hectares of total land area, 3.6 billion hectares is affected by desertification. Against this, the population affected by desertification is 1.1 billion. This comes to about 14% of the total world population.

Overall, land has been classified into six major regions, based on aridity and humidity. Though a sizeable chunk of earth's area is humid (39.2%), it is confined mostly to northwestern region. It is the southern and central region that has all the areas that are hyper-arid to arid.



Source: SLMP Leaflet

<sup>4</sup> A deficiency of moisture, especially when resulting from a permanent absence of rainfall

## 12 Desertification in Pakistan

Human security is threatened by desertification, land degradation, and drought (DLDD). These are depriving people of their means of livelihoods by taking away food, access to water, means for economic activities, even their homes. Failing policies for protecting the environment in many countries and climatic change are putting more pressure on the soil today than ever. When secure water and food supplies are not guaranteed, people frequently migrate to areas where they believe they can find them.

The three sources of threat to the human security - desertification, land degradation and drought - are interlinked. However, the resultant effect of the three is more in the shape of desertification. Nature and human being, both have a role in the gradual transformation of habitable land into desert. Often misinterpreted as an expansion of existing deserts, desertification is actually a gradual process of land degradation in arid, semi-arid, and sub-humid areas triggered by unsustainable land practices, deforestation, overgrazing and extreme climatic variations such as prolonged droughts and floods. In this ultimate process, land loses its productivity, vegetation cover and capability to support ecosystem functions and services, enhancing risks and vulnerabilities of poor dry land communities for food security and sustainable livelihoods.

Like many other developing countries, Pakistan is also severely affected by desertification and land degradation. Pakistan is predominantly a water scarce country where 80 percent of its land area is arid or semi-arid and two-thirds of its rapidly increasing population depends on dry-lands to support its livelihood mainly through agro-pastoral activities.

Natural resource base of land, water and vegetation in arid and semi-arid areas is highly fragile and extremely vulnerable to degradation. Increasing population along with the demand for more food, fodder and fuel wood has given rise to a chain of interrelated economic, social and environmental issues associated with land degradation.

Desertification is essentially the result of soil degradation. A variety of natural and human factors are contributing to desertification, including drought, overgrazing, overexploitation of land and water resources, over cultivation of marginal lands, deforestation, soil erosion, water logging and salinity and the use of inappropriate agricultural technologies such as excessive use of chemicals and irrigation water.. Consequences of this being: abandoned



croplands affected by waterlogging and salinity; abandoned villages; traditional irrigation systems and croplands desertified by deteriorated groundwater aquifers or lowering of water table; siltation of rivers, irrigation systems and reservoirs; and landslides in hilly areas. Desertification leads to losses in agricultural productivity and enhances poverty. It also causes significant reductions in carbon storage in soils, contributing to global warming and loss of biodiversity.

Various approaches have been tried to combat the menace of desertification, for example, introduction of fast-growing exotic species of trees and grasses for stabilization of shifting sand dunes and creation of microclimates through shelterbelt plantation and have proved highly successful to control desertification. Sustainable land management (SLM), soil and water conservation, afforestation and rehabilitation of degraded land, repetitive high resolution satellite images, delineation and mapping of affected areas, remote sensing and geographic information systems (GIS) are suitable tools for combating desertification. Efforts already underway to combat desertification need to be strengthened and integrated through a nationally supported, coordinated and monitored system.

Following are the major factors contributing to the process of land degradation leading to desertification in Pakistan:

### 12.1 Soil Erosion

Soil erosion is the wearing-away of land surface by detachment and transport of soil / rock materials through the action of moving water, wind, ice or other geological agents. Basically, the process is classified into two categories – ‘Geologic’ and ‘Accelerated’. The former operates under natural conditions and is mainly responsible for evolution of natural landscapes. The latter is man induced mainly as a result of disturbance in the natural landscape through human activities and is generally more rapid compared with the natural processes. While, the former – geologic – is operative on inherently

vulnerable land surfaces, the latter becomes active on areas which are made vulnerable or where natural vulnerability is accentuated mainly through destruction of the protective plant cover. Soil erosion is highly undesirable because of its detrimental effects. Initially, it may only reduce the productivity but its continued unchecked activity would result in irreparable loss of the basic land resource. Apart from the aforesaid and a host of other direct adverse economic consequences, it affects the quality of life through environmental degradation, especially in terms of water and air pollution. While natural geologic processes continue to operate all over Pakistan, extensive areas in the country are prone to ‘accelerated’ erosion by water and wind to varying degrees as shown in the accompanying Soil Erosion map of the country. Water erosion mainly affects the sloping / elevated terrain characterizing the highlands. Marks of various types of water erosion - sheet, rill, gully, and landslides etc. are amply manifest in the country.

### 12.2 Erosion by Wind

Erosion by wind, on the other hand, is a characteristic feature of areas with dry, loose, bare sands or finer materials subject to strong air currents. Vast sandy deserts – Cholistan, Thal, Thar and Kharan – constitute major wind erosion arena. Very arid silty or finer valley floors / terraces of western Baluchistan are also subject to erosion by wind.

Some 3-5 million hectares are affected by wind erosion in Pakistan. The amount of soil removed by wind constitutes about 28% of the total soil loss. High velocity wind storms cause severe movement of sand dunes, depositing thick layers of sand on roads, railway tracks and croplands, ultimately threatening village inhabitants.

**Table 5: Areas affected by wind erosion**

Wind Erosion	Area (million ha)
Light	3.998
Moderate	6.742
Total	10.740

A recent land use survey of the whole country includes the mapping units, "range land, non-degraded" and "range land, degraded". By inspection, it appears that over 90%, even possibly 95%, of range land is considered to be degraded.

There had been a massive increase of more than 1,806% in "Moderate to Severe Erosion" in Pakistan during a matter of nine years. The overall increase in wind erosion has been 174%. This is a very alarming situation and must be treated as one of the priority areas while devising a strategy for the next 15 years.

**Table 6: Changes in wind erosion between 1998-2007 (%)**

Erosion Type	Changes
Slight to Moderate Erosion	-50.3
Moderate to Severe Erosion	1,806.5
Severe to Very Severe Erosion	36.8
Overall	173.8

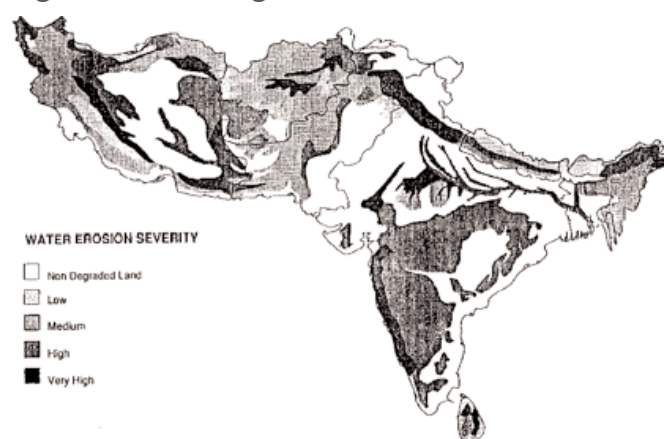
### 12.3 Erosion by Water

The soils in the Indus basin are undeveloped and the mountains surrounding the area have some of the world's steepest slopes. Intense summer rainfalls, along with melting snow in high mountains contribute to soil erosion hazards. Land use practices, vegetation cover, soil type and structures are other major factors related to soil and water erosion. In the northern mountainous areas with steep slopes, the water erosion is low in the areas with permanently

closed canopy forests, while it is greater in areas with arable crops on steep slopes.

According to Global Assessment of Soil Degradation (GLASOD) estimates, about 11 million hectares are affected by water erosion. Sedimentation of canal irrigation system decreases water and land use efficiency. Some 40 million tons of soils are brought into the Indus basin each year, which shortens the life span of major reservoirs and reduces their efficiency. The upstream riverside infrastructure is destroyed and top soil is washed away declining the productivity of the area. In downstream, the sedimentation reduces the efficiency of hydropower generation and irrigation systems.

**Fig. 21: Land degradation in Pakistan**



Source: GLASOD Estimates

The following table shows the accelerated momentum with which water erosion is causing land degradation:

**Table 7: Intensity and extent of erosion in Pakistan**

Intensity of Water Erosion	Area affected (million ha)		% increase
	1998	2007	
Slight to Moderate Erosion	3.979	5.165	130
Moderate to Severe Erosion	3.581	20.003	559
Severe to Very Severe Erosion	3.745	17.677	472
Bank Erosion	0.001	2.282	228,200
Overall	11.306	45.127	399

Here again, it is the “Moderate to Severe Erosion” that has exhibited a more than 5-times increase. The Overall increase caused by water erosion was, however, four times – a very alarming situation, indeed.



### 12.4 Soil Salinity and Sodicity

Salt affected soils of Pakistan can be classified at the highest level into two broad categories – Geogenic & Pedogenic. Geogenic salinity would refer to the presence of excessive soluble salts inherently contained in the parent soil material, having been derived from either one or both of the sources of sediments, and the depositing agent (mainly water). Such ‘congenital’ salinity characterizes the intermontane floors of western Balochistan. Pedogenic salinity refers to the salinization of an originally non-saline parent material (sediment) as a result of a peculiar interaction of the various soil-forming factors including human intervention. This kind of salinization is mainly a characteristic of the ‘Indus Plains’ and constitutes both the popularly labelled ‘primary’ and ‘secondary’ types of salinity. Pedogenic salinity occurs under similar environments in other geographic areas too within the country.

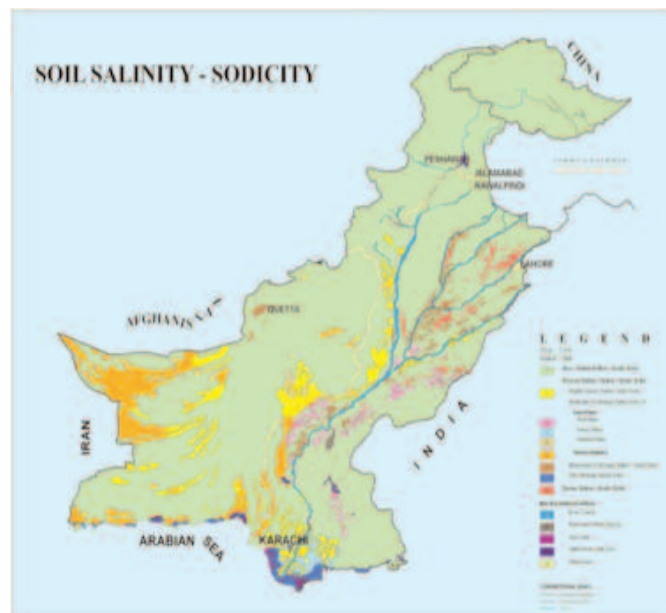
A saline soil is characterised by the presence of excess soluble salts that interfere with the growth of most crop plants. The salinity-sodicity map of Pakistan shows a number of categories based on the kind and severity of the problem.

The following table depicts the extent of salinity/sodicity in Pakistan:

**Table 8: Extent of salinity in Pakistan**

Nature of Salinity	Extent of land affected (%)
Non-Saline	82.2
Slightly Saline	12.2
Severe to Very Severe Saline	1.3
Moderately Saline	0.9
Other Areas	3.4

Most of the soils in Pakistan are non-saline to the extent of 82% which is a good indicator.



### 12.5 Water-logging and Salinity

Canal irrigation in Pakistan while providing water for irrigation, has also resulted in the twin menace of water-logging and salinity. Since early twentieth century, efforts have been made to tackle the problem. It was only in the fiscal year 1953-54 that detailed mapping of soil and land use of the Indus Plain was carried out under the Colombo Plan. Unlike inundation canals, where water was available during one season, with the

introduction of perennial canals water has been made available throughout the year.

As a result, water seeps to the subsurface throughout the year from the unlined canals and irrigated fields. Consequently, accumulation of water in the subsurface starts and the water table begins to rise. So long as the water table remains at a depth of five meters or more below the surface, there is no problem. When the water table rises to five metres from the surface, the water starts to rise by capillary action. In a major part of Pakistan, being arid to semi-arid, there is a considerable amount of salt in the soil. The rising water dissolves salts and carries them to the surface where it evaporates and salts are continuously added to the surface soil. The amount of salt on the surface increases as the water table rises. By the time water table reaches 3.3 metres from the surface, salinity adversely affects the production and yield of crops.

A detailed plan was developed to combat the problem in 1959. The Indus basin was divided into 28 zones of reclamation. Tube wells and drains were to play a key role in reclamation of these various zones. Salinity Control and Reclamation projects are still working to combat the problem but they are costly. As a result, lining of canals and on-farm water management is being pursued to contain the problem.



There is a clear indication that water-logging has been occurring all along the river systems of Pakistan.

## 12.6 Poor Management of Surface and Groundwater resources

A massive 90-95% of freshwater resources in Pakistan are used for agricultural purposes. Climatic conditions of dry areas of the country are harsh, ranging from hyper-arid to arid, with erratic rainfall of 100-400 mm per annum. The situation can be realized by the fact that groundwater in many parts of Balochistan and Sindh has been depleting at rate of about two metres per annum. As a result, many Karezes and dug wells have dried up. This is mostly due to excessive mining of groundwater for flood irrigation practices. In fact, food security in the country depends upon the productivity of 18 million hectares of irrigated and 4 million hectares of rain-fed agricultural lands. Pakistan has one of the largest canal irrigation systems in the world. However, poor on-farm water management practices, traditional use of irrigation water by flooding and water losses during carriage in canals is contributing to water logging and salinity in cultivated areas, which results in reduced land productivity.

## 12.7 Drought and Migration

Drought in Pakistan has become a frequent phenomenon. The drought of 1997–2003 was considered the worst in 50 years, when it gripped the lower parts of Pakistan mainly areas in Balochistan and Sindh. Many areas were badly affected, impacting some 3 million people and 7.2 million heads of livestock. Hundreds of lives were lost and thousands of livestock and wild ungulates perished. Persistent droughts also severely affected local livelihoods. The drought resulted into water shortages for humans, livestock, and agriculture, decreased crop production, led to crop failures and shortage of forage and fodder.

During a prolonged drought people often migrate along with their livestock towards irrigated areas. This builds further pressure on surrounding

grazing lands. Migration disrupts traditional land use patterns, results in loss of traditional land use practices. Impacts of droughts are generally classified as economic, social, and environmental. These impacts often linger on for months or years beyond the termination of the drought period and could have serious consequences for sustainable management of land resources.

### 12.8 Floods

Before the summer floods of 2010, the Indus had turned into a muddy puddle in parts of Sindh. Britain's Financial Times reported at the time that "angry farmers marched through villages in Sindh demanding access to water. Those who can no longer turn a profit in the fields are increasingly resorting to banditry or migrating to urban shanties".

Earlier, there was a 2009 report by the Woodrow Wilson International Center saying that the melting Himalayan glaciers have exacerbated Pakistan's water shortages. And the World Bank warned that Pakistan could face a "terrifying" 30-40 per cent drop in river flows in a 100-year time.

In its most recent findings by the Global Change Impact Studies Centre (GCISC) - a dedicated research institute for climate change studies in the country - has concluded that Pakistan is amongst the top ten countries experiencing frequent and intense climate events such as

floods, droughts, cyclones, heavy rains, extremely high temperatures, etc.

The bar diagram shows how vulnerable Pakistan is to the vagaries of floods that have now become a permanent feature.

- The above figure is intended on three counts:
- (a) to show the top 15 countries with greatest populations exposed to river flood risk;
  - (b) Either the least developed countries or the developing countries are the most vulnerable to natural disasters and climate change; and
  - (c) These countries have 80% of the world population that is exposed to river flood risk worldwide.

### 12.9 Loss of soil fertility

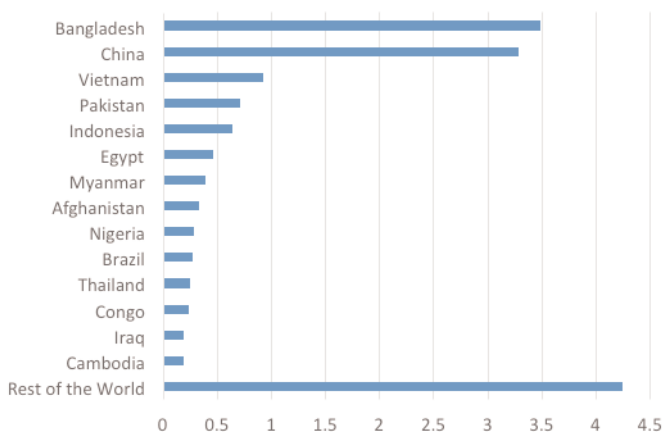
Soil covers most of the land surface on the earth in a thin layer, ranging from a few cm to several metres deep. It is composed of rock and mineral particles of many sizes mixed with water, air, and living things, both plant and animal, and their remains.

According to revised estimates by GLASOD, soil fertility in Pakistan is confined only to "light fertility decline" over 5.2 million hectares that comes to 20% of the land area of Pakistan.

The most serious form of soil degradation is caused by accelerated erosion. It is the washing or blowing away of surface soil, sometimes down to bedrock. While some erosion takes place without the influence of man, the soil is lost so slowly that it is usually replaced through natural processes of decay and regeneration. Soil loss and creation of new soil usually stays in balance.

Unfortunately, many inappropriate farming and forestry operations encourage erosion. It accelerates when sloping land is ploughed and when grass is removed from semi-arid land to begin dry land farming. It accelerates when cattle, sheep and goats are allowed to overgraze and when hillside forests are felled or cut indiscriminately. While there are isolated instances of deserts being reclaimed by irrigation

Fig. 25: Population affected (millions/yr)



Source: World Resource Institute

or of new forests being planted, man, in the majority of instances, degrades the soil when he begins agricultural operations.

Soil fertility in Pakistan is continuously depleting due to mining of the essential plant nutrients from the soils under intensive cultivation and imbalanced use of fertilizers. For example, in 2011-12, the offtake of nitrogen decreased by 0.1 per cent while the use of phosphate and potash declined by 19 per cent and 31.3 per cent respectively compared with 2010-11. On overall basis, the fertilizer offtake in 2011-12 was 4.1 per cent less as compared to the 2010-11 achievements.

### 12.10 Deforestation

There is only 5.2% area under forests in Pakistan, which is too low to meet environmental, as well as socio-economic needs of the country. Due to deforestation, forest cover is shrinking by 3.1% annually and woody biomass, is declining by 5% annually.

Natural vegetation reduces sedimentation in water reservoirs and stabilizes sand dunes. Mangrove forests protect the port of Karachi against wave action and act as nursery for the existing shrimps. Every major type of forest or protective land cover in Pakistan has suffered heavily in the recent years from indiscriminate wood cutting, overgrazing, poor management and ecological changes brought about by human interference. This has increased desertification and aggravated erosion and silting of reservoirs and biological defenses against water logging and salinity. The ability to resist soil erosion caused by monsoon rains is largely dependent on vegetation and its vigor at ground level. Soil erosion increases on degraded grazing land with sparse vegetation cover, and leads to siltation of rivers and channels. Soil fertility declines due to removal of top soil resulting in low production of forage, fodder, fuel wood, timber and grains. Soil erosion in the watershed areas of rivers increases sedimentation load, which reduces the storage capacity of dams.

### 12.11 Livestock Grazing Pressure

Free grazing of livestock is extremely destructive to forest and vegetation cover. In Balochistan, livestock production primarily depends upon rangelands. Sheep and goats obtain about 60% of their feed from rangelands while in Balochistan, 90% of the required livestock feed is provided by rangelands. With the increase in livestock population there is heavy pressure on natural vegetation. During periods of feed scarcity, thousands of cattle, sheep and goats depend on fodder plants, which are lopped off the main stem. Unsystematic livestock grazing reduces the productivity of rangelands due to soil compaction, de-vegetation of fragile slopes, destruction of terraces and selective destruction of growing trees and shrubs. Since the economy in desert regions is pastoral, it affects both livelihoods of the desert dwellers as well as influences the fragile environment.

### 12.12 Expansion of High-delta Crops

Naturally dry lands are constrained with water availability and crop production. Poorly planned expansion of high-delta crops especially in dry lands has depleted the groundwater resources, especially in Balochistan. Planting large-scale apple orchards and vegetables like onion and potato as well as some fodder varieties are high on water demand and thus have forced the farmers to abandon the land due to scarcity of irrigation water. Successful crop production in dry areas requires varieties that are well adapted to these regions. Crops, such as sorghum, sesame, groundnut, and fruit trees like olive, pomegranate and pistachio are naturally adapted to dry conditions. These crops and fruit trees are low-delta and high-yielding, if properly managed.

### 12.13 Un-Sustainable Harvesting of Non-Timber Forest Products (NTFP)

Extracting NTFP like Mazri Palm (*Nannorrhops ritchiana*) and some medicinal plants is leading to the depletion of populations of many plant species. Unsustainable harvesting of Mazri plants along with its roots exposes the soil which causes erosion leading to land degradation and

poses threats to the very existence of this important species in dry land ecosystems. Similarly, Guggal (*Commiphora wightii*), a slow growing plant, is endangered due to chemical extraction of gum (resin). Excessive and unscientific tapping of its gum is the main cause of destruction of its habitat and land degradation in desert regions of Sindh.

### 12.14 Climate Change

Climate change is causing an increase in extreme weather events which results in occurrence of frequent droughts and flash floods. Climate change constitutes an additional pressure to already threatened dry land systems. Dry land plants have a low adaptive capacity to climate change and are, therefore, faced with severe impacts. Climate change has negative consequences for dry land biodiversity and ecosystem functions and services. The climate change is likely to impact species composition and may lead to reduction in natural capital of the country. The most serious climatic challenges for Pakistan are threats to its water, food, and energy security due to drastic shift in weather pattern (both on temporal and spatial scales), increased incidences of high altitude snow avalanches and GLOFs (Glacial Lakes Outburst Floods), increased land degradation due to depletion of rangelands, deterioration of cultivated lands, especially in areas affected from water and wind erosion, water-logging, and salinity etc. Climate change impacts often lead to reduced productivity of agricultural crops due to increased heat and water stress. In short, climate change scenario may aggravate the land degradation and desertification process in the country.

### 12.15 Loss of Biodiversity

Due to the ever-increasing human and livestock population, there is an enormous pressure on natural vegetation in almost every agro-ecological region of the country. Overgrazing of rangelands has extensively decreased its carrying capacity. Some areas have also been affected by water logging and salinity damaging the natural flora. Aridity and prolonged drought in arid lands have

affected the vegetation cover in these areas. All these factors have contributed towards the loss of biodiversity in various regions of the country. As a result of natural habitat degradation and illegal hunting, 31 species of mammals, 20 species of birds and 5 species of reptiles have been listed as endangered species in the country.

### 12.16 Socio-economic conditions

With a population of over 180 million, Pakistan is ranked 7th most populous country in the world with a growth rate of 2.6 percent per annum. The implications of such a rapid population proliferation are grave and multifaceted. It adversely fosters the process of sub-division and fragmentation of farmlands and adds to the fragile and marginal lands by denudation of forests and rangelands. There is massive migration from rural to urban areas. It is the poorest of the poor who suffer from desertification and drought. Unless properly managed, the already degraded resources will be under heavy pressure. Agriculture, forestry, hunting and fishing sectors account for 66% of the rural work force. Over half of the labour force is engaged in the agriculture sector, which has been performing below potential due to various technical, social and structural constraints.

### 12.17 Warming Pakistan

An article by Fahad Malik, published in DAWN of September 21, 2016 explains what is there for us if we remain oblivious to climate change that is rapidly surfacing as an issue that eclipses all others in terms of its severity and sheer impact.

As part of the UN Framework Convention on Climate Change to reduce global warming, Pakistan has resolved to mitigate the effects of climate change by becoming signatory to Paris Agreement in April 2016. This represents a universal action plan to reduce global warming to below 2oC worldwide, and measures to implement it need to be developed based on region-specific climatic challenges.

Pakistan's contribution to global greenhouse gas emissions is relatively minuscule compared to India's and China's but the toxicity expelled into the atmosphere disrupts weather patterns of even those countries located in the vicinity that may not be directly responsible for those emissions. The cross-border spillage, coupled with our increasing dependency on fossil fuels, alarming rate of deforestation and unmonitored carbon emissions have impacted our regional climate to the point that an unprecedented ecological disaster is imminent if effective measures are not taken soon.

In spite of environmentalists' concerns since the early 1990s, it was only after the destruction of lives and infrastructure in the 2005 earthquake that the government began to recognize that climate change may not simply be a surface-level issue and that shifting water levels may also be leading to seismic shifts. The 2010 super floods ravaged lands, killing hundreds, and displacing millions. At its height, the sheer scale of the floods could be observed from space, with the Indus stretching as far as 30 km apart at certain points. In the aftermath of such disasters, German Watch ranked Pakistan eighth in 2015 in the Global Climate Risk Index of countries most susceptible to climate change.

Pakistan's known glacial count is 7,253 — the highest in the world — with 543 glaciers in Chitral alone. Unfortunately, our glaciers are melting at an exponential rate due to soaring temperatures disrupting volumetric flow in several rivers. As such, the UN has predicted low-latitude glaciers in the Himalayan range to completely vanish by year 2035. The colossal melting of ice will cause our rivers (primary source of 75% of our water supply) to flood — at first causing an overabundance of water, and then receding at an ever greater speed with no source left to replenish.

Add to it the vagaries of real estate and timber industry that have jointly claimed an astonishing 151,000 acres of forests in the country since its inception thus reducing productive forest (forests

those provide timber and fuel wood on sustainable basis) cover to a paltry 1.9%, not to mention wiping away the essential first line of defense against floodwaters and carbon emissions. These calamities transform global warming from a simple case of malfunctioning weather to an all-encompassing problem that, if left unchecked, can inadvertently influence Pakistan's existing social framework. The chain reaction could aggravate social inequalities such as resource consumption and food security, possibly leading to deadly conflicts and further instability in water-scarce provinces like Balochistan.

Unless the establishment makes exploration of renewable energy sources a part of its prime directive, weather-related catastrophes will continue to mount. Sporadic afforestation initiatives must evolve into a nation-wide movement that accounts for life, land and livelihood — else our country runs the risk of being at Nature's mercy.

## 12.18 Poverty

Poverty in Pakistan fell dramatically between 2007-08, when it was estimated that only 17.2% of the total population lived below the poverty line. The declining trend in poverty as seen in the country during the 1970s and 1980s was reversed in the 1990s by a variety of reasons. As of 2009, Pakistan's Human Development Index (HDI) was 0.572, higher than Bangladesh's 0.543 but lower than India's 0.612.

Considering the two Dollars a day of income and based on the World Bank report "World Development Indicators (WDI) 2015", over 50% of Pakistan's population is living below the poverty line. According to the World Bank's Poverty Head Count Analysis 2014, if income per adult in Pakistan is taken as \$ 1.25 per day, then 21.04% of the population falls below poverty line according to 2008 population estimates.

Based on 2004-05 estimates, the following table amply exhibits how widespread the menace of poverty is in engulfing the whole of Pakistan.



Poverty in Balochistan is especially pronounced where it hovers around 53% of the population meaning that more than half the population in Balochistan lives below the poverty line. As for the rural-urban divide, there is not much difference anywhere in other provinces, except Khyber Pakhtunkhwa where urban poverty (41%) is far in excess of rural poverty (34%).

**Table 9: Incidence of Poverty in Pakistan**

	Overall	Urban	Rural
Pakistan	30	28	31
Punjab	28	27	28
Sindh	27	24	30
KP	35	41	34
Balochistan	53	48	54

## 13 Plans/Rules/Acts prepared/implemented in the past

Following are the summaries of certain major policy documents prepared in Pakistan for various sectors:

### 13.1 Forestry Sector Master Plan (1992)

The Forest Sector Master Plan (FSMP) aimed at doubling forest cover in 25 years. Between 1990- 2005, Pakistan lost 625,000 hectares of forests that comes to 24.7% of its total forest cover. The per capita forest area in Pakistan is 0.03 hectare – which is well below the world average. Of the entire forest stock, only 27.6% is capable to produce commercial timber. Forests in KPK – known to have better forest cover - constitute about 6.8% of its land area. Moreover, forest quality is poor with almost half of the crown area having canopy cover of less than 25%. Interestingly, 75% of dense forests in the province are located above 2,000m while most of the rest of forests below this altitude are severely degraded. Finally, vast majority of mature forests are growing in steep zones while only about 12% of forest stands are situated on flat to-steep terrain. In terms of accessibility, these are the only ones viable for intensive or social forest management.

Because of this dismal situation, Forestry Sector Master Plan was conceived and prepared in 1992 by the Government of Pakistan with financial and technical assistance from donor agencies. The Master Plan is an overarching document that provides general vision for forestry sector and identifies priorities over the plan period to streamline support for the sector in the future.

Broadly speaking, goals identified in the plan were (a) to protect, manage and rehabilitate forests; (b) increase fuel wood production in upland watersheds and lowland farms; (c) improve land use and productivity; and (d) to cater to rising poverty. The plan, by its very nature, does not deal with specific issues with the aim of providing solutions to the problems, however, it does provide for a significant expansion in government capacity to manage forests.

### 13.2 National Conservation Strategy (1992)

The National Conservation Strategy (NCS), in part a response to the 1992 floods, is aimed to approach the entire set of economic concerns through a sustainable development framework. The NCS was not limited to forestry

rather in fact, it is considered the landmark document whose recommendations on incorporating environmental concerns remain extremely relevant to government policy making even today.

### **13.3 Sarhad Provincial Conservation Strategy (1996)**

The Sarhad Provincial Conservation Strategy (SPCS), 1996 was a direct result of consultations that followed the National Conservation Strategy. The SPCS is a specific document that, like the NCS, sought to bring sustainable development into mainstream and provincial policy formulation and implementation. The SPCS provided the impetus for much of the reform options presented concerning the forest sector in the past decade.

### **13.4 Balochistan Conservation Strategy (2007)**

The Balochistan Conservation Strategy (2007) is the counterpart of the SPCS in Balochistan. It highlighted the Province's priorities for conservation through sustainable development, giving due attention to forests as one of the focus areas.

### **13.5 Provincial Forest Resource Inventory**

In early 1990s, the then NWFP government sought to compile real time information on the state of NWFP forests. The Provincial Forest Resource Inventory (PFRI) was conducted utilizing GIS imagery and data collected from across the province. The PFRI contradicted all earlier survey findings that painted a much rosier picture about the state of forests. It was the result of the PFRI that really signaled to the urgency of implementing a reform process, lest all forests be lost over the short to medium term.

### **13.6 Hazara Community Participation Rules (1996)**

The Hazara Community Participation Rules were enacted for protected forests in 1996 and extended to reserved forests in 1997. These rules

were the first upgradation to the 1936 Hazara Forest Act and designed to bring in community participation in the management of protected and reserved forests through the Joint Forest Management (JFM) approach.

### **13.7 The NWFP Forestry Commission Act (1999)**

As part of the reform process in 1999, the NWFP Forestry Commission Act was designed to establish an independent commission to oversee the work of the Forest Department as well as to ensure proper implementation of various reforms suggested in the reform process. A Forestry Roundtable was also to be established under the Act in order to ensure stakeholder participation.

### **13.8 The NWFP Forest Policy (1999)**

The Provincial Forest Policy detailed, in line with the FSMP, various objectives to ensure that the revised forestry management system continues to be developed. The policy by and large reiterates all objectives already laid down in previous policy documents.

### **13.9 Punjab Forest Policy Statement (1999)**

In 1999, the Punjab Forest Policy Statement was prepared which outlined the priorities of the forest policy. The stipulations included in the statement and its general direction resembled the priorities of the NWFP reform process.

### **13.10 Draft National Forest Policy (2001)**

A draft National Forest Policy was floated in line with the forest reforms spearheaded by initiatives in NWFP. The Policy outlines the broad set of objectives casting the net wider than simply forest preservation. It highlights poverty alleviation as a major objective and details an action plan for sustainable management of all types of forests. It is an open-ended document, which needs further channeling to be readily implementable. A final national forest policy has still not been promulgated.

### 13.11 NWFP Forest Ordinance (2002)

The entire set of policy documents and initiatives under the NWFP reform process needed a legal basis for effective implementation. For this purpose, the NWFP Forest Ordinance, 2002 was promulgated. The Ordinance replaced the Forest Act 1927 and the Hazara Forest Act 1936. In 2003-04 detailed Forest Management Rules were established under the Ordinance that provided for a specific regulatory framework to implement the reform process.

### 13.12 Biodiversity Action Plan (1999)

The Biodiversity Action Plan sets out a strategy for action under 13 main components which correspond to the Articles of UN Convention on Biodiversity: (2) planning and policies; (2) legislation; (3) identification and monitoring; (4) in-situ conservation; (5) ex-situ conservation; (6) sustainable use; (7) incentive measures; (8) research and training; (9) public education and awareness; (10) environmental impact assessment; (11) access issues; (12) exchange of information; and (13) financial resources.

For each component, issues relevant to Pakistan were identified and a list of objectives and corresponding actions were recommended to deal with the identified issues. Slowing the rate of biodiversity loss in Pakistan will require policy and institutional reform as well as institutional strengthening to better understand the elements of biodiversity and the most effective means for ensuring the conservation and sustainable use of these elements. Active participation and support of local communities will be essential for in-situ conservation. The Plan calls for greater collaboration between government agencies, local communities and NGOs to work together as partners in biodiversity conservation.

### 13.13 Ten-year National Perspective Plan 2001-2011

The plan visualizes long-term macroeconomic and sectoral growth strategies. As effective implementation is the key, a steady movement towards 2010-11 will be vigorously pursued

through operational strategies embodied in the Three-Year Development Programme, which will roll over every year.

Key objectives of the Perspective Plan are:

- (a) Accelerating GDP growth, reduce unemployment and alleviate poverty;
- (b) Financing growth, increasingly by Pakistan's own resources;
- (c) Government to improve its income-expenditure configuration to contain domestic borrowing;
- (d) Private Sector to transform a larger proportion of its saving into foreign exchange through exports;
- (e) Improvement in competitiveness by promoting productivity, efficiency, and quality;
- (f) Build human capital base for long-term, self-reliant growth; and
- (g) Institutionalize social capital conducive to sustainable development

### 13.14 Sindh Sustainable Development Strategy (2007)

After the development of the World Conservation Strategy, each country was expected to develop its own National Conservation Strategy (NCS). Pakistan was among the first few countries to start this process. One of the main recommendations of the NCS was for each province to develop a Provincial Conservation Strategy. This was done by the NWFP (now KPK) and Balochistan, followed by Northern Areas (now G-B).

While Sindh is rich in natural resources, it is also subject to a host of environmental and developmental issues. There is a severe water shortage in the province, especially in the arid and desert areas. Land is also afflicted by desertification, waterlogging, and salinity. Forests occupy only 2.5 percent of the total land area of Sindh while tree coverage has been rapidly decreasing due to overgrazing and felling. Moreover, there has recently been extensive intrusion of the sea into the Indus Delta, which has destroyed a large portion of agricultural land

and has impacted the livelihoods of the local people adversely. Owing to these factors and other issues such as poor economic and social development, the province has a high incidence of poverty and rural-urban migration. Recurrent droughts further compound the problems. Therefore, it was felt necessary that a sustainable development and good governance initiative be undertaken in the Province.

In light of the issues in Sindh, IUCN Pakistan provided technical assistance to the Planning and Development Department (P&DD), Government of Sindh to develop the Sindh Strategy for Sustainable Development (SSSD). This document serves as a planning framework for sustainable development in the Province.

### **13.15 National Climate Change Policy (2012)**

The National Climate Change Policy provides a framework for addressing the issues that Pakistan faces or will face in future due to the changing climate. In view of Pakistan's high vulnerability to the adverse impacts of climate change, in particular extreme events, adaptation effort is the focus of this policy document. The vulnerabilities of various sectors to climate change have been highlighted and appropriate adaptation measures spelled out. These cover policy measures to address issues in various sectors such as water, agriculture, forestry, coastal areas, biodiversity and other vulnerable ecosystems.

Notwithstanding the fact that Pakistan's contribution to global greenhouse gas (GHG) emissions is very small, its role as a responsible member of the global community in combating climate change has been highlighted in it by giving due importance to mitigation efforts in sectors such as energy, forestry, agriculture and livestock.

### **13.16 Action Plan for the Implementation of National Forest Monitoring System (NFMS), 2015**

Forest resources of Pakistan are depleting at an alarming rate of 2.1% per annum with only 5.01

% of land cover as forests. This is a serious threat given the unabated rise in population and associated wood demands, encroachments over forest area have all led to adverse impacts on climate. A number of policies mentioned earlier have been developed by the federal and provincial governments, but there has been no formal national level forest monitoring system in Pakistan to monitor forest resources and their sustainable management. Pakistan also lacks a well-defined institutional arrangement, with associated roles and responsibilities and a mechanism for reporting to international conventions.

### **13.17 Pakistan River Act, 2016 (Draft)**

An initial draft of the proposed River Act has been submitted to the Water and Power Ministry in an effort to lay down proper flood protection and management measures necessary to make provisions for proper management of rivers and their tributaries and other related matters.

The proposed legislation envisages active flood control measures through preventive and mitigation parts by proper management of commercial, recreational and development activities around the rivers. Experts say that this approach is a step forward, as it could help the country ward off the threat of flooding.

### **13.18 National Forest Policy, 2015 (Draft)**

Although the National Climate Change Policy (2012) contains a number of forestry-related mitigation and adaptation measures, however, forestry is much more than a sink of carbon emission and source of sequestration. Therefore, it is imperative for the Government of Pakistan to promulgate an umbrella Forest Policy that reinforces provincial forest policies. This Policy does not seek to intervene in provincial domains but is designed to be supportive to the provincial forest policies and programmes. Most of the guidelines and measures contained in this Policy shall be applicable to the Federal government within its constitutional mandate. Before 18th

amendment in the Constitution (2010), the Federal government had been supplementing provinces and territories in the form of technical and financial support in Forestry sector without a national forest policy. This Policy shall provide a legal basis for the Federal government to arrange and extend support to all provinces and territories towards achieving their respective targets and meeting international obligations by filling in their capacity and financial gaps.

### **13.19 National Commission on Agriculture (NCA) 1988**

The National Commission on Agriculture was appointed by Prime Minister Muhammad Khan Junejo in 1986 under the chairmanship of Sartaj Aziz, Minister of Agriculture. The tradition of appointing commissions to make recommendations to the governments on agricultural policy goes back more than a century to the time of the British rule in India. The NCA presented its report to the government in March 1988. Its reach and recommendations were comprehensive in that they argued for the radical transformation of agricultural sector. It was of the view that the way the sector was organized it would not be able to realize its full economic potential. That potential was large but could only be achieved if the government was prepared to undertake some major changes in the way land was owned, water supplied, inputs marketed, surpluses sold, and taxes collected. The commission's report was made public only a few months before the government of Muhammad Khan Junejo was dismissed by President Zia ul-Haq. In the political uncertainty in which Pakistan functioned in the 1990s, no government had the time or the inclination to think through the recommendations made by the Commission. It was only under the government headed by General Pervez Musharraf that Pakistan began to seriously address the question of structural reform of the agricultural sector.

### **13.20 The Draft National Food Security and Agriculture Policy 2013**

The Policy aims to create a modern, efficient and diversified agricultural sector that can ensure a stable and adequate supply of basic food supplies for the country's population; provide high quality products to its industries and for export; ensure attractive incomes and decent employment for those who live and work in rural areas; use the resource base in an efficient and sustainable manner; flexibly adapt to climate change and be resilient enough to quickly recover from shocks and emergencies; and ensure that all sections of the population have stable access to adequate, nutritious and safe foods necessary for a healthy life. It also aims to achieve value added growth in the agriculture sector for both domestic and export markets and achieve food security and to raise overall rates of economic growth for the benefit of all sections of the society. The agricultural sector needs to grow at 5 percent for reducing poverty and reaching the growth targets of 7-8 percent for the national economy of Pakistan. It also sets out a vision and goal for agriculture and food security with a set of policy directions.

### **13.21 Climate-smart Agriculture**

Pakistan needs to adapt to the new, more variable weather patterns that are emerging. This will require a series of actions ranging from adjustments in infrastructure; improve water harvesting infrastructure; better flood management protocols and procedures; and cropping and farming systems that can adapt to different weather conditions. At the same time there is a need for improved coordination and synergies between various institutions including Ministry of National Food Security and Research (MNFSR), and national, provincial and district disaster management authorities, in order to ensure that existing legislation and regulations, such as those relating to encroachment into flood plains are adhered to.

### 13.22 Livestock Policy

The thrust of new Livestock Policy is to reduce poverty and develop rural areas with special emphasis on a substantial increase in bank lending for the livestock sector. For this purpose, the government will enhance banks' credit limit to up to Rs.5 million. Banks lending exclusively for the development of livestock in the rural areas will create thousands of jobs in villages.

According to the draft policy, Pakistan's population is expected to reach 217 million by 2020 and this combined with higher household incomes will generate a significant increase in the annual demand for meat products by more than 50%.

Livestock contributes nearly 9.4% to the national GDP, and account for close to 39% of the total agricultural output.

## 14 Implementation of previous policies and plans

Analyzing the forest policies and plans, it has been found that, most of the policy initiatives, until recently, had ignored the livelihood provisions for local communities. However, even the conservation aspect of those policies was never implemented effectively. People's participation in management was not given sufficient attention and social and cultural aspects of management were ignored. The roots of this approach can be traced back to the colonial era.

### 14.1 Gaps in capacity

After the implementation of 18th Amendment, the devolved Ministry of Environment (MoE) remained far below the targeted objectives because of a number of shortcomings, for example: (a) it could not establish an effective coordination mechanism for the implementation of NAP; (b) it remained inconsistent in its implementation strategy; (c) it could not develop coordination among various concerned institutions and organizations; (d) it could not develop and implement any project or programme ; (e) it adopted an ad-hoc approach; and (f) it did not appoint a National Focal Person to coordinate the implementation of the provisions of NAP.

The National Action Plan for combating desertification helped in identifying gaps in capacity for the planning of sectoral projects. Some of the gaps in capacity to integrate desertification in planning for various sectors are listed as under:

- Lack of appropriate planning process for preparation of project documents e.g. project identification, formulation, and appraisal
- Insufficient participation of experts, especially in multi-dimensional and integrated projects
- Hardly any resources are made available to constitute Missions for the identification, formulation and appraisal phases of project planning
- Insufficient participation of beneficiaries in the planning process because the experts involved in project planning have a strong assumption that they are the best judges of project interventions
- PC-I has to be followed strictly and process of modification is extremely difficult. The rigid approach is one of the major limitations for effective implementation of developmental projects
- Re-planning, fixing and re-fixing of targets based on the real-life situation is a difficult task within the rigid framework of the PC-Is
- The delay in project funding and inappropriate costing results in delays in completion of projects



- Project durations exceeded the planned duration and completion was normally at higher costs
- Experts normally involved in preparation of project documents are those who are not directly involved in conducting appraisals with the stakeholders; they do not have the capacity to conduct participatory appraisals and planning to identify problems and documentation of options for development of solutions
- Serious gaps existed in capacity for participatory appraisals, planning and formulation of projects with concerns related to environment, desertification and global warming

## 14.2 Analysis of National Action Programme

This process should have involved detailed analyses from technical, environmental, policy, institutional, and financial perspectives. Overall implementation of NAP has been weak and as a

**Table 7: Intensity and extent of erosion in Pakistan**

Project	Implementing Agency	Budget (million US\$)	Duration
Environmental Rehabilitation in NWFP and Punjab	NWFP Forest Department and Punjab Forest Department	20.0	1997-2002
Barani Village Development Project	Agency for Barani Area Development, Govt. of Punjab	25.1	1999-2007
NWFP Barani Area Development Project	Government of NWFP	98.7	2003-2009
Southern Federally Administered Tribal Areas Development Project	Government of NWFP	21.8	2002-2009
Dera Ghazi Khan Rural Development Project	Government of Punjab; NRSP	40.0	1999-2006
Increasing rangelands productivity through rangeland improvement and mitigate poverty	Sindh Forest Department	6.0	2003-2008
Combating desertification in Riverine Forests of Sindh	Sindh Forest Department	2.0	2005-2008
Revamping rangelands with participation of stakeholders	Cholistan Range Management Division, Punjab		2005-2008
Control of hill torrents in Dera Ghazi Khan	Soil Conservation Directorate, Govt. of Pakistan	1.4	2004-2006
Establishment of water recharge system through construction of mini dams in Soon Sakesar and Mohar area of district Khushab	Soil Conservation Directorate, Govt. of Pakistan	0.3	2003-2006
Pastoral Livelihood Support Program by SCOPE	SCOPE	0.03	2000-2006
Creating Asset for rural women	SCOPE	0.05	2000-2006
Water Harvesting Program in Sindh, Kohistan	SCOPE	0.065	2000-2006
Sustainable Land Management Project to combat desertification in Pakistan	Ministry of Environment, Govt. of Pakistan	17.0	-
Mitigation of Drought Disasters in Cholistan desert by management of water resources	PCRWR, GoP	2.5	-
Mitigation of desertification for poverty alleviation (MDPA)	PCRWR, GoP	-	-
Rehabilitation of saline and water-logged areas	IWASRI, GoP	-	-

consequence, its objectives through half-hearted implementation could not be achieved as envisaged. Major factors responsible for the ineffective implementation of NAP included:

- Non-establishment of National Desertification Control Unit (NDCU) at federal and provincial levels. Resultantly, there was very weak coordination among the various organizations involved in executing the NAP-related activities.
- Absence or weak capacity of federal and provincial focal organizations to coordinate the planning, formulation and implementation of projects addressing NAP-related activities.
- Though thrice reconstituted, yet the NCCD has remained non-functional to this day, in overseeing, guiding and reviewing the NAP implementation.
- Weak departmental capacity to develop and implement projects related to desertification and land degradation.
- Absence of collaboration among various line agencies and other organizations
- Lack of adoption of any procedure to perform periodic assessment of resources
- Lack of use of latest assessment tools, for example GIS-based maps
- Non-inclusion of SLM, at least as an elective subject, at higher secondary school level
- Non-availability of land use policy and plans at national and provincial levels

However, during the last decade, a number of projects related to desertification and land degradation under the federal and provincial PSDPs and ADPs have been implemented. These are summarized in the table-10:

Institutional, technical and financial capacity to implement NAP was weak as indicated in the foregoing paragraphs. At the time when NAP was developed through a wider consultative process, some gaps in the capacity to integrate desertification control and implementation with planning process for various sectors were highlighted. Later during 2009, the then Ministry of Environment undertook the National Capacity Self Assessment (NCSA) exercise to review gaps

in the implementation of NAP in accordance with provisions of NCCD and of course, the fastly changing ground realities.

Implementation of NAP required inter-agency cooperation for joint programming, planning and in some cases required joint implementation and day-to-day operational coordination to achieve its objectives. For example, range improvement, development and management cannot be carried out without joint programming by Forest, Livestock, Agriculture and Soil Survey departments, involvement of herders and CBOs. Hence, a strong coordination between the departments/ agencies to implement joint NAP-related programmes were required. In addition, capacity building and review of the mandates of the relevant organizations was considered necessary to focus on the conservation and sustainable use of natural resources in general and implementation of NAP in particular. Although these institutions undertook various projects complimenting NAP objectives over the past, all these efforts were in isolation and no collaborative arrangement had ever been adopted. Major reason for lack of such coordination relates to the fact that “National Desertification Control Unit” could not be established thus far. Similarly, such units were also not established at the provincial level.

#### **14.2.1 Gaps in capacity**

Some of the significant areas that lacked substance include:

- Absence of enabling policy, legislative and institutional conditions
- Lack of involvement of key stakeholders/decision makers in the process
- Lack of rural poor participation in sustainable natural resource management
- Lack of strong political will and weak implementation mechanisms
- Lack action plan as NAPs did not detail cost of investment
- Insufficient funds for implementation, even from Global Mechanism
- Lack of integration of NAP in to national development plans

- Weak institutional capacity, especially in terms of focal points /coordinating units
- Inadequate inter-ministerial coordination
- Lack of awareness and access to relevant information
- Limited use of science and technology in formulating the NAP
- Inadequate basic data for planning and assessment
- Absence or weak monitoring and evaluation process

#### 14.2.2 Gaps in policy

- Absence of land use policy both at the federal and provincial levels supported by appropriate legislation
- Absence of sectoral initiatives aiming at mitigation and adaptation to changing climate scenarios
- Little awareness of DLDD issues among planners and policy makers
- Weak capacity of law enforcing and policy implementing agencies
- Weak coordination among provincial line departments and federal agencies
- Divided jurisdiction of natural resource management which results in disputes
- Out-dated forest laws
- Low participation of stakeholders at grassroots level in the policy and planning process
- Undefined rights of local communities for NR use and conservation
- Undefined land tenure rights of communities
- Lack of political commitment to implement policy reforms Inconsistent participation of national focal point in Conference on Parties (COPs) of UNCCD

#### 14.2.3 Technical Gaps

- Insufficient trained manpower in the disciplines related to DLDD and SLM
- Lack of awareness at community level about SL technologies
- Absence of land use policy and conversion of natural lands to other uses
- Poor know-how of alternate energy sources to minimize use of fuel wood

- Absence of data repository and lack of drought forecasting
- Poor dissemination and sharing of NAP document and other relevant information among relevant organizations
- Limited knowledge of decision makers / policy makers about DLDD
- Poor capacity of national focal point for coordination with UNCCD secretariat and among provinces for NAP implementation
- Absence of regular review and monitoring process
- No / poor marketing of products at community level
- Lack of innovative technologies with traditional knowledge utilization
- Absence of a National Desertification Atlas

#### 14.2.4 Institutional gaps

- Non-existence of national and provincial desertification control units to coordinate the implementation of NAP
- Thinning out of responsibility for program implementation across many organizations over large and diverse geographical areas
- Lack of coordination and overlapping of the mandates in public institutions
- Severe capacity limitations of government agencies resulting in dis-integrated policy and planning decisions, without proper communication or knowledge of inter-relations between proposed sectoral policies
- Little understanding among various agencies about consequences of above-stated weakness on land degradation and subsequent effects on economic development and ecosystem integrity
- Insufficient quantitative data on current land use in arid and semi-arid regions and other related disciplines
- Absence of institutional review system
- Isolated approach of project implementation among various institutions
- Loss of institutional memory due to rapid posting and transfers of concerned officials
- No independent agency / authority to execute NAP at federal and provincial levels

- Absence of educational discipline focused on DLDD / SLM
- Lack of an independent Land Use Development Authority with the mandate for policy formulation, resource mobilization and coordination
- Poor linkages between R&D Institutions and field based organizations

#### **14.2.5 Financial gaps**

- No mention of domestic/local financing mechanism in NAP
- Poor capacity of DLDD related institutions for exploring funds from both local and international sources such as Global Mechanism

- Non-establishment of National Desertification Fund
- Curtailing allocated budget during the implementation stage due to shift in priorities
- Complicated and cumbersome financial procedures
- Poor monitoring of funds utilization
- Political instability and inconsistency among policies and priorities
- No focus / legislation to promote PPP on Public-Private Partnership and Corporate Social Responsibility
- Less focus on Innovative Financial Resource Mobilization
- Absence of community contribution / local community managed funds

## 15 National Action Programme - 2002 and its Implementation

### 15.1 International Protocols

Pakistan has committed towards conservation of environment and natural resources by signing and ratifying a number of international environment agreements and protocols. It is party to conventions on biodiversity; climate change; desertification; endangered species; hazardous wastes; wetlands; etc. At the country's level, many laws and legislations pertinent to the environment have been formulated and approved by the Federal and provincial governments.

### 15.2 Financial Framework

Federal and provincial governments approved and implemented various projects costing Rs.28.333 billion which to some extent contributed towards realizing NAP objectives. However, in the absence of any inter-agency collaboration, their impact was not appreciable.

Similarly, international NGOs like WWF-Pakistan, IUCN Pakistan, UNDP and SCOPE undertook some projects in various regions of the country but no effort was made to assess the impact of their interventions.

And finally, the then Ministry of Environment did not establish National Desertification Control Unit that could have evaluated impacts of different activities. This was because emphasis of the government remained focused on Federal/Provincial Public Sector Development Programmes. Green funds for environmental support services, fee on exports, conservation fee on hunters and grazing fees on public lands could not be imposed as envisaged under NAP.

There is, therefore, a need to develop an integrated financing strategy for NAP implementation at the Federal and provincial levels in light of the constitutional modifications made under the 18th Amendment.

### 15.3 Capacity for implementation

Institutional, technical, and financial capacity to implement NAP aligned with the provisions of UNCCD and planning of sectoral projects remained weak. At the time when NAP was developed through a wider consultative process, some gaps in the capacity to integrate desertification control and NAP

implementation with planning process for various sectors were highlighted. Later during 2009, the Ministry of Environment undertook National Capacity Self-Assessment (NCSA) exercise to review gaps in the implementation of NAP in the changing scenario.

The project cycle management, participatory approach, coordination and capacity-building aspects were neglected while the NCSA, 2009 highlighted the areas of knowledge management, awareness, land use planning, data gathering, monitoring & evaluation, human and institutional capacities.

## 15.4 Pilot Phase Achievements

There were 5 distinct outcomes which were to be achieved under the pilot phase. The major outcome was Outcome 4: on-the-ground interventions to demonstrate SLM practices in 11 pilot districts of Punjab, Sindh, Khyber Pakhtunkhwa, and Balochistan. A summary of outcome-wise achievements are given below:

### 15.4.1 Creating enabling environment for mainstreaming SLM into sectoral policies and planning

- 1) Conducted sectoral reviews of National Forest, Water and Agriculture policies in the context of SLM, NAP & UNCCD. The reports of the study on sectoral reviews of these policies in the context of SLM, NAP & UNCCD, were printed and disseminated among stakeholders.
- 2) NAP review and gap analysis was conducted, report prepared, printed and disseminated among stakeholders.
- 3) Detailed UNDP project document and GEF CEO endorsement form for the up-scaling phase of the SLMP prepared and got approved from the UNDP and GEF Secretariat.
- 4) To mobilize provincial counterpart funding (co-financing), provincial PC-Is for the up-scaling phase were prepared and got approved from the respective Provincial Development Working Parties (PDWPs).

- 5) Enabling Activity Project Document was prepared and got approved from the GEF-UNDP for NAP alignment and strengthening UNCCD reporting processes.
- 6) Project proposal for NAP Alignment and Strengthening National Reporting Processes, requesting GEF/UNDP grant of US\$148,500 was prepared and got approved for funding.
- 7) Background paper on criteria and indicators for SLM was prepared and shared with stakeholders in a consultative workshop.
- 8) Operational guidelines for development of local SLM funds prepared and contract agreements for the establishment of 5 local level SLM Funds were signed having community contribution from 8 villages in D.I. Khan and Tharparker districts. Provided loans to the local community members for SLM interventions and recovered the amount in installments.

### 15.4.2 Capacity building of line agencies and other implementing partners for SLM

- 1) Conducted 10 national workshops, 15 provincial/district workshops and training workshops for 2,800 community activists.
- 2) Conducted in-country exchange visits for staff of SLMP, line agencies and CBO members in the four provinces.
- 3) National Coordination Committee to combat desertification reconstituted & 4 provincial coordination committees to combat desertification established.
- 4) Training Need Assessment completed.
- 5) Four persons from SLMP Climate Change Division and P&D Department, Government of Balochistan conducted an exchange visit to China for one week. SLMP management participated in different international forums and meetings under UNCCD.
- 6) Completed implementation of 2 Targeted Research Projects in collaboration with PMAS Arid Agriculture University, Rawalpindi and PARC-Arid Zone Research Center, Quetta
- 7) Completed implementation of one Public-Private Partnership project in collaboration with Zimindara Seed Corporation (Private

organization) and Barani Agricultural Research Institute, Chakwal; and

- 8) Completed implementation of Flood/Drought Early Warning System in collaboration with the Pakistan Meteorological Department and WFP.
- 9) Conducting a study on Operational and policy aspects of the Rodh Kohi System in collaboration with University of Agriculture, Peshawar.
- 10) Conducted study on extent of desertification in Khyber Pakhtunkhwa
- 11) Developed advocacy & awareness raising material and prepared draft Communication Strategy for SLMP.
- 12) Observes World Day to combat desertification each year on 17th June

#### 15.4.3 Mainstreaming SLM Principles into land use planning

- 1) Prepared draft guidelines for village and national level land use planning for SLM. The guideline for village land use planning for SLM in Urdu language was printed and disseminated among stakeholders.
- 2) Trained stakeholders and prepared participatory GIS based village land-use plans for SLM of 62 project villages in collaboration with local CBOs, line departments and NGOs.
- 3) Signed a Memorandum of Understanding (MoU) with Pakistan Poverty Alleviation Fund to jointly fund SLM related interventions planned under participatory GIS based village land use plans for SLM. PPAF provided financing for three schemes costing Rs.2.16 Million in villages in Lakki Marwat and Pishin districts.
- 4) Trained stakeholders for GPS data collection and participatory ground truthing of satellite data.
- 5) Geo-database of 63 villages was developed. Present and future land use change maps for SLM were prepared.
- 6) Procured ASTER satellite data and prepared baseline database and thematic maps of 14 districts.
- 7) Conducted a study on role of GIS/RS in SLM. The report of study on role of GIS/RS in SLM

was printed and disseminated among stakeholders.

- 8) Undertook GPS coordinates of on-the-ground SLM activities implemented under SLMP to map and verify the activities and their covered area.
- 9) SLMP website was developed and up-dated.
- 10) Prepared performance indicators and monitored performance of pilot projects under SLMP.
- 11) Drafted sustainability/impact indicators for on-the-ground SLM activities implemented under SLMP and shared with stakeholders in a consultative workshop.

#### 15.4.4 Activities to demonstrate SLM Practice

Implemented 11 pilot projects to demonstrate on-the-ground SLM activities (2 in Punjab, 2 Sindh, 2 KP and 5 in Balochistan) covering 71 villages. The cumulative achievements under pilot projects are given below:

- 1) Dry afforestation/plantation: 1,493 acres
- 2) Rangeland reseeding: 1,900 acres
- 3) Water harvesting structures/ponds: 215
- 4) Soil conservation/kana plantation: 405 acres
- 5) Rehabilitation of degraded land: 200 acres
- 6) Low delta crops/dry-land fruit cultivation: 222 acres
- 7) Shelterbelts/woodlots: 705 acres
- 8) Rod plantation/shelterbelts: 60 Avenue km
- 9) Energy/hill side ditch plantation: 480 acres
- 10) Strengthening of earthen bunds: 35,500 feet
- 11) Construction of Rod water diversion bunds: 16
- 12) Forest/fruit plant nurseries: 48
- 13) Micro irrigation system: 36 acres
- 14) Installed improvised irrigation system: 48 peter engines with water pumps
- 15) Excavated groundwater bore holes: 189
- 16) Water distribution system through underground piping and hydrants: 165 acres
- 17) Farm water inlet and gated structures: 143
- 18) Sowing of perennial grasses: 100 acres
- 19) Kandi pruning: 28,000 plants
- 20) Citrus plantation in Mirani Dam area: 4,000 plants

- 21) Animals vaccinated: 5,500
- 22) Kana leave spreading: 50 acres
- 23) Kana chik-making machine: 4
- 24) Ban manufacturing and hammering machines to community: 25
- 25) Kitchen gardening: 100 households
- 26) Check dams: 4
- 27) Solar pumps: 5
- 28) Dug wells: 6
- 29) Medicinal plants plantation: 12 acres
- 30) Bio-sand filters for 100 households

### **15.5 Successes of previous plans complementing UNCCD's objectives**

Following are some of the prominent successes achieved during the implementation of pilot phase of NAP:

#### **15.5.1 Range Utilization Model in Pothwar Plateau**

PARC initiated a research project at Lohi Bher Range to evolve and test a package of technology for the Pothwar Plateau Rangelands. The Lohi Bher Range covering about 435 ha is located about 20 km south-east of Islamabad. Number of interventions pertaining to range improvement, vegetation dynamics, forage yield, soil and water harvesting techniques were carried out and data recorded. Range utilization model developed at Lohi Bher Range provides useful package for introducing commercial ranching and development of private livestock farms in the Pothwar Plateau.

#### **15.5.2 Gully land management through soil conservation and water harvesting**

Pothwar plateau is experiencing a serious problem of poor management and use of available land and water resources. PARC launched a project entitled "Management of land and water resources in gully-eroded area in Pothwar Plateau" with the objective to optimize land use and control water for making the soil ideal for crops, pastures and trees to protect it from erosion and other destructive influences.

Contoured trenches were constructed with small

bunds; across the slope of the land on a contour so that long slope is cut into a series of small ones and each contour bund act as a barrier to the flow of water thus controlling run-off. To drain excess water and rainstorms during monsoon season, grassed waterways and outlets were provided. The tree plantation was made in the eye-brow terraces along the contours, whereas the pasture species were planted in the contour-bunded fields without much land shaping. Surface run-off decreased to 19% with the adoption of eyebrow land shaping technique and planting *Leucaena* plant with elephant grass. Performance of *Leucaena* was at the top with average growth rate of 23 cm/month; *Eucalyptus*, *Poplar*, *Mulberry*, *Guava*, *Plum*, *Apricot*, *Loquat* and *Ailanthus* were also planted successfully.

Vegetation cover and frequency of desirable grass/forests increased due to protection. Under rain-fed conditions of Pothwar, grass yield can be increased manifold if simply enclosed and grasses are clipped whenever ready for cutting. The increase in ground cover will also help to overcome the soil erosion problem. Thus, this model demonstrated the technology for the utilization/reclamation of gullied land for livestock, crop production and afforestation under rain-fed conditions.

#### **15.5.3 Range improvement through community participation**

Pakistan Agricultural Research Council initiated Operational Range Research Programme (ORP) in Pothwar to ensure transfer of technology to the end users, in this case livestock farmers. It essentially involved application of known rangeland interventions on the farmer's field by the farmers with the technical input from the range scientists. Range improvement operations such as reseeding, planting of trees and shrubs and cultivation of fodder crops was done according to land suitability and with the active participation of local farmers.

Within two years the forage production increased five-fold improving the production potential, reducing soil erosion and providing better habitat



for local fauna and flora. Forage crops such as Dhaman, cowpeas and sorghum became so popular that about 60-70 percent of the farmers in the area grow these fodders now.

The farmers have also started producing seed of the fodder crops. Impressed with the outcome of ORP approach, several livestock farmers in the Pothowar tract are seeking technical help for establishing small scale commercial ranches/livestock farms.

#### **15.5.4 Salinity control and reclamation of affected areas**

In Indus basin region of the country majority of the salt-affected soils are saline-sodic. Secondary salinity, which is related to modern irrigation system in Pakistan, is the result of either (a) accelerated redistribution of salts in the soil profile due to high water table or (b) the use of insufficient water to leach salts out of the soil.

To tackle the problem of salinity and water logging, WAPDA undertook a programme of soil reclamation throughout the country in the early sixties. Data have been collected in respect of crop acreage, cropping patterns, cropping intensity, crop yield and fertilizer application in the project area. Cropping intensity increased from 75% (pre-project) to 121% in 1985 as a whole and 159% on selected farms. In the Soil Conservation and Rehabilitation Project (SCARP) area, cropping pattern of rice, sugarcane, maize, wheat and fodder increased considerably. Yield of major crops like rice, sugarcane, maize and wheat improved considerably.

The development of animal husbandry is very important as it is an integral part of agricultural development. There was a 67% increase in the total population of cattle and buffaloes. Milk production increased by 56.8% while meat production increased by 66%. Hence, gross value of production showed an increase of 116% over the base year. This has added to the prosperity and health of the people of the project area.

#### **15.5.5 Rehabilitation of desert ranges through reseeding**

Artificial reseeding is prescribed when natural vegetation cannot recover within a short period and there are few desirable species. In desert rangeland, grass is often seeded in strips. In the Thal area, planting tufts of *Cenchrus ciliaris* and *Lasiurus sindicus* on shifting sand dunes dramatically increased forage yield. These species have been reseeded successfully over thousands of hectares in Thal and Dhabeji rangelands. *Lasiurus sindicus* has done well in sandy soils where annual rainfall is as much as 350 mm.

*Cenchrus ciliaris* can be reseeded on all types of rangelands with sandy, sandy loam, stony and deep and red soils. These grasses perform well in the areas with annual rainfall between 150 and 750 mm. With proper water distribution, *Dichanthium annulatum* was seeded over a large area in Rakh Miran (Dera Ismail Khan). It naturally occurs on heavier soils with higher rainfall and performs well in regions where rainfall exceeds 400 mm per year.

#### **15.5.6 Forage Reserve establishment in arid highlands of Balochistan**

*Atriplex canescens*, commonly known as four-wing saltbush is an evergreen shrub with dense foliage having extensive root system and is adapted to wide range of soils and climates. Four-wing saltbush can successfully be established in highland Balochistan rangelands by using proper soil moisture conservation techniques. The most desirable characteristics of the plant include its extreme drought and cold tolerance and high quality browse especially during autumn and winter months.

Four-wing saltbush has the tremendous capability of re-sprouting after cutting/pruning. After establishment, stands cut few inches above ground level during late autumn and winter re-sprout more vigorously during next spring season with fresh and tender leaves and shoots. It shows the potential of this plant as a fuel wood resource

in areas with a high demand for fuel wood in addition to forage for livestock.

There is a huge demand of fuel wood in highland Balochistan for cooking and heating rooms during winter period. Local shrubs are uprooted and are used as fuel wood, which leads to the degradation of rangelands. Four-wing saltbush can be promoted as a sustainable source of fuel wood and can help reduce uprooting of local shrubs from already denuded rangelands.

### **15.5.7 Reclamation of salt-affected areas**

Kallar grass (*Leptochloa fusca*) is widely distributed in the salt-affected areas of Pakistan. This grass has been used to reclaim large salt-affected areas in the Central Punjab and the farmers are now making a good living by raising buffaloes, cattle, goats and sheep. A large number of small farmers are now adopting this practice, thus reducing rural to urban migration. This grass has the ability to improve the soil up to the extent that some moderately salt tolerant species as *Brasica napus*, barley and some tree species have also been grown successfully.

It was observed that penetration of Kallar grass roots in sodic soils enhanced hydraulic conductivity, microbial activity, organic matter and ultimately leaching of salts. Since Kallar grass has a quite high lignin content (up to 25%), ploughing under the Kallar grass hay raises the stable organic matter level of soils. It can be concluded that where the soils are saline-sodic or sodic and the supplies of irrigation water are saline, the growing of Kallar grass can be a viable method for the economic utilization of such soil and water resources. At the same time for growing plants on saline-sodic or sodic soils with good quality or sweet irrigation water, Kallar grass may be used as an ameliorative plant.

### **15.5.8 Desertification Control in Cholistan**

A project was executed in Cholistan by Pakistan Council of Research in Water Resources

(PCRWR) with the objective to conduct site-specific research in water, land and plant resources of deserts for making them productive and sustainable, and to control desertification for developing a stable environment. The activities included; catchment area development for rainwater harvesting, establishment of ponds from harvested rainwater to provide drinking water for humans and livestock, conjunctive use of rainwater and saline water, grass land development, mustard cultivation under saline water irrigation, and land horticulture under conjunctive irrigations, range land development, jobo cultivation and desertification assessment and mapping of Cholistan desert. Main grasses and browseable species successfully grown included; *Lasiurus indicus*, *Panicum antidotale*, Wild millet, *Cenchrus ciliaris*, *Acacia nilotica*, *Ampliceps* (*Acacia australina*), *Parkinsonia* and *Atriplex*.

### **15.5.9 Restoration of land productivity in Barani lands**

Agency for Barani Areas Development (ABAD) has been implementing integrated programmes in rainfed areas to check land degradation. They have been successful in restoring land productivity of agricultural land, biodiversity and vegetation cover in these areas. This is evident from the extent of activities such as:

Terracing & leveling (22,444 ha), land reclamation (6,110 ha), gully plugging (8,786 ha), water disposal outlets (8,786 ha), fruit trees plantation (264,100 plants), social forestry (27.473m plants) and public forestry (5027 ha). ABAD has also initiated a number of activities for the construction of small dams, mini dams, dug wells, and to check the loss of water resource in Pothwar uplands and to harness the maximum benefits from the available water resources. These activities not only developed the water resources but also reduced the soil erosion and increased the vegetative cover that improves the environment and rejuvenates the economic activities.

## 16 10-year Strategic Plan of the UNCCD

The United Nations Convention to Combat Desertification (UNCCD) has been giving due attention to land degradation especially in dry lands where the most vulnerable ecosystems exist. Ten years since its inception, the UNCCD has now been recognized as an instrument that has the potential to make a lasting contribution to the achievement of sustainable development leading to poverty reduction. However, it is also recognized that a number of limiting factors have troubled the effective implementation of the provisions of UNCCD. Major factors include insufficient financing, weak scientific basis, insufficient advocacy and awareness, institutional weaknesses and difficulties in reaching consensus on priorities among the stakeholder.

Since the Rio Conference (1992), policy environment has changed considerably. Adoption of Millennium Development Goals (MDGs) in 2000 and outcomes of World Summit on Sustainable Development (WSSD) in 2002 has resulted in increased support to the least-developed countries (LDC), stronger commitment for climate change mitigation and adaptation, and prospects of global agricultural trade liberalization.

The following template indicates the UNCCDs yardstick to develop and measure the composition and priorities that will result as a baseline to develop a set of objectives, outcomes, inputs, indicators, and the indicative budget for Pakistan:

## The Mission

To provide a global framework to support the development and implementation of national and regional policies, programmes and measures to prevent, control and

### 16.1 UNCCD 10-Year Strategy (2008 -2018)

#### The Vision

The aim for the future is to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas in order to support poverty reduction and environmental sustainability.

#### Strategic Objectives

#### Expected Impacts

1. To improve the living conditions of affected populations

1.1 People living in areas affected by desertification/land degradation and drought to have an improved and more diversified livelihood base and to benefit from income generated from sustainable land management

1.2 Affected populations' socio-economic and environmental vulnerability to climate change, climate variability and drought is reduced

#### Indicators

S1: Decrease in numbers of people negatively impacted by the processes of desertification/land degradation and drought

S2: Increase in the proportion of households living above the poverty line in affected areas

S-3: Reduction in the proportion of the population below the minimum level of dietary energy consumption in affected areas

2. To improve the condition of affected ecosystems

2.1 Land productivity and other ecosystem goods and services in affected areas are enhanced in a sustainable manner contributing to improved livelihoods

2.2 The vulnerability of affected ecosystems to climate change, climate variability and drought is reduced

S-4: Reduction in the total area affected by desertification/land degradation and drought

S-5: Increase in net primary productivity in affected areas

3. To generate global benefits through effective implementation of the UNCCD

3.1 Sustainable land management and combating desertification/land degradation contribute to the conservation and sustainable use of biodiversity and the mitigation of climate change

S-6: Increase in carbon stocks (soil and plant biomass) in affected areas

S-7: Areas of forest, agricultural and aquaculture ecosystems under sustainable management

4. To mobilize resources to support implementation of the Convention through building effective partnerships between national and international actors

4.1 Increased financial, technical and technological resources are made available to affected developing country Parties, and where appropriate Central and Eastern European countries, to implement the Convention

4.2 Enabling policy environments are improved for UNCCD implementation at all levels

S-8: Increase in the level and diversity of available funding for combating desertification/land degradation and mitigating the effects of drought

S-9: Development policies and measures address desertification/land degradation and mitigation of the effects of drought

Operational Objectives	Outcomes
<p>1. Advocacy, Awareness-raising and Education</p> <p><i>To actively influence relevant international, national and local processes and actors in adequately addressing desertification/land degradation and drought-related issues</i></p>	<p>1.1 Desertification/land degradation and drought issues and the synergies with climate change adaptation/mitigation and biodiversity conservation are effectively communicated among key constituencies at the international, national and local levels</p> <p>1.2 Desertification /land degradation and drought issues are addressed in relevant international forums, including those pertaining to agricultural trade, climate change adaptation, biodiversity conservation and sustainable use, rural development, sustainable development and poverty reduction</p> <p>1.3 Civil society organizations (CSOs) and the scientific community in the North and the South are increasingly engaged as stakeholders in the Convention processes and desertification/land degradation and drought are addressed in their advocacy, awareness-raising and education initiatives</p>
<p>2. Policy Framework</p> <p><i>To support the creation of enabling environments for promoting solutions to combat desertification/land degradation and mitigate the effects of drought</i></p>	<p>2.1 Policy, institutional, financial and socio-economic drivers of desertification/land degradation and barriers to sustainable land management are assessed, and appropriate measures to remove these barriers are recommended</p> <p>2.2 Affected country Parties revise their national action programmes (NAPs) into strategic documents supported by biophysical and socio-economic baseline information and include them in integrated investment frameworks</p> <p>2.3 Affected country Parties integrate their NAPs and sustainable land management and land degradation issues into development planning and relevant sectoral and investment plans and policies</p> <p>2.4 Developed country Parties mainstream UNCCD objectives and sustainable land management interventions into their development cooperation programmes/projects in line with their support to national sectoral and investment plans</p> <p>2.5 Mutually reinforcing measures among desertification/land degradation action programmes and biodiversity and climate change mitigation and adaptation are introduced or strengthened so as to enhance the impact of interventions</p>
<p>3. Science, Technology and Knowledge</p> <p><i>To become a global authority on scientific and technical knowledge pertaining to desertification/land degradation and mitigation of the effects of drought</i></p>	<p>3.1 National monitoring and vulnerability assessment on biophysical and socio-economic trends in affected countries are supported</p> <p>3.2 A baseline based on the most robust data available on biophysical and socio-economic trends is developed and relevant scientific approaches are gradually harmonized</p> <p>3.3 Knowledge on biophysical and socio-economic factors and on their interactions in affected areas is improved to enable better decision-making</p> <p>3.4 Knowledge of the interactions between climate change adaptation, drought mitigation and restoration of degraded land in affected areas is improved to develop tools to assist decision-making</p> <p>3.5 Effective knowledge-sharing systems, including traditional knowledge,<sup>5</sup> are in place at the global, regional, sub regional and national levels to support policymakers and end users, including through the identification and sharing of best practices and success stories</p> <p>3.6 Science and technology networks and institutions relevant to desertification/land degradation and drought are engaged to support UNCCD implementation</p>

Operational Objectives	Outcomes
<p>4. Capacity-building</p> <p><i>To identify and address capacity-building needs to prevent and reverse desertification/land degradation and mitigate the effects of drought</i></p>	<p>4.1 Countries which have carried out the national capacity self-assessment (NCSA) implement the resulting action plans to develop the necessary capacity at the individual, institutional and systemic levels<sup>6</sup> to tackle desertification/land degradation and drought issues at the national and local levels</p> <p>4.2 Those countries which have not previously undertaken capacity needs assessments engage in relevant assessments processes to identify capacity needs for tackling desertification/land degradation and drought at the national and local levels</p>
<p>5. Financing and Technology Transfer</p> <p><i>To mobilize and improve the targeting and coordination of national, bilateral and multilateral financial and technological resources in order to increase their impact and effectiveness.</i></p>	<p>5.1 Affected country Parties develop integrated investment frameworks for leveraging national, bilateral and multilateral resources with a view to increasing the effectiveness and impact of interventions</p> <p>5.2 Developed country Parties provide substantial, adequate, timely and predictable financial resources to support domestic initiatives to reverse and prevent desertification/land degradation and mitigate the effects of drought</p> <p>5.3 Parties increase their efforts to mobilize financial resources from international financial institutions, facilities and funds, including the GEF, by promoting the UNCCD/Sustainable land management (SLM) agenda within the governing bodies of these institutions</p> <p>5.4 Innovative sources of finance and financing mechanisms are identified to combat desertification/land degradation and mitigate the effects of drought, including from the private sector, market-based mechanisms, trade, foundations and CSOs, and other financing mechanisms for climate change adaptation and mitigation, biodiversity conservation and sustainable use and for hunger and poverty reduction</p> <p>5.5 Access to technology by affected country Parties is facilitated through adequate financing, effective economic and policy incentives and technical support, notably within the framework of South-South and North-South cooperation</p>

## 17 Sustainable Development Goals

Also known as the Global Goals, the idea of Sustainable Development Goals (SDG) was conceived in September 2015, as a successor to the Millennium Development Goals (MDGs). One of the goals aims to combat desertification, restore degraded land and soil including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world by 2030. It has, therefore, become a strong vehicle for driving UNCCD implementation, while at the same time contributing to other SDGs, including those relating to climate change mitigation and adaptation, biodiversity conservation, ecosystem restoration, food and water security, disaster risk reduction, and poverty.

Pakistan has accorded the highest priority to achieving these goals that will enable it to join the league of upper middle class countries by 2030. The government's Vision 2025, which is premised on seven pillars – (i) developing human and social capital; (ii) achieving sustained, indigenous and inclusive growth; (iii) governance, institutional reform & modernization of the public sector; (iv) energy, water & food security; (v) private sector led growth and entrepreneurship; (vi) developing a competitive knowledge economy through value addition; and (vii) modernization of transportation infrastructure & greater regional connectivity - has identified the kind of enabling environment that is essential to flourish economically, socially, politically, and culturally. When fully achieved, this would result in sustainable consumption and production leading to efficient use of natural resources to reduce vulnerabilities to climate change and achieve food, water, and energy security. This approach will thus minimize pressure on natural resources and help in achieving sustainable development.

The agenda of SDGs, thus, complements Pakistan's "Vision 2025" that reflects its developmental needs and priorities and provides a policy framework for the integration of new goals in its national economic and development planning.

The Global Mechanism, in close collaboration with the UNCCD Secretariat, will support interested countries in achieving Land Degradation Neutrality (LDN) target setting process, including the definition of national baselines, and measures and targets to achieve LDN by 2030.

## 18 Land Degradation Neutrality

Simply put, land degradation is the reduction or loss in the biological and economic productive capacity of land. Land degradation is mostly caused by human activities (by default or by design) and worsened by natural processes. Currently, the cost of land degradation touches US\$490 billion per year which, in fact, is much higher than the cost of action to prevent it. About 40% of the world's degraded land occurs in areas with the highest incidence of poverty and directly impacts the health and livelihoods of an estimated 1.5 billion people. There are, however, clear economic and environmental actions that can prevent and reverse land degradation. For example, the adoption of SLM could deliver up to US\$1.4 trillion in increased crop production.

In 2008, the Commission on Sustainable Development emphasized that a link exists between climate change, biodiversity loss and land degradation. Still, many countries are facing great challenges in harnessing their land resources for sustainable and equitable development. For this purpose, a concerted global effort to halt and reverse land degradation, restore degraded ecosystems and sustainably manage land resources is essential. Land rehabilitation and ecosystem restoration can also help recover productive capacity and other important services affected by mismanagement. A target to achieve land degradation neutrality would help mobilize resources and fulfill our commitment to more responsibly manage land resources.

To address the multiple Sustainable Development Goals in a synergistic and cost effective manner, countries can now formulate voluntary targets to achieve LDN, according to their specific national context and development priorities. These targets will also support the implementation of the countries' National Action Programmes.

Under the LDN Target Setting Programme, all participating country Parties will:

- receive technical guidance on how to effectively assess and define national baselines related to the indicator frameworks of the SDGs and the UNCCD, and how to establish relevant measures and targets to achieve LDN by 2030;
- have access to cutting-edge technical expertise on demand via an online LDN target setting help desk; and
- have the opportunity to participate in international capacity-building and knowledge exchange events



Affected country Parties will also receive direct technical and financial support for their national LDN target- setting processes, including:

- specialized expertise;
- access to the best available data;
- support for conducting a multi-stakeholder consultation process, mainstreaming LDN into national SDG agendas; and
- assistance in identifying LDN investment opportunities, in order to link LDN target setting with implementation

LDN, thus, provides ample opportunities to Pakistan for having access to specialized expertise, best available data for process formulation, consultation processes, and

assistance in financial opportunities to link its targets with national priorities.

### **18.1 Monitoring of LDN**

There is a pressing need to give policymakers simple messages based around a few indicators, for example:

- Capitalize work done on the UNCCD progress indicators
- Flexible and tiered approach
- Trends in land cover/land uses changes
- Trends in land productivity
- Trends in soil organic carbon stocks
- Socio-economic conditions
- National local relevant indicators

## 19 Institutional mechanism for NAP implementation

Unlike other multilateral environmental agreements that have finite number of stakeholders, UNCCD seeks to involve a wide spectrum of stakeholders from international, national and grass-root levels. Moreover, the sectoral canvas of UNCCD is extremely broad involving all institutions concerned with land management and reclamation, soil conservation, water resource use, forestry, agriculture, range and livestock, and drought management. Besides, social and financial sector institutions, both governmental and non-governmental, operating in deserts and dry land areas are also regarded as key facilitators in sustainable land management and in the control of desertification. Federal Ministries, provincial departments, local governments, community organizations, non-government organizations, R&D institutions, and academia are all players in the implementation of UNCCD in Pakistan.

Before the initiation of NAP, all of these institutions at national, provincial, district, local and grass-root levels, had already been providing services towards increasing productivity of lands and halting the process of land degradation. However, all of their efforts were implemented as “stand alone”- in isolation of one other. From 2002 onwards, a new trend evolved - consultations between different stakeholders and joint initiatives on combating desertification. Within a few years, these institutions started frequently interacting, fast assuming the form of a national network on UNCCD. Implementation of NAP requires inter-agency cooperation for joint programming, planning and in some cases, require joint implementation and day-to-day operational coordination to achieve its objectives. For example, range improvement, development, and management cannot be carried out without joint programming by Forest, Livestock, Agriculture and Soil Conservation departments besides the active involvement of herders and community-based organizations (CBOs). Hence, a strong coordination between the departments /agencies to implement joint NAP-related programmes is required.

Although these institutions have undertaken various projects complimenting the NAP objectives in the past, all these efforts were in isolation and no collaborative arrangement had ever been adopted. Major reason for lack of coordination was because of the fact that “National Desertification Control Cell” could not be established at the Federal and the provincial levels.

## 19.1 The Bottom-up Approach

When local actors participate in decision-making about the strategy and in picking up of priorities to be pursued, it leads to bottom-up approach. Based on past experiences, however, it has been concluded that the bottom-up approach may not be considered as alternative or opposed to top-down approach, but rather be used to complement it, in order to achieve better overall results.

Policies and approaches based on bottom-up approach should be designed and implemented in the way best adapted to the needs of the communities targeted to be served. The best way to do so would be to invite local stakeholders to take the lead and participate in development at local level. This becomes all the more important where there are structural problems in agriculture, forestry, environment, livestock management and many more facets of local conditions to improve the quality of rural life.

The involvement of local actors includes, among others, the local population at large preferably

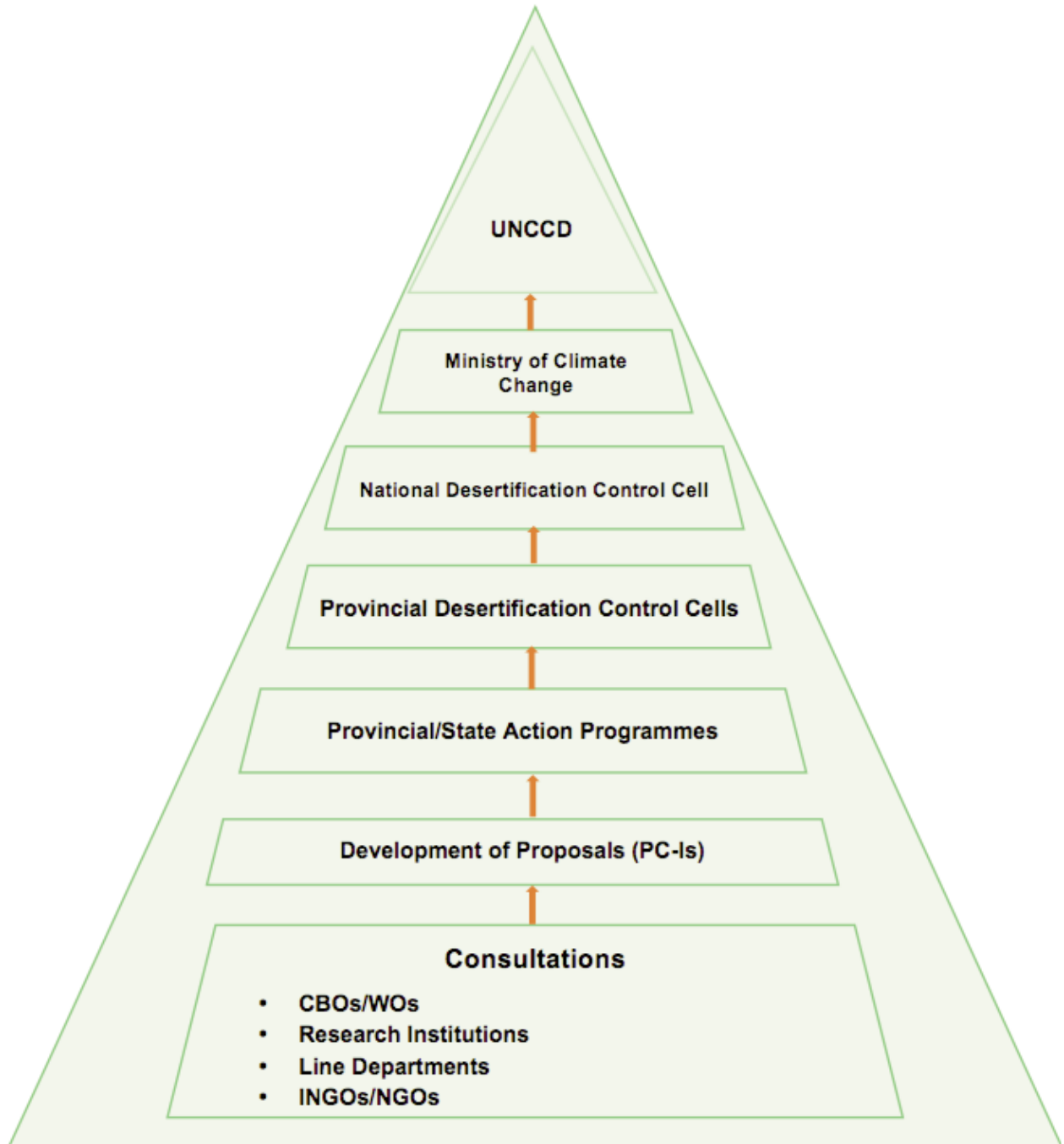
through their CBOs/WOs, economic and social interest groups (NGOs), local government representatives, etc. It may, however, be ensured that capacity-building is made an essential component of the bottom-up approach, involving:

- awareness raising, training, participation, and mobilization of the local population to identify the strengths and weakness of the area concerned;
- participation of different interest groups in drawing up a local development strategy; and
- establishment of criteria for selection of appropriate actions (projects) to deliver in accordance with the strategized priorities

Any interventions to be initiated in the rural areas under NAP should henceforth follow the bottom-up approach, subject to local adjustments but without harming its basic philosophy and purpose.

The following Conceptual Framework has been developed to clarify how the bottom-up approach in regard to NAP should function:

Fig. 26: The Bottom-up Approach for NAP Implementation



## 19.2 Schematics for NAP implementation

The United Nations Committee to Combat Desertification (UNCCD) shall act as a fulcrum to maintain equilibrium between the imperatives of its 10-Year Strategy to combat desertification and the requirements of Pakistan, through the Ministry of Climate Change (MoCC), in line with its national priorities. The MoCC in turn, shall be represented by its Focal Point. Besides coordinating between the two entities – UNCCD and MoCC – regarding matters pertaining to the control of desertification, the Focal Point shall also ensure the timely submission of periodical National Reports to the UNCCD.

The National Coordination Committee for Desertification (NCCD) representing the MoCC shall be established to provide policy support to sustainable land management besides identifying factors contributing to desertification and to devise strategies to counter the adverse effects of desertification. It shall also liaise with provincial coordination committees established to combat desertification at the provincial levels.

The MoCC may revisit the mandate of National Coordination Committee for Desertification (NCCD) from time to time to bring it in line with the changing environmental and socio-economic challenges, coordinate with provincial planning and development departments, get NAP approved, allocate budget (local and foreign exchange), formulate task-based sub-committees, establish National Desertification Control Cell (NDCC), and liaise with national and international organizations and agencies.

To ensure sustainability of NAP, a National Desertification Control Cell (NDCC) shall be established in the MoCC to coordinate the implementation of NAP, to provide policy guidance and strategic direction to enhance coordination and harmonization among various ministries and departments, besides INGOs, regarding the control and prevention of further desertification.

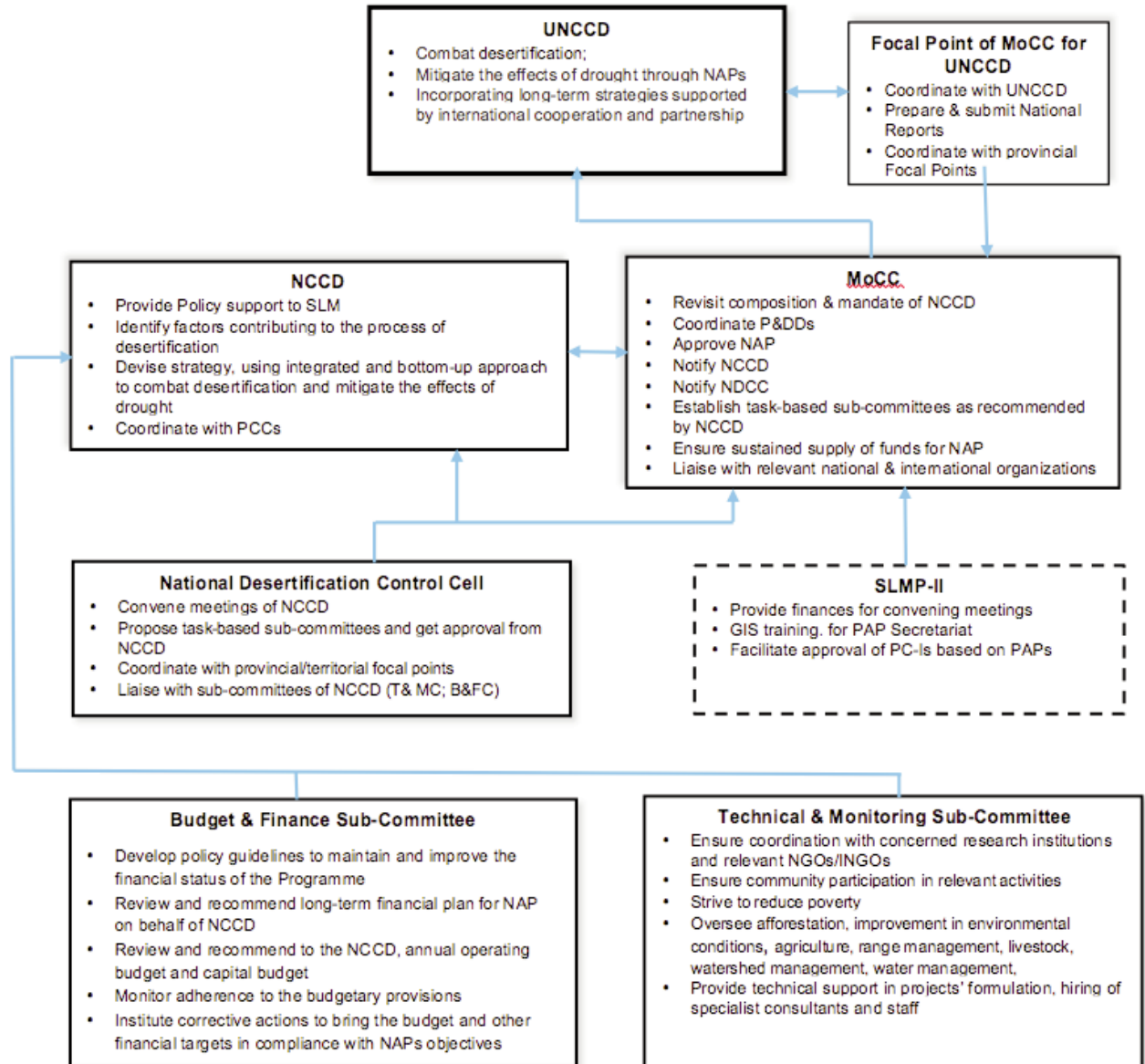
Then, there is the Sustainable Land Management Programme (SLMP) that acts as a coordinating body and bridging entity and provides technical and financial support to NCCD and its various sub-committees in convening meetings till the time the NCCD gets fully established besides the establishment of a fully functional National Desertification Control Cell (NDCC).

The Technical and Monitoring Sub-Committee of the NCCD shall have the twin responsibility of combatting desertification and reducing poverty besides providing technical support during projects' formulation. The Sub-Committee shall also provide support in hiring of specialist and admin staff and see to it that the projects are progressing as planned.

The Budget and Finance Sub-Committee shall develop policy guidelines to maintain and improve the financial status of NAP, recommend long-term financial plan for NAP, review annual budget besides monitoring the adherence to the budgetary provisions.

The following organogram has been included to give a brisk view of how various components of NAP will be implemented:

Fig. 27: Schematics for NAP Implementation



### 19.3 Constitution of National Coordination Committee to Combat Desertification (NCCD)

A National Coordination Committee was first notified on October 6, 1998 that was subsequently superseded by another notification of May, 1999 with 24 members. It had the following Terms of Reference (ToRs):

- i. Review and periodic update of National Action Programme for Combating Desertification to address the changing needs
- ii. Strengthen inter-agency coordination and advise the respective Ministries/Departments/Institutions on the specific actions to be taken by them for combating desertification
- iii. Coordinate and facilitate on the causes and consequences of desertification and coordinate information for reporting to CCD Secretariat
- iv. Promote education and public awareness and capacity-building of stakeholders for combating desertification
- v. Identify and recommend projects for donor support

Meanwhile, not a single meeting of the NCCD was convened when, it was reconstituted and notified in December, 2012. It had the following ToRs:

- Provide guidance for implementation of the UNCCD and National Action Programme (NAP) to combat desertification and mitigate impacts of drought;
- Facilitate periodic updating of the NAP to address emerging challenges of Desertification, Land Degradation and Drought (DLDD) in Pakistan and to bring NAP in line with the 10-year strategic plan/decisions of the Conference of parties (COP) for implementation of UNCCD;
- Strengthen inter-ministerial/inter-agency coordination for specific actions to be taken by them for combating land degradation and desertification;
- Make recommendations to Federal/provincial governments for developing proper land use

planning; preparing legal, policy and financial frameworks for DLDD;

- Coordinate and facilitate the target-oriented research on the causes and consequences of desertification;
- Facilitate promotion of education, public awareness and capacity building of stakeholders for addressing DLDD;
- Identify and recommend projects for donor support, especially for promoting sustainable management of land and conservation of water resources;
- Advise on integrating/addressing the impacts of climate change on land and water resources and recommend appropriate measures for mitigation and adaptation to climate change;
- Make recommendations for mainstreaming/integrating implementation of UNCCD and NAP into sectoral policies and national economic development planning, and;
- Facilitate effective implementation of the 10-year Strategic Plan of the UNCCD, development of Integrated Financing Strategy (IFS) for SLM & NAP and implementation of UNCCD COP and Centre for Research on Innovation and Competition (CRIC) decisions.

#### 19.3.1 The need for reconstitution of NCCD

Given the enormity of task and international obligations under the UNCCD, the significance of assignment to effectively implement the provisions of National Action Programme to Combat Desertification in Pakistan, there is a need to reactivate, revamp, and realign its scope and mandate. There is also a need to constitute two Sub-Committees – Technical & Monitoring Committee; and Budget & Finance Committee - to effectively meet the challenges and objectives of sustainable land management and to ensure poverty alleviation and to address similar objectives set-forth by other UN Conventions (e.g., CBD; UNCCC).

### 19.3.2 Reconstitution of National Coordination Committee on Desertification

Based on the requirements discussed above, there is a need to reconstitute the NCCD in accordance with its proposed role. As such, the NCCD may have the following composition:

- 1) Secretary, Ministry of Climate Change, Government of Pakistan **Chairman**
- 2) Secretary, Ministry of National Food Security & Research, Govt. of Pakistan, Islamabad **Member**
- 3) Inspector General of Forests, MoCC, GoP, Islamabad/UNCCD Focal Point **Member**
- 4) National Project Director SLMP, MoCC, GoP, Islamabad **Member**
- 5) Chairman National Disaster Management Authority GoP, Islamabad **Member**
- 6) Chairman, Planning & Development Board, Government of the Punjab **Member**
- 7) Secretary, Planning & Development, Govt. of Sindh, Karachi **Member**
- 8) Secretary, Planning & Development Department, Government of KP, Peshawar **Member**
- 9) Secretary, Planning and Development Department, Govt. of Balochistan, Quetta **Member**
- 10) Secretary, Planning and Development Department, Muzaffarabad, Azad Kashmir **Member**
- 11) Secretary, Planning and Development Department, Gilgit-Baltistan **Member**
- 12) Country Representative, IUCN Pakistan, Karachi **Member**
- 13) Chief, National Desertification Control Cell/National Project Coordinator, SLMP-II **Member/Secretary**

### 19.3.3 ToRs of the NCCD

The NCCD shall act as an overarching body to oversee the implementation of NAP at the Federal level and to coordinate Provincial Action Programme (PAP) based activities at provincial/state levels. Following are the proposed ToRs for NCCD:

- 1) Develop policy guidelines and a

comprehensive implementation strategy in line with the provisions of UNCCD

- 2) Oversee the implementation of NAP at the Federal level
- 3) Extend policy-based guidelines to provincial/territorial action programmes
- 4) Assist in resolving issues and constraints to achieve targets aligned with the provisions of UNCCD
- 5) Liaise with international donors to ensure sustained inflow of funds and technical assistance
- 6) Based on the experiences of pilot projects, the NCCD will approve NAP for subsequent period

### 19.3.4 Other Functions of the NCCD

In support of its mandate and to ensure effective implementation of National Action Programme, the NCCD may:

- 1) notify and establish the National Desertification Control Cell (NDCC) having all the necessary staff and equipment to effectively execute the functions of NAP and to support PAPs;
- 2) notify and constitute a Technical and Monitoring Sub-Committee;
- 3) notify and constitute a Budget and Finance Sub-Committee;
- 4) notify and establish a National Desertification Fund; and
- 5) accord approval for staff and equipment and other requirements of NDCC

## 19.4 The Need for the Establishment of Technical & Monitoring Sub-Committee

Being a policy and strategy-making body, besides dealing with international donor agencies, the NCCD will be hardly left to look after the implementation of NAP that in itself is a gigantic task. With such limitations on part of the NCCD, it will be appropriate to constitute Technical and Monitoring Sub-Committee (T&MC) to ensure smooth, seamless and timely execution of a number of activities under NAP.



#### 19.4.1 Composition of Technical & Monitoring Sub-Committee

The T&M Sub-Committee shall comprise of specialists in environment/climate change; forestry; rangelands management; watersheds management; agriculture; soil conservation; GIS/RS; water management; poverty alleviation; disaster risk management; rural support; sustainable land management; conflict resolution; community organization and participation; etc.

#### 19.4.2 Membership of T&M Sub-Committee

Following shall be the composition of T&M Sub-Committee:

- 1) National Project Director SLMP, MoCC, Govt. of Pakistan **Chairman**
- 2) Inspector General of Forests, MoCC, GoP, Islamabad/UNCCD Focal Point **Member**
- 3) Chairman National Disaster Management Authority Govt. of Pakistan, Islamabad **Member**
- 4) Director General, Pakistan Meteorological Department, Islamabad **Member**
- 5) Director General, Soil Survey of Pakistan, Islamabad **Member**
- 6) Director General, Pakistan Forest Institute, Peshawar **Member**
- 7) Chairman, SUPARCO, Pakistan **Member**
- 8) Member Natural Resources Management, PARC, Islamabad **Member**
- 9) Representative of University of Arid Agriculture, Rawalpindi **Member**
- 10) Country Representative, IUCN Pakistan, Islamabad **Member**
- 11) Chief Executive Officer, National Rural Support Programme, Islamabad **Member**
- 12) Sr. Director, WWF-Pakistan, Islamabad **Member**
- 13) Chief, Desertification Cell/National Project Coordinator, SLM **Member/Secretary**

#### 19.4.3 ToRs of T&M Sub-Committee

The T&M Sub-Committee shall deal with technical aspects of NAP implementation and have the following ToRs:

- a) Concentrate its efforts on preventing land degradation and desertification
- b) Ensure coordination with all the concerned research institutions and relevant NGOs/INGOs
- c) Ensure sustainable management of natural environment and man-made resources
- d) Ensure full participation of concerned communities in all the relevant activities and strive to reduce the extent of poverty to the maximum extent possible
- e) Oversee afforestation and general improvement in environmental conditions, besides activities concerning agriculture, range management, livestock, watershed management, water-smart technologies, water management, reduction of rural poverty, etc.
- f) Provide technical support in:
  - projects' formulation to control desertification and enhance extension programmes;
  - hiring of specialist consultants and managerial staff;
  - closely monitoring progress made under various projects purported to control land degradation and progress being made to enhance the socio-economic well-being of concerned communities;
- g) Ensure that the projects remain on track
- h) Frequently liaise with the NCCD to keep it abreast of the project-related activities, including progress made and problems faced, if any;
- i) Advise the NCCD on additional measures required in the interest of programme;
- j) Recommend inter-sectoral adjustments and allocation of resources - men, material, and financial
- k) Provide any other support/guidance as and when required
- l) Propose and guide research concerning SLM and other relevant disciplines

## 19.5 The need for the establishment of a Budget and Finance Sub-Committee

To effectively cater to the financial needs and requirements of National Action Programme, a Budget and Finance (B&F) Sub-Committee is proposed. Typical task areas for the Sub-Committee may among others, include budgeting and financial planning, financial reporting, and the creation and monitoring of internal controls and accountability policies and practices.

Besides looking after the financial matters of NAP, the Budget and Finance Sub-Committee may also look after the financial functions of National Desertification Control Fund and ensure proper maintenance of the financial books; monitor the financial matters of NAP; review and recommend for approval annual -and supplementary budgets and contingent allocations and disbursements relating to unforeseen expenditures pertaining to NAP.

### 19.5.1 Composition of B&F Sub-Committee

Besides members nominated by the respective governments, members appointed to B&F Sub-Committee need to have a strong background and experience with developing and managing budget for public and private sector projects and proposals.

The B&F Sub-Committee shall have the following composition:

- 1) Representative, Ministry of Climate Change, Govt. of Pakistan **Chairman**
- 2) Representative, Ministry of Finance, Govt. of Pakistan **Member**
- 3) Representative, Ministry of Planning and Development, Govt. of Pakistan **Member**
- 4) Representative of National Desertification Control Cell **Member**
- 5) Representative, P&DD, Govt. of Khyber Pakhtunkhwa **Member**
- 6) Representative, P&DD, Govt. of the Punjab **Member**
- 7) Representative, P&DD, Govt. of Sindh **Member**
- 8) Representative, P&DD, Govt. of Balochistan **Member**
- 9) Representative, P&DD, Govt. of Gilgit-Baltistan **Member**
- 10) Representative, P&DD, Govt. of Azad Jammu & Kashmir **Member**
- 11) Chief Executive, Pakistan Poverty Alleviation Fund, Islamabad **Member**
- 12) Director, Finance, IUCN, Pakistan **Member**
- 13) Director, Operations, WWF-Pakistan **Member**
- 14) National Project Coordinator, SLMP, Islamabad **Member/Secretary**

### 19.5.2 ToRs of B&F Sub-Committee

The B&F Sub-Committee shall have the following ToRs:

- Develop policy guidelines to maintain and improve the financial status of the programme
- Review and recommend long-term financial plan for NAP on behalf of NCCD
- Review and recommend to the NCCD, annual operating budget and capital budget consistent with the long-term financial plan and policies of the NAP
- Monitor adherence to the budgetary provisions
- Institute corrective actions to bring the budget and other financial targets and requirements in compliance with the objectives set forth for NAP
- Guide and support NCCD regarding other sources of funding for NAP from various international donor agencies, corporate sector, and philanthropists
- Perform any other function as and when required, or desired by the NCCD

## 19.6 Technical Cooperation

So far, technical assistance received for desertification control in Pakistan has been limited. More technical assistance shall be sought from other country parties of CCD or from developed country parties.

Technical cooperation shall be needed to improve and develop the capacity in:

- Land use changes, early warning, assessment and mapping of desertification;
- Information system on desertification; and
- Monitoring, evaluation, and impact assessment
- Any other assistance required during the currency of NAP

## 19.7 National Desertification Control Cell

The National Desertification Control Cell (NDCC) shall be established in the Ministry of Climate Change (MoCC), Government of Pakistan, Islamabad. The Cell is purported to ensure sustainability of the National Action Programme, headed by a qualified and experienced person of a higher status with adequate technical, administrative and support staff shall be established.

### 19.7.1 The Purpose and Objectives

The Cell shall act as National Focal Point (NFP) to coordinate the implementation of NAP, to provide policy guidance and strategic direction to enhance coordination and harmonization among various ministries and departments and INGOs regarding the control and prevention of further desertification.

Following shall be the specific objectives of National Desertification Control Cell:

- Coordination of policies and decisions concerning desertification
- Effectively engage various stakeholders in order to develop mechanisms to control desertification
- Provide support to NCCD to enhance partnership with the international donor agencies in aligning and harmonizing the technical and financial support in line with the provisions of UNCCD
- Review policy decisions and the state of their implementation and report to the NCCD
- Coordinate resource mobilization efforts for implementation of decisions pertaining to

desertification control

- Improve coordination, documentation, and dissemination of research and information on desertification
- Building capacities of the federal and provincial-territorial levels concerning implementation of NAP and PAPS
- Scaling up the capacities of the federal and provincial/territorial levels to enhance integration of adaptation and mitigation measures into their development plans (through PC-Is) as well as policies and risk management practices in desertification-related activities
- Facilitate the development of effective information management systems and integration into planning processes
- Provide technical support leading to meaningful adjustments in the on-going developmental programmes, in line with the changing socio-environmental conditions

## 19.8 National Desertification Control Fund

### 19.8.1 The Context

To effectively sustain the National Action Programme to combat desertification and to reduce poverty in arid and semi-arid regions of the country, a need is felt to establish a special fund to be called “National Desertification Fund”. Establishment of the Fund may preferably be done by an Act of Parliament to provide it legal cover to effectively support the National Action Programme. This will not only afford credibility to the Fund but may also win the confidence of international donors who may generously contribute to it to ensure that it serves as an instrument of sustainability.

### 19.8.2 Salient Features of the Proposed Fund

These may include:

- The Fund shall be established through a notification with at least Rs.500 million and invested in a government-backed financial portfolio

- Finance certain costs that are bound to be funded by NAP, but may not be readily available while activities are carried out, must continue unhindered.
- Certain activities that are not covered under the National Action Programme but are essential for meeting its objectives, may also be financed from the proceeds of NDF.
- Meet the routine expenses of community-based organizations (CBOs) including office space, furniture and fixture, computers, telephones, stationary, electricity and heating expenses and the Petrol, Oil and Lubrication (POL) charges besides other expenses of concerned communities
- Cater to needs of technical requirements of the stakeholder communities, such as training, information dissemination, education and communication, inter-district cooperation, exposure visits, farmer days, seminars and workshops, community field days, even environment-based research.

### 19.8.3 The Budget and Finance Committee

Besides looking after the finances of national Action Programme, the Budget & Finance Committee may also look after the financial matters of NDF. As earlier suggested, following is the composition of B&F Committee already proposed under NCCD:

- 15) Representative of the Ministry of Finance, Govt. of Pakistan **Chairman**
- 16) Representative of the Ministry of Planning and Development, Govt. of Pakistan **Member**
- 17) Representative of National Desertification Control Unit **Member**
- 18) Representative of P&D, Govt. of Khyber Pakhtunkhwa **Member**
- 19) Representative of P&D, Govt. of the Punjab **Member**
- 20) Representative of P&D, Govt. of Sindh **Member**
- 21) Representative of P&D, Govt. of Balochistan **Member**

- 22) Representative of P&D, Govt. of Gilgit-Baltistan **Member**
- 23) Representative of P&D, Govt. of Azad Jammu & Kashmir **Member**
- 24) Director, Finance, IUCN, Pakistan **Member**
- 25) Director, Finance WWF-Pakistan **Member**
- 26) Any other person **Member**

### 19.8.4 Mandate of B&F Committee

In terms of National Desertification Fund, the B&F Committee shall have the following functions to perform:

- Develop a detailed procedure for the establishment and investment of National Desertification Fund
- Develop a procedure for audit of the Fund
- Consider tapping additional resources to augment financial status of the Fund
- Perform any other function as and when required

### 19.8.5 Sources of Funding

This may include national and international sources besides contributions to the Fund from the budgetary allocations for the Annual Development Programme. A pre-determined percentage of royalties from timber, firewood, and charcoal; medicinal plants; and mining industries, as well as fines and penalties collected by the concerned government departments, shall henceforth be deposited in the Fund. Funds may also be raised from local philanthropists and the private sector, especially such industries that are known for contributions to such causes.

International donor agencies including UNDP, European Union, GIZ are already active and implementing certain environment-related projects by direct assistance to government or through international NGOs. Once NAP is approved and the setup to implement is fully functional, a request shall be made to international agencies / partners, based on the portfolio of new projects of interest.

Additional international sources of funding may be solicited from the following international agencies:

- UN Agencies (e.g. UNDP, UNEP, UNCCD, UNICEF, FAO, WHO)
- Bilateral agencies (e.g. USAID, GIZ, SNV, CIDA, DANIDA, Saudi Fund, Kuwaiti Fund, Embassies, DFID, JICA, OPEC Fund)
- International Funding Agencies (e.g. IFAD, ADB)
- International Foundations (e.g. Ford Foundation, MacArthur Foundation)
- International NGOs (e.g. World Vision, Action Aid, Care International, Plan International)
- International Relief Organizations (e.g. ADRA, Catholic Relief Services, Islamic Relief Agency)
- ITTO (International Tropical Timber Organization)

### 19.9 Organizations that may be involved in desertification control

Following are some of the known organizations, both in public and private sector that have specialized skills in a number of fields and could be involved in NAP to combat the adverse effects of desertification in Pakistan. Needless to say, that a meeting of all the below-mentioned organizations would greatly help in knowing first hand, the skills, the expertise and the personnel engaged with them in their endeavors to improve the natural environment of Pakistan coupled with better living and working conditions, especially for the rural poor.

#### 1) Pakistan Council of Research in Water Resources

- Desertification assessment and mapping of the Cholistan Desert
- Rain-water harvesting in Cholistan
- Tree plantation using rain water and ground saline water
- Sand dune fixation and stabilization
- Reclamation of desertified land by the introduction of Jojoba, Atriplex
- Design and preparation of sand trappers

#### 2) Pakistan Agricultural Research Council

- Development of desert reclamation techniques by planting of drought tolerant plants with rainwater harvesting, pitcher

- irrigation and drip irrigation
- Establishment of shelterbelts and windbreaks for protecting crops and soil conservation
- Introduction and propagation of promising and land plants like saltbush, Salicornia, Tamarix, Vetiver grass, Jojoba
- Agro-forestry systems of raising trees in conjunction with crops.
- Reclamation of saline and waterlogged areas by planting salt tolerant trees and shrubs.
- Pumping water by renewable energy
- Soil and water conservation
- Ground water management
- Irrigation efficiency & water management

#### 3) International Waterlogging and Salinity Research Institute

- Research on waterlogging and salinity
- Solving issues concerning groundwater, surface water and environment
- Developing economically feasible solutions and dissemination
- Farmer days and workshops
- Coordinates with other institutes
- Managing and supervision of its allied organizations (Mona Reclamation Experimental Project, Bhalwal; Lower Indus Water Management and Reclamation Research Project, Hyderabad; International Sedimentation Research Institute, Pakistan; SCARPs Monitoring Organization, Lahore)

#### 4) University of Agriculture, Faisalabad

- Reclamation of saline areas

#### 5) Agency for Barani Areas Development, Rawalpindi

- Soil and water conservation in rain-fed areas
- Afforestation and range development
- Water resources development
- Women training and extension
- Farm to market roads
- On-farm water management
- Micro enterprise development
- Rural infrastructure development

**6) Arid Zone Research Institute, Bahawalpur**

- Arid horticulture
- Establishment of grasses on sand dunes
- Medicinal plants of areas

**7) Cholistan Institute of Desert Studies, Islamia University, Bahawalpur**

- Selection and propagation of salt tolerant and drought resistant shrubs, trees and grasses
- Studies on desert plants with emphasis on their morphogenic and ethno-botanical characters and medicinal value
- Studies on nomadic lifestyle and socio-economic aspects of the desert dwellers

**8) Cholistan Development Authority, Bahawalpur**

- Colonization and allotment of Government land
- Development of water resources and surveys for sweet ground water
- Development of communication facilities
- Drought relief and management

**9) Sindh Arid Zone Development Authority, Karachi**

- Development of water resources
- Communication facilities
- Agricultural and livestock development and relief and rehabilitate

**10) Water and Power Development Authority**

- Salinity control
- Soil reclamation

**11) WAPDA Environment Cell**

- Carrying out Environmental Impact Assessment (EIA) and Initial Environmental Examination (IEE) of Hydropower Projects
- Implement Environmental Management Plans (EMPs) according to EIA
- Monitor Environmental & Social parameters during feasibility, design, construction and operation phase of the projects
- Help WAPDA in facilitating in environmental auditing
- Evaluate and comment on the environmental reports prepared by consultants and other agencies

**12) Pakistan Forest Institute, Peshawar**

- Dry land Afforestation
- Agro-forestry
- Watersheds/rangeland development and management
- Rangeland development and management

**13) Soil Survey of Pakistan, Lahore**

- Land capability classification
- Soil-Vegetation Surveys
- Soil classification

**14) Global Change Impacts Study Center**

- Mathematical Modeling
- Regional Climate System Modeling
- Crop Simulation Modeling
- Watershed Modeling
- Climate scenarios
- Climate extremes
- Food and water security

The Center uses the following models that could be useful for NAP:

- Regional Climate Models
- Watershed Models
- Crop Simulation Models
- Water Management Models
- Environment Models

**15) Climate Change, Alternate Energy and Water Resources Institute**

- Climate change/variability analysis, impact assessment and adaptations
- Risk assessment and management of hydrological extremes
- Cryosphere monitoring
- Water balance analysis and modeling at basin scale
- Land use change assessment, monitoring and planning
- Remote sensing based agro-met advisory services for farmers and other stake holders
- Database development and management
- Develop and strengthen national and international collaboration to implement climate adaptive water management and climate resilient agriculture in Pakistan
- Characterization and classification

- Resource inventories
- Training

**16) Punjab Forestry Research Institute Gatwala, Faisalabad**

- Agro-forestry
- Afforestation

**17) Punjab Forest Department**

- Forestry Sector Development Project

**18) Forest Department**

- Forestry Sector Development Project

**19) Arid Zone Research Centre (AZRC), Quetta**

- Soil and water conservation
- Range/livestock development and management
- Socio-economic and anthropological studies of and area/desert communities
- Selection of food/forage/crops for and areas

**20) International Union for Conservation of Natural Resources**

- Business and Biodiversity: highlighting opportunities and benefits of a more sustainable approaches
- Climate Change: assessing risks and restoration of ecosystems
- Economics in relevance to Biodiversity and Ecosystem
- Ecosystems Management: through climate regulation and protection
- Environmental laws
- Forests: Regulating climate and sustaining communities
- Gender Equity and Equality for sustainable development
- Environmental Policy
- Protected Areas Management Strategies
- Water management in dry lands through adaptive strategies
- Identification and management of key biodiversity areas
- Heritage Assessment and Conservation

**21) Sustainable Development Policy Institute**

- Policy advice and research and advocacy
- Implementation of policies, programs, laws and regulations based on sustainable development
- Strengthening civil society
- Dissemination of research findings and public education
- Contribution to building up national research capacity

**22) Society for the Conservation and Protection Environment**

- Combating drought and desertification in Dry lands
- Water and sanitation
- Climate change adaptation and mitigation
- Social mobilization
- Environmental law
- Biodiversity conservation
- Ecosystem services

**23) Aga Khan Rural Support Programme**

- Social and economic emancipation
- Rehabilitation
- Infrastructure development
- Development of marginal lands
- Communities organization, activation and mobilization
- Local governance

**24) Pakistan Institute for Environment and Development Action Research**

- Increasing irrigation efficiency
- Education
- Poverty alleviation
- Enterprise development
- Human and institutional development
- Participatory actions and learning
- Urban development
- Water & environmental sanitation and school improvements

**25) Rural Development Foundation**

- Organization of rural development committees
- Management capacity-building

- Formulation of community-level projects
- Development of linkages with government and non-government organization
- Organization of seminars and events
- Information dissemination

#### 26) Leadership for Environment and Development, Pakistan

- Incorporating learning, knowledge management and public policy engagement
- Design and implementation of projects

- Evidence-based research
- Sensitization of the policy and law makers
- Working on “Pakistan 2047”; “Tracking SDGs”; and “Sustainable Cities”

### 19.10 Stakeholders and their Role in NAP Implementation

The following matrix presents the possible roles that various agencies and representatives may have in the implementation of NAP:

Stakeholder	Description	Role
Farmers, local communities	<ul style="list-style-type: none"> <li>● Farmers, pastoralists and herders living within the Programme areas</li> </ul>	<ul style="list-style-type: none"> <li>● Provide support in problem identification</li> <li>● Provision of solution to certain problems</li> <li>● Having a wealth of experience in local conditions and customs to be used in NAP implementation</li> <li>● Put to use the invaluable indigenous knowledge</li> <li>● Being owners of the process, take full interest in NAP</li> </ul>
Government	<ul style="list-style-type: none"> <li>● Represented in NAP by the concerned ministries / departments</li> </ul>	<ul style="list-style-type: none"> <li>● Coordinate all the NAP-based activities implemented through line departments and other interest groups</li> <li>● Assigns responsibilities to stakeholders</li> <li>● Ensures that all the obligations under the UNCCD are complied with</li> <li>● Mass mobilization</li> <li>● Sustained financial support</li> </ul>
INGOs/NGOs	<ul style="list-style-type: none"> <li>● National, local and international NGOs involved in environmental, development and other activities in different parts of the country</li> </ul>	<ul style="list-style-type: none"> <li>● Promote popular participation</li> <li>● Compliment government's effort</li> <li>● Provide funding and/or technical support for NAP activities</li> <li>● Provide relevant literature and guidance</li> <li>● Assist NAP in documentation, web-development and uploading, etc.</li> </ul>
Academia	<ul style="list-style-type: none"> <li>● Research institutions, universities and research scholars</li> </ul>	<ul style="list-style-type: none"> <li>● Assist and carry out research in various areas of concern</li> <li>● Training</li> <li>● Capacity-building</li> </ul>
Business Sector	<ul style="list-style-type: none"> <li>● Business and industrial community, banks, etc.</li> </ul>	<ul style="list-style-type: none"> <li>● Funding of some of NAP activities</li> </ul>
Community elders	<ul style="list-style-type: none"> <li>● Local chiefs, maliks and nambardars</li> </ul>	<ul style="list-style-type: none"> <li>● Mobilize and sensitize local communities</li> </ul>
Others	<ul style="list-style-type: none"> <li>● Philanthropists</li> </ul>	<ul style="list-style-type: none"> <li>● Funding some of the NAP activities</li> </ul>



## **20 National Action Programme to Combat Desertification in Pakistan**

### **20.1 The Vision**

Strive to ensure that our planet remains green, resilient, vibrant, safe, biologically diverse, and provides respectable livelihood options leading to eradication of poverty and hunger.

### **20.2 The Mission**

Strengthen the capacities of institutions, line agencies and professionals to be able to disseminate information, raise awareness, conserve, use and manage land, water and biodiversity to arrest and reverse the process of land degradation, that leads to desertification, in order to promote sustainable development and ensure the eradication of poverty.

### **20.3 The Goal**

Implement strategies and activities aligned with the provisions of UNCCD to combat desertification in Pakistan.

### **20.4 The Purpose**

Identify factors that contribute to the process of desertification and suggest credible and pragmatic measures through a cross-cutting, coordinated, and bottom-up approach leading to control land degradation, mitigation of the effects of drought, and combatting desertification.

### **20.5 The Scope**

National Action Programme contains a description of the state of country's environment with reference to the phenomenon of desertification, its causes and effects and implication of the current land use practices in the backdrop of the existing socio-economic conditions. It goes on to identify problems and issues, which needs to be addressed. It recommends strategy to intensify efforts at national, provincial, regional and district level to adopt such measures and steps with the active involvement of the all stakeholders including the community organizations and NGOs which help in reversing the trend of desertification and land degradation to improve the quality of life of the affected people.

## 20.6 Rationale for combating desertification

A major activity in reversing desertification is the establishment of permanent and temporary vegetative cover on the land. This, however, should be done in the context of economic growth, environmental sustainability and enhanced livelihoods. Considering that most economic activities in Pakistan are land-based, community participation in all activities designed to combat desertification is critical to the achievement of the desired impact. The Action Plans to combat desertification are, therefore, proposed with the view that the component activities would be planned to accommodate the following principles:

- Full involvement of the communities to ensure that they make informed choices based on a thorough understanding and implications of each option;
- Developing a sense of community ownership of desertification control measures and the required capacity for operation and maintenance of any facility resulting from such a measure;

- Gender considerations in issues relating to community-based activities necessary for reducing the effect of desertification;
- Providing cost-effective solutions and methodologies that easily lend themselves to community and district level operation and maintenance;
- Proposing solutions that are socially acceptable that will permit the use of limited human and financial resources available;
- Ensuring a balance between economic desirability of interventions in the low income community context that will, at the same time, ensure conformity to environmental standards; and
- Creating awareness of the environmental issues inherent in reversing desertification

## 20.7 Programme Objectives, Impacts, Indicators, and Outcomes

These have been elaborated in the Matrix that follows.

## Alignment of National Action Programme with UNCCD Strategy

### NAP 10-Year Strategy (2017-30)

#### The Vision

To implement the provisions of UN Convention to offset the adverse impacts of Land Degradation and Drought leading to Desertification in KP / Punjab / Sindh / Balochistan /G-B /AJK

#### Strategic Objectives

#### Expected Impacts

1. Objective 1:  
To enhance and diversify livelihood options of the stakeholder communities

1.1 Communities in affected areas have multiple option of income generation from SLM  
1.2 There is marked reduction in threats to communities because of environmental vulnerabilities like land degradation droughts and floods

#### Indicators

1. Number of people directly affected by drought and land degradation decreased  
2. Number of households living below poverty line reduced  
3. Number of people having nutrition and dietary deficiencies decreased

2. Objective 2:  
To improve areas of affected ecosystem by implementation of SLM provisions

2.1 additional land area formerly affected by degradation brought under plough leading to enhanced livelihood options  
2.2 Resilience of sites of given ecosystems increased in the face of climate variability

4. Area affected by land degradation and drought reduced  
5. Productivity of agricultural and other commodities increased over X number of hectares compared with pre-project situation

3. Objective 3:  
To generate provincial/territorial benefits through effective implementation of the provisions of NAP

3.1 Biodiversity conservation and sustainable management increased in the target areas through adoption of practices in line with the provisions of SLM practices

6. Vegetation cover and biomass increased in SLM-implementation areas  
7. X number of hectares in target locations brought under sustainable management practices

Objective 4:  
To mobilize resources to support NAP's implementation through effective partnerships between provincial/territorial and national actors

Impact:  
4.1 Resources (financial & technical) increased at national and provincial / territorial levels due to implementation of the provisions of UNCCD  
4.2 Policies at the provincial/territorial level framed to in accordance with the provisions of UNCCD

8. sustained inflow of funds to combat desertification ensured through multiple sources  
9. Sectoral policies result in synergies to address desertification at national and provincial/territorial levels

## NAP 10-Year Strategy (2017-27)

### Mission

To arrest and control land degradation process by developing national and provincial/territorial programmes and policies and to control the adverse effects of DLDDs

### Operational Objectives

### Outcomes

Operational Objective 1: Advocacy, Awareness-raising and Education

*To mobilise print and electronic media to influence parliamentarians and policy makers in addressing issues of desertification and land degradation*

- 1.1 People in general and key stakeholders in particular, are effectively sensitized to the consequences of DLDD and associated issues pertaining to biodiversity at the provincial/territorial level
- 1.2 DLDD issues get due attention at all the provincial/territorial forums including Agriculture, Livestock, Climate Change, Water, Energy and Rural Development & Livelihoods
- 1.3 NGOs and the Research Institutions are actively involved and engaging stakeholders in awareness-cum-demonstration trials to mitigate concerns of DLDD and ensure SLM

Operational Objective 2: Policy Framework

*To develop Provincial/Territorial Policies and guidelines on DLDD and translate them into actions to address the issues of land degradation and desertification*

- 2.1: Drivers of land degradation and desertification identified and solutions proposed for the redressal of these issues
- 2.2: Pakistan revises and updates the NAP to integrate the emerging challenges in land use and makes available the required financial resources to ensure implementation of proposed corrective measures
- 2.3 Planning Commission of Pakistan integrates SLM guidelines with its future development plans
- 2.4 Integrates UNCCD objectives in all future projects of various segments of SLM and ensure that all the provinces/state shall devise their PAPs in line with national objectives
- 2.5 DLDD issues are addressed encompassing biodiversity, DRR activities to reinforce the impacts of interventions

Operational Objective 3: Science, Technology and Knowledge

*To attain a status of technical knowledge to effectively tackle the issues of DLDD*

- 3.1: KP/Punjab/Sindh/Balochistan/G-B/AJK develops an effective monitoring framework to implement the provisions as set forth in PAP
- 3.2: NAP and PAPs establish baselines on biophysical and socio-economic trends and support relevant research institutions to strengthen research in allied discipline of SLM
- 3.3: Make better decisions, there is now greater understanding of the ecological and socio-economic aspects of the target areas
- 3.4: A better understanding of the implications of climate change and its consequences is proving useful to make better and timely decisions
- 3.5: Because of effective networking, a blend of traditional and innovative knowledge base is available and proving a useful tool to assist policy makers in making pragmatic decisions
- 3.6: Networks on relevant scientific institutions are actively working to ensure the implementation of the provisions of UNCCD

Operational Objective 4: Capacity-building

*To build capacities based on local needs and priorities to prevent the harmful effects of DLDD*

- 4.1 Based on needs of areas of concern, build capacities at all the levels to effectively take upon the consequences of land degradation leading to desertification
- 4.2: Areas where no capacity-building has been done, are being approached to assess their needs and develop modules to forestall the consequences of land degradation leading to desertification

Operational Objectives	Outcomes
<p>Operational Objective 5: Financing and Technology Transfer</p> <p><i>To ensure the involvement of financial institutions in the advancement of cause of conservation and control of land degradation</i></p>	<p>5.1: Investments by the financial institutions are made effectively to double-up the efforts leading to better natural and man-made environment</p> <p>5.2: Financial institutions are providing timely and adequate resources to hold and reverse the adverse effects of land degradation</p> <p>5.3: In line with the provisions of UNCCD, financial resources are ensured for sustainable land management</p> <p>5.4: Besides financial resources made available by the traditional sources, efforts are made to hunt for inventive resources leading to the conservation of biodiversity in tandem with improvement in the financial lot of the local communities</p> <p>5.5: Sustained availability of financial resources is ensuring effective incentives and technical support leading to better mechanism to control land degradation and community welfare</p>

## 20.8 Integrated Financing Strategy (IFS) to combat desertification in Pakistan

The IFS is a process to be undertaken by Pakistan with the assistance of the Global Mechanism (GM) to leverage national, bilateral and multilateral resources to increase the effectiveness and impact of interventions to further the implementation of the UNCCD in line with the Strategy. An IFS leads to the development of an Integrated Investment Framework (IIF), or when one exists, supports its implementation.

The IFS is, thus, a part of the action plan defined above i.e., it is its financial strategy. Based on the needs and priorities already identified, the IFS will establish a Strategy for optimizing the use of existing financial resources as well as mobilizing new resources in order to support the implementation of NAP.

The following matrix details the framework for six thematic areas, activities planned, agencies to be involved along with the indicative budget to combat land degradation that leads to desertification:

Thematic Areas	Activities	Participating Agencies	Outputs	Budget (m. Rs.)
1. Public Awareness	<ul style="list-style-type: none"> <li>● Hiring a specialist to conduct evaluation of previous awareness and environmental education programmes/activities, determine their effectiveness, locate gaps, and design a new strategy of implementation</li> <li>● develop and implement awareness-raising strategies about sensitivity to the environment as a whole and problems associated with its misuse through: <ul style="list-style-type: none"> <li>○ a comprehensive effort through messaging, grassroots outreach, media relations, government affairs, budget, etc.;</li> <li>○ a series of words and phrases that are most persuasive to key audiences, based on specific research;</li> <li>○ utilizing messaging to proactively engage key audiences on relevant issues and programmes and asking them to respond to a specific call for action to help achieve the goal; and</li> <li>○ a variety of activities that help concerned agencies and stakeholders to adapt to, learn, and understand more about the threats and consequences due to desertification</li> </ul> </li> <li>● Motivating people for active participation in environmental protection, improvement and sustenance</li> <li>● Instill in the concerned stakeholders the necessity for conservation of bio resources</li> <li>● Evaluation of environmental programmes in terms of social, economic, ecological and aesthetic factors</li> <li>● Emphasize and ensure Environmental Education in both formal and non-formal systems of education</li> <li>● Involve celebrities in environmental campaigns and ensure their whole-hearted participation: it can be an enormous help if a celebrity takes on a cause as his/her own, not only because he/she can make a direct contribution but also because the status of a cause can rise in direct relation to that of the celebrity</li> <li>● Protecting the environment for sustainable development to preserve forest cover; minimize cutting of trees and use trees for aesthetic pleasure</li> <li>● Establish a website for NAP and upload all the information for the benefit of planners, researchers, educationists, students and the public in general</li> </ul>	<ol style="list-style-type: none"> <li>1) Ministry of Climate Change, GoP</li> <li>2) Ministry of Planning and Development, GoP</li> <li>3) Ministry of Information &amp; Broadcasting, GoP</li> <li>4) Ministry of National Food Security &amp; Research, GoP</li> <li>5) Ministry of Women Development, Social Welfare and Special Education, GoP</li> <li>6) Ministry of Tourism, GoP</li> <li>7) Radio Stations; TV channels</li> <li>8) NGOs; CBOs; WOs</li> <li>9) Association of newspapers</li> <li>10) Land developers (DHA, Bahria Town, CDA)</li> <li>11) Religious scholars</li> <li>12) Lawyers Association</li> <li>13) Celebrities</li> </ol>	<ul style="list-style-type: none"> <li>● Materials and strategies on awareness-raising developed concerning land degradation, global warming, climate change, etc. and their implications world-wide and in Pakistan</li> <li>● Reproduce booklets developed by WWF-Pakistan on the role of Islam in the conservation of biodiversity are reproduced (with their permission and acknowledgement) and disseminated</li> <li>● Package the information appropriately for key stakeholder groups such as Judiciary, ministers, heads of departments and senior officers, law enforcement officers, farmers, foresters, biologists, conservationists, agriculturists, soil scientists, etc.</li> <li>● A webpage on the NAP website developed to upload all the information for use by various interest groups and individuals as mentioned under “Activities”</li> </ul>	500.000

Thematic Areas	Activities	Participating Agencies	Outputs	Budget (m. Rs.)
2. Capacity building and Institutional Strengthening and Coordination	<p>Build capacities and to mobilize resources to combat desertification to reduce its impacts in Pakistan through the development of a scientifically based mechanism that provides continuous and reliable information about the state of desertification in the country. This may be achieved through the following activities:</p> <ul style="list-style-type: none"> <li>● Develop ToRs for NAP Coordination Committee and its two sub-committees on implementation and finances</li> <li>● Establish NAP Coordination Cell in MoCC</li> <li>● Hire consultants to develop modules based on baseline data to target district-wise land degradation, soil stabilization, water management, rainwater harvesting techniques, soil analysis, ecological zonation, community mobilization, land capability mapping, level and extent of poverty</li> <li>● Pooling together the existing (but scattered) capacities among governmental and non-governmental organizations</li> <li>● Formulate legislations and mandates regarding desertification control</li> <li>● Rectification of information and databases on desertification and updated at different scales through specialized environmental information systems and implementation of GIS/RS tools</li> <li>● Establish a Training Unit within the Coordination Cell capable of planning, coordinating and initiating activities related to combating desertification</li> <li>● Establish a National Fund to combat desertification; ToRs to be decided</li> <li>● Conduct a series of workshops and technical meetings (on regular basis) to define the mandates for line agencies and develop a plan that feed information to the Cell for further processing</li> <li>● Introduce Sustainable Land Management as an elective subject at 9th to 12th classes</li> <li>● Introduce SLM as a specialized course at BS level in all the public and private sector universities</li> <li>● Offer scholarships for MS in SML in HEC-recognized foreign universities</li> <li>● Provide grants and involve universities in research pertaining to causes of land degradation and desertification and to suggest remedial measures</li> </ul>	<ol style="list-style-type: none"> <li>1) Ministry of Climate Change, GoP</li> <li>2) Ministry of Planning and Development, GoP</li> <li>3) Ministry of National Food Security &amp; Research, GoP</li> <li>4) Relevant Line Agencies</li> <li>5) Relevant NGOs, CBOs, CSOs, WOs</li> </ol>	<ul style="list-style-type: none"> <li>● A multi-sectoral committee established to coordinate the development and implementation of the provisions of NAP</li> <li>● MoCC strengthened to effectively implement the provisions of NAP through the appointment of additional staff and procurement of equipment, and other necessities and hiring of office space</li> </ul>	3,000,000

Thematic Areas	Activities	Participating Agencies	Outputs	Budget (m. Rs.)
3. Policy Formulation	<ul style="list-style-type: none"> <li>Develop ToRs for Policy Analysts</li> <li>Hire Policy Analysts with expertise in relevant sectors</li> <li>Conduct analysis of the existing policies to determine their impacts on land degradation, determine gaps and develop policy guidelines in alignment with UNCCD</li> <li>The government of Pakistan has made efforts to involve NGOs in policy-making processes since it ratified the UNCCD and its participatory policy-making discourse in 1997; adopting the same spirit while formulating implementation mechanism for NAP, will lead to outcomes in line with the provisions of UNCCD</li> <li>Host public consultations on the results of the policy analysis and use recommendations and public comments to develop or amend policies already in practice</li> <li>Develop procedure for annual review of policies and the status of their implementation</li> <li>Identify and get agreement of key senior personnel to lead policy review</li> <li>Develop a compensatory mechanism reflecting economic incentive for investment in SLM</li> </ul>	<ol style="list-style-type: none"> <li>Ministry of Climate Change</li> <li>Ministry of Planning and Development</li> <li>Ministry of Law and Justice &amp; Human Rights</li> <li>Islamabad High Court Bar Association</li> <li>Relevant INGOs/NGOs</li> <li>Relevant CBOs/WOs</li> </ol>	<ul style="list-style-type: none"> <li>New policies developed and/or existing policies amended as appropriate to facilitate the reduction in land degradation by involving all the relevant stakeholders as mentioned under "Participating Agencies"</li> </ul>	200.000
4. Legislative Reforms and Legal Framework	<ul style="list-style-type: none"> <li>Recruit consultants having experience in legislative and legal affairs to look into the existing laws and rules as applicable from time to time</li> <li>Review the existing legislation and rules and regulation prescribed and in practice and formulate new Rules of Business pertaining to laws related to desertification monitoring and control</li> <li>Host public consultation on draft legislation and rules</li> <li>Finalize draft legislation based on comments from stakeholders</li> <li>Develop training module on enforcement with respect to land degradation infringements</li> <li>Identify law enforcement officers for training</li> <li>Train enforcement officers within the Police Service, Law Department, and other government agencies to improve their ability to respond to land degradation infringements</li> <li>Conduct in-house training sessions every 6 months</li> </ul>	<ol style="list-style-type: none"> <li>Ministry of Climate Change</li> <li>Ministry of Law, Justice and Human Rights</li> <li>Attorney General's Office</li> <li>Ministry of Information</li> <li>Relevant INGOs/NGOs</li> </ol>	<ul style="list-style-type: none"> <li>Existing legislations revised, if necessary and draft new regulations in line with the provisions of UNCCD so that it has effect in the formulation of legislative reforms</li> <li>Both types of legislations enacted through the national Assembly and notified by the Government of Pakistan through the Ministry of Climate Change</li> </ul>	100,000



Thematic Areas	Activities	Participating Agencies	Outputs	Budget (m. Rs.)
5. Site Restoration & Rehabilitation	<ul style="list-style-type: none"> <li>Hire staff for supervision of restoration and rehabilitation activities</li> <li>Develop regulations for operations, management and rehabilitation of degraded lands</li> <li>Develop criteria and procedure for identification of sites for rehabilitation</li> <li>Identify key agencies and CBOs/CSOs/WOs for implementation of the provisions of PC-Is and build their capacity to adequately carry out the required activities</li> <li>Identify capacity needs of the stakeholders and provide capacity development assistance</li> <li>Engage key stakeholders in planning and rehabilitation of priority sites and collect baseline data</li> <li>Conduct a series of trainings in land degradation, soil conservation and stabilization, water management, rainwater harvesting techniques, soil analysis, ecological zonation, community mobilization, land capability mapping, assessment of poverty and other trainings that may be needed later on</li> <li>Details of topics, agencies responsible for implementation and areas of implementation have been included under sub-title "Possible Projects proposed to be launched under NAP"</li> </ul>	<ol style="list-style-type: none"> <li>Ministry of Climate Change</li> <li>Ministry of Planning &amp; Development</li> <li>Ministry of National Food Security and Research</li> <li>Soil Conservation</li> <li>NARC</li> <li>Relevant INGOs/NGOs</li> <li>Relevant CBOs/WOs/CSOs</li> </ol>	<ul style="list-style-type: none"> <li>Sites for rehabilitation and located, management plans, specific to each site through a multi-stakeholder participatory process, developed</li> </ul>	4,000,000
	<ul style="list-style-type: none"> <li>Hire consultant for Evaluation of activities</li> <li>Host public consultations on the results of the evaluation and plan for a new NAP implementation strategy</li> <li>Host further consultations in the preparation and finalization of the new NAP</li> </ul>	<ol style="list-style-type: none"> <li>Third party evaluation through the Ministry of Climate Change</li> </ol>	<ul style="list-style-type: none"> <li>Independent periodic evaluation conducted regarding the implementation of projects and programmes</li> </ul>	60,000
			<b>Total Cost</b>	<b>7,860,000</b>

## 21 Possible Projects proposed to be launched under NAP

Following are certain topics proposed for implementation of NAP agenda for Pakistan:

Project Title	Location	Implementing Agency	Collaborating Agency/Expert
1. Enhancement and creation of awareness-raising about the causes and consequences of land degradation leading to desertification	<ul style="list-style-type: none"> <li>● The whole of Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Respective Line Agencies</li> </ul>	<ul style="list-style-type: none"> <li>● Awareness-raising Experts for each of the line agency</li> </ul>
2. Afforestation of dry lands	<ul style="list-style-type: none"> <li>● Southern KP</li> <li>● Southern Punjab</li> <li>● Northern Sindh</li> <li>● South-western Balochistan</li> <li>● Southern AJ&amp;K</li> <li>● Eastern Gilgit-Baltistan</li> </ul>	<ul style="list-style-type: none"> <li>● Forest Department</li> </ul>	<ul style="list-style-type: none"> <li>● Irrigation Department</li> <li>● Water Management</li> </ul>
3. Enhancement of grazing capacity of Alpine pasture	<ul style="list-style-type: none"> <li>● Northern KP</li> <li>● Northern AJ&amp;K</li> <li>● Gilgit-Baltistan</li> </ul>	<ul style="list-style-type: none"> <li>● Forest Departments</li> </ul>	<ul style="list-style-type: none"> <li>● Soil Conservation</li> </ul>
4. Afforestation and rehabilitation of mountain slopes and stabilization of degraded watersheds	<ul style="list-style-type: none"> <li>● Northern KP</li> <li>● Northern AJ&amp;K</li> <li>● Gilgit-Baltistan</li> </ul>	<ul style="list-style-type: none"> <li>● Forest Department</li> </ul>	<ul style="list-style-type: none"> <li>● Bio-engineering experts</li> <li>● Civil Engineers</li> <li>● WAPDA</li> </ul>
5. Afforestation of degraded forests	<ul style="list-style-type: none"> <li>● The whole of Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Forest Departments</li> </ul>	<ul style="list-style-type: none"> <li>● Local CBOs</li> </ul>
6. Adoption of agro-forestry Prescriptions for degraded and marginal Lands	<ul style="list-style-type: none"> <li>● The whole of Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Forest departments</li> <li>● Agriculture departments</li> </ul>	<ul style="list-style-type: none"> <li>● Agro-forestry specialists</li> <li>● Local CBOs</li> </ul>
7. Introduction of agricultural and horticultural practices adapted to dry lands	<ul style="list-style-type: none"> <li>● The whole of Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Forest departments</li> <li>● Agriculture departments</li> </ul>	<ul style="list-style-type: none"> <li>● Agricultural and Horticultural experts</li> </ul>
8. Better water management (conservation and harvesting) practices for Dry lands	<ul style="list-style-type: none"> <li>● Southern KP</li> <li>● Southern AJ&amp;K</li> <li>● Gilgit-Baltistan</li> <li>● South-western Balochistan</li> <li>● Northern Sindh</li> <li>● South Punjab</li> </ul>	<ul style="list-style-type: none"> <li>● Water management departments</li> </ul>	<ul style="list-style-type: none"> <li>● Water management specialists</li> </ul>
9. Floods and Landslides Control	<ul style="list-style-type: none"> <li>● Northern KP</li> <li>● Northern and Central AJ&amp;K</li> <li>● Gilgit-Baltistan</li> <li>● Northern &amp; Central Punjab</li> <li>● Northern Sindh</li> </ul>	<ul style="list-style-type: none"> <li>● NDMA</li> </ul>	<ul style="list-style-type: none"> <li>● PDMA's</li> <li>● Forest Department</li> <li>● Bio-Engineers</li> <li>● Watershed Management Specialists</li> <li>● Soil Conservationists</li> </ul>

Project Title	Location	Implementing Agency	Collaborating Agency/Expert
10. Drought mitigation and management practices	<ul style="list-style-type: none"> <li>● Southern KP</li> <li>● Southern AJ&amp;K</li> <li>● Gilgit-Baltistan</li> <li>● South-western Balochistan</li> <li>● Northern Sindh</li> <li>● East-central Punjab</li> </ul>	<ul style="list-style-type: none"> <li>● Water Management Departments</li> <li>● Forest departments</li> </ul>	<ul style="list-style-type: none"> <li>● Water Management Specialists</li> <li>● Drought Management Specialists</li> </ul>
11. Soil stabilization and management of fragile eco-systems	<ul style="list-style-type: none"> <li>● Northern KP</li> <li>● Central and Northern AJ&amp;K</li> <li>● Gilgit-Baltistan</li> </ul>	<ul style="list-style-type: none"> <li>● Soil Conservation Department</li> </ul>	<ul style="list-style-type: none"> <li>● Forest Departments</li> <li>● Watershed Rehabilitation Experts</li> </ul>
12. Wise use of water-smart technologies	<ul style="list-style-type: none"> <li>● Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Agriculture Departments</li> </ul>	<ul style="list-style-type: none"> <li>● Forest Departments</li> <li>● Water Management Specialists</li> </ul>
13. Assessment of forests, rangelands and wildlife to update knowledge for future planning	<ul style="list-style-type: none"> <li>● Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Forest Departments</li> </ul>	<ul style="list-style-type: none"> <li>● Specialists in Forests, Rangelands and Wildlife Management</li> </ul>
14. Strengthening/establishing desertification control cells	<ul style="list-style-type: none"> <li>● Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● P&amp;DDs</li> </ul>	<ul style="list-style-type: none"> <li>● Desertification Specialists</li> </ul>
15. From conventional to high income cash crops	<ul style="list-style-type: none"> <li>● Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Horticulture departments.</li> </ul>	<ul style="list-style-type: none"> <li>● Agriculture Departments</li> </ul>
16. Putting marginal and wastelands to better cultural practices	<ul style="list-style-type: none"> <li>● Balochistan</li> <li>● Southern KP</li> <li>● Central Punjab</li> </ul>	<ul style="list-style-type: none"> <li>● Agriculture departments</li> </ul>	<ul style="list-style-type: none"> <li>● Horticulture Departments</li> </ul>
17. Integrated farming practices including Agro-Silvo-Pastoral practices	<ul style="list-style-type: none"> <li>● Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Agriculture departments</li> <li>● Livestock department</li> <li>● Poultry breeding departments</li> </ul>	<ul style="list-style-type: none"> <li>● Agricultural, Livestock and Poultry specialists</li> </ul>
18. Value-addition through semi-processing of fruits and nuts	<ul style="list-style-type: none"> <li>● Northern KP</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Small &amp; Medium-sized Development Authority (SMEDA)</li> </ul>	<ul style="list-style-type: none"> <li>● Mechanical and electrical engineering specialists</li> </ul>
19. Rehabilitation of water-logged areas and improvement / establishment of drainage system	<ul style="list-style-type: none"> <li>● Punjab</li> <li>● Sindh</li> </ul>	<ul style="list-style-type: none"> <li>● Agriculture Department</li> </ul>	<ul style="list-style-type: none"> <li>● Water Management</li> <li>● Hydrology</li> <li>● Forest Departments</li> </ul>
20. Reclamation of saline and sodic soils	<ul style="list-style-type: none"> <li>● Punjab</li> <li>● Sindh</li> </ul>	<ul style="list-style-type: none"> <li>● Soil Conservation departments</li> </ul>	<ul style="list-style-type: none"> <li>● Agriculture departments</li> </ul>
21. Conservation and sustainable management of biodiversity	<ul style="list-style-type: none"> <li>● Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Forest departments</li> <li>● Wildlife departments</li> </ul>	<ul style="list-style-type: none"> <li>● BD specialists</li> </ul>
22. Assessment of degraded lands through the application of GIS technology	<ul style="list-style-type: none"> <li>● Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● All the line departments</li> </ul>	<ul style="list-style-type: none"> <li>● SUPARCO</li> <li>● Forest Resource Center, KP</li> <li>● WWF-Pakistan</li> </ul>

Project Title	Location	Implementing Agency	Collaborating Agency/Expert
23. Adoption of improved livestock feeding and management practices	<ul style="list-style-type: none"> <li>● Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Livestock departments</li> </ul>	<ul style="list-style-type: none"> <li>● Livestock Management Specialists</li> </ul>
24. Intensification of sand dunes stabilization through dry afforestation	<ul style="list-style-type: none"> <li>● Punjab</li> <li>● Sindh</li> </ul>	<ul style="list-style-type: none"> <li>● Forest Departments</li> </ul>	<ul style="list-style-type: none"> <li>● Dry Afforestation Specialists</li> </ul>
25. Introduction of water recharge techniques and water-smart technologies	<ul style="list-style-type: none"> <li>● Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Hydrology departments</li> </ul>	<ul style="list-style-type: none"> <li>● Hydrologists</li> </ul>
26. Enhancement of eco-services of mangrove forests through rehabilitation and by ensuring fuel wood alternatives to Local communities	<ul style="list-style-type: none"> <li>● Sindh</li> <li>● Balochistan</li> </ul>	<ul style="list-style-type: none"> <li>● Forest Departments of Sindh and Balochistan</li> </ul>	<ul style="list-style-type: none"> <li>● Sociologists</li> </ul>
27. Growing of fruit trees in water-deficient areas	<ul style="list-style-type: none"> <li>● Deserts of Sindh, Punjab and Balochistan</li> </ul>	<ul style="list-style-type: none"> <li>● Agriculture Departments</li> </ul>	<ul style="list-style-type: none"> <li>● Forest Departments</li> <li>● Water Management Specialists</li> </ul>
28. Development of national and provincial land use plans through GIS/RS techniques	<ul style="list-style-type: none"> <li>● Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● SUPARCO</li> </ul>	<ul style="list-style-type: none"> <li>● Soil Survey Department</li> </ul>
29. Reversal of the effects of desertification in selected areas by Involving local communities			
30. Exposure visits of professionals to areas where NAP-based activities are in progress			
31. Research and Education: <ul style="list-style-type: none"> <li>● Calorific Intake before and after the Implementation of NAP-based Interventions</li> <li>● Alleviation of poverty and its impacts on socio-economic well-being of stakeholder communities</li> <li>● Financial analysis of conventional versus improved agricultural practices</li> <li>● Financial analysis of semi-processed nuts and fruits facilities</li> <li>● Determination of optimum sizes of land for integrated land use in various ecological regions</li> <li>● Reducing dependence on wood-based energy and contribution to carbon sequestration</li> <li>● Impacts of climate change on various land use practices</li> <li>● Capacity Need Assessment of print and electronic media concerning land degradation</li> <li>● Policy review and feedback for different sectors concerning DLDD</li> </ul>	<ul style="list-style-type: none"> <li>● Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Universities of Pakistan, Gilgit-Baltistan and AJ&amp;K</li> <li>● Research and Training Institutes</li> </ul>	<ul style="list-style-type: none"> <li>● Educationists; Researchers</li> </ul>

Project Title	Location	Implementing Agency	Collaborating Agency/Expert
32. Introduction of desertification control as an elective subject at Matric and FSc Level	<ul style="list-style-type: none"> <li>● Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Provincial/State Education Departments</li> </ul>	<ul style="list-style-type: none"> <li>● -</li> </ul>
33. Introduction of desertification control as a specialization at BS Level	<ul style="list-style-type: none"> <li>● Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Higher Education Commission</li> </ul>	<ul style="list-style-type: none"> <li>● Universities in Pakistan, especially in Gilgit-Baltistan, and AJ&amp;K</li> </ul>
34. Financial support for MS in desertification control in foreign universities	<ul style="list-style-type: none"> <li>● Pakistan</li> <li>● Gilgit-Baltistan</li> <li>● AJ&amp;K</li> </ul>	<ul style="list-style-type: none"> <li>● Higher Education Commission</li> </ul>	<ul style="list-style-type: none"> <li>● Universities in Pakistan, especially in Gilgit-Baltistan, and AJ&amp;K</li> </ul>





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