



National Drought Plan Pakistan

2025 – 2035

UNCCD



Ministry of Climate Change and Environmental Coordination

CONTENTS

FOREWORD	VI
ACKNOWLEDGEMENT	VIII
ACRONYMS	IX
EXECUTIVE SUMMARY	1
BACKGROUND	1
1.1. PAKISTAN - WATER SOURCE, SOILS, AND LAND	1
1.2. CLIMATE.....	4
1.3. UNDERSTANDING DROUGHT	14
1.4. PURPOSE, SCOPE, GOALS, AND OBJECTIVES.....	14
1.5. PLAN DEVELOPMENT PROCESS.....	16
RELATIONSHIP WITH RELEVANT PLANS AND POLICIES.....	19
2.1. IMPORTANCE OF NATIONAL DROUGHT PLAN	19
2.2. RELATIONSHIP OF NATIONAL DROUGHT PLAN WITH RELEVANT POLICIES, PLANS, AND REGULATORY FRAMEWORK	19
2.3. SUSTAINABLE DEVELOPMENT GOALS	25
2.4. LAND DEGRADATION NEUTRALITY INITIATIVE	25
DROUGHT OVERVIEW IN PAKISTAN	28
3.1. HISTORICAL OCCURRENCE OF DROUGHT IN PAKISTAN.....	28
3.2. MAIN CAUSES OF DROUGHT IN PAKISTAN.....	35
3.3. DROUGHT IMPACTS: BY SECTORS & PROVINCES	38
ORGANIZATIONS AND ASSIGNMENT OF RESPONSIBILITIES	47
4.1. MINISTRY OF CLIMATE CHANGE AND ENVIRONMENTAL COORDINATION (MOCCEC)...	47
4.2. NATIONAL DISASTER MANAGEMENT AUTHORITY (NDMA).....	47
4.3. MINISTRY OF PLANNING, DEVELOPMENT AND SPECIAL INITIATIVES.....	48
4.4. MINISTRY OF NATIONAL FOOD SECURITY AND RESEARCH.....	48
4.5. PAKISTAN AGRICULTURAL RESEARCH COUNCIL (PARC).....	50
4.6. MINISTRY OF WATER RESOURCES.....	50
4.7. PAKISTAN METEOROLOGICAL DEPARTMENT (PMD).....	52
4.8. MINISTRY OF NATIONAL HEALTH SERVICES, REGULATIONS AND COORDINATION	56
4.9. GLOBAL CHANGE IMPACTS STUDY CENTER (GCISC)	56
4.10. NATIONAL DISASTER RISK MANAGEMENT FUND (NDRMF)	56

4.11. PROVINCIAL FOREST DEPARTMENTS.....	56
4.12. PROVINCIAL IRRIGATION & DRAINAGE AUTHORITIES	56
4.13. UNITED NATION AGENCIES.....	56
4.14. NGOS AND RURAL SUPPORT PROGRAMS	58
4.15. PETROLEUM COMPANIES	59
4.16. DEVELOPMENT FINANCE INSITUIONS.....	59
DROUGHT MONITORING, FORECASTING AND PREPAREDNESS	60
5.1. DROUGHT INDICES/ ANOMALIES	60
5.2. CURRENT MONITORING, FORECASTING, DATA COLLECTION, AND PREPAREDNESS	61
VULNERABILITY, RISKS AND DROUGHT ADAPTATION	63
6.1. ASSESSMENT OF VULNERABILITY AND RISKS.....	63
6.2. DROUGHT VULNERABILITY INDEX AND HAZARD MAP OF PAKISTAN	64
6.3. RISK INSURANCE AND RISK TRANSFER	67
DROUGHT COMMUNICATION AND RESPONSE ACTIONS	68
7.1. DROUGHT COMMUNICATION PROCESS.....	68
7.2. DECLARATION OF DROUGHT CONDITIONS	69
DROUGHT MITIGATION AND PREPAREDNESS AT NATIONAL LEVEL	71
8.1. FEDERAL AND PROVINCIAL GOVERNMENTS' EXPENDITURES FOR PROJECTS RELATED TO DROUGHT AND DESERTIFICATION 2014-2021	71
8.2. PROPOSED PROJECTS FOR DROUGHT MITIGATION AND PREPAREDNESS	74
ANALYSIS OF GAPS IN DROUGHT MANAGEMENT	75
9.1. ABSENCE OF DROUGHT MANAGEMENT IN PLANNING AND BUDGETARY PROCESSES	75
9.2. WEAK POLICY AND INSTITUTIONAL COORDINATION MECHANISMS.....	75
9.3. WEAK REGULATORY FRAMEWORKS	75
9.4. LIMITED CAPACITY IN DROUGHT MONITORING, PREPAREDNESS AND EARLY WARNING	75
9.5. LIMITED WATER STORAGE AND WATER MANAGEMENT IN DROUGHT PRONE AREAS	76
9.6. LIMITED AWARENESS AND CAPACITY OF STAKEHOLDERS	76
9.7. SOCIOECONOMIC VULNERABILITIES	76
PRIORITY RECOMMENDATIONS AND IMPLEMENTATION ACTIONS	77
1.1 MAINSTREAMING OF DROUGHT IN PLANNING AND BUDGETARY PROCESSES	77
1.2 FORMULATION OF NATIONAL LAND USE AND DROUGHT MANAGEMENT POLICIES	77

1.3	IMPROVING INSTITUTIONAL AND COORDINATION MECHANISMS.....	78
1.4	IMPROVE GROUNDWATER REGULATION AND MANAGEMENT IN DROUGHT PRONE AREAS.....	78
1.5	STRENGTHEN DROUGHT FORECAST AND EARLY WARNING SYSTEMS.....	78
1.6	DROUGHT EMERGENCY RESPONSE PREPAREDNESS.....	79
1.7	WATER RESOURCE DEVELOPMENT AND MANAGEMENT IN DROUGHT PRONE AREAS.....	79
1.8	WATERSHED MANAGEMENT	80
1.9	MANAGEMENT OF FORESTS, CROPLAND AND RANGELANDS	80
1.10	CAPACITY BUILDING AND AWARENESS RAISING	81
	ACTION PLAN FOR DROUGHT MANAGEMENT	82
	REFERENCES	88

ANNEXURES

ANNEXURE I:	FEDERAL PSDP PROJECTS RELATED TO DESERTIFICATION AND DROUGHT .	1
ANNEXURE II:	ADP-SINDH PROJECTS RELATED TO DESERTIFICATION AND DROUGHT	6
ANNEXURE III:	ADP-BALUCHISTAN PROJECTS RELATED TO DESERTIFICATION AND DROUGHT	20
ANNEXURE IV:	ADP-PUNJAB PROJECTS RELATED TO DESERTIFICATION AND DROUGHT ...	43
ANNEXURE V:	ADP-KHYBER PAKHTUNKHWA PROJECTS RELATED TO DESERTIFICATION AND DROUGHT.....	52
ANNEXURE VI:	ADP-GILGIT BALUCHISTAN PROJECTS RELATED TO DESERTIFICATION AND DROUGHT	67
ANNEXURE VII:	ADP-AJK PROJECTS RELATED TO DESERTIFICATION AND DROUGHT	69
ANNEXURE VIII:	NATURAL, CLIMATIC REGIONS AND AGRO-ECOLOGICAL ZONES	71
ANNEXURE IX:	LAND CAPABILITY CLASSIFICATION.....	76
ANNEXURE X:	DROUGHT RISK REDUCTION - GENDER ACTION PLAN	77
ANNEXURE XI:	ON-GOING FEDERAL PSDP PROJECTS FOR DROUGHT PREPAREDNESS, ADAPTATION AND MITIGATION	80
ANNEXURE XII:	PROVINCIAL DROUGHT PLAN - SINDH.....	83
ANNEXURE XIII:	PROVINCIAL DROUGHT PLAN - BALUCHISTAN	106

ANNEXURE XIV:	PROVINCIAL DROUGHT PLAN - PUNJAB	149
ANNEXURE XV:	PROVINCIAL DROUGHT PLAN – KHYBER PAKHTUNKHWA.....	181
ANNEXURE XVI:	STATE DROUGHT PLAN – GILGIT BALTISTAN	198
ANNEXURE XVII:	STATE DROUGHT PLAN – AZAD JAMMU AND KASHMIR	216
ANNEXURE XVIII:	POTENTIAL DONORS FOR PROJECTS ON DROUGHT	231
ANNEXURE XIX:	METEOROLOGICAL AND SATELLITE-BASED DROUGHT INDICES	232

FOREWORD

Drought is the prolonged period of water shortage and dry weather with precipitation significantly below normal recorded levels causing serious hydrological imbalances, adversely impacting land resources' productivity systems in the natural climate cycle. It is one of the major drivers of global food and water insecurity. On an average, each year about 55 million people are affected by drought in the world. It leads to shortage of water for humans and animals and causes damages to crops, livestock and the environment.

In view of the fact that the country mostly consists of arid, semiarid and even hyperarid regions, the susceptibility of different regions to become drought-stricken is very high. The worst occurrence of drought in the country was during 1998–2001. In addition to this drought was also experienced in 1947, 1951-52, 1963-64, 1965-66, 1968-69, 1970-74, 1983-84, 1987- 88, 2003-2004, 2006 and 2013-2015 mostly in Balochistan and Sindh. Areas like Cholistan experienced drought many times but during first quarter of 2025, mild drought incidence was noted in most parts of Punjab in addition to Sindh and Balochistan. Some parts of Khyber Pakhtunkhwa (KP) also experienced drought at different times. Rise in temperature, El-Nino affect, climate change, decrease and erratic rainfall and inefficient use of water are among the main causes of drought. Deforestation, over-grazing, and attack of pests like locust increase this phenomenon.

The expected climate change and increased numbers and frequency of heat spells are vivid and living indicators of a future increase in drought-like conditions. Drought results in lowering of groundwater levels, reduction in surface water resources, reduced yields and crop failures, loss of livestock, environmental degradation, malnutrition, lack of safe drinking water, diseases spread, reduction in human health and socio-economic conditions resulting in increased poverty and increased food and water insecurity as well as migration. The women are the most severely affected and gender related issues increase during drought.

The National Drought Monitoring Centre (NDMC) serves as a central hub for collecting, consolidating, and analyzing drought-related data and it prepares and issues monthly drought bulletins advising government agencies on drought-related matters. Ministry of Climate Change and Environmental Coordination is the focal ministry for UNCCD. The National Climate Change Policy outlines strategies to track the impact of climate change on water, food, and energy security and associated disasters including drought, aiming to implement remedial plans to support water, energy, and food policies.

Foreseeing the Pakistan's peculiar vulnerabilities to ensuing catastrophes of climate change and associated disasters like drought striking with inconceivable occurrence and ferocity, the development of an effective National Drought Plan commences the process of mainstreaming drought response initiatives in development efforts by different departments and agencies in the country.

The National Drought Plan of Pakistan is a comprehensive framework designed to mitigate the adverse effects of droughts, which have historically impacted various regions of the country. It will serve as an important stratagem for management of drought and associated impacts, improving governance and coordinating system for effective drought risk management,

capacitating and improving the resilience mechanisms and socio-economic wellbeing of the drought vulnerable people and safeguarding livelihood assets of rural communities. Relevant Government agencies are urged to align with their sectoral strategies and programs with this National Drought Plan to mainstream and operationalize the plan at both federal and state levels.

The Government is committed to effectively meet the objectives of the plan and engage to the national and international processes in order to support the implementation of same. It is an appeal to all international organizations to magnanimously take part in the implementation of this plan because Pakistan is facing drought as a major challenge for socio-economic growth, and sustainable development.



Secretary
Ministry of Climate Change and Environmentl Coordination
Government of Pakistan



ACKNOWLEDGEMENT

Development of National Drought Plan is a result of wide ranging consultation process involving all the relevant government departments and other key stakeholders at the national and provincial levels, providing their valuable inputs with keen insight and interest in drought, desertification and land degradation related issues.

The invaluable guidance and ideas provided by Secretary, Ministry of Climate Change and Environmental Coordination (MoCCEC), Government of Pakistan and the support provided by Syed Ghulam Qadir Shah, former Inspector General (Forests), Ms. Haseena Anbarin, Deputy Inspector General (Forests), Mr. Muhammad Afrasiyab, Assistant Inspector General (Forests) and Dr. Raja Muhammad Omer, former Deputy Inspector General (Forests), MoCCEC throughout the process of development of this policy document is deeply appreciated.

The efforts of national and provincial stakeholders, departments and experts for supporting in development of this plan are acknowledged. The support provided by Mr. Naeem Ashraf Raja, Director, Biodiversity, Ms. Parveen Ejaz and Dr. Rizwan Irshad, Deputy Directors, MoCCEC and other members of Inspector General (Forests) team towards the completion of this important document are appreciated.

The valuable comments and inputs of the Heads of line Departments of national and provincial stakeholders, academia, civil society members, national and international NGOs and Asian Development Bank are highly acknowledged. Without their support, this work would not have been possible.

The support provided by UNCCD through necessary funding for preparation of the plan and technical comments provided by their experts on drought, land degradation, desertification and climate change including Ms. Munazza Naqvi, Mr. Hansol Park and their consultant Tayyab Shahzad are also greatly appreciated.


Inspector General (Forests)
Ministry of Climate Change and Environmental Coordination
Government of Pakistan

ACRONYMS

ADB	Asian Development Bank		Agriculture
AJ&K	Azad Jammu and Kashmir	ICT	Information and communication technologies
AMJ	April, May, June		
AWS	Automatic weather station	IWRM	Integrated Water Resource Management
BAP	Biodiversity Action Plan	JAS	July August September
BUIT	Balochistan University of Information Technology	KP	Khyber Pakhtunkhwa
BUIITEMS	Balochistan University of Information Technology, Engineering & Management Sciences	LDN	Land Degradation Neutrality
		LST	Land Surface Temperature
		MA	March, April
		MJ	May, June
CBD	Convention on Biological Diversity	mmhos/cm	Milli mhos per centimeter
CCA	Culturable Command Area	MoCCEC	Ministry of Climate Change and Environmental Coordination
CCS	Climate Change Scenario		
CPA	Cumulative Precipitation Anomaly	NARC	National Agricultural Research Center
COP	Conference of Parties	NDMA	National Disaster Management Authority
CSA	Climate Smart Agriculture	NDMC	National Disaster Management Commission
CSOs	Civil Society Organizations		
CwCom	Communication with communities	NDRMF	National Disaster Risk Management Fund
DDMA	District Disaster Management Authority	NDVI	Normalized Difference Vegetation Index
DRM	Disaster Risk Management	NGO	Non-governmental organization
DRR	Disaster Risk Reduction	NRSP	National Rural Support Program
DJF	December, January, February	ON	October, November
DJFM	December, January, February, March	OND	October, November, December
dS/m	Deci-Siemens per meter	PARB	Punjab Agriculture Research Board
DSS	Decision Support System	PARC	Pakistan Agricultural Research Council
ENSO	El Niño-Southern Oscillation	PAWD	Percentage Area Weighted Departure
FAO	Food and Agriculture Organization	PCRET	Pakistan Council of Renewable Energy Technology
ETM	Enhanced Thematic Mapper	PDMA	Provincial Disaster Management Authority
FATA	Federally Administered Tribal Areas	PDMC	Provincial Disaster Management Commission
GB	Gilgit Baltistan	PPAF	Pakistan Poverty Alleviation Fund
GCISC	Global Climate Impacts Study Center	RAI	Rainfall Anomaly Index
GHGs	greenhouse gases	RCP	Representative Concentration Pathway
GoP	Government of Pakistan		
CYII	Crop Yield Insurance Index	RDI	Reconnaissance Drought Index
HFA	Hyogo Framework for Action		
HVA	High-value agriculture		
ICSA	Institute for Climate Smart		

RSPN	Rural Support Program Network
SCF	Small Commercial Farmers
SDF	Drought Severity-Duration-Frequency
SDI	Streamflow Drought Index
SDG	Sustainable Development Goal
SLMP-II	Sustainable Land Management Program
SMA	Soil Moisture Anomaly
SMART	Strengthening Markets for Agriculture & Rural Transformation
SPEI	Standardized Precipitation Evapotranspiration Index
SPI	Standardized Precipitation Index
SUPARCO	Space and Upper Atmosphere Research Commission
SWBI	Surface Water Balance Index
TBTTP	Ten Billion Tree Tsunami

	Project
TCI	Temperature Condition Index
Temp.	Temperature
TF	Through Forward
TVCI	Temperature Vegetation Cover Index
TVDI	Temperature Vegetation Dryness Index
UNCCD	United Nations Convention to Combat Desertification
UNICEF	United Nations Children Fund
UNDP	United Nations Development Program
UNHabitat	United Nations Human Settlement Program
VCI	Vegetation Condition Index
VHI	Vegetation Health Index
WFP	World Food Program
w.r.t.	With respect to
WTO	World Trade Organization

EXECUTIVE SUMMARY

Drought is a naturally occurring phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances that adversely affect land resource production systems (UNCCD, Article 1). It results in water shortage for humans, animals, and damages to crops and the environment. Vulnerability and risks to drought are increased by factors including inappropriate use of land and water resources, deforestation, excessive removal of vegetation and poverty. Erratic precipitation patterns due to a changing climate are increasing soil moisture stress, resulting in agricultural drought. The average annual precipitation in the country since 1901 has increased, but mean rainfall in the arid plains and the coastal belt has decreased from 10% to 15% since 1960, contributing to the ongoing degradation of the country's arid areas and mangrove ecosystems. Moreover, monsoons are increasingly becoming erratic (irregular in time and space), and a cycle of 4-7 years of higher precipitation followed by some equal years of low rainfall is causing a gradual increase in the drought spell over the period, resulting in increased drought events. Pakistan's annual average temperature has increased by 1.68 degrees Celsius between 1901 and 2021, more than the global average temperature increase of 1.1 degrees Celsius. Heat spells are increasing, indicating that a drought-like situation is



expected in the near future, which is also expected using climate modeling scenarios. So, there is a need to prepare and implement the National Drought Plan.

The scope of the National Drought Plan incorporates the most vulnerable drought-affected areas, implementing systems to monitor the early warning of drought, vulnerability and risk assessment for drought, and taking actions to reduce drought impacts and better respond to drought. The role of women and other disadvantaged groups is reflected in the plan. The drought has been described in strategies and policies including Pakistan Vision 2025, National Disaster Risk Reduction Policy 2013, National Climate Change Policy 2021, National Food Security Policy 2018, National Water Policy 2018, National Drinking Water Policy 2009 and National Forest Policy 2015 contributing to an overall country level effort for drought risk reduction. Drought has also been reflected in laws like the National Disaster Management Act (NDM Act) 2010, plans including the National Adaptation Plan 2023, strategies including the National Water Conservation Strategy 2023-27, and in relevant provincial policies, guidelines, and SOPs. Furthermore, drought is dealt with in Pakistan's international obligations, like the Sustainable Development Goals, UNCCD's Land Degradation Neutrality Initiative, and Aichi Biodiversity Targets.

The worst drought in the country was during 1998 –2001. In addition to this, drought was also experienced in 1947, 1951-52, 1963-64, 1965-66, 1968-69, 1970-74, 1983-84, 1987- 88, 2003-2004, 2006, and 2013-2015, mostly in Balochistan and Sindh. Some parts of Punjab and Khyber Pakhtunkhwa (KP) also experienced drought at different times. Rise in temperature, El-Nino effect, climate change, low and erratic rainfall, and inefficient use of water are among the main causes of drought. Deforestation, over-grazing, and attacks of pests like locusts increase this phenomenon. Drought impacts natural resources, including water, forests, Agriculture, food security, livestock, human health, socio-economic conditions, and poverty. The women are the most severely affected, and gender related issues increase during drought. The main federal government organizations dealing with drought include MoCCEC, National Disaster Management Authority (NDMA), Ministry of Water Resources, Ministry of National Food Security and Research, Pakistan Meteorological Department (PMD), Pakistan Agriculture Research Council (PARC), Global Change Impacts Study Center (GCISC), Water and Power Development Authority (WAPDA), and National Disaster Risk Management Fund (NDRMF). In addition to several NGOs, Rural Support Programs, and micro-finance banks, United Nations agencies, including UNDP, UNICEF, FAO, and WFP, also cover drought in their projects and programs.

Drought monitoring and forecasting assist in drought risk reduction. Drought-related hydro-meteorological and other relevant indices/indicators are noted and reported by PMD, Provincial Irrigation and Drainage Authorities, and WAPDA. The GCISC also conducts data analysis, helpful for decision-making at the government and community levels, at or before the onset of a drought-like situation. The PMD is monitoring drought through its meteorological and flow gauge stations. It has established National and Regional Centers for Drought/Environment Monitoring and Early Warning. Most of the information is provided on the website of PMD. The National Disaster Management Authority (NDMA) also disseminates the data through mobile companies as messages to the general public using electronic media. Forecasting of drought provides time to government decision makers and local communities for planning and implementing drought mitigation strategies. Disaster risk and vulnerability assessment studies have been conducted by NDMA; these studies also cover drought risks.

When there is an alert for drought, year-wise communication plans will be developed. During droughts, women who often have a management and leadership role at the household are impacted more than men as they carry out their daily activities in mitigating the negative impacts of drought on the family. The Plan recognizes the vulnerability of women and other disadvantaged groups and takes special measures to involve them in drought management, risk reduction, and control efforts.

Important gaps in drought management in Pakistan include the absence of drought management in planning and budgetary processes, weak policy and institutional coordination mechanisms, weak regulatory frameworks, limited capacity in drought monitoring, preparedness, and early warning, limited water storage and water management in drought prone areas, limited awareness and capacity of stakeholders. The proposed priority actions include mainstreaming of drought in planning and budgetary processes, formulation of national land use and drought management policies, improving institutional and coordination mechanisms, improving groundwater regulation and management, strengthening drought forecast and early warning systems, drought emergency response preparedness, water resource development and management in drought prone areas, management of watersheds, forests, cropland and rangelands, capacity building and awareness raising.

The main actions include developing drought preparedness plans, concept notes, project documents, incorporating disaster related indicators in the planning documents, mapping groundwater resources, updating drought vulnerability index & hazard map of Pakistan, developing MIS/ decision support system for drought, national land use policy, national drought management policy, establishing Director General office for desertification/ drought mitigation, strengthened national drought monitoring & early warning center and systems for drought, re-investigating agro-climatic zones, crop and livestock calendars, research on water resource management and drought tolerant livestock breeds.

The key local projects and actions involve efficient irrigation technologies for arid agriculture, command area development of small reservoirs and dug-wells, hill torrents flood management, lined surface and underground ponds and mini-dams, improved karezes, rainwater harvesting, wells, low delta crops, water saving cropping practices, community managed integrated rangeland management, seed banks, mazri crop nurseries, low delta forest nurseries, forest tree plantations, land use management, LPG, micro-hydel, solar energy, fuel-efficient stoves, Veterinary health services, improved livestock breeds, improved fodder, off-farm employment opportunities to protect natural resources, control locust growth by environment friendly means, achieving targets of Land Degradation Neutrality, Recharge Pakistan Program, local and foreign training workshops and exchange visits for staff of government and NGOs and farmers' trainings on drought mitigation, awareness raising through workshops, media and telecommunication companies, incorporating drought and water conservation education into school curricula.

If there is likelihood of the drought, the NDMA may take necessary response measures and coordinate relevant ministries and departments. As part of the National Drought Plan, Drought Plans for four provinces, GB and AJ&K were drafted. However, the provinces will develop and finalize their Drought Mitigation plans as they consider necessary. Proposed federal level projects/ actions for Drought preparedness, adaptation and mitigation with a total cost of PKR. 361.2 billion have been mentioned in the plan. In addition to this the proposed provincial projects have also been proposed. The total cost of proposed provincial and federal projects for drought mitigation is PKR. 4,548 billion.

BACKGROUND

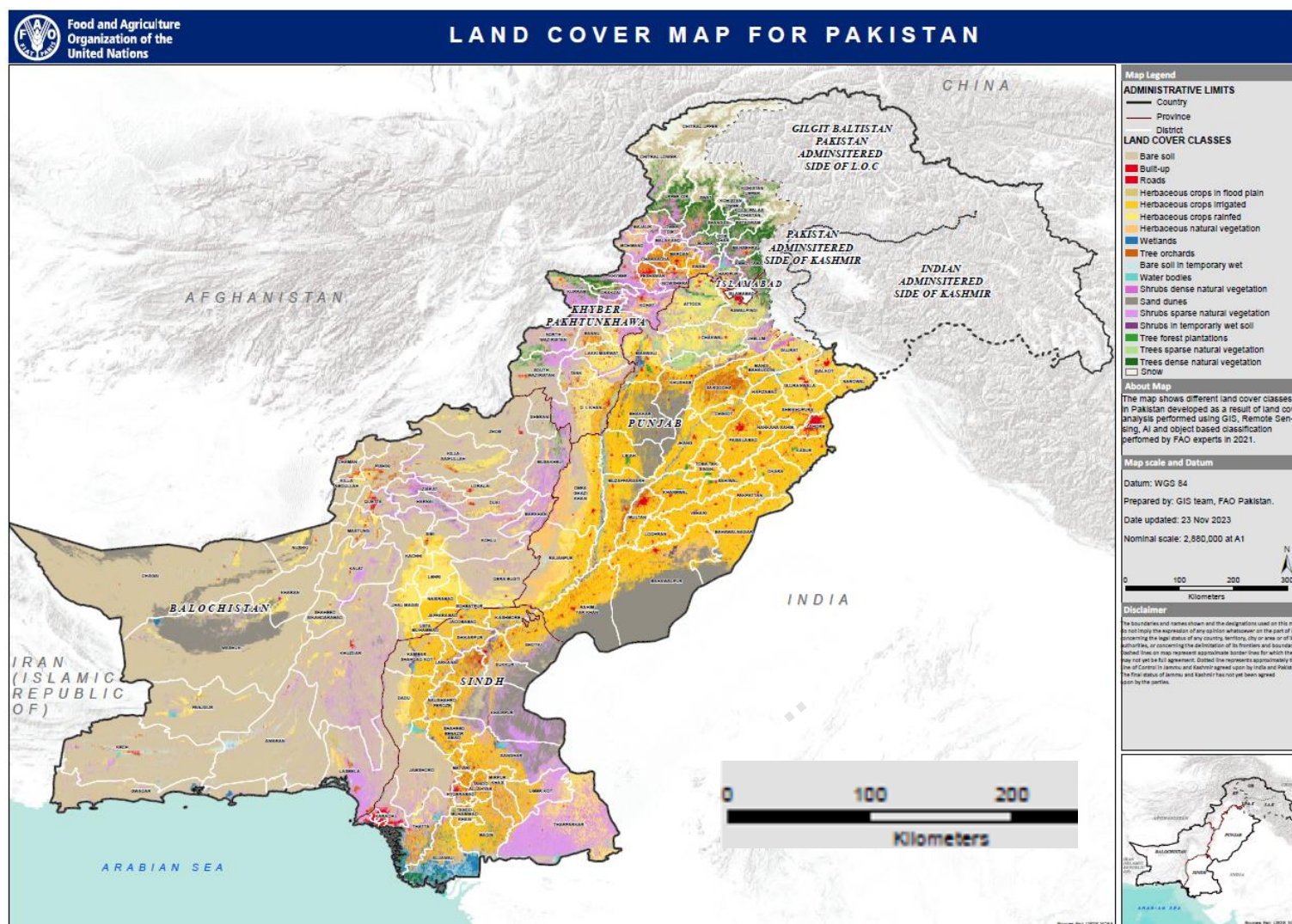
Drought is a naturally occurring phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances that adversely affect land resource production systems (UNCCD, Article 1). On average, each year about 55 million people are affected by drought in the world (WHO). It leads to a shortage of water for humans and animals and causes damage to crops, livestock, and the environment. The phenomenon is slow. The shortage and erratic rainfall is its main cause. Poverty and improper use of land increase its vulnerability. Approximately 60% of deaths caused by extreme weather events are due to drought globally (UNCCD, 2022).

1.1. Pakistan - Water source, Soils, and Land

The main source of water in the main rivers in Pakistan, including the Indus, Chenab, and Jhelum, is the melting of glaciers. Soils in most parts of Pakistan have a pH value more than 7 and are alkaline, with a poor nitrogen level. Soil moisture levels depend on rainfall, particularly monsoon. Land-cover map of Pakistan has been presented in Figure 1.1. Most of the drought-prone areas include open ground/ fallow lands, deserts, exposed rocks, saline, and rangelands. Forest cover includes scrub forests, riverine, mangroves, and irrigated plantations. Agricultural land can be classified as irrigated, rainfed, and rod-kohi/ hill torrent-spate. Pakistan has about 4.68% of its land area covered under various types of forests during the year 2020 (National Forest Monitoring System, Ministry of Climate Change) (Figures 1.2 & 1.3).

About one-fifth of the total area of Pakistan is rain-fed, hill torrents/rod-kohi, and irrigated agricultural land. Almost ten percent is the fallow-land and another ten percent is deserts. More than twenty-seven percent of the country consists of rangelands and pasture lands, while about twenty-five percent is rocky areas. About two percent is glacier/ snow coverage. More than one percent is under water bodies, saline and sodic lands, waterlogged and built-up areas together (Government of Pakistan, 2009).

Pakistan has seven geographical areas (Wikipedia), ten agro-ecological zones (FAO), five major climatic regions, and eight land capability classes (IUCN, Pakistan, 2017), presented at Annexure VIII and VIII. Most of the country falls in drought-prone lands Class VII (24.3 percent: poor forests and rangelands) and Class VIII (46.7 percent; unfit for agricultural purposes) (Khan 2015). This leads to the conclusion that about three-fourths of the soils of Pakistan have certain limitations for growing crops, forests, and even rangelands (National Action Programme to combat desertification in Pakistan, 2017).

Figure 1.1. Pakistan's land cover⁸

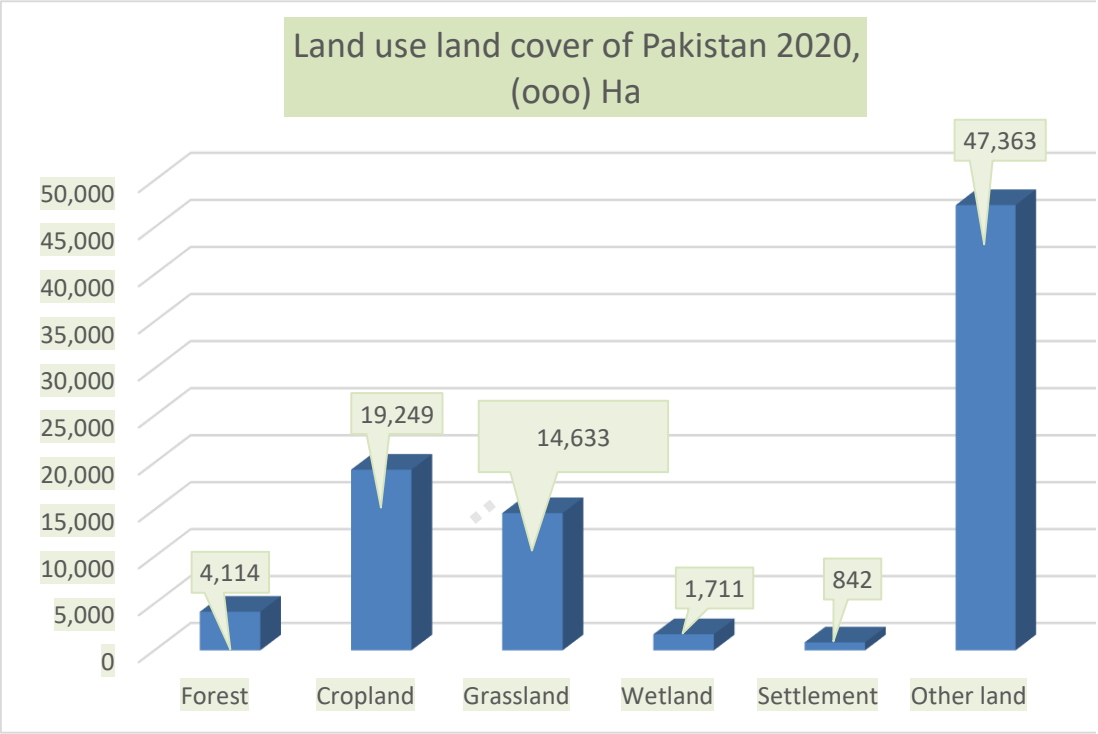


Figure 1.2. Land use land cover of Pakistan

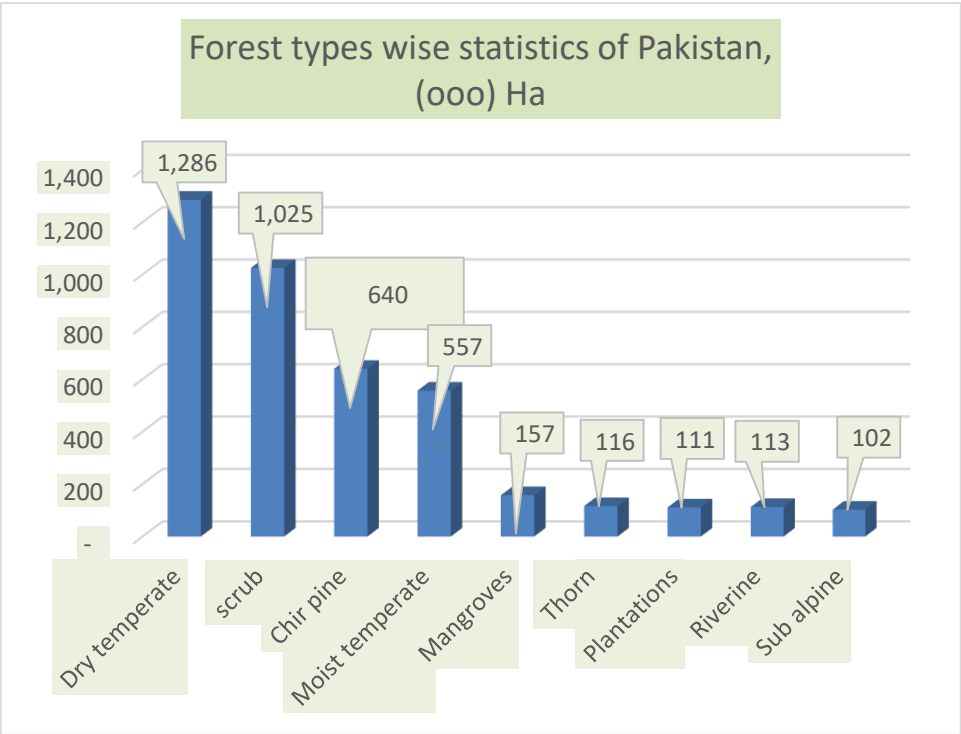


Figure 1.3. Forest types wise statistics

Source: MoCC (2022)

1.2. Climate

Monsoon occurs from June to September in most parts of Pakistan, except parts of Gilgit Baltistan, Balochistan, and KP (tribal areas and Chitral). Western disturbances result in rains and snowfall in winter in southern and northwestern Pakistan.

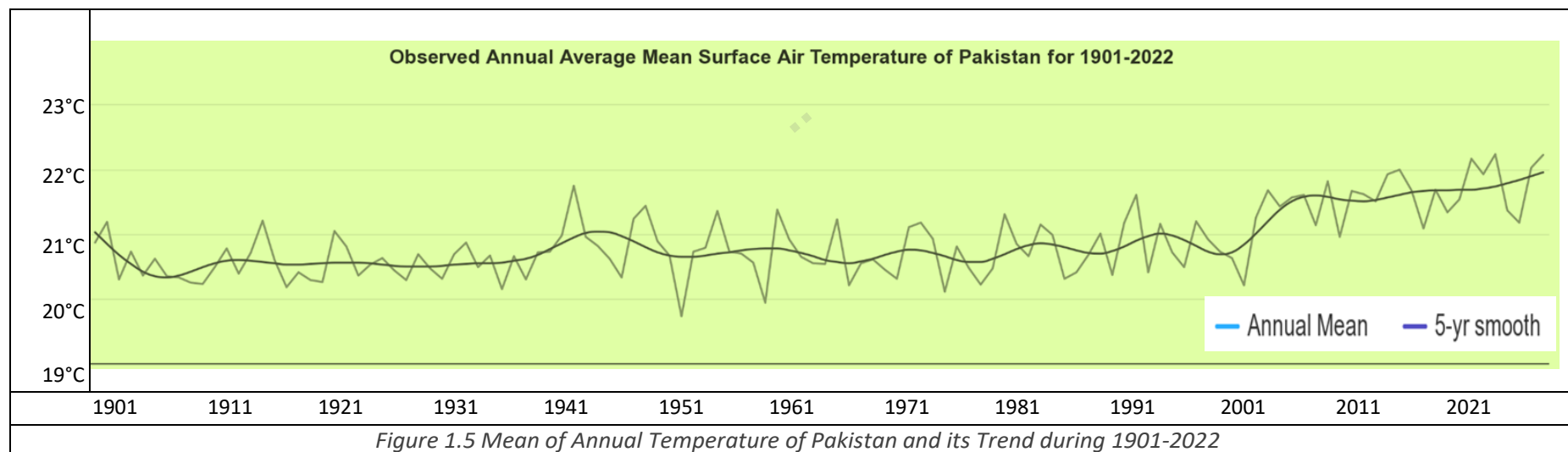
1. Temperature

Between 1901 and 2021, Pakistan's annual average temperature has increased by 1.68 degrees Celsius (°C), more than the global average temperature increase of 1.1°C (Imran, 2023). The mean of annual temperature in the country between 1901 and 2022 is presented in Figure 1.4 and 1.5 (World Bank Group, 2021). Spatial distribution of March-April, May-June, July-September, October-November, December-January-February and annual normal temperature for past thirty years (1981-2010) (Sarfraz, 2014) is presented in Figures 1.6 to 1.11. The southern and eastern areas of the country are hotter.

Hot Spells: On May 28, 2017 temperature recorded in Turbat (Balochistan) was 53.7°C; the hottest ever recorded in Pakistan (Wikipedia). The heat spells are increasing in the country, indicating an expected drought-like situation in the near future. Summer is showing increased extremes of heat in Pakistan. The number of heat wave days per year has increased nearly fivefold in the last 30 years. (ADB). Karachi heat wave (June 2015) led to the death of more than 1,200 people (Chaudhry, 2015). *Spatial distribution of 1981-2010 annual normal rainfall is at Figure 1.18.*

	1991-2020				1961-1990				1931-1960				1901-1930			
Units:°C	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
Pakistan	11.21	22.85	29.49	21.8	10.48	21.96	29.17	21.13	10.45	22.03	29.24	21.11	10.06	21.75	29.31	20.85

Figure 1.4 Mean of Average Mean Surface Air Temperature of Pakistan during 1901-2020



Source: <https://climateknowledgeportal.worldbank.org/country/pakistan/climate-data-historical>

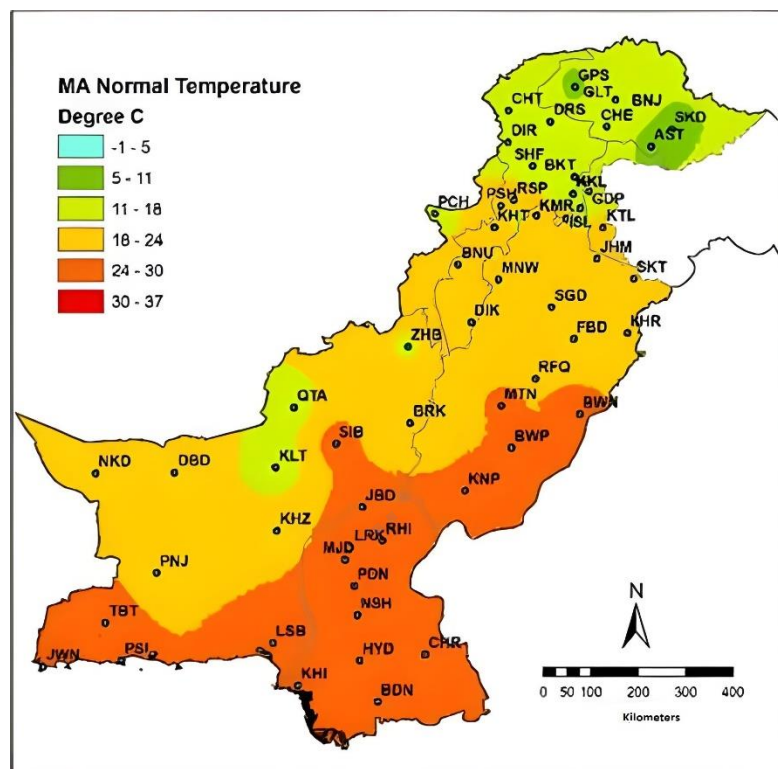


Figure 1.6: Spatial distribution of March - April temperature for past 30 years (1981-2010)

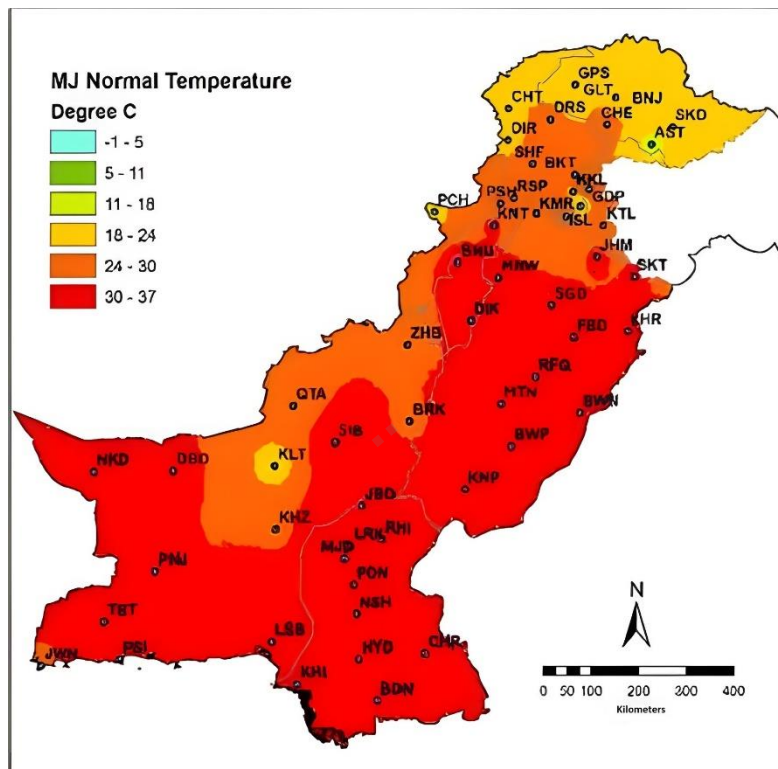


Figure 1.7: Spatial distribution of May - June temperature for past 30 years (1981-2010)

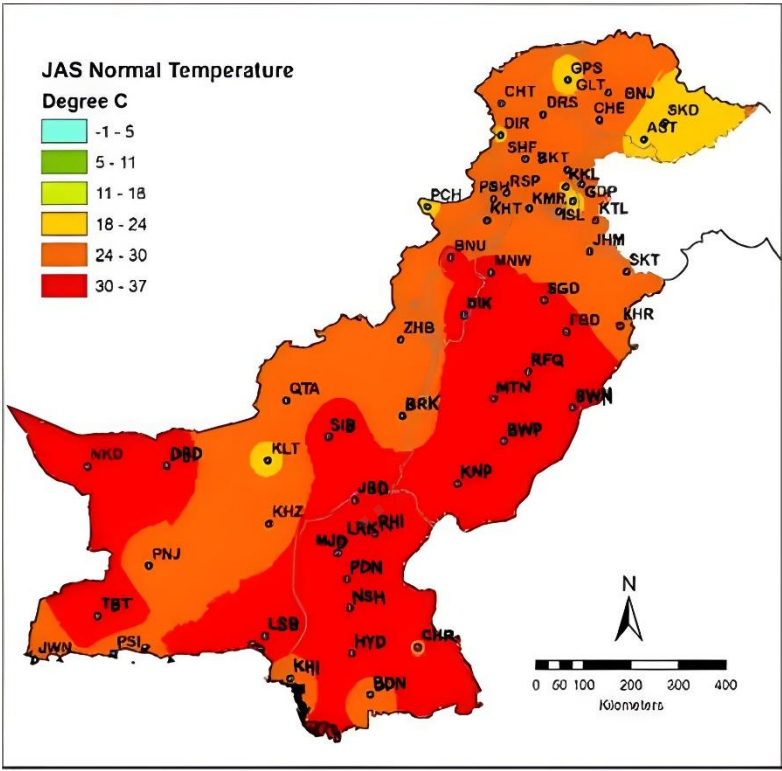


Figure 1.8: Spatial distribution of July-Sep. normal temperature for past 30 years (1981-2010)

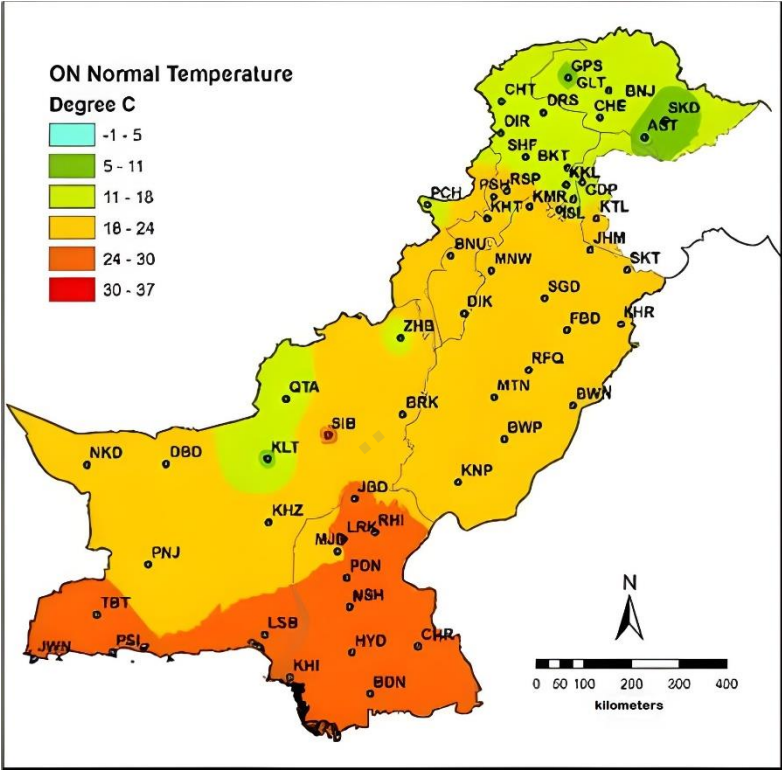


Figure 1.9: Spatial distribution of Oct.-Nov. normal temperature for past 30 years (1981-2010)

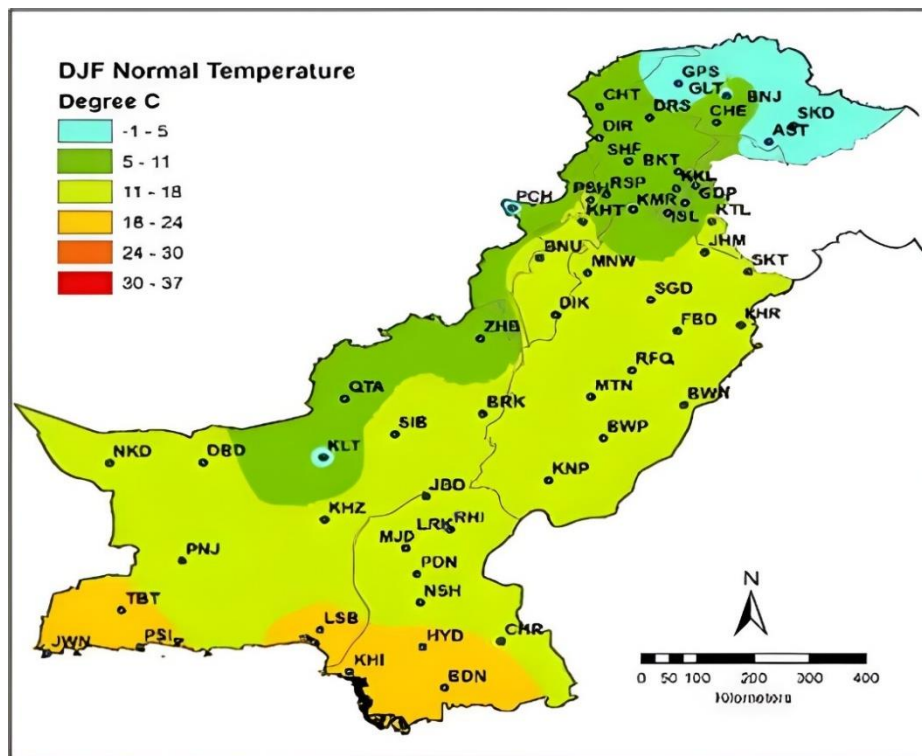


Figure 1.10: Spatial distribution of Dec.-Feb. normal temperature for past 30 years (1981-2010)

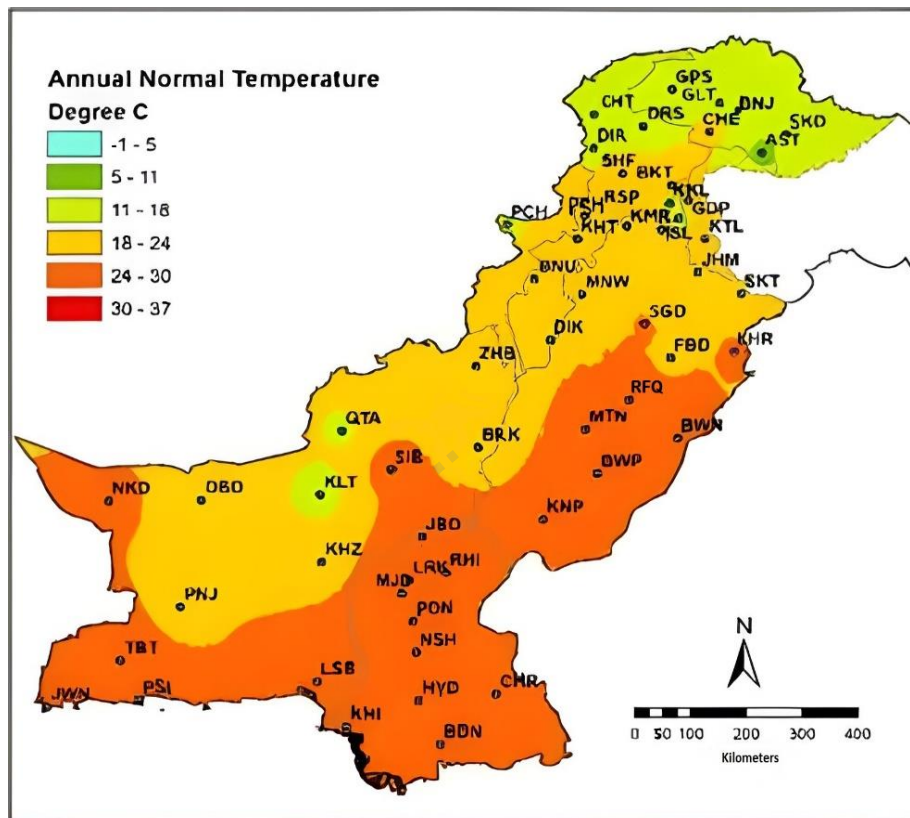


Figure 1.11: Spatial distribution of Annual normal temperature for past 30 years (1981-2010)

Reference: Regionalizing The Climate of Pakistan Using Köppen Classification System (2014)

2. Rainfall/ Precipitation

Average annual rainfall (1901-2007) (ADB, 2017) and mean annual precipitation (1901-2020) (World Bank Group, 2021) in the country have increased, but it is erratic (Figures 1.13 and 1.12). Regarding the spatial distribution of mean annual rainfall received during the last 30 years (1981-2010 (Sarfraz, 2014) (Figure 1.18), there was a prolonged decline in annual rainfall during the early 20th century, but since 1960, a slight increasing trend has prevailed. It hides sub-national variation. Mean rainfall in the arid plains and coastal belt has decreased from 10% to 15% since 1960, contributing to the ongoing degradation of the country's arid and mangrove ecosystems (World Bank Group, 2021). In April to June (Figure 1.14), there is less rainfall and greater temperature, showing a seasonal drought-like condition as part of the annual cycle. It needs to be adjusted through changing the cropping pattern and animal growth periods. During summer, there is higher rainfall in northern areas (except some dry areas among extreme northern areas) and western areas of Sindh and almost the whole of Balochistan (Figure 1.15). Extreme northern areas, including Gilgit-Baltistan and Chitral, are rain-shadow areas for the summer monsoons, though winter rains are comparatively higher. The monsoon is shifting towards the north, contributing to replenishing glaciers. Monsoons are increasingly becoming erratic (irregular in time and space) and a cycle of 4-7 years of higher precipitation followed by some equal years of low rainfall is causing gradual increase in the drought spells over the period of time resulting in increased drought events and serious consequences for the plants/ crops, livestock and wildlife. Under the climate change scenario, the drought periods are gradually extending and becoming more severe; carcasses of dead livestock are frequently seen during extreme drought years, usually in the middle of the drought cycle. Till the 1950s, Pakistan was a water-abundant country with the capacity to provide enough food to its people through adequate food resources grown along its agricultural belt. On average, minimum rainfall in Pakistan was received during October-November (Figure 1.16) and maximum temperature during the July-September quarter. During winter, there is higher rainfall in the western and northern parts (except some dry areas among extreme northern areas) and Quetta, Ziarat, and surrounding areas among the western areas (Figure 1.17) because it is mountainous and has more height.

Figure 1.12 presents the linear trend line of Pakistan's precipitation for the past thirty years, 1975-2004. It can clearly be concluded that the annual precipitation fluctuates tremendously from the average trend line. During 1999-2001, mean precipitation fell to the most extremely low levels. The extremely low levels of precipitation correlate with meteorological drought episodes in Pakistan.



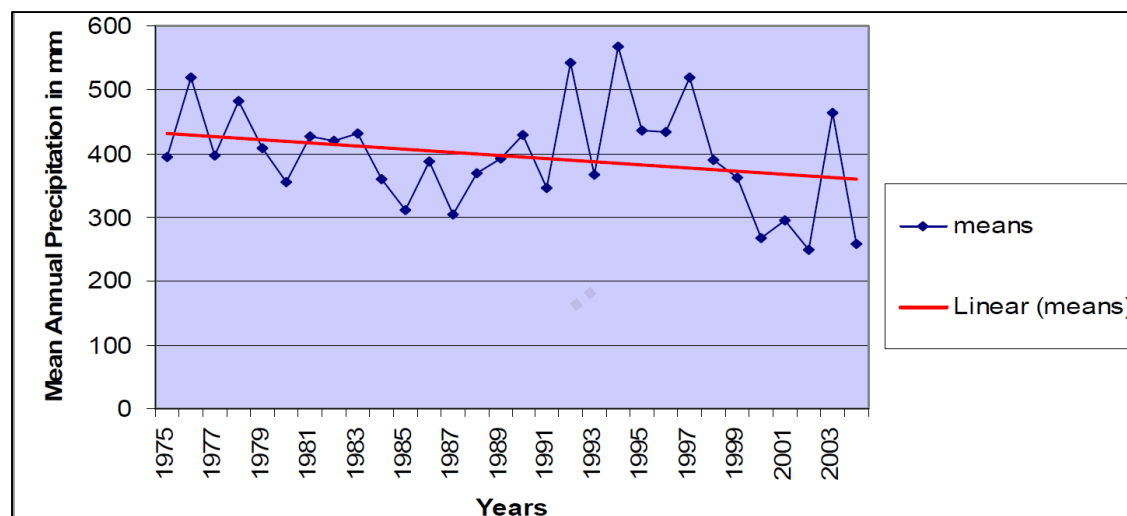


Figure 1.12. Pakistan's mean annual precipitation (mm) during 1901-2020 period

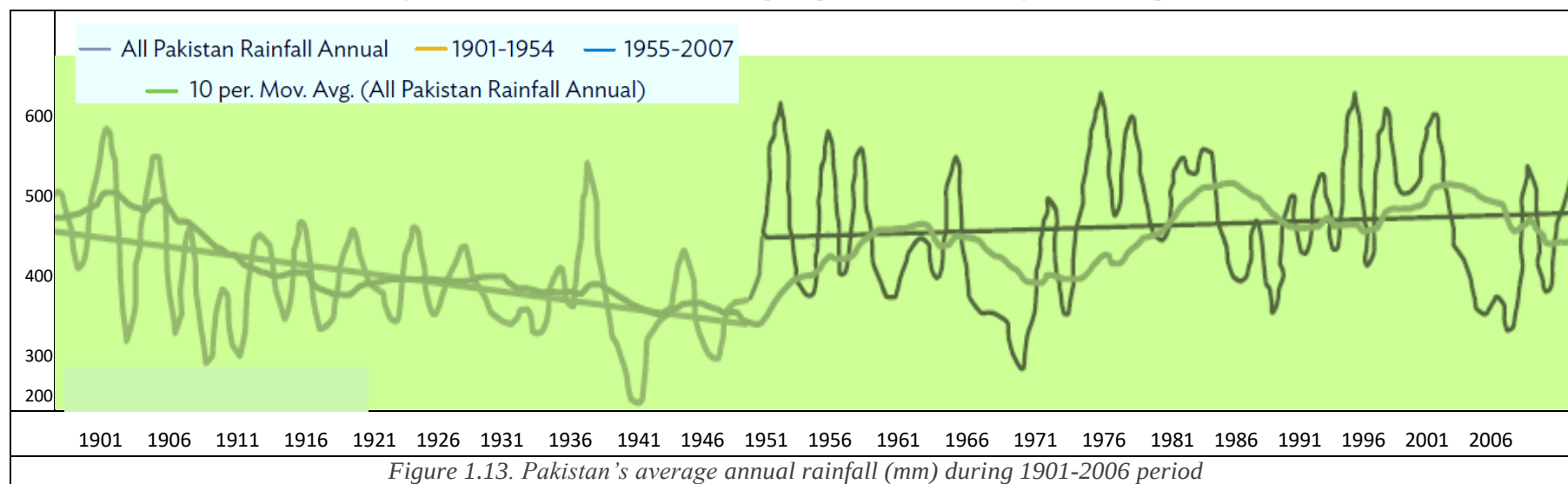


Figure 1.13. Pakistan's average annual rainfall (mm) during 1901-2006 period

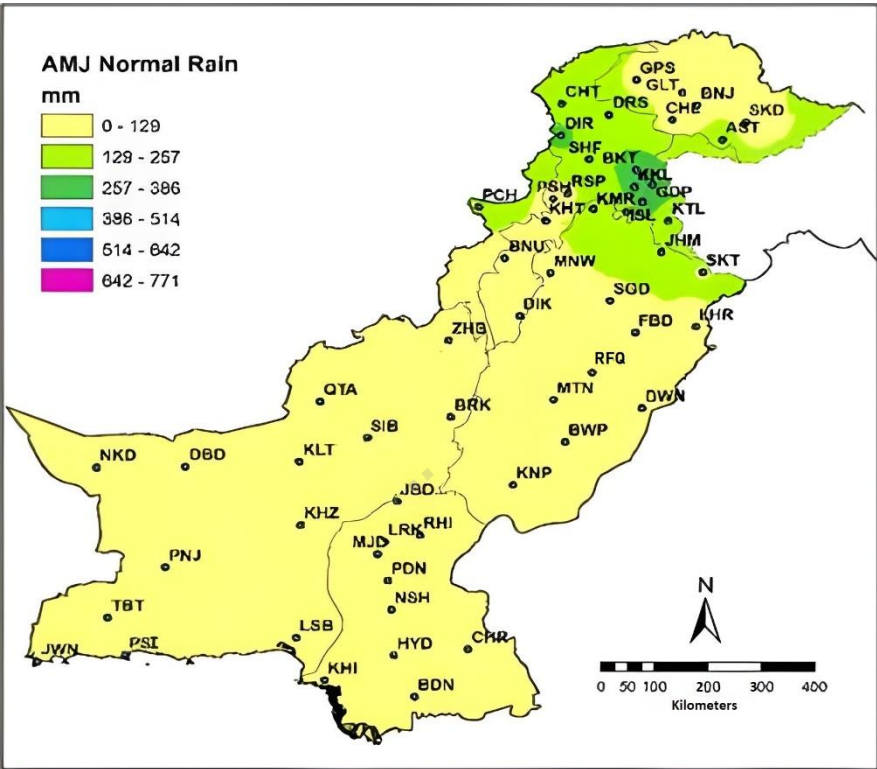


Figure 1.14: Spatial distribution of Apr.-June Sep. rainfall (mm) for past 30 years (1981-2010)

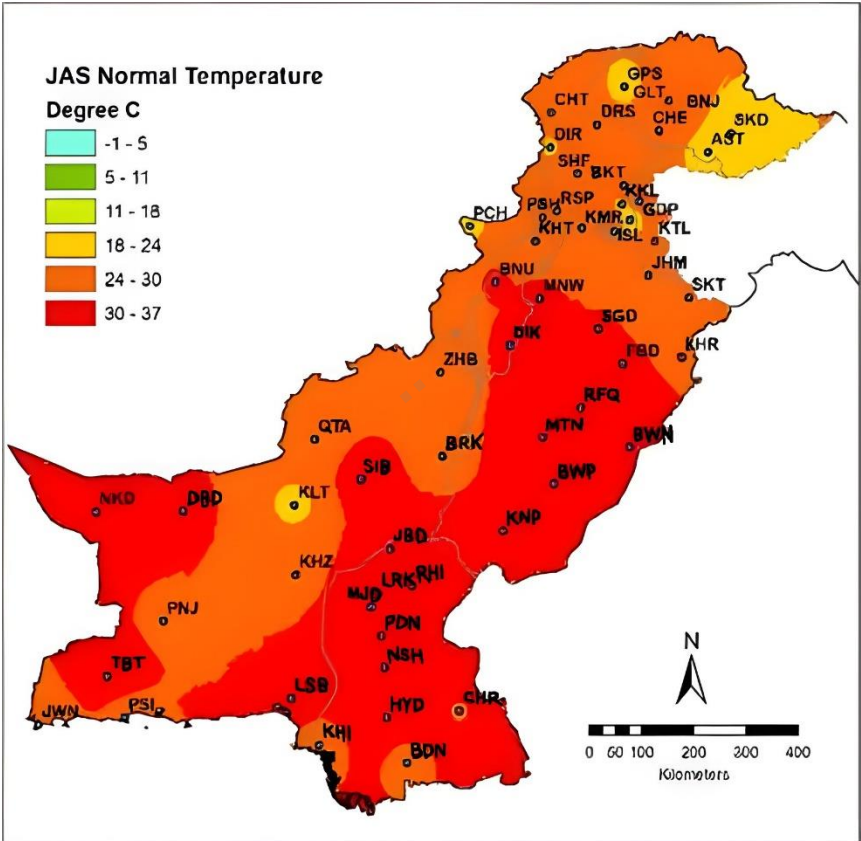


Figure 1.15: Spatial distribution of July-Sep. rainfall (mm) for past 30 years (1981-2010)

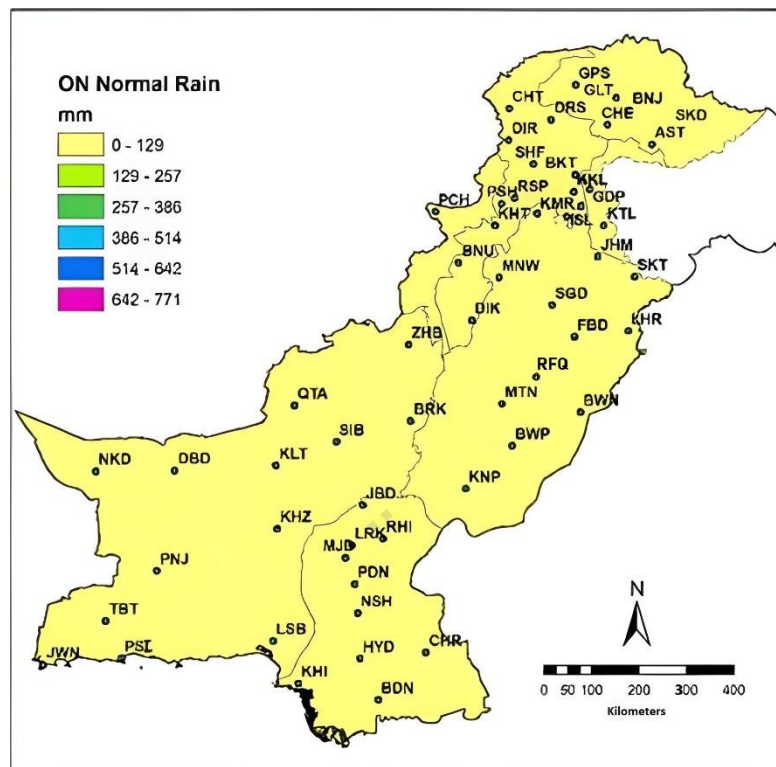


Figure 1.16: Spatial distribution of Oct.-Nov. rainfall (mm) for past 30 years (1981-2010)

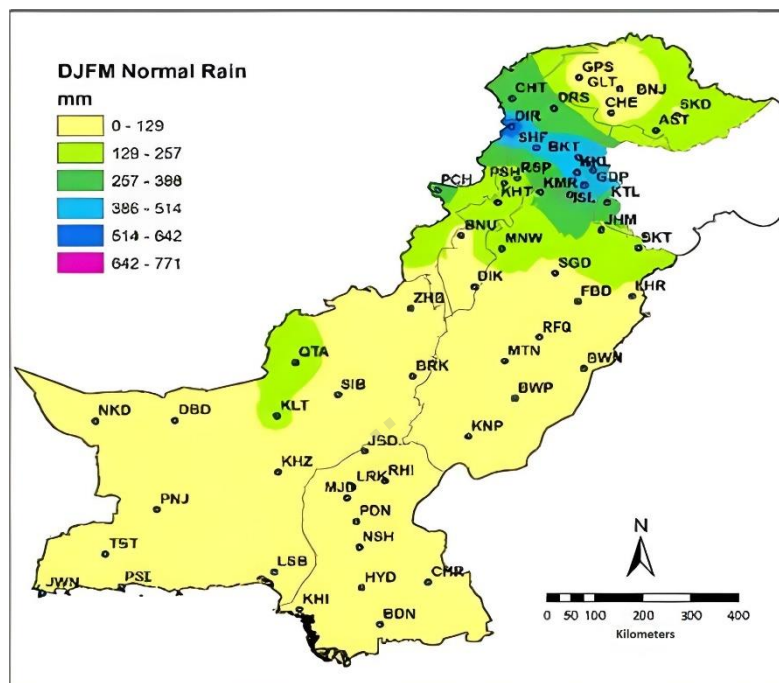


Figure 1.17: Spatial distribution of Dec.-Mar. rainfall (mm) for past 30 years (1981-2010)

i. Future Climatic Projections for Pakistan

It was suggested that the mean temperature of the country is expected to be changed by 2.7°C and 8.3°C, as per Representative Concentration Pathway (RCP) scenarios 4.5 (RCP 4,5) and 8.5

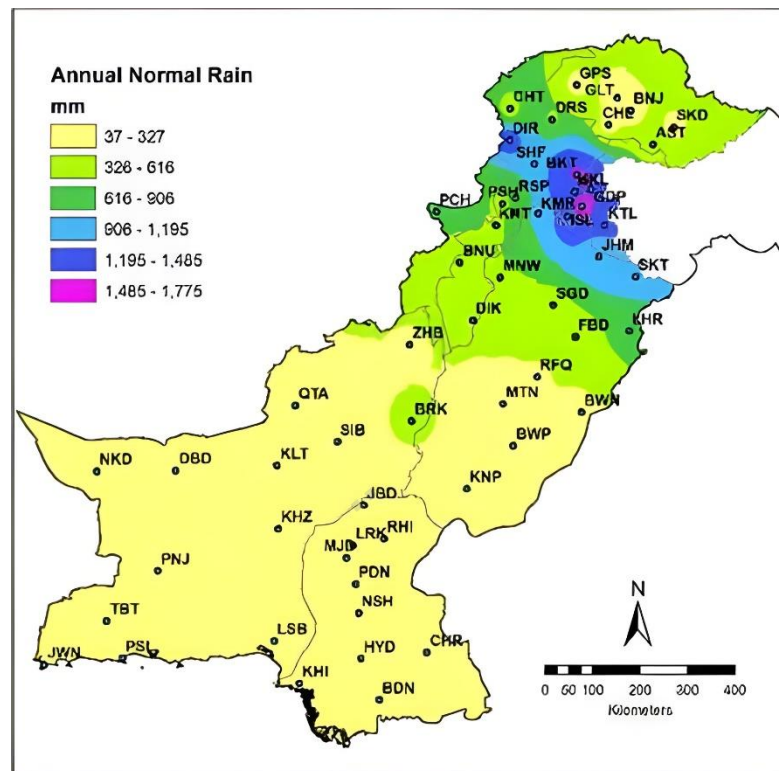


Figure 1.18. Spatial distribution of 1981-2010 annual normal rainfall (mm)

(RCP 8.5), respectively, till the end of the twenty-first century (Ikram et al. 2017). The temperature in the winter season is expected to rise from 6°C to 8°C by the end of this century, taking 1975 – 2005 as the baseline, which is higher than that expected for summer temperature. The increase in temperature is expected to be from 3°C to 4°C (RCP 4.5) and from 3°C to 8°C (RCP 8.5) by the end of this century in northern mountainous areas which is more than the temperature change in expected in the southern areas (2°C - 3°C, RCP 4.5 and 5°C - 7°C, RCP 8.5). The rate of expected change is higher in the winter (4°C - 6°C, RCP 4.5; 6°C - 8°C, RCP 8.5) by the end of this century with regard to the 1975–2005 baseline.

Average annual precipitation in the country is expected to increase by 2 – 3 mm per day (RCP 4.5) and 3 – 4 mm per day (RCP 8.5). Drought has experienced in such areas, and increasing summer season temperature may result in more frequent drought and an increase in its intensity. An increasing trend is expected in the frequency of dry days with precipitation less than 1 mm per day in the country. Intensive rainfall incidences are expected only in the main regions receiving monsoon rains and coastal areas in Sindh; in areas receiving monsoon rains, the precipitation is expected to rise by 4 mm per day, while in southern parts of Pakistan, the precipitation is expected to decrease by 2 mm per day.

Monsoon is expected to shift towards north-eastern areas, including the dry temperate areas having glaciers resulting in increased melting of glaciers during monsoon and lesser availability of water from glaciers to the country after monsoon. The breaks in intensive wet days are expected to be longer due to expected increase in erratic precipitation. Lower and moderate rainfall occurrence events are expected to decrease, which may increase the dryness and

decrease soil moisture, causing a decrease in the soil's ability to absorb excessive water during heavy rainfall in a shorter time.

1.3. Understanding Drought

There are five broad types of droughts¹ (Figure 1.19):

- i. Meteorological Drought: Meteorological drought depends upon atmospheric variables and precipitation received in different seasons, i.e., yearly or monthly average values. Factors, including dryness degree in comparison to a normal duration of dry periods, are the basis of this drought type.
- ii. Agricultural Drought: Different features of meteorological and hydrological drought, as affecting agricultural output, are classified as agricultural drought. Such features include lower precipitation and increased evapotranspiration/ vapor pressure difference, deficit in soil moisture, and lowered groundwater reservoir. Water requirements of plants depend on existing weather, plant type, its growth stage, and physical, biological, and chemical properties of the soil. The definition considers the receptiveness of crops during various crop development stages. At seeding/planting, soil moisture deficiency in the top 15-30 cm of soil may affect germination, resulting in lower population of plants per unit area and crop yield reduction. It may not have profound effects on crop yield if this moisture level is enough for the requirements of plant growth during early stages and is restored, especially during critical crop growth stages, and it fulfils plant water requirements.
- iii. Hydrological Drought: Effects and impacts of precipitation and snowfall period on hydrological system and water resources (surface: dams, ponds, lakes, streams, rivers; sub-surface groundwater; and soil moisture) are generally not immediate and take longer periods. These determine the severity and frequency of hydrological drought, mostly calculated at river-basin or watershed scale, which impacts the use of water sources and ecosystem services, including wildlife habitat, irrigation, production of hydro-power, and recreation.
- iv. Socioeconomic Drought: Socio-economic drought occurs when there is a significant decrease in water supply, resulting in a lowered supply of economic goods, like fish, hydropower, crops that increase poverty, which impact human and animal health, livelihood, well-being, and quality of human life.
- v. Ecological Drought: Stress to the ecosystem and ecology as a result of prolonged changes in its hydrologic system, and meteorological drought results in ecological drought.

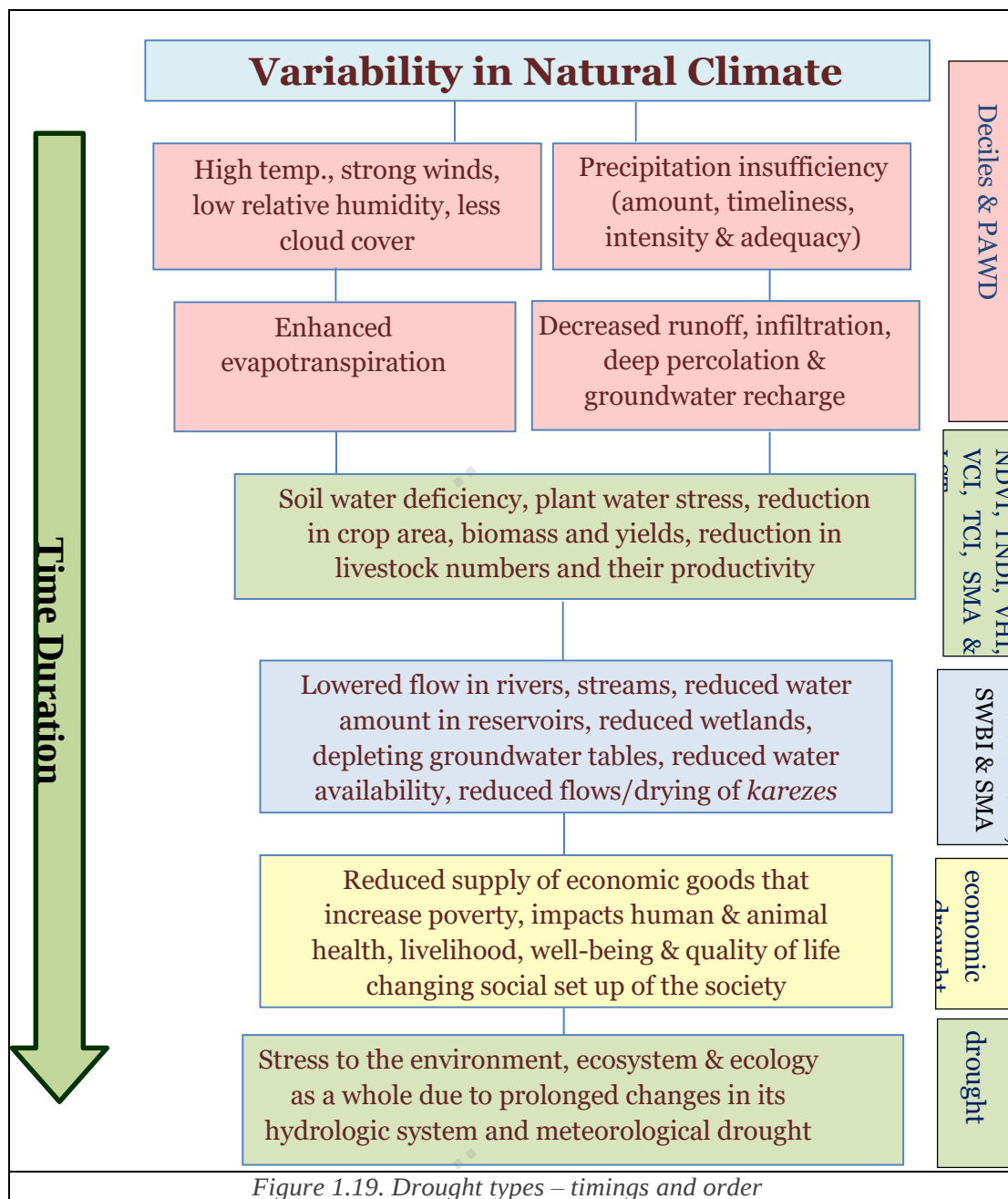
1.4. Purpose, Scope, Goals, and Objectives

The drought initiative was a result of the decision No.29 of UNCCD's 13th Conference of the Parties. Pakistan was selected to prepare the "Drought Plan" as it indicated its interest. The scope of the Plan includes: 1) Identification of the most vulnerable drought-affected areas, 2) Implementation of systems to monitor and provide early warning for drought, 3) Vulnerability and risk assessment for drought, and 4) Taking actions to reduce drought impacts and better respond to drought. These are also coherent with the framework of the drought initiative of the UNCCD.

¹ National Drought Mitigation Center, University of Nebraska-Lincoln, USA

The salient features of the initiative include preparing the system for drought prediction, reducing drought risks and vulnerability through regional initiatives, and a toolbox to increase drought resilience of the ecosystems and the people. In addition, a key feature is the promotion of proactive management of drought risk - the goal to promote a paradigm shift in approach to drought management, from a reactive and crisis-based approach towards a proactive and risk-based one.

The ultimate goal of the Drought Plan is to reduce the impacts of drought on the people and the economy of Pakistan. The objectives of the plan are to assist the government and relevant national and international stakeholders to provide a national level mechanism in drought resilience through concrete actions, including, assessing drought situation in the country, undertaking drought preparedness and preventive actions to assist human communities and their ecosystem in increasing the resilience for drought and taking short, medium and long-term drought mitigation initiatives to minimize economic losses, social hardships and environmental degradation.



1.5. Plan Development Process

Drought impacts can be lowered through the drought plan implementation. UNCCD focuses on the 10-steps process for the plan development (UNCCD). Preparation of the Pakistan's National Drought Plan did not strictly follow these steps since a lot of work has already been conducted on the drought. The process is summarized as:

- 1) Drought Task Force: Due to COVID 19 outbreak, a formal task force could not be constituted. Consultations were held with the National Focal Point of UNCCD for formation of National Drought Plan, under the atmosphere of COVID 19 restrictions. Major stakeholders were identified and the consultant held formal meetings with them to collect basic

information and circulated the draft plan amongst them for taking their inputs on the plan.

2) Drought Plan Objectives: The UNCCD Focal Point guided setting the objectives of the plan which were endorsed by the stakeholders during plan preparation exercise, these include determining the role of government in drought response and mitigation initiatives, deciding the scope of drought plan, identifying the most vulnerable drought effected areas, and defining impact, social and legislative implication of the drought plan.

3) Participation of Stakeholder and Conflict Resolution: The UNCCD Focal Point guided identifying the stakeholders, benefiting from drought plan, including, farmers, poor, rural residents, marginalized people, women-headed households, youth, and decision makers. These were involved, from the beginning of the drought plan preparation, through their active participation and developing ownership in planning drought management. The plan was circulated among the federal and provincial stakeholders and comments received were incorporated in the plan. Moreover, following consultations were held with provinces and States.

Sr. No.	Province/ State	Date of Consultation meeting	Sr. No.	Province/ State	Date of Consultation meeting
1	Khyber Pakhtunkhwa	22 February 2022	4	Sindh	24 March 2022
2	Punjab	1 March 2022	5	GB	31 May 2022
3	AJK	15 March 2022	6	Balochistan	15 August 2022

Province/ State level consultations were coordinated by respective Planning and Development departments (P&DDs) and involved the relevant departments and authorities in the province/ State.

4) Resources and Group Expected for Drought Risk Identification: The UNCCD Focal Point guided in identification of resources, including, human, economic and natural. Besides, resource inventory, the information on cost of plan against the losses were tried to be weighed with identification of main problems.

5) Structure of Responsible Organizations and Development of Drought Plan: Drought plan requires description of three main components, viz., monitoring, assessment, mitigation and response to each component. This requires formation of "Assessment and Monitoring Committee" that will be constituted during plan implementation.

6) Science and Policy Integration and Reducing Institutional Capacity Gaps: The plan focuses on policy makers and scientists to be closer to work together for drought preparedness, adaptation to climate change and associated disasters and drought mitigation.

7) Increase Outreach of the Proposed Plan and Take Inputs: Constant communication with public on reducing ways to reduce impact of drought and role of the drought plan were also focused in the plan.

8) Implement The Plan: Monitoring concerns with overseeing is a part of effective implementation. Various measures mentioned in the plan are already being implemented and other will be implemented as per resource availability and political commitment of the

government, NGOs and the private sector in the country.

9) Education and Awareness Programs: Development program for community education for drought response and related topics in order to responding to drought effectively were proposed in most of the plans and programs.

10) Post-drought Evaluation: Post drought evaluation of several measures in the plan to assist learning lessons from accomplishments and mistakes will be planned and held after five years of plan implementation.

RELATIONSHIP WITH RELEVANT PLANS AND POLICIES

2.1. Importance of National Drought Plan

Drought has a major impact on food security, health, population displacement and migration, loss of wildlife and fish, reduced freshwater availability, increased forest fire hazards, and clouds of dust. Such impacts result in reduced agricultural income, higher food prices, unemployment, and loss of property. These consequences directly or indirectly affect human and animal life through starvation and disease, ultimately leading to prolonged economic depression and armed conflicts. The 13th meeting of the UNCCD's COP urged the execution of a drought initiative. The development of a drought plan at the national level is part of this initiative. Pakistan has already been impacted by drought, and climate change is expected to further increase drought-like conditions in the future. It is anticipated that the drought plan will be implemented at the national level.

2.2. Relationship of National Drought Plan with relevant Policies, Plans, and Regulatory framework

Pakistan Vision 2025 states that water scarcity in the country is being caused by drought, among other factors. The water security goals include increasing the water storage capacity from 30 to 90 days, promoting technologies to reduce water wastage across various sectors, including agriculture, conserving water through pricing rationalization, and allocating financial resources based on national and provincial priorities as well as relevant economic and social concerns. Additionally, the goals include the establishment of a National Commission for Water to manage water resources and oversee their regional and sectoral allocations, along with increasing citizens' access to quality water.

Different policies and plans of Pakistan highlight drought and its management measures, including increased security of water and resilience to climate change, decreased drought risks, appropriate management of natural resources, and enhancing national capital, in the context of the National Drought Plan. The National Drought plan is based on the drought-related actions and measures of the National Water Policy, the National Forest Policy, and the Framework for Implementation of National Climate Change Policy, and discusses the parts of the policies and plans that focus on drought issues, their prevention and mitigation, as described below:

2.2.1. National Disaster Risk Reduction Policy 2013

The objectives of the Disaster Risk Reduction Policy 2013 (DRR) focus on disaster mitigation, including drought as a disaster. DRR focuses on enhancing integrated capacity at the national level for monitoring hazard and vulnerability trends, enhancing capacity in early warning for multi-hazards and disaster preparedness, assessing response and planning considering risks of disasters, environment, and climate change, and consolidating resilience of main infrastructure (structural as well as nonstructural). It is mentioned that a guidebook on indigenous mechanisms for coping with drought will be developed by the National Disaster Management Authority (NDMA). Similarly, DRR also suggested the constitution of an experts' core group for research in risk reduction for disasters and post-drought studies. The findings of these studies were planned to be incorporated into disaster risk management plans.

2.2.2. National Climate Change Policy 2021

Development of contingency plans, development and introduction of low delta varieties of crop, shrubs and grasses, drought tolerant livestock breeds, implementation of agricultural drought management practices and strengthening drought monitoring and early warning systems in the country are among the main policy measures relevant to drought management. One of the objectives of National Climate Change Policy (NCCP) 2021 is to minimize the risks arising from the potential increase in frequency and intensity of extreme weather events such as droughts. The relevant policy measures include, development of contingency plans for short- term measures to adapt to water shortages that could help mitigate drought, develop new varieties of crops which are high yielding, resistant to heat stress, drought tolerant, and less prone to attack by insects and pests, develop and introduce better breeds of livestock with higher milk and meat productivity and which are less prone to heat stress and drought, encourage farmers, particularly in rain- fed areas, to avoid monoculture and, instead, plant a variety of heat and drought resistant low delta crops, so as to reduce the risk of crop failure, encourage agricultural drought management practices that recognize drought as part of a highly variable climate, as opposed to treating it as a causal natural disaster, develop a program to prevent crop damage due to unexpected weather changes by introducing cold and drought resistant short duration cereal crops suited for high altitudes, promote “low delta crops” and research on drought and pest resistant crops, undertake development of drought resistant shrubs, fodder crops and grasses for pastures and oases for livestock and strengthen flood forecasting, drought monitoring and early warning systems in the country.

2.2.3. National Food Security Policy 2018

Several actions described in the National Food Security Policy 2018 are related to drought risk mitigation. As a pre-disaster for drought, the policy focuses on coordinating NDMA through a representative, preparedness plan for food security for food-insecure and drought-prone districts in case of an expected drought emergency, awareness on raising livestock feed resources for such areas, and assessment of agriculture and livestock in early warning. The policy measures also focus on assisting provinces in the provision of fodder, vaccines, deworming, medicines for animals during drought, and making a plan for the early recovery phase, assessing losses to crops and animals after drought response.

2.2.4. National Water Policy 2018

Reducing vulnerability for drought management on a long-term basis is among the objectives of the National Water Policy 2018. The policy emphasizes provinces to prepare drought management plans and divert flood water towards dry lands through escape channels to improve groundwater availability and the micro-environment to combat drought. Facility to recharge aquifer and economic activities related to non-water and use of available groundwater resources for social forestry, livestock, and domestic purposes are given top priority in the policy. The policy calls for the delineation of drought-prone zones to be promoted to ensure adequate measures in case of a drought-like situation. As per policy, Meteorological and other departments/ agencies will be supported in research for drought prediction to support timely countermeasures like releases from water reservoirs and water management. Emphasis has been placed on the need to investigate

groundwater aquifers as water storage facilities and on exploring cost effective technologies for sailaba spate irrigation system.

2.2.5. National Drinking Water Policy 2009

The proposed policy measures include development of plans for drought preparedness and response from national to local levels to ensure safe drinking water to the affected communities.

2.2.6. National Forest Policy 2015

The policy covers desert Forest ecosystems in addition to other ecosystems. It is described that desertification; climate change and loss of biodiversity issues can be cost effectively and durably solved by developing and preserving forests. One of the cross-cutting subjects of UNFCCC, UNCCD and UNCBD is forestry, emphasizing the need for regular monitoring and reporting on forests' status.

2.2.7. Draft National Rangeland Policy

The proposed policy measures related to drought management include compensating farmers for any loss occurring due to any disaster especially drought, landslides, epidemic disease and wild fire and establishment of National Range Conservation and Development fund to develop rangeland and support the livelihoods of the poor and vulnerable population of the rangeland dependent communities in case of disasters like drought, floods, wild fire, landslides, and epidemic in order to sustain development interventions and provide the required funds. The policy document is also required to comply with and will enable the government to be an active partner in fulfilling the objectives of various UN Conventions including UNCCD.

2.2.8. National Disaster Management Act (NDM Act) 2010

The NDM Act describes legal backup for prevention and mitigation of disasters, including drought. It contains guidelines for constitution of National and Provincial Disaster Management (DM) Commissions and Authorities, District and Local DM Authorities, National, provincial and district DM plans, National Institute of DM, National Disaster Response Force, and National and Provincial DM Funds. The NDM Act describes that NDM plan will consider the National Disaster Risk Reduction Policy, which focuses on actions required for disasters' preventions/ mitigation, integrating such actions in plans for development, disaster preparedness and building capacity for responses, federal government institutions' roles and responsibilities in implementing actions, annual review of the plan and federal government to finance the plan.

2.2.9. Framework for Implementation of NCCP (2014-2030)

The framework recognizes that the areas likely to be affected by drought will increase in the country. The proposed strategies and relevant actions to manage and mitigate drought are as follows:

Strategies	Actions
4.1.3-3.8: Developing contingency plans for short-term measures to adapt to water shortages that could help to mitigate drought.	- Identify the areas that could be severely affected from seasonal or prolonged drought. - Allocate water from existing gross national water availability to water storages that could help mitigate drought in these affected areas.
5.3.0-1.1: Developing a risk management system to safeguard against crop failures due to extreme climatic events including droughts.	Develop and introduce research-based drought resistance crop varieties
1.3: Encouraging farmers, particularly in rain-fed areas, to avoid monoculture and plant a variety of heat and drought resistant crops, to reduce the risk of crop failure.	Identify vulnerable areas within the rain-fed agriculture systems that are prone to increasing heat and drought related failures of crops.
1.4: Encouraging farmers to adopt agriculture drought management practices as part of highly variable climate, rather than as unusual natural disaster.	- Identify the drought vulnerable agricultural areas - Develop and introduce drought resistant crops - Develop localized plans for water storage and rain water harvesting for drought management - Involve the farming community to manage the reoccurring drought due to climatic variations - Involve line departments to transfer innovative technologies for agricultural drought management to vulnerable areas.
5.3.1-2.1: Improving crop productivity by increasing efficiency of agricultural inputs, in particular the input of irrigation water	- Training of farmer community to promote water conservation techniques in drought prone areas.
2.4: Promoting biotechnology in terms of more carbon responsive crops, improving breeds and production of livestock through genetic engineering and other relevant fields	Enhance infrastructure to absorb biotechnology and genetic engineering for both crops and livestock to improve varieties and breeds, making them drought resistant

3.2: Developing new varieties of crops which are high yielding, and resistant to the anticipated impacts of climate change	- Initiate research to develop new varieties of crops that are less vulnerable to heat stress and are drought resistant. - Develop new climate change resistant crops that could survive changes in temperature and precipitation, high yielding, resistant to heat stress, drought tolerant, less vulnerable to heavy spells of rains, and less prone to pests.
7.1.1-1.1: Addressing the essential knowledge gap about climate change impact on forests through research on adaptation	Organize research projects on response of various forest types to increased temperature and drought spells
9.2.0-1.1: Improving awareness of issues related to mitigation of climate change induced disasters through public participation	Develop drought adaptability of the communities living in county's drought prone areas particularly in Balochistan
9.2.2-3.1: Developing hazard zoning and mitigation strategies through management, formulation, enforcement of regulation and laws	Identify the drought vulnerable areas in Balochistan and develop mitigation strategies for vulnerable communities
10.2.2.-2.1: Ensuring agriculture crops adapting to the changing climatic conditions at high altitudes	- Undertake experiments on short duration, heat and drought resistant crops in mountain areas. Introduce cold and drought resistant short duration cereal crops suited for high altitudes based on tested experimental results.
10.6.7-3.1: Researching on and promotion of "low delta crops" as well as drought and pest resistant crops	Ensure development of low delta and drought resistant, high-yield crop varieties for arid and hyper-arid areas in Pakistan
3.2: Undertake development of drought resistant shrubs, fodder crops and grasses for pastures and oasis for livestock.	- Explore research opportunities to improve feed and fodder in arid areas. Involve local communities and nomadic tribes to develop experimental plots of improved grasses and shrubs for livestock

2.2.10. National Adaptation Plan 2023

National adaptation plan highlights development of the plan for managing projected river flow and rainfall variability under different climate scenarios as an objective of agriculture-water nexus. It recommends to develop plans for managing drought-flood cycles in areas where both hazards affect agricultural communities. Key actions in the development and implementation of these plans will include the most feasible and locally appropriate infrastructure options,

institutional and community-based measures for rationalizing water use during periods of drought, improving risk monitoring and early warning systems. Integrated watershed management is critical to mitigate drought.

2.2.11. National Water Conservation Strategy 2023-27

The aim of NWCS is to support the delivery on the National Water Policy (NWP) for sustainable water resources management through policy guidelines, water conservation strategies, activities and technologies. The overall objectives include ensuring conservation of water, minimizing wastage and securing equitable distribution, supporting service providers to develop best management practices for water conservation minimizing financial dependence on government and providing actionable information around water conservation ensuring water security under changing climate.

2.2.12. Provincial Disaster Risk Management Guidelines 2007

Provincial Disaster Risk Management Guidelines 2007 support different initiatives described in National Drought Plan for prevention and mitigation of drought situation. The steps described in the guidelines for preparation of Provincial disaster management plans include review of secondary data and literature, consultation with provincial stakeholders about priority hazards, risks, strategies for reducing risks, roles that different stakeholders can play in emergency response, recovery and resources available with each stakeholder for emergency response, preparation of a draft of the Provincial Disaster Risk Management Plan as per outline provided in the guidelines, submission of the draft to NDMA to review and give technical advice, circulating the draft plan to relevant stakeholders for feedback and comments, holding provincial level workshop to seek comments on the draft plan, finalizing the provincial plan based upon stakeholder comments, approval of plan by the Provincial Disaster Management Commission, publishing and dissemination of the Provincial Plan to all relevant stakeholders, revision and updating of the plan.

2.2.13. National and Punjab Provincial Standard Operating Procedures (SoPs) During Disasters

The NDMA and PDMA Punjab has published SOPs that will be followed by federal and provincial departments. Guidelines for local communities during and after disasters including those for drought were also published.

2.2.14. Draft Integrated Sustainable Land Management Policy of Punjab 2018:

One of the actions proposed in the policy is to “devise and implement management plans for drought”.

2.2.15. Provincial Climate Change Policies:

Except Balochistan, all the provinces including Punjab, Sindh, KP and States (including AJ&K) have developed their Provincial/ State Climate Change Policies. The Gilgit Baltistan has formulated the Climate Change Strategy and Action Plan 2017 which is serving as its policy document. These policies suggest certain actions in case of disasters that also includes drought preparedness, early warning, response and mitigating drought.

2.2.16. Provincial Forest Policies:

Among the provinces, only Punjab has its approved Forestry Sector Policy 1999. As per the policy, the arid areas of the provinces having lower tree cover and rainfall probability are considered under threat of desertification and drought, appropriate measures including dry land afforestation and range management will be adopted wherever possible to arrest and combat desertification. The policy emphasizes on mandatory Environmental Impact Assessment of the projects to protect the areas from environmental degradation for a sustainable development. The Sindh Sustainable Forest Management Policy focuses on local communities' participation in protection of existing forests and afforestation measures, particularly in kacha areas.

2.2.17. National Action Program to Combat Desertification (NAP)

National Action Program to Combat Desertification (NAP) developed in 2002 was revised in 2018 to align it according to the UNCCD's 10 years' strategy. It focuses on systematic and comprehensive area development approach involving Communities' participation at grassroots level with a bottom-up mechanism for sustainably managing natural resources especially in fragile ecosystems to combat desertification and stop land degradation.

2.3. Sustainable Development Goals

Pakistan adopted Sustainable Development Goals (SDGs) through its National Assembly's Resolution (30. Ministry of Planning, Development and Reforms). Combating desertification, stopping and reversing land degradation, restoration, protection and promotion of terrestrial ecosystems for a sustainable use, sustainably management of forests, and halting biodiversity loss are focused in SDG 15. Its targets focus on conserving, restoring and sustainably using terrestrial (including inland fresh-water) ecosystem and its services as per international agreements, tackling drought, restoring land affected by desertification and degraded, combating desertification and try to get land degradation-neutral world. One of the targets of SDG 11 stress on reducing the damages caused by disasters and protecting poor and other vulnerable people and increasing resilience to disasters and at all levels, holistic disaster risk management as per Sendai framework for disaster risk reduction 2015 to 2030. International efforts like Sendai Framework for Disaster Risk Reduction 2015-2030 aims to achieve the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries over the fifteen years. It outlines four priorities for action to prevent new and reduce existing disaster risks: (i) Understanding disaster risk; (ii) Strengthening disaster risk governance to manage disaster risk; (iii) Investing in disaster reduction for resilience and; (iv) Enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation and reconstruction.

2.4. Land Degradation Neutrality Initiative

Land Degradation Neutrality (LDN) is related to SDG target 15.3. It is the state of increase or keeping stable within specified spatial and temporal scales and ecosystems, the quality and amount of land resources which are necessary to support ecosystem services, functions and increase food security. Pakistan's targets as of 2030 are to get LDN in degraded forests (at least

30%), grasslands (6%), croplands (5%) and wetlands (10%); reducing change of grassland, forest and cropland to artificial land; restoring bare-land to productive (crop land, etc.), prevention of erosion and loss of soil, reversing degradation of land, forest-land reclamation, implementing practices leading to sustainable management and land use plans, increase sustainable water management and its resilience to climate change. The progress of LDN targets as reflected in Pakistan report of 2022 submitted to UNCCD is as follows:

Target & year	Targeted action
Attain LDN by 2030 in - at least 30% of degraded forests spread over entire Pakistan	Improve policies, provide economic incentives. Restore/improve wetlands, grasslands, pastures, Protected areas (PAs), tree covered areas & multiple functions. Preserve wetlands, reduce its degradation, halt/reduce its conversion to other land uses (includes conserving wetlands). Increase PAs, and PAs extent. Improve management of PAs and watershed/landscape management. Restore rangeland (e.g. by controlling livestock and wildfires), halt/reduce conversion of grassland to other land cover types. Improve land productivity in grasslands. Improve coastal management, reduce coastal erosion, reduce saline water intrusion in coastal zones. Increase land productivity in tree covered areas. Restore tree-covered areas and increase its extent and tree covered land (net gain) e.g. plantations. Improve tree cover management e.g. fire management. Increase carbon stock, soil productivity, fertility, reduce soil/land degradation, soil erosion. Rehabilitate bare land, restore degraded land. Reduce/halt deforestation and conversion of tree cover to other land cover types (e.g. conserving forest land).
atleast 5% of degraded cropland spread over entire Pakistan	Restore/improve croplands, multiple land uses and multiple functions. Practice sustainable land management. Improve water use for irrigation. Halt/reduce conversion of cropland to other land cover types. Rehabilitate bare or degraded land for crop production. Increase tree-covered area extent. Increase tree covered land (net gain) e.g. plantations. Restore land/ soil productivity in agricultural areas, soil organic carbon stock in croplands and grasslands. Maintain the current level of Soil organic components. Reduce soil erosion, sand encroachment, improve watershed/ landscape management, rehabilitate bare land, restore degraded land. Increase carbon stock, reduce soil/land degradation and reduce/halt conversion of multiple land uses
atleast 6% of degraded rangelands spread over entire Pakistan	Restore/improve grasslands, pastures (e.g. by controlling livestock and wildfires), PAs, tree covered areas, multiple functions, halt/reduce grassland's conversion to other land cover types, improve land productivity in grasslands, soil organic carbon stock in croplands and grasslands. Reduce soil erosion, land encroachments, improve PAs' management. Increase soil fertility, carbon stock, reduce soil/land degradation, maintain current level of SOC and reduce/halt conversion of multiple land uses

atleast 10% of degraded Wetlands spread over entire Pakistan	Restore/improve wetlands tree covered areas, multiple land uses. Preserve wetlands, reduce its degradation, halt/reduce wetland conversion to other land uses (includes conserving wetlands). Increase PAs and PAs extent. Improve coastal management, reduce erosion, saline water intrusion in coastal zones, reduce/halt deforestation and conversion of tree cover to other land cover types (e.g. conserving forest land). Increase land productivity in tree covered areas. Increase tree-covered area extent, tree covered land e.g. plantations. Reduce/halt conversion of multiple land uses
--	---

DROUGHT OVERVIEW IN PAKISTAN

3.1. Historical Occurrence of Drought in Pakistan

3.1.1. Meteorological Drought

Generally, the climate of Pakistan, especially in its southern areas, is arid or extremely arid. Spatiotemporal changes in aridity of Pakistan from 1901 to 2016 are presented in Figures 3.1, 3.2, and 3.3 (Ahmed et al. 2019).

Several drought events have occurred frequently in the past. Heat waves' frequency has increased significantly, which indicates a forthcoming drought. The longest drought event occurred in many parts of Pakistan during 1999-2001. Pakistan is listed among the 23 countries by the United Nations that are facing drought emergencies from 2021 to 2022, according to a report released by the UNCCD.

The total area of the country under drought during year 2000 to 2018 and the proportion of land that is degraded over the total land area in 2022 are shown in Figures 3.4 and 3.5 (UNCCD. 2023). Drought hazard in the country from 1996 to 2019 is presented at 3.6 to 3.10. The occurrence and frequency of drought are reported to have increased since the mid-20th century (Table 3.1).

Table 3.1 Province-wise years of the worst drought

Sr. No.	Name of Province	Years of worst drought
1	Punjab	1899, 1920 and 1935, 1969, 1987-88 and 2000-01 (PMD, 2023), 2021, 2022 (Heatwave, March-April in Cholistan) (PMD, 2022)
2	Sindh	1871, 1881, 1899, 1931, 1947, 1951-52, 1958, 1966, 1969, 1972-74, 1987-88, 1999-2001, 2003-2004 and 2006, 2018 and 2021 (Ahmed et al. 2019)
3	KP	1902, 1951-1952, 1970-71, 1987-88, 1999-2001 (Ahmed et al. 2019) ²⁹
4	Balochistan	-1952, 1963-64, 1965, 1968, 1970-71, 1983-84, 1987-88, 1999-2002, 2004 and 2006, 2018 and 2021 (Ahmed et al. 2019) Almost every year, drought-like situation is observed in some parts of the province.

Lasbella, Khuzdar, Kalat, Lorrilai, Kohlu, Zhob, Kharan, Qilla Saifullah, Pishin, Qilla Abdullah, Noshkee, Dera Bugti, Awaran, Mastunge districts covering all agro-climatic zones in Balochistan were affected by a mild to moderate drought (Meteorological and Hydrological) (BUIITEMS & UNDP, 2015). The main drought-prone areas in Sindh are Tharparker, Umer Kot, and Sangher. If there are no rains in Thar in July-August during the monsoon season, it indicates the beginning of a drought.

3.1.2. Agricultural Drought

The erratic nature of monsoon is increasing in spatial and temporal description as per Climate Change Vulnerability Index 2016 (Government of Pakistan, 2021) causing excessive lowering of soil moisture during parts of some years and parts of the stress years causing water stress for agricultural crops and livestock which can be regarded as

agricultural drought. Crop moisture Index (CMI) is used to monitor agricultural drought (Zhao et al. 2019). As a major part of rainfed and fallow land cultivation in Pakistan is concerned with winter (Rabi) crops (like wheat, the main cash/ food security crop), therefore, the drought hitting during winter has serious consequences for the farmers and the national food security.

The country's thirty-eight percent area is considered to be a desert locust breeding ground (Figure 3.11). Twenty-five years ago, heavy damage to crops resulting in Agricultural drought occurred in the country due to locust attack. During 2020, SUPARCO assisted in the identification of about 161,720 square kilometers of Pakistan as locust-affected areas. In a large-scale locust control operation, coordinated by provincial agricultural departments, NDMA, and the armed forces of the country, using vehicle-mounted sprayers, a helicopter, and a Beaver aircraft with ULV sprayer were utilized. The losses to crops were estimated to be more than Rs. 200 billion². Drought in the country from 2000 to 2001 reduced the growth of crops by 2.6 per cent (Khattak et al., 2019). Drought in 2018 affected 26 districts in Sindh and Balochistan, affecting about 5 million people and causing about thirty-four percent reduction in cultivation of crop and reduced productivity (NDMA & United Nations, 2019).

3.1.3. *Hydrological Drought*

Meteorological or agricultural drought is impacted by hydrological drought. Hydrological drought put tremendous stress on the groundwater resources of Balochistan, resulting in the loss of livelihood opportunities of farmers, increased poverty, and reduced quality of life. To sustain life, farmers sell their important assets (especially livestock) and property.

Index for stream flow drought (SDI) depends on data on stream flow and is are used to determine the severity of droughts. Moderate, severe, and extreme drought are considered for SDI values of -1.5 to -1.0, -2.0 to -1.0, and >-2.0, respectively. Average SDI values for the two largest reservoirs of Pakistan (Khattak et al., 2019) are presented in Figure 3.12 to highlight hydrological drought

3.1.4. *Socio-economic Drought*

Conflicts among users of water increase when quantity of water in hydrological system decreases, during drought. During hydrological drought but the demand for basic necessities of the communities is met through the stored products, therefore Pakistan has thought not faced a socio-economic drought. There may not be hydrological drought, but due to other types of droughts the stored products do not fulfill the demand for basic necessities, which leads to socio-economic drought. From 1998 to 2002 drought, about two million livestock died in Balochistan (Anjum et al., 2012), resulting in significant reduction in milk, milk products and meat and thence increased malnutrition, and health

² <http://www.fao.org/pakistan/resources/in-depth/desert-locust-situation-in-pakistan/en/>

issues land death of a large population. Most of the people of the area had to shift to one meal in a day instead of 2-3 meals³.

3.1.5. Ecological Drought

Drought for many years has resulted in a decrease in the area under juniper forests and permanent migration of human population from many areas in Balochistan.

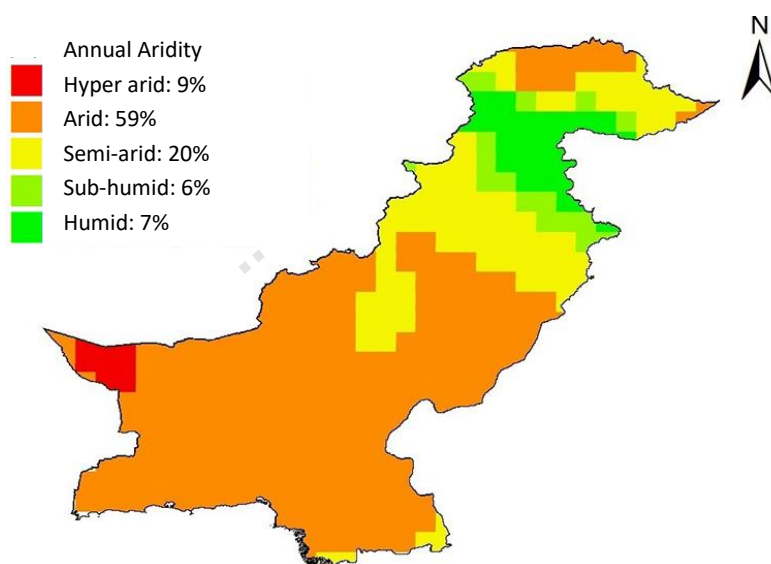


Figure 3.1. Spatiotemporal changes in aridity of Pakistan during 1901–2016 (Annual aridity)

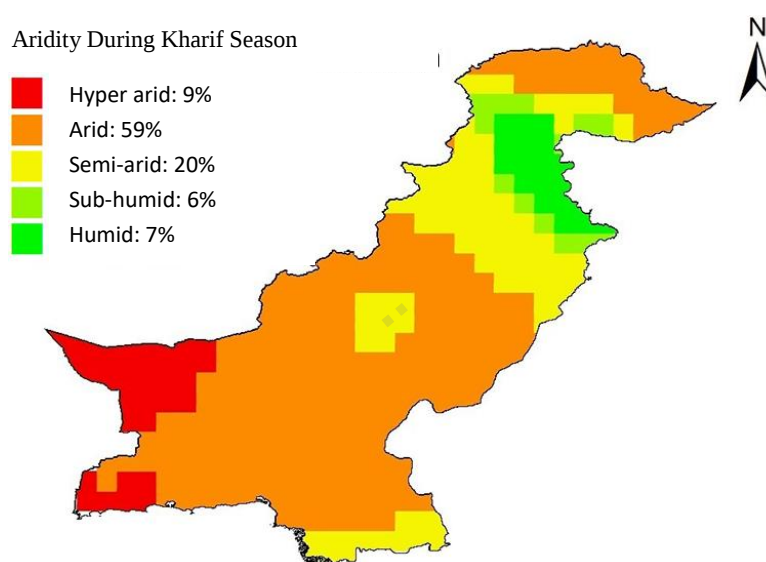


Figure 3.2. Spatiotemporal changes in aridity of Pakistan during 1901–2016 (Kharif Season)

³ <https://cscr.pk/explore/themes/energy-environment/lessons-pakistan-droughts-past/>

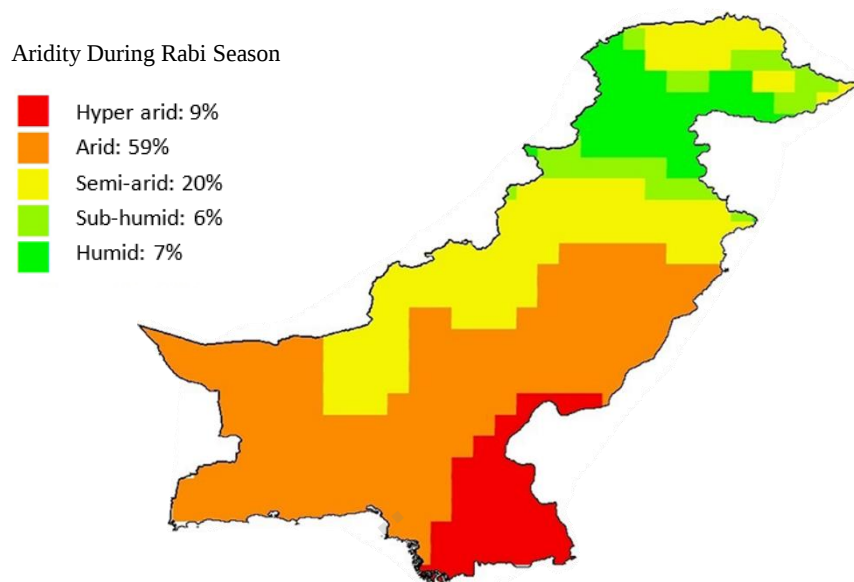


Figure 3.3. Spatiotemporal changes in aridity of Pakistan during 1901–2016 (Rabi Season)

Source: Ahmed, 2019

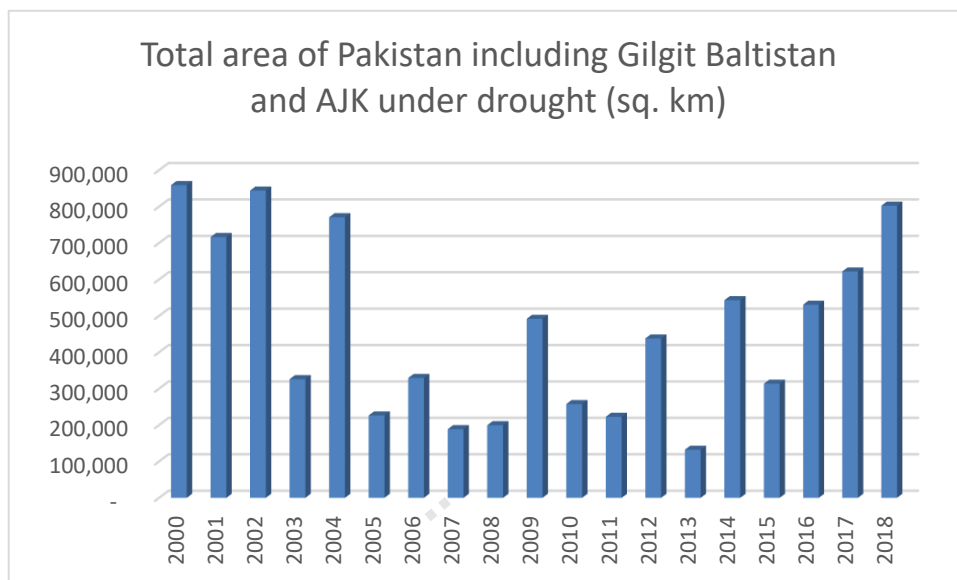
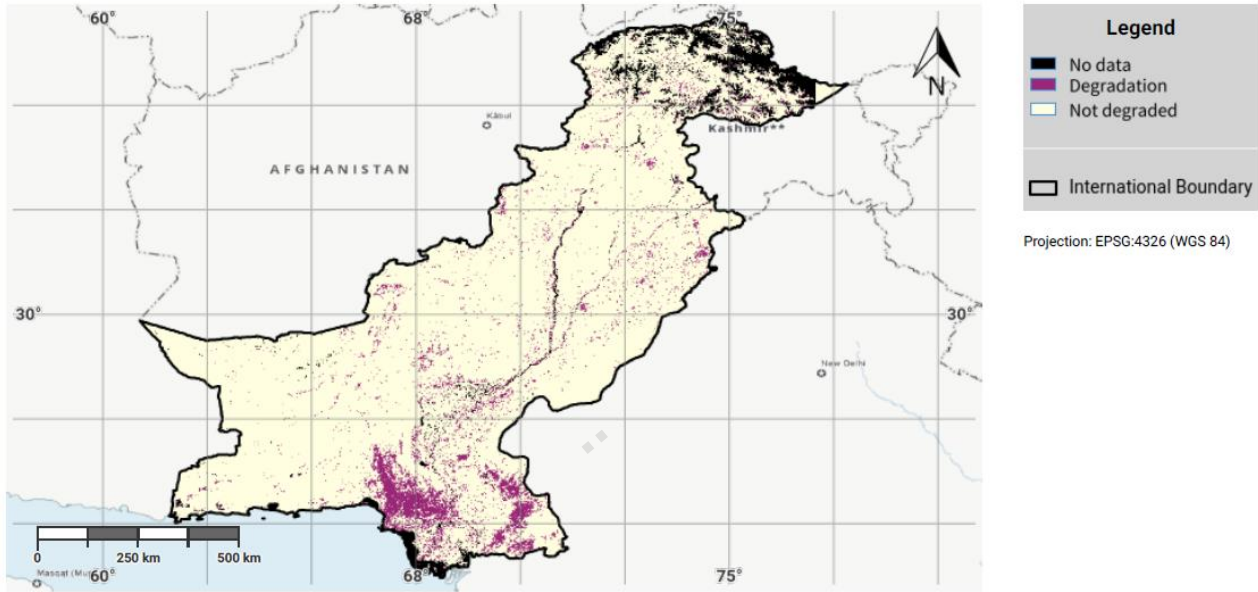


Figure 3.4. Total area of the country including Gilgit Baltistan and AJK under drought during year 2000 to year 2018

Proportion of land that is degraded over total land area (SDG Indicator 15.3.1) in the baseline period



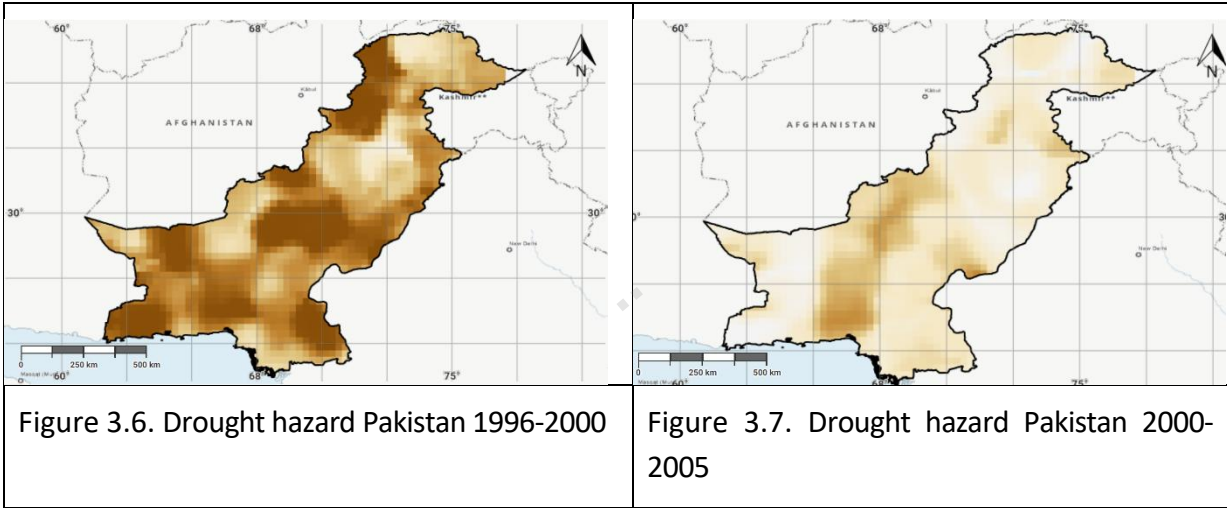
Disclaimer

This boundary was extracted from trends.earth platform and does not represent the official boundary of Pakistan. The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Convention to Combat Desertification (UNCCD) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. All maps represent the terrestrial area of the country; offshore islands, overseas departments and territories may not be displayed due to cartographic limitations. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

Source Data Credits

- Derived based on the methodology in the Good Practice Guidance Version 2 for Sustainable Development Goal (SDG) indicator 15.3.1 - Proportion of land that is degraded over total land area. URL: <https://www.unccd.int/publications/good-practice-guidance-sdg-indicator-1531-proportion-land-degraded-over-total-land>

Figure 3.5. Proportion of land that is degraded over total land area in 2022



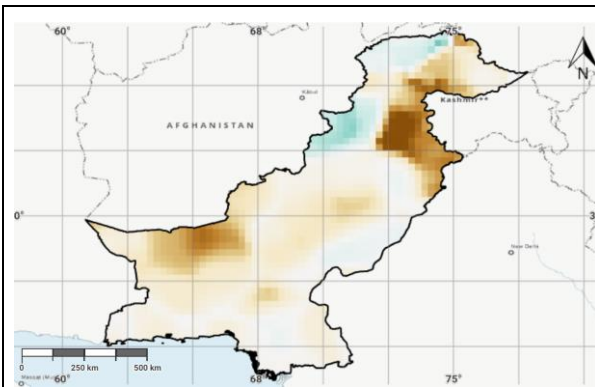


Figure 3.8. Drought hazard Pakistan 2005-2010

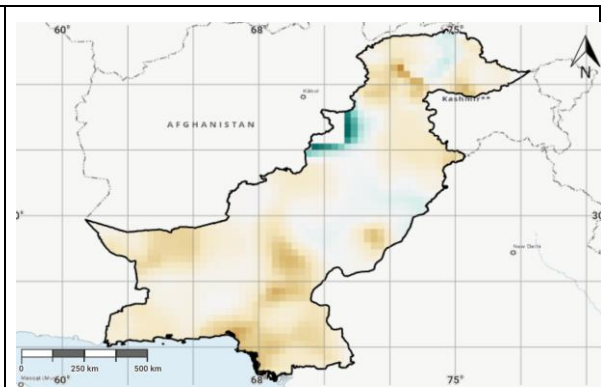


Figure 3.9. Drought hazard Pakistan 2010-2015

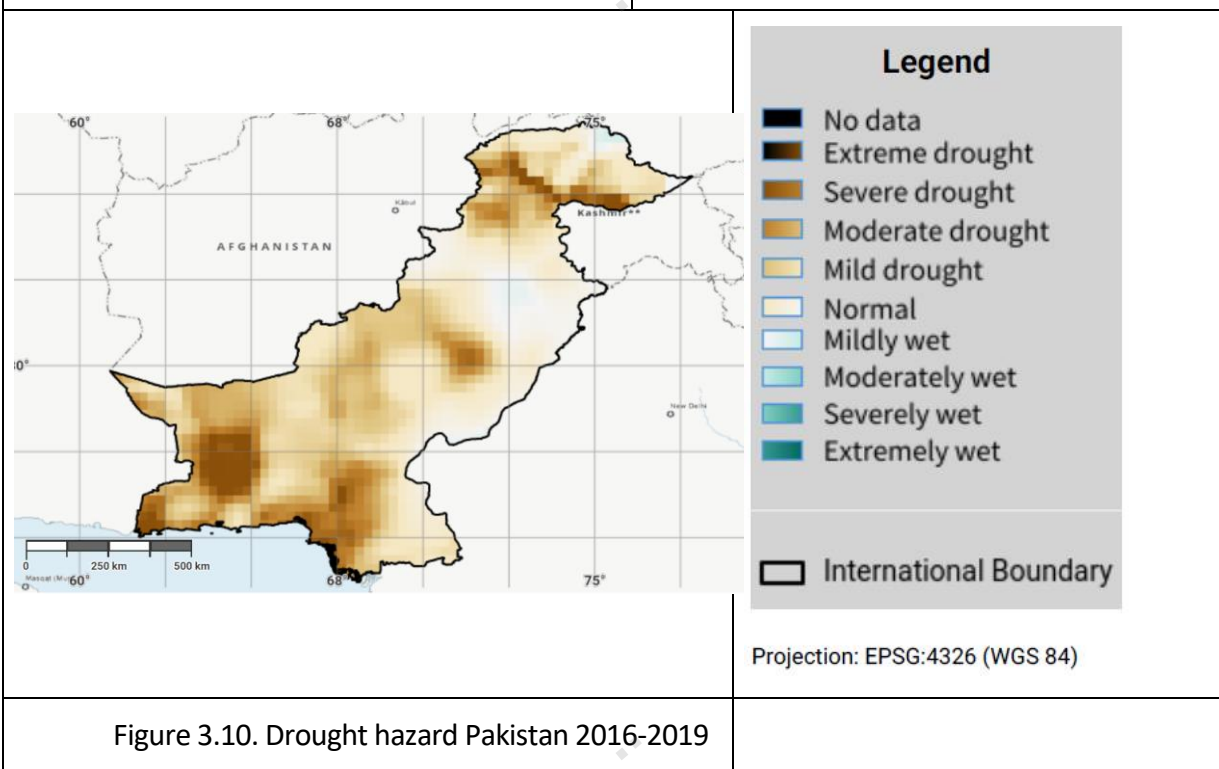


Figure 3.10. Drought hazard Pakistan 2016-2019

Source: Government of Pakistan, 2022

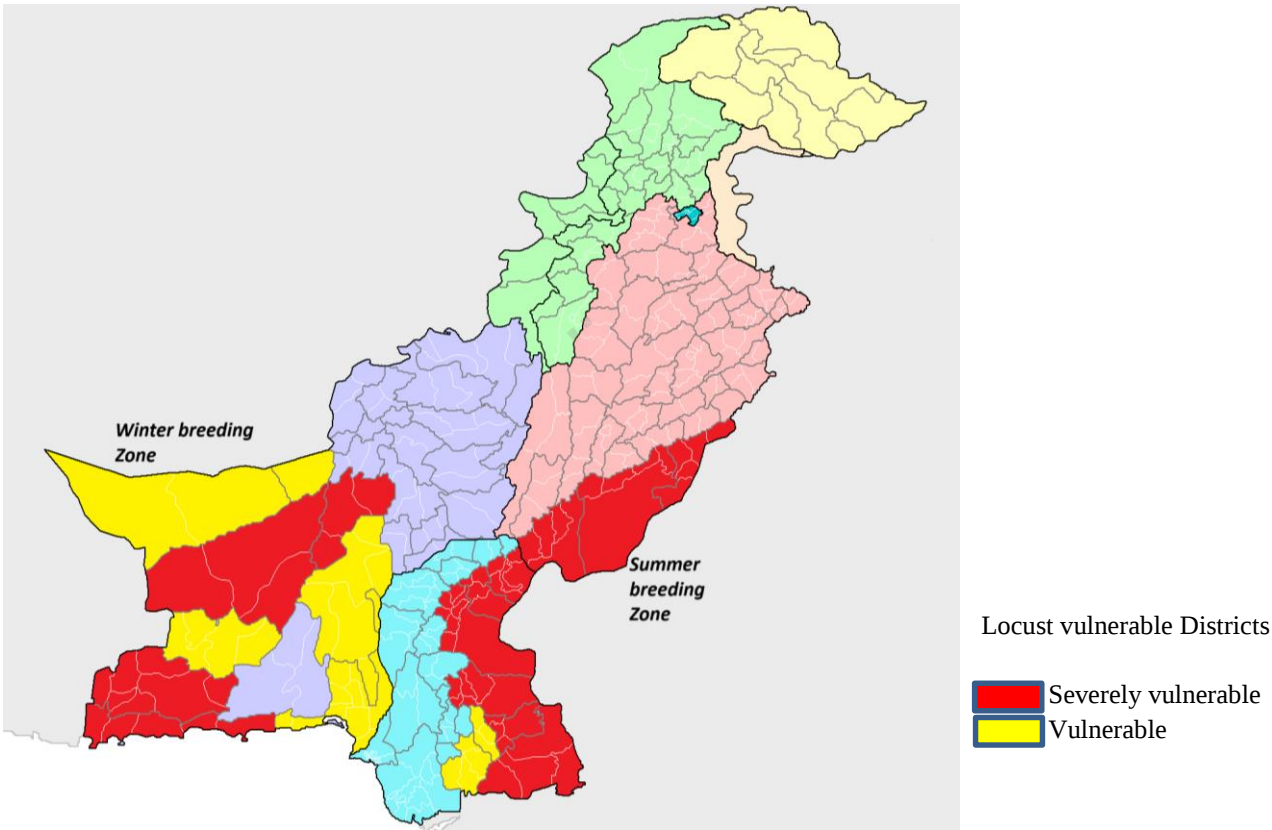


Figure 3.11. Locust vulnerable districts in Pakistan

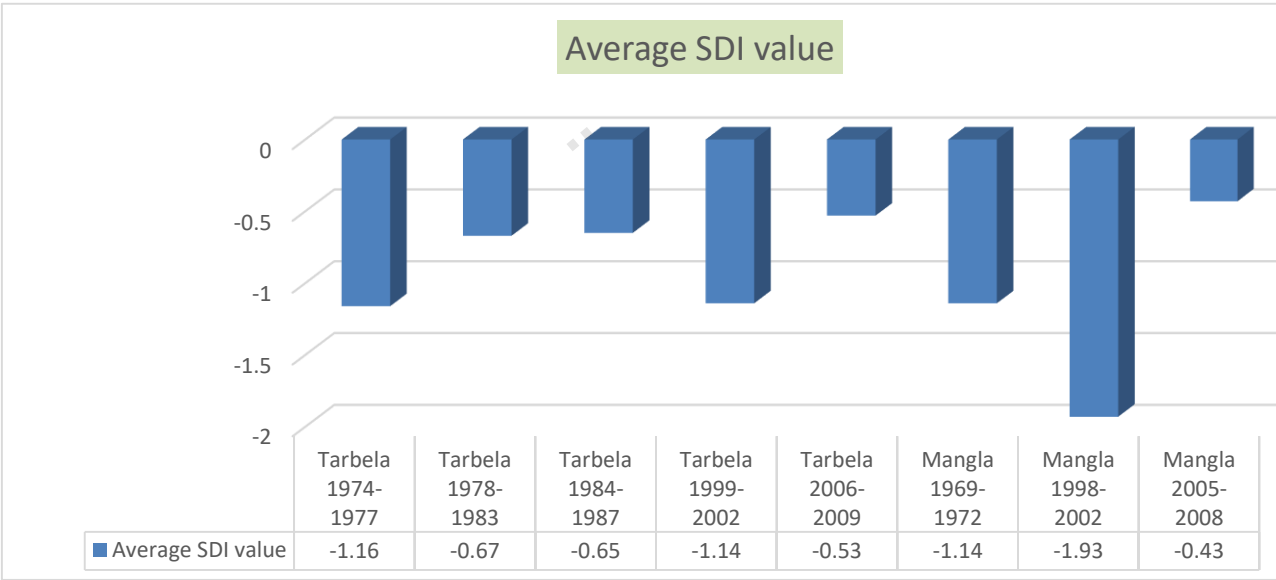


Figure 3.12. Av. SDI values for Tarbela & Mangla reservoirs during different drought calendar yrs

3.2. Main Causes of Drought in Pakistan

The main causes of drought in Pakistan are:

1. Monsoon rain failures:

El Niño effects: La Niña and El Niño-associated events may cause fewer rain events in some of the monsoon periods. Eleven out of twenty-one drought years from 1871 to 1988 were the El Niño phase of the Southern Oscillations (ENSO), impacting negatively on monsoon and directly impacting drought (PMD, 2015).

2. Climate change and El Niño effects:

Due to a higher variability in the precipitation regime as a result of the climate change impacts, the frequency and severity of floods and drought, especially hydrological drought, are expected to increase. Extreme events are expected to be increased due to changes in temperature regime and precipitation patterns, causing increased glacier melting and, later on, reduced river flows and intensification in scarcity of river/ stream flow of water.

3. Inefficient use of water

Pakistan is a water-scarce country, with per capita water availability less than 1,000 cubic meters today. When water supplies drop below 1,000 cubic meters per person per year, the country faces "water scarcity". Traditional agricultural practices, growing high delta crops in water-scarce areas, outdated irrigation systems, and weak water management infrastructure result in inefficient use of water in agriculture. Groundwater supplies 90 percent of domestic water in rural areas of Pakistan, 70 percent of domestic water nationally, and over 50 percent of agricultural water (World Bank, 2021). Over-extraction of groundwater results in groundwater shortage and deterioration of its quality. Lack of sufficient water storage facilities, inefficient use of water in industries and households are further increasing the water crisis. In a study, the deficient governance of groundwater and reduced management of water resources were considered among the main causes of drought in Balochistan.

4. Other factors that increase vulnerability to drought

Increased anthropogenic activities, associated with overgrazing and soil problems, increase vulnerability to drought. Pastures/ rangelands support the livelihood of almost forty percent area of Pakistan. Almost half of these have been degraded, limiting the livelihood of common people and ultimately drought-like conditions.

Soil problems mostly cause increased vulnerability to drought. Wind erosion and sandstorms are common in sandy areas. Wind erosion is also noted in silty soils with a hyper-arid climate in Balochistan (Figure 3.13, Yang et al., 2023). These problems hinder crop growth and ultimately encourage drought occurrence.

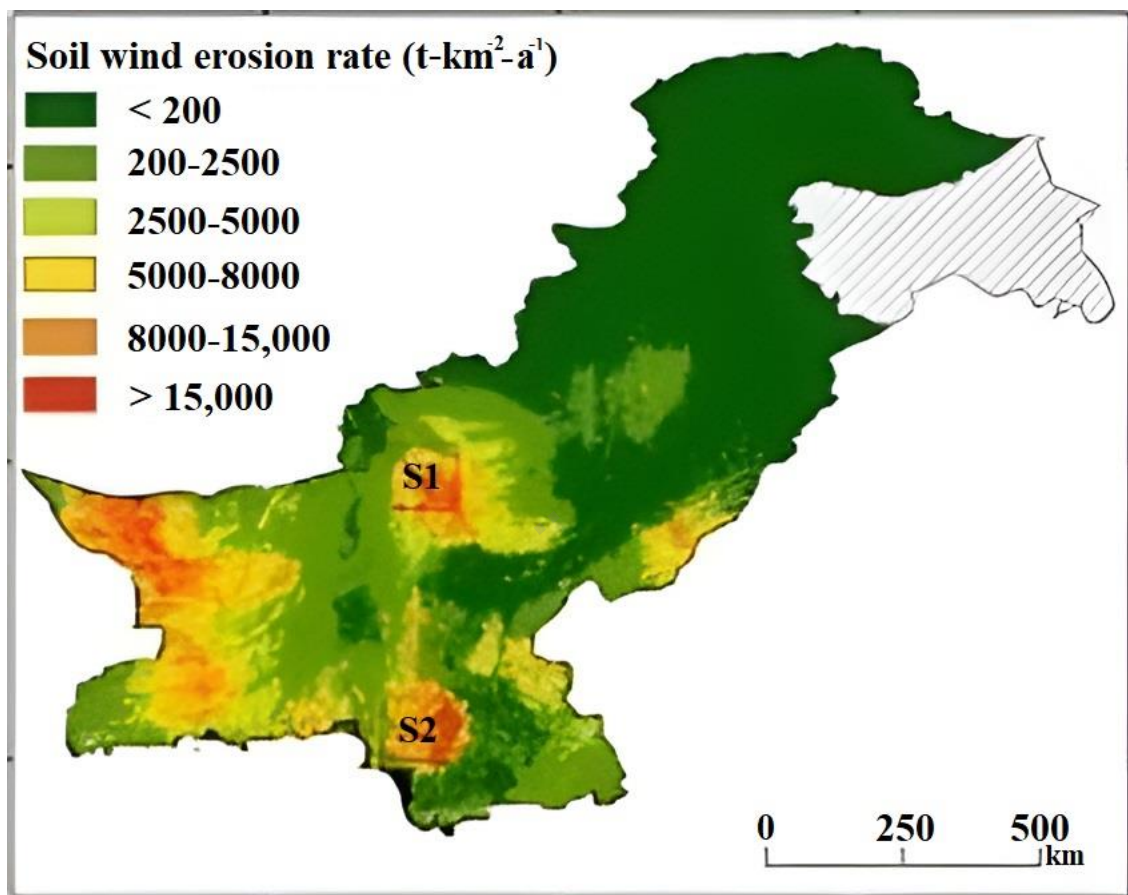


Figure 3.13a. Soil wind erosion rate ($\text{t.km}^{-2}.\text{a}^{-1}$) in Pakistan, Source: Yang et al 2023

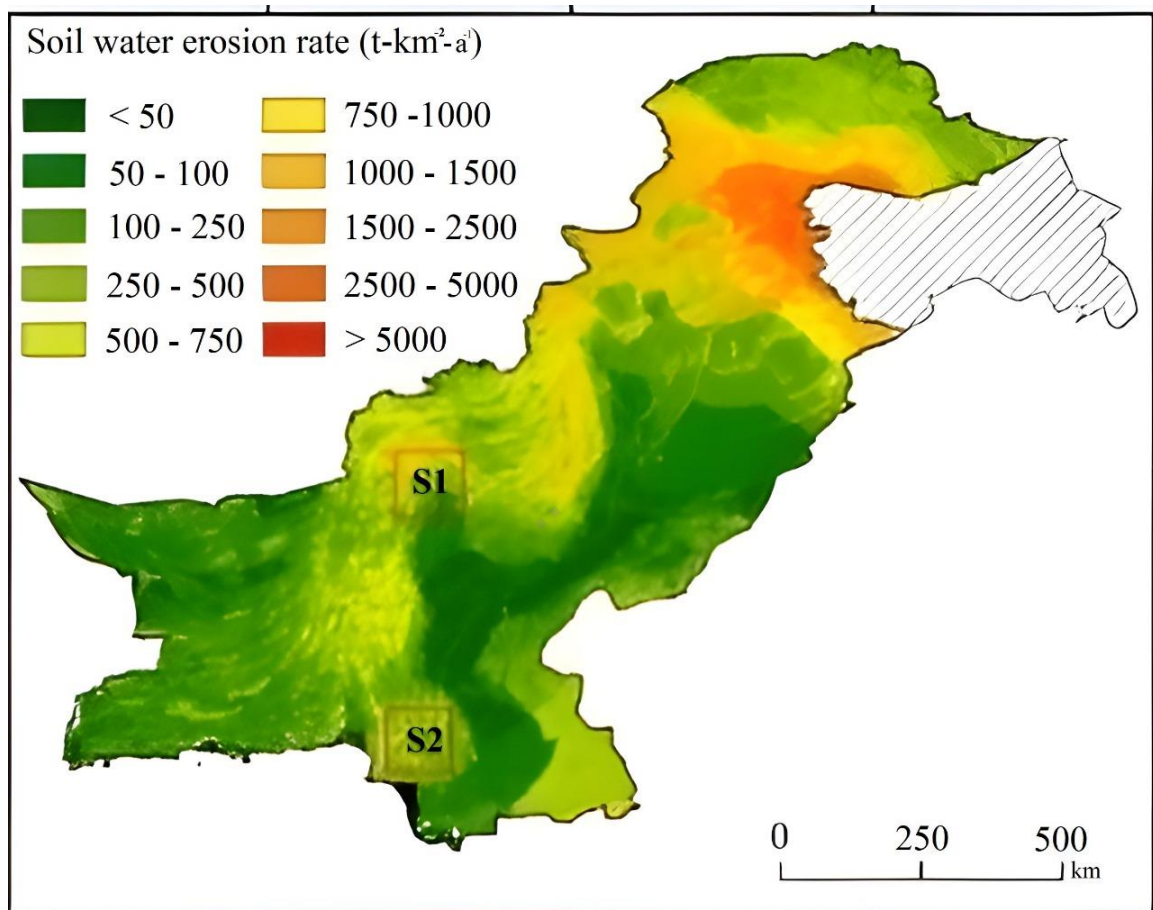


Figure 3.13b. Soil water erosion rate ($\text{t.km}^{-2}.\text{a}^{-1}$) in Pakistan, Source: Yang et al 2023

Causes of Drought in Balochistan

Balochistan has been especially hit by drought. The causes of drought (Figure 3.14) include (BUIITEMS & UNDP, 2015) unfavorable cultural practices, including overgrazing, lack of awareness among the farmers, degradation of the environment, improper management of water resources, governance of groundwater resources, and climate change. Different areas of the province, though, follow an almost similar pattern, yet are influenced by slightly different causes of drought.

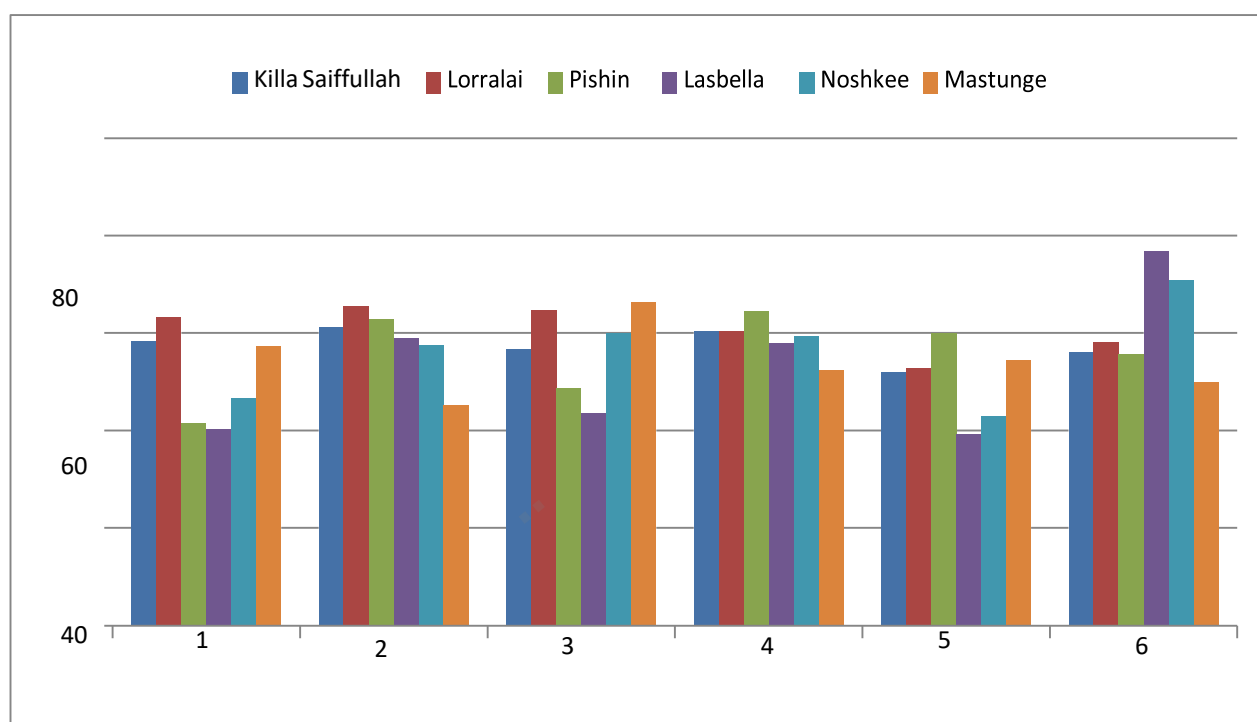


Figure 3.14. Causes of drought impacts (%) in different areas of Balochistan (Source: Survey, 2015)

A1 = Degraded Environment

A4 = Reduced management of water resource

A2 = Deficient governance of groundwater

A5 = Unfavorable cultural practices like overgrazing

A3 = Change in climate

A6 = Farmer's lesser awareness of drought mitigation

Ref.: BUIITEMS & UNDP, 2015

3.3. Drought Impacts: By Sectors & Provinces

3.3.1. Sectoral Impacts of Drought at National Scale

Drought impacts are less obvious and are spread over large geographical areas. Consequently, drought affects more people than any other environmental hazard. From 1926 to 2006, the four main drought events resulted in 223 human casualties (Anjum et al., 2012). The drought of 1998-2002 was the worst to hit Pakistan. This drought was estimated to have affected a total of 3.3 million people and about 30 million livestock, with approximately 2 million deaths (Anjum et al., 2012). Availability of milk products and meat either vanished or was reduced significantly, which resulted in malnutrition and poor physical health, especially among children. The prices of livestock and related products also rose sharply because of the limited availability of stock in the area. There was a loss of jobs for many people related to farming. The diet patterns of people also changed to one meal a day instead of two (Durrani 2018). In the water sector, drought lowers water levels in reservoirs, lakes, and ponds and reduces streamflow. In the agriculture and food security sector, it reduces soil quality, resulting in reduced crop yields, death of vegetation, trees, and livestock, causing food security issues. Moreover, it increases the quantity of dust and dust storms. In the fisheries and wildlife sector, it causes reduction and degradation of fish and wildlife habitat because of a lack of drinking water for livestock and wildlife (Canada Waterportal 2023). Province-wise impacts of drought are described below:

3.3.2. Drought Impacts in Balochistan

A study (BUIITEMS & UNDP, 2015) suggested the following impacts of drought for Balochistan:

i. Drought Impact on Water Resources

Lowering of the water resources and the groundwater tables in Balochistan (Figure 3.15) is the result of excessive pumping of groundwater through deep tube wells for irrigation, driven by subsidized electricity (flat rates) for high-value fruits, such as apples, and vegetables, such as onions. Inefficient irrigation leads to wastage of limited water and reduced groundwater recharge due to decreased average rainfall, causing an annual decline in the water table by 2-5 meters. In Lasbella (Hab Dam Reservoirs) and Noshkee (Zaginawar Lake), drying has led to a decline in the water table in the surrounding areas. As a result of the declining water table, the extraction cost of water has increased, and there is a failure of tube wells and dug wells.

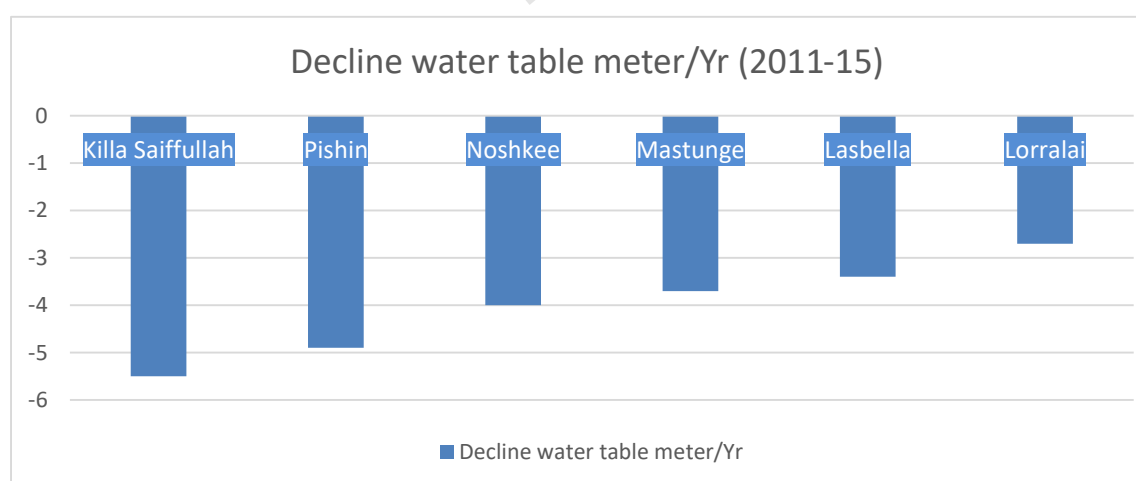


Figure 3.15. Average decline in water-table meters per year

Ref.: BUIITEMS & UNDP, 2015

In upland Balochistan, an average water table decline of approximately 200 meters has been suggested over the past 30 years. Farmers established highly valuable orchards by exploiting tube well irrigation. In District Pishin (Tora Shah, Manzari, Khanzai, Malikyar and Huramazai) and District Killa Saifullah (Kan Mehtarzai), failure of springs, karezes and wells is common. In District Loralai (Cheena Alizai, Shabozai, Lahore, and Ponga union councils), only half of the discharge flow was left in karezes and tubewells, resulting in the loss of livelihood sources. In downstream areas, tubewells are being installed by rich farmers, while poor farmers purchase water from tubewell owners or fetch it using tractor-mounted water tanks. In the 1960s, with increasing groundwater extraction, the kareze and spring irrigation accounted for about half of the total groundwater used for irrigation. Nowadays, more than 90% of *karezes* have dried up, and the natural flow of the remaining ones has decreased to about half of their flow levels before 1960. Tube wells are also drying up in most areas of Balochistan (BUIITEMS & UNDP, 2015).

ii. Drought Impacts on Agriculture, Livestock Productivity and Food Security

During the droughts of 1998–2002 and 2004, rainfed and irrigated crop yields decreased by up to 80% and 20%, respectively. Animal production also declined due to a shortage of fodder. Rainfall is the primary source of agricultural productivity in Balochistan. As a result of the meteorological drought, followed by hydrological and agricultural droughts, the area under cultivation and agricultural productivity decreased, causing food shortages, hunger, and starvation. These droughts had long-term impacts on agriculture, forestry, livestock production, and water resources. The pattern of crop growth changed, and a large number of livestock perished or experienced reduced productivity; consequently, people were forced to leave their villages in search of food and water. Many people, particularly women and children, died due to food shortages and disease outbreaks.

Due to the drought, eight percent of orchards were damaged or dried up from water stress. Fruit yield, size, storability, and quality declined. The area under apple orchards was reduced by up to 40%, while areas under peach, plum, and apricot orchards decreased by up to 38%. As a result, the area under grape cultivation increased, as grapes are a low delta crop with high economic value. In both apple and grape crops, drought caused leaf burning.

In Balochistan, water stress from drought caused significant reductions in the yield of major fruits (Figure 3.16). As shown in Figure 3.17, the maximum reductions in apple and grape yields were recorded in Killa Saifullah and Mastung districts, respectively. Pishin district showed the maximum reduction in peach, plum, and apricot yields, followed by Killa Saifullah, Mastung, and Loralai districts. About 17% reduction in almond yield was recorded in Loralai. Chikoo and banana, which are grown only in Lasbella, also suffered yield reductions of 6–7%.

The cultivated area for wheat, barley, and vegetables decreased severely in Pishin, Killa Saifullah, Lasbella, and Noshkee areas (Figure 3.18). Drought and electricity disruptions due to load shedding were identified as major causes of the reduced yields of irrigated field crops such as wheat, barley, and vegetables (Figure 3.19).

The lowered yield of principal cereal crops is also one of the reasons for increasing rural poverty. Moreover, the declining agricultural production caused by lower precipitation, reliance on rainfed agriculture, and unfavorable weather conditions is the principal cause of poverty in rural areas. Due to a lack of soil moisture, the standing crops in the field were damaged, and many crops could not be harvested. In two union councils of Noshkee district, the farmers were unable to find enough soil moisture even to sow crops from 2001 to 2005.

Farmers found enough moisture to prepare the land, but it was inadequate to support crop growth up to harvest for many years during and after the drought in rainfed areas across drought-prone districts. In areas severely affected by the droughts of 1997–2002, around 80% of livestock perished. The drought led to the drying up of rangelands used for livestock grazing, degradation of vegetated areas, decreased water availability for both human and livestock, and the death of approximately two million animal heads (BUIITEMS & UNDP, 2015).

The surviving animals became weaker, with reduced productivity, lower pregnancy rates, decreased body weight, and diminished immunity to diseases, making them more vulnerable to illnesses and parasites. The market price of animals dropped, while the cost of production rose due to shortages of fodder, feed, and water. During the drought, communities migrated with their livestock to more productive areas, which were less affected by the drought. The severe reduction in water availability, food crops, livestock productivity, and fodder during the droughts of 1997–2005 resulted in famine, resulting in the death of hundreds of people in Balochistan due to malnutrition and related diseases.

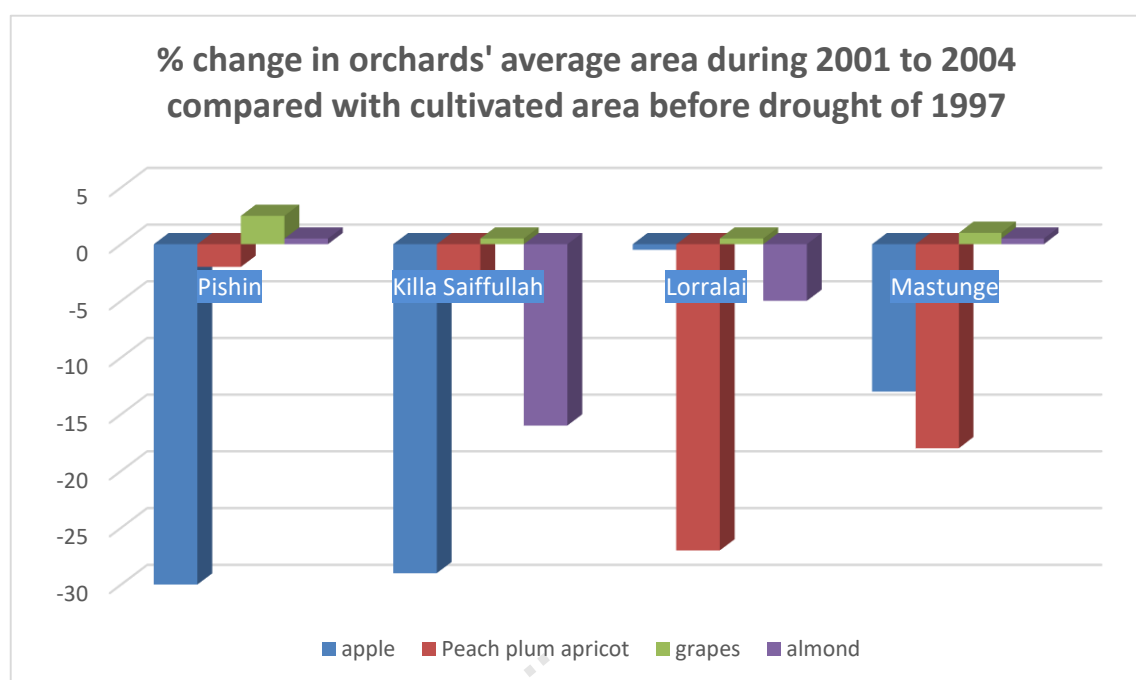


Figure 3.16. Change in orchards' average area (%) during 2001-2004 compared with area before 1997 drought

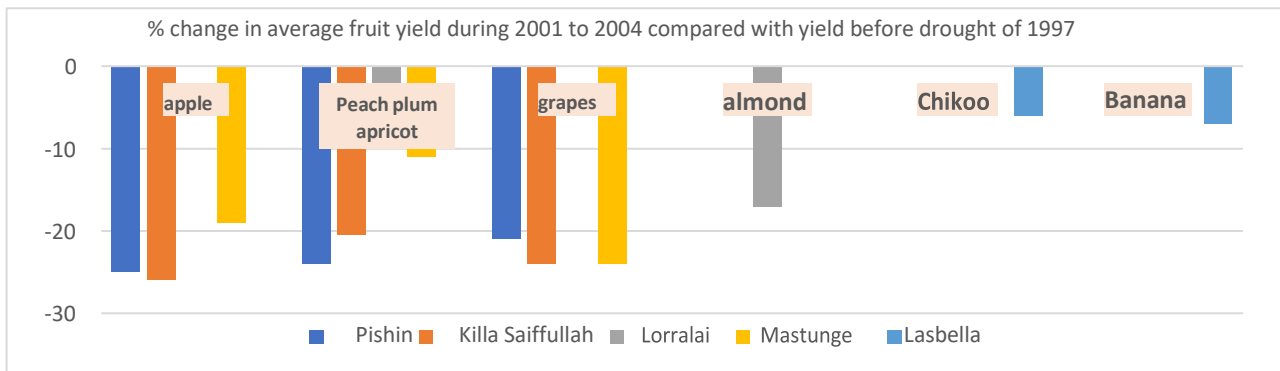


Figure 3.17. Percent change in average fruit yield during 2001-2004 compared with yield before drought, 1997

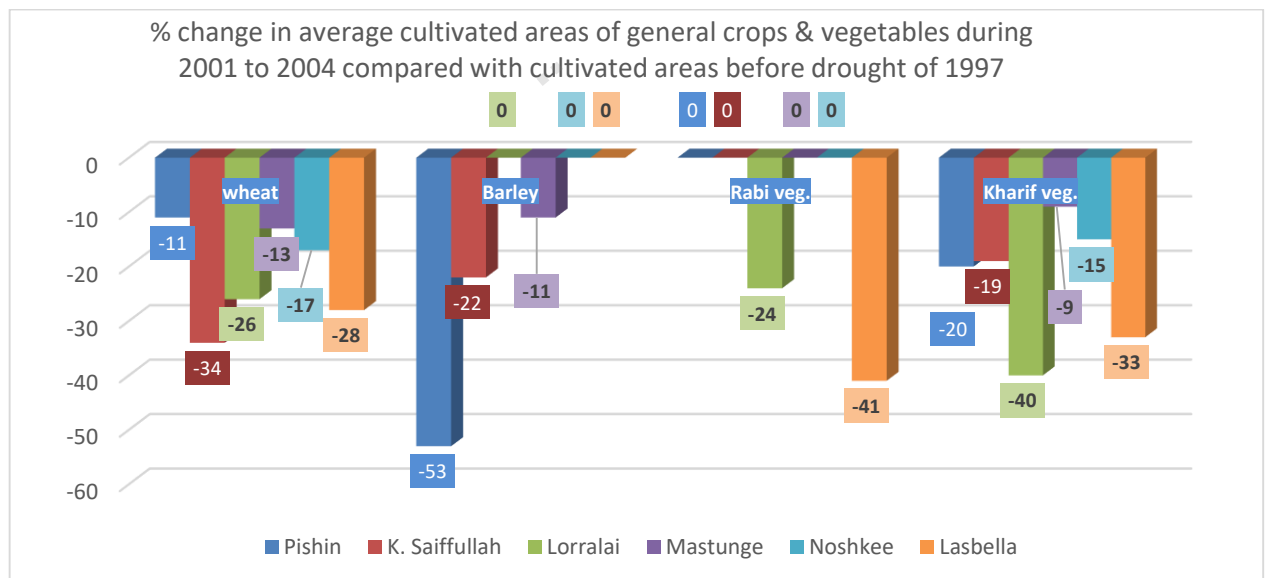


Figure 3.18: Drought impact on crop and vegetable cultivated areas (Source: Survey, 2015)

Ref.: BUIITEMS & UNDP, 2015

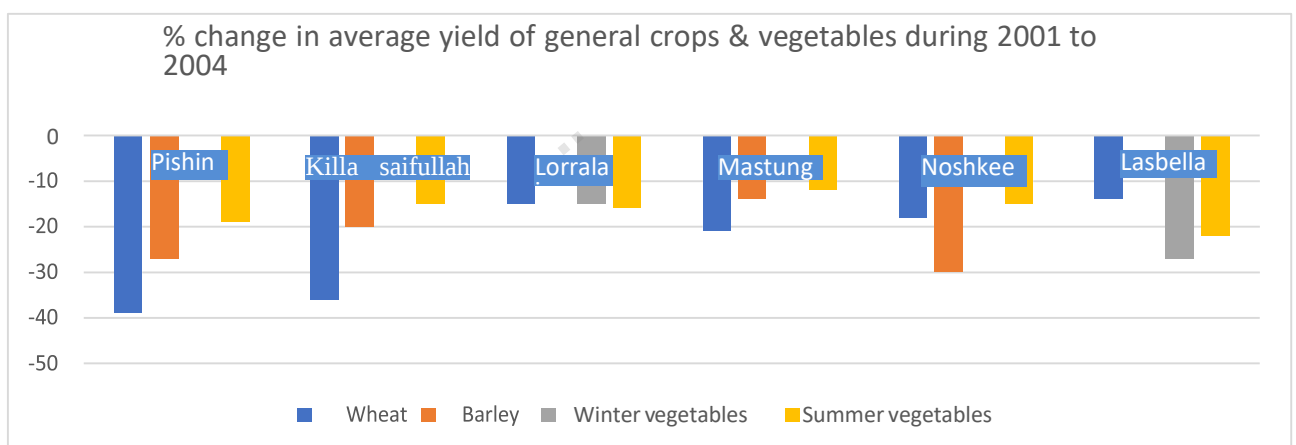


Figure 3.19. Percent change in average yield of general crops & vegetables during 2001 to 2004 compared with yield before drought of 1997

Ref.: BUIITEMS & UNDP, 2015

iii. Socio-economic Drought, Gender, Education, and Public Health

During the Balochistan drought of 1998–2002, farmers' incomes in the affected areas declined by 10% to 40%, depending on the region and crop type. To meet their livelihood needs, villagers were forced to sell their assets, including land, property, and livestock. The market value of animals fell by up to 30%, trapping many poor people in a vicious cycle of poverty. The communities could afford meat only once a week, and cultural occasions (e.g., marriages) were celebrated with simple food menus during the drought years (PDMA, Balochistan, 2007-2014).

From 2000 to 2002, the national exchequer reportedly suffered a loss of 25 billion rupees. The government had to invest heavily in relief work across 22 districts, which slowed economic growth. Food prices and inflation also increased (PDMA, Balochistan, 2007-2014). Women were forced to fetch water from longer distances, leading to mental stress, physical exhaustion, and greater susceptibility to diseases. The deteriorating water quality resulted in outbreaks of diseases such as hepatitis, diarrhea, and cholera. During droughts, school attendance dropped, as many families migrated, and those who stayed experienced reduced incomes. In normal years, residents of Balochistan typically consume wheat, vegetables, meat, fruits, milk, and yoghurt. However, during droughts, the consumption of meat, fruits, vegetables, and, to some extent, milk and yoghurt, was significantly reduced. Daily food intake often dropped to just one meal (FAO 2000), leading to malnutrition and associated health issues, further burdening the government's healthcare system and reducing productivity.

iv. Overall Drought Impacts On Sectors and Security Situation

Drought impacts on Agriculture, assets' sale, water usage, crime rate and health in Balochistan are presented at Figure 3.20.

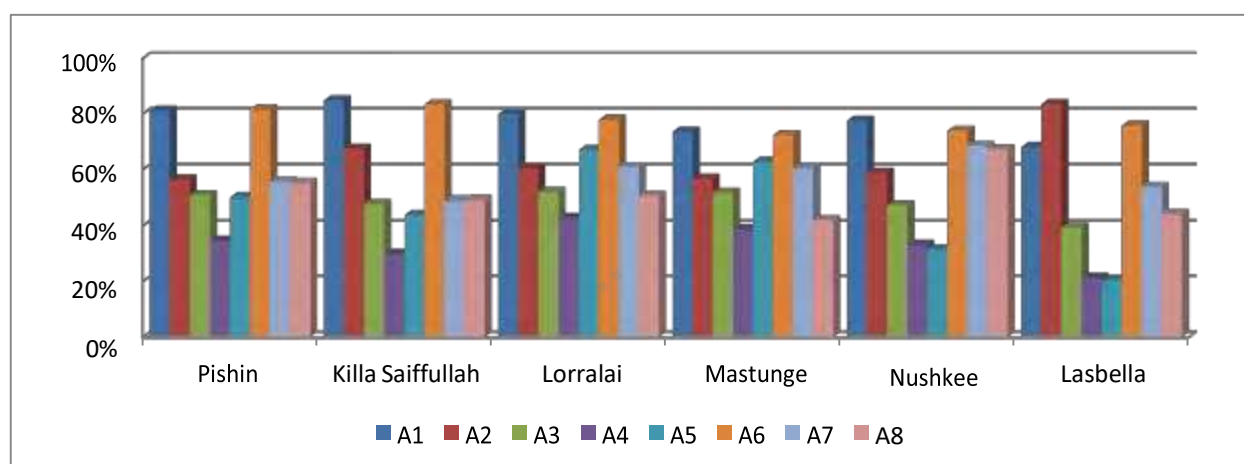


Figure 3.20. Drought impacts (%)

A1	Crop yields' reduction	A5	Crime rate increase
A2	Livestock losses	A6	Irrigation water reduction
A3	Forced sale of assets	A7	Household water usage reduction
A4	Forced sale of land	A8	Health reduction due to malnutrition, lack of safe drinking water and diseases spread

Ref.: BUITEMS & UNDP, 2015

Ecological habitats were destroyed, resulting in biodiversity loss, increased land degradation, deforestation, and desertification. The drought led to a decline in natural resources, increasing conflicts among resource users, and raised security risks

3.3.3. Drought Impacts in Sindh

The impacts of drought in Sindh (Mostly noted from unpublished reports of Thardeep Rural Development Program) are as follows:

i. Water Resources

The drought of 2003–2004 caused ground and surface water levels to drop in various reservoirs. Additionally, springs also dried up.

ii. Rain-fed Crops and Livestock

The area under rainfed agriculture was reduced during the drought years. Farmers suffered crop losses. These losses led to increased food insecurity in the following years. As a result of drought during 1999 – 2002, the market value of livestock, including goat and cows, declined. The sale of goat, cows, and sheep increased. Fodder price was higher. Availability of drinking water for humans and livestock, pasture, rangelands, and fodder was reduced because of drought.

iii. Socio-economic, Health, and Education Impacts and human deaths

During the 1987 drought, about 40% of the population of desert areas migrated along with their families and herds to the barrage areas and another 14% to other locations within Thar (GoS, UNICEF, Save the Children, 1987).

Malnutrition increased, and the population of children with normal weight decreased. Malnutrition resulted in decreased hemoglobin levels (less than 10 grams per deciliter) in the blood during 1999, causing night blindness and decreased weight, especially in pregnant women, lactating mothers, and children. Increased incidences of sexual exploitation were also recorded. An increase in the dropout rate of primary school students was noted in 1999 due to large-scale migration from drought areas. Drought 1997-2002 caused the death of 127 people in Sindh (Anjum et al., 2012).

3.3.4. Drought Impacts in Punjab

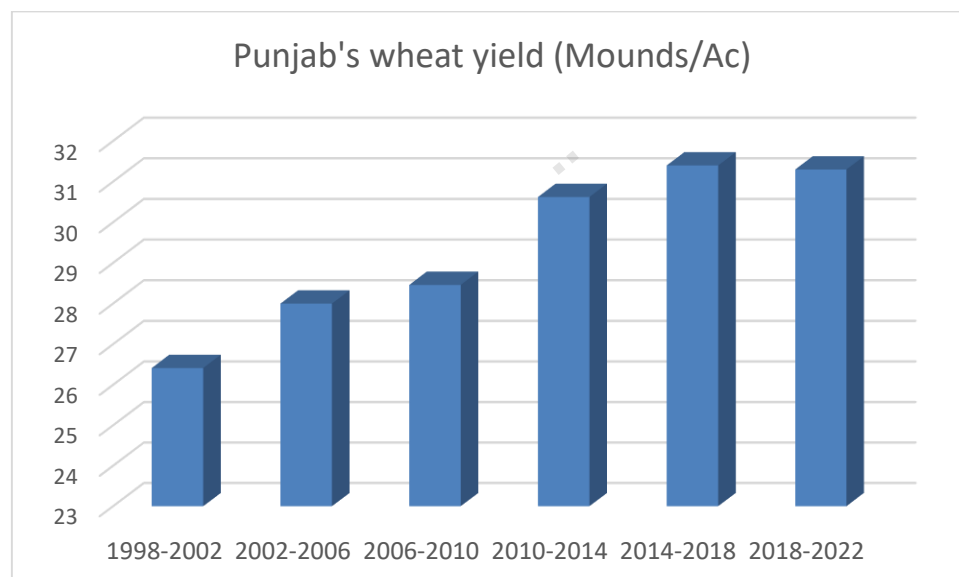
In 1999-2002, a major drought affected 7,286 villages of the Punjab province. Minor droughts in 2001, 2002, 2003 and 2004 affected 3449, 3493, 31 and 313 villages, respectively. The rainfall received during 2000 was 13.2 percent and 26.2 percent lower compared to those received during 1999 and 1998, respectively. Cholisthan, Thal and Dera Ghazi Khan areas are the main arid/ hyper-arid areas. Rahim Yar Khan, Bahawalnagar, Rajanpur, Bahawalpur, Dera Ghazi Khan, Multan, Bhakkar, Khushab, Layyah, Chakwal, Jhelum, Rawalpindi, Attock, Mianwali, Narowal and Muzafargarh are drought vulnerable districts (PDMA Punjab, 2018).

vi. Agriculture

During drought in 1998-2002, agricultural crops, livestock and fruit orchards were severely affected resulting in losses to economic assets, environment damage and deterioration of health conditions of people in the drought affected districts. It declines in the economy of the province

by 21 per cent (PDMA Punjab, 2018). The dry spells of 2009-2010 severely affected the province, badly affecting the crop production (Durrani, 2018). This resulted in 97% reduction in the vegetated area of Rawalpindi district making it the most drought affected district of the province. On the contrary, district Dera Ghazi Khan turned out to be the most resilient district with where 54% of its vegetation affected by this drought.

The average yield of wheat in the province from July 1998- June 2002 was 26.41 mounds per acre, while it increased to 28.0 mounds per acre during July 2002 – June 2006. The yield during 2006-07 was 30.09 mounds per acre⁴.



Ref. <https://crs-agripunjab.punjab.gov.pk/system/files/Wheat%20Historical%20Data.pdf#overlay-context=node/165>

vii. *Water*

During droughts in 2001, Cholistan, Potowar and Mianwali were the worst affected areas in the Punjab. The water flows in the canals were reduced and there was no water at some points of the canals at the tail ends. Groundwater resources were also severely affected.

viii. *Crops and Livestock*

Reduced acreage and productivity of the rainfed and irrigated crops are the main agricultural impacts of drought. During drought, Punjab produced 18.44 million tones as against target of 20 million tons of wheat. Production of other crops was also impacted negatively, i.e., cotton 10.07 million bales as against the previous year's production of 10.68 million bales. Rice 3.891 million tones as against the target of 4.025 million tones. Vegetable production had also faced shortfalls, e.g., onion 1.405 million tones as against a target of 1.542 million tones. About ten percent reduction in the livestock productivity was recorded in severely drought affected areas. Livestock movement from Cholistan to adjacent irrigated areas for water and feed was increased (Reliefweb, 2002).

3.3.5. Drought Impacts in Khyber Pakhtunkhwa

⁴ <https://crs-agripunjab.punjab.gov.pk/system/files/Wheat%20Historical%20Data.pdf#overlay-context=node/165>

The dry spells of 2009-2010 severely affected the province of KP, badly affecting the crop production (Durrani, 2018). During 1998-2003, extreme drought particularly in Kakul, Dir and Balakot caused groundwater depletion, causing crop failure and even starvation (Rahman, 2021).

3.3.6. Drought Impacts in Gilgit Baltistan (GB)

Amongst the hardest hit by drought were the pastoralists and agriculturists in GB. Over 200 yaks died on account of insufficient vegetation available at higher altitudes. The irrigation system had become redundant and channels were choked. In addition, the standing crops, livestock, cattle herds, inland fishery and fruit orchards were severely affected, which resulted in estimated losses to the tune of Rs 100 million on account of 2001-2003 droughts⁵.

⁵ Northern Areas Disaster Management Authority, 2008, Disaster Risk Management Plan, Northern Areas,

ORGANIZATIONS AND ASSIGNMENT OF RESPONSIBILITIES

The main stakeholders for drought mitigation and adaptation are as follows:

4.1. Ministry of Climate Change and Environmental Coordination (MoCCEC)

The mandate of the ministry is development of national policies, strategies, plans and programs related to disaster management, including drought, coordination, implementation and monitoring actions with international agreements. MoCCEC is the focal point for implementation of international and regional environment related conventions, including those related to drought, desertification, climate change and agencies like Global Environment Facility (GEF), Green Climate Fund (GCF), Nationally Appropriate Mitigation Actions (NAMA) Facility, United Nations Framework Convention on Climate Change (UNFCCC), UNCCD, United Nations Convention on Biological diversity (UNCBD) and United Nations Environment Program (UNEP). It works as focal point for designing, development of strategy, legislative framework, plan and coordination of implementation of drought related initiatives. It is the focal ministry for drought related multi-lateral donor and coordinating agencies, Forestry component, at federal level, is being managed under the ministry. The ministry has developed the National and provincial Action plans to combat desertification. Furthermore, National policies on Environment, Forestry, Sanitation, Drinking Water and Climate Change were prepared. As provided in these policies the ministry has the mandate to develop the plans for disasters including drought.

4.2. National Disaster Management Authority (NDMA)

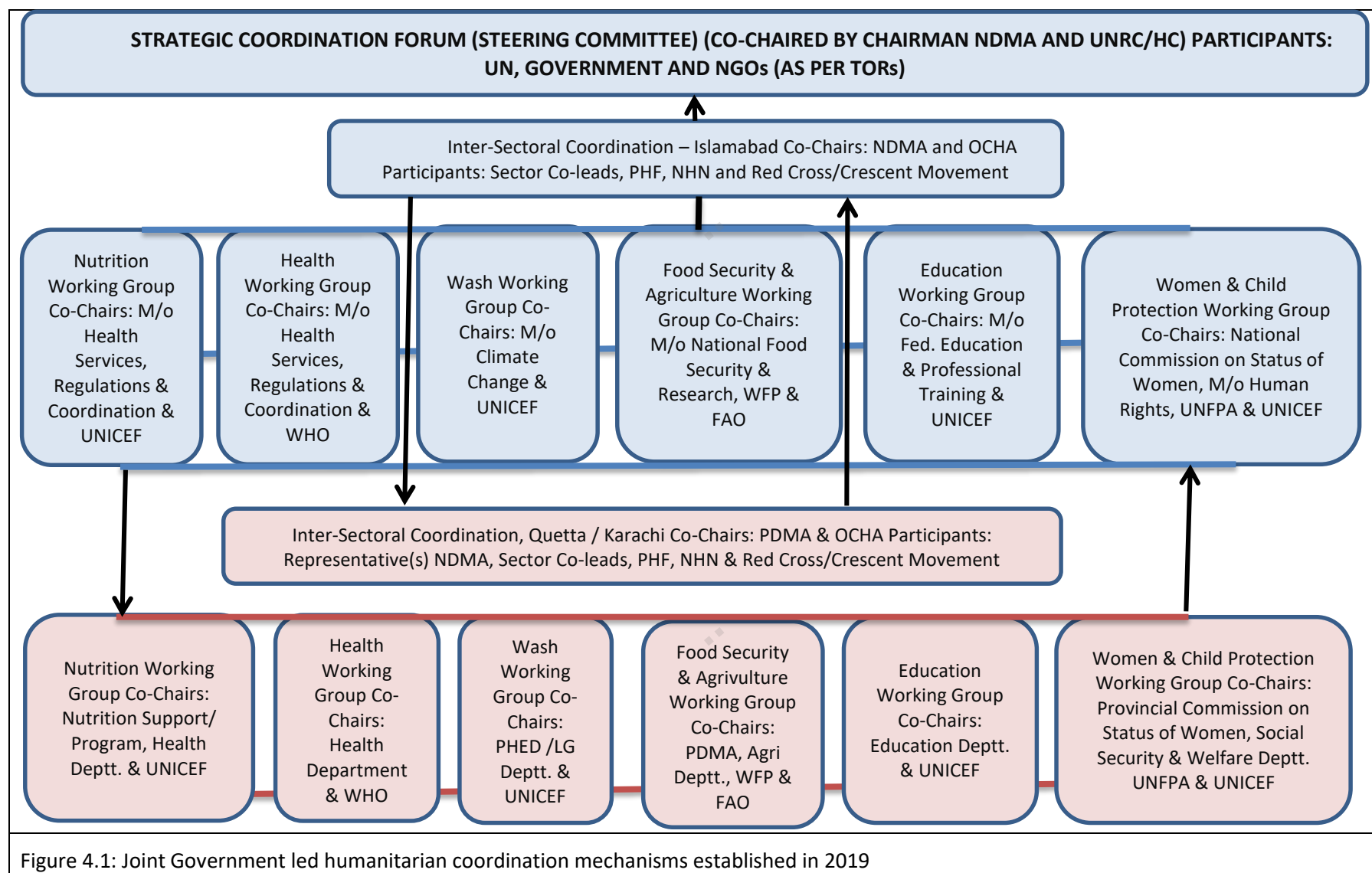
As per NDMA Act 2010 (Government of Pakistan, 2010), the role and responsibility of NDMA is to act as coordinating, implementing and monitoring body for disaster including drought management, preparing National level Plans for disasters, formulating guidelines for preparing disaster management plans by different federal ministries, departments or provincial authorities, providing needed technical assistance to the provinces for preparing their disaster management plans in accordance with the guidelines of National Commission, coordinating response for threatening disaster situation or disaster, providing guidelines to federal ministries and provincial institutions on actions to be taken in case of a threatening disaster situation or disaster and promoting awareness and education regarding disaster management. The NDMA has prepared the National Disaster Management Plan (2012 – 2022) and National Disaster Risk Reduction policy 2013. It prepares National monsoon contingency plans at annual level. Regarding the drought in 2018, the NDMA issued a report of analysis of the drought situation and recommended humanitarian action - immediate short-term and complementary development measures – long-term. A Coordination structure comprising of Strategic Coordination Forum (Steering Committee) Co-chaired by NDMA and United Nations Resident Coordinator/ Humanitarian Coordinator and working groups were formulated to provide strategic direction to the overall drought response. Inter-sectoral Coordination Mechanisms were established at the national and provincial (Sindh & Balochistan) levels (Figure 4.1).

4.3. Ministry of Planning, Development and Special Initiatives

It is responsible (Government of Pakistan, 2021) for preparing overall plan for the social and economic development sectors in the country, annual plans, annual development program and assigning responsibility in the execution of its component items. It is also responsible to monitor implementation of main development programs and projects; identify bottlenecks, initiate timely remedial actions, review and evaluation of progress achieved in the implementation of the National Plan. It is also responsible to associate with the Economic Affairs Division with donor agencies in matters related to external assistance for projects.

4.4. Ministry of National Food Security and Research

It is responsible for economic coordination and planning for food, planning and policy making for agriculture, import and export of food stuffs and food grains, coordination with donors in the food sector and coordination with international organizations related to agriculture and livestock. It is also responsible for preparing plans for allocation of food stuffs and food grains, locust control and maintaining locust warning institutes. The ministry was the Co-chair of the Food Security and Agriculture Working Group established for drought response in Pakistan in 2019 by NDMA and the United Nations. The ministry also has administrative control of Pakistan Agricultural Research Council (PARC).



4.5. Pakistan Agricultural Research Council (PARC)

The PARC is the administrative head of research institutes for dryland and other areas. It is the apex research body to coordinate and promote Agricultural research. It has following major research establishments:

Since 1984, National Agricultural Research Centre (NARC), Islamabad is conducting national level research in most of the important fields of agriculture and livestock through its 19 institutes. Arid Zone Research Institute, Umerkot is conducting research on crops of arid zone. National Sugarcane Research Institute, Thatta is conducting research on improved sugarcane varieties' breeding. The main focus of Southern-Zone Agricultural Research Centre (SARC), Karachi is to undertake research on topics related to control of insect, vertebrate pests and crop diseases, grain storage techniques, grain quality control, research on sugarcane, coastal agricultural and peri-urban dairying.

The research work in Balochistan Agricultural Research & Development Centre, Quetta is focused on arid zones. The institute has its stations in Barkhan, Jafferabad, Turbat, Lasbella and Khuzdar. The research work in Arid Zone Research Centre, D.I. Khan, and Khyber Pakhtunkhwa is focused on arid zones. The institute has its stations in Laki Marwat, Tank, Miran Shah and Wana. The focus of research work in National Tea and High Value Crops Research Institute (NTHRI), Mansehra is tea and other high value crops in Mansehra and surrounding areas.

Summer Agricultural Research Station, Kaghan is focusing on reducing the growing period of high yielding crop varieties. Arid Zone Research Institute, Bhawalpur is conducting research on crops of arid zone. Mountain Agricultural Research Centre (MARC), Gilgit is conducting research on vegetables, maize, wheat, food legumes, deciduous fruits, medicinal plants, spices and forestry etc. in the high-altitude arid areas.

4.6. Ministry of Water Resources

The mission of the ministry is to develop water and hydropower resources in order to fulfil existing and future water shortage challenges and provide affordable renewable energy, proceed as catalyst to implement National Water Policy with other stakeholders through technology, innovation initiative and creativity. The ministry coordinates the working of WAPDA, Indus Water Treaty, 1960, Institute of Engineering Pakistan, Indus River System Authority (IRSA) and Federal Flood Commission. It coordinates Indus water works and keeps liaison with international water sector organizations e.g., International Commission on Large Dams and International Commission on Irrigation and Drainage. It is coordinating development of medium and large dams in Pakistan. Brief of its main attached departments is as follows:

i. Indus River System Authority (IRSA):

The Authority:

- lays down the basis for the regulation and distribution of surface waters amongst the Provinces according to the allocations and policies spelt out in the Water Accord;
- reviews and specify river and reservoir operation patterns and periodically review the

system of such operation;

- coordinates and regulates the activities of the WAPDA in exchange of data between the Provinces in connection with the gauging and recording of surface water-flows;
- determines priorities with reference to sub-clause (c) of clause 14 of the Water Accord for river and reservoir operations for Irrigation and hydro-power requirements;
- compiles and reviews canal withdrawal indents as received from the Provinces on 5-daily or, as the case may be, on 10-daily basis and issue consolidated operational directives to Water and Power Development Authority for making such releases from reservoirs as the Authority may consider appropriate or consistent with the Water Accord;
- settles any question that may arise between two or more Provinces in respect of distribution of river and reservoir waters; and
- considers and makes recommendations on the availability of water against the allocated shares of the Provinces within three months of receipt of fully substantiated water accounts for all new water projects for the assistance of the Executive Committee of the National Economic Council.

ii. Pakistan Commissioner for Indus Waters:

- Pakistan Commissioner for Indus Waters (PCIW) is the part of the Permanent Indus Commission, a bilateral commission consisting of officials from India and Pakistan, was created to manage and implement the objectives, goals and outlines of the Indus Waters Treaty. It maintains and exchanges data and co-operates between the two countries.
- Federal Flood Commission (FFC) is one of major wings of office of the CEA/CFFC mainly responsible for the preparation of National Flood Protection Plans and their implementation through concerned Provincial and Federal Line Agencies in the country. Chief Engineering Advisor in extended office Capacity acts as Chairman Federal Flood Commission.

iii. Pakistan Council of Research in Water Resources (PCRWR):

PCRWR is a national research organization that undertakes and promotes research in different water sector disciplines.

iv. Federal Flood Commission

Federal Flood Commission (FFC), Ministry of Water Resources provides advisory services to Ministry of Water Resources on issues relating to engineering matters i.e flood control (protection & mitigation), dam safety, irrigation, drainage, water, power including hydro-power, besides, other allied engineering matters at national level. It is mainly responsible for the preparation of National Flood Protection Plans and their implementation through concerned Provincial and Federal Line Agencies in the country. Office of Chief Engineering Adviser/ Chairman, Federal Flood commission (O/o CEA/ CFFC) has formulated National Flood Protection Plan-IV (NFPP-IV) under water sector Capacity Building & Advisory

Services (WCAP) through Consultant M/s NESPAK which was approved by CCI in its 31st meeting held on 2nd July 2017. In the NFPP-IV, besides other a study for drought management has been included. The relevant paras of NFPP-IV include: "Drought mitigation through floods requires a comprehensive study based on possibility of new flow paths and capacity enhancement and extension of existing canals reaching Tharparker. An amount of Rs.50 million has been proposed for studies on drought mitigation through floods in Sindh. The proposed study will provide recommendation based on techno-economical evaluations".

v. Water and Power Development Authority

Water and Power Development Authority (WAPDA) is responsible for planning, investigation and execution of projects and schemes for generation, transmission and distribution of power, irrigation, water supply, drainage, prevention of water logging and reclamation of saline land. Its role is to collect hydro- meteorological data /river flow of Indus basin, levels of main storage reservoirs and groundwater. The information from stream gauging and hydro-meteorological stations is provided to the PMD and other federal and provincial organizations during drought situation.

4.7. Pakistan Meteorological Department (PMD)

The Pakistan Meteorological Department is the lead agency for weather related interventions. It is working under Aviation section of Ministry of Defence. In addition to meteorological services, it provides information related to hydrology, climate, disasters including drought, agricultural development with regard to weather situation, weather and climate related impact assessment, seismology and geomagnetism. It provides forecasting services for weather and early warning of natural hazards including drought through electronic and print media and its website. National Drought Monitoring and Early Warning Center and National Agro-met Center are working under PMD. It has regional centers in all the provinces and Gilgit Baltistan. Fortnightly, monthly and quarterly Drought bulletins can be accessed through its website. National Drought Monitoring Center (NDMC) was established in 2004-2005. It serves as a hub for the collection, consolidation and analysis of drought related data (observed, satellite derived products, water sector etc.) from all possible sources in the country. Data is analyzed using Geographical Information System (GIS) tools for assessing drought intensity and developing early warnings from fortnight to season led time based on Numerical Weather Prediction (NWP) products.

Planning early is the key to drought resilience. To further enhance early warning system capacities. Strengthening of the observational network for drought monitoring, training and capacity building of NDMC team to bridge the gaps between the existing and desired meteorological and hydrological monitoring network of PMD is proposed.

The raw data (precipitation & temperature) from 126 meteorological stations and almost 425 ordinary rain-gauges (installed around the country) are processed to calculate various meteorological drought indices including Standardized Precipitation Index (SPI), Standardized Precipitation-Evapotranspiration Index (SPEI), Reconnaissance Drought

Index (RDI) and Deciles. Moreover, the satellite-based drought indices including Normalized Difference Vegetation Index (NDVI) Temperature Vegetation Dryness Index (TVDI), Vegetation Condition Index (VCI) and Land Surface Temperature (LST) and hydrological reservoirs data are mostly used to determine the drought. They are calculated by using the primary data of precipitation, temperature etc. Similarly, for agriculture drought indices, in addition to the above (NDVI, TVDI, VCI and LST), the additional indices including Vegetation Health Index (VHI), Temperature Condition Index (TCI) and Soil Moisture Anomaly (SMA) may be included. Moreover, Hydrological droughts indices like Stream-flow drought index (SDF), Water balance index (WBI) and Soil moisture index (SMA) may be incorporated. In 2018, NDMC issued timely three alerts (6th June, 6th September & 7th December) of drought early warning and its impacts over Sindh and Balochistan to national stakeholders that helped the relief agencies to timely intervene and minimize the drought impacts over drought prone region. The PMD has the capability of drought monitoring and research. Cloud seeding experiments were conducted on warm clouds in Pakistan during 20th June to 15th September, 2000 which practically is the monsoon period in Pakistan where convective type of clouds makes their sufficient availability to augment precipitation through the cloud modification program. Beaver and Fletcher aircraft of Plant Protection Department with liquid dispensers and Mashhad aircraft of Army Aviation, mounted with solid dispenser joined the mission. Mashhad aircraft was modified to the extent that a solid dispensing machine, indigenously manufactured in accordance with the requirements of Pakistan Meteorological Department (PMD) was fitted to the aircraft. The aircrafts were very old and had the limitations to go beyond a certain height. Some cases where conditions were conducive for cloud seeding could not consequently be tampered. Study was conducted in forty-eight experiments in all were conducted, 14 in Sindh, 18 in Balochistan, 3 in NWFP and 13 in Punjab out of which 10 were undertaken in Southern Punjab. More than eighty percent experiments were conducted south of 30°N where intensity of aridity was much higher as compared to the aridity in northern half of the country. Thar desert, Sindh, Zhob, Balochistan. The study brought a reasonably high success.

4.7.1. Recommendation for improving weather and climate related governance:

Forecasting of drought provides time to government decision makers and local communities for planning and implementing drought mitigation strategies. Development of policies, strategies, plans, programs for climate change adaptation and mitigation and climate research require climate change scenarios and modelling needing meteorological data for several years. The early warning systems and disaster preparedness is also based on such information. It will be beneficial for more integrated and responsive weather and climate-related governance.

Ministry of Climate Change and Environmental Coordination (MoCCEC) is the focal ministry for UNCCD. It is involved in developing policies and plans for climate change and associated disasters including drought. There is a need to establish an institutional link of the PMD with the MoCCEC. In many countries Meteorological agencies are working under the Ministry of Climate Change, Environment, Ecology or Earth sciences.

Swedish Meteorological and Hydrological Institute, is working under the Ministry of Climate and Enterprise. The Norwegian Meteorological Institute is subordinate to the Ministry of Climate and Environment. Meteorological Service of Canada is a branch of Environment and Climate Change Canada. South African Weather Service is working under the South African Government's Department of Environmental Affairs and Tourism, and India Meteorological Department is part of Ministry of Earth Sciences which also handles climate change concerns.

Initially an MoU may be signed between PMD and MoCCEC, to define scope of collaboration, roles and responsibilities in areas including data sharing and analysis, policy-making, research on climate change adaptation, early warning systems, disaster preparedness, carbon emission and disaster risk reduction. A joint task force/ committee consisting of representatives from both PMD and MoCCEC may be establish with regular schedule of meetings to facilitate the climate change adaptation and mitigation efforts including timely data sharing, climate forecasting, development of public awareness campaigns and reporting for international obligations under UNFCCC, UNCCD, UNCBD and WMO etc. It will facilitate PMD to get climate finance from climate change donors like GCF, GEF and Adaptation Fund etc. Amendments in the existing laws and regulations may also be proposed to establish formalized institutional linkages to facilitate cooperation between PMD and MoCCEC, ensuring that both institutions have the necessary mandate to collaborate effectively on climate change issues.



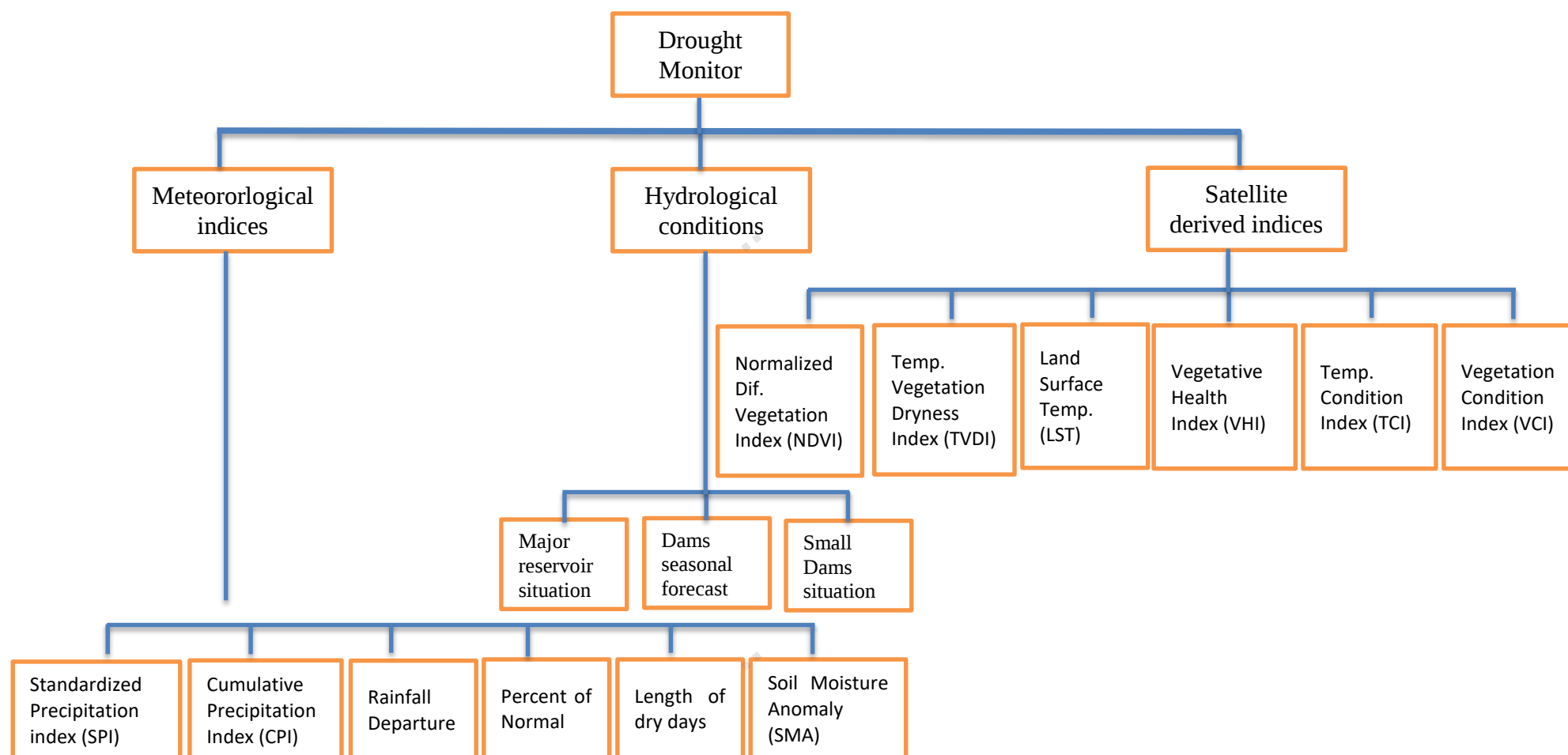


Figure 4.2: Flow chart depicting drought monitor by NDMC, PMD from various indices

4.8. Ministry of National Health Services, Regulations and Coordination

The ministry is responsible for planning and coordination in health sector at national level and development of policies and plans for population programs to mainstream population consideration in development planning in the country. It is responsible for coordination at international level for provision of medical facilities and public health. The ministry was the Co-chair of the Nutrition and Health Working Groups established for drought response in Pakistan in 2019 by NDMA and the United Nations.

4.9. Global Change Impacts Study Center (GCISC)

The GSICE suggests sectoral guidelines for climate change adaptation and mitigation to the government. It raises public awareness on climate change and its impacts including drought. Furthermore, it conducts research on climate change and its impacts including drought related matters. It is working on climate smart water management in Agriculture in Indus basin. It is also monitoring SDG Indicator 6.4.1: Water use efficiency change over time and 6.4.2: Water stress level and withdrawal of freshwater in proportion to available resources of freshwater.

4.10. National Disaster Risk Management Fund (NDRMF)

The fund was established as not-for-profit company with ADB and GoP funding. The funds are being utilized to provide necessary grants to government and NGOs for disasters including drought, climate change and other relevant topics. NDRMF is for Disaster Risk Reduction and Disaster Risk Financing, that includes droughts. However, until now the scope or portfolio of approved subprojects for drought management is very limited.

4.11. Provincial Forest Departments

The Provincial Forest Departments are responsible for conserving and developing natural resources especially forest and rangelands, overcoming the problem of deforestation and rangeland degradation which ultimately assist in drought mitigation.

4.12. Provincial Irrigation & Drainage Authorities

The Provincial Irrigation & Drainage Authorities manage the deliveries in the canal network. During 1998-2002 drought, these Authorities made water available from storage reservoirs during slack water need period and reallocated it during critical water need stages. Canal water was provided on priority to canal commands with brackish water.

4.13. United Nation Agencies

i. OCHA

The OCHA is the United Nations Office for the Coordination of Humanitarian Affairs. It coordinates with humanitarian organizations for a coherent response to disasters. The OCHA was the Co-chair of the Inter-Sectoral Coordination – Islamabad and Quetta/Karachi established for drought response in Pakistan in 2019 by NDMA and the United Nations.

ii. UNDP

The UNDP is the implementing agency of multilateral environmental donors like GEF and GCF. It works with the Government of Pakistan and Civil Society Organizations to assist them in identifying solutions to challenges related to development. It builds institutional capacity and provides technical expertise for improvement of development outcomes and innovative solutions at global level in data collection and quality, improved management of environment, climate change adaptation, mitigation and financing, accountable and strong governance and capacities to respond to disasters⁶. It is implementing partner of SLMP-II and other projects related to climate change which are being managed by Ministry of (M/o) Climate Change.

iii. UNICEF

UNICEF protects and supports the wellbeing and rights of women and children and focuses on basic services like nutrition, health, education, protection, hygiene, sanitation and water. It provides humanitarian services at disasters. The UNICEF was the Co-chair of the Nutrition, Women and Child Protection Health Working Groups established for drought response in Pakistan in 2019 by NDMA and the United Nations.

iv. FAO

The FAO is among the United Nations institutes managed by the member nations' Conference. The strategic objectives of FAO include assistance in eradicating hunger, malnutrition and insecurity in food, protection of livelihoods during disasters, increasing productivity and sustainability in agriculture, efficient and inclusive food systems and agriculture⁷. The FAO was the Co-chair of the Food Security and Agriculture Working Groups established for drought response in Pakistan in 2019 by NDMA and the United Nations.

v. WFP

The WFP focuses on humanitarian and recovery assistance during disasters for basic nutrition and food needs for vulnerable people, relief, rehabilitation and development aid. The WFP was the Co-chair of the Food Security and Agriculture Working Group established for drought response in Pakistan in 2019 by NDMA and the United Nations.

vi. WHO

WHO is working for provision of universal health services to protect health from emergencies, provision of better health services and well-being. It focuses on primary health care, health workers' training, labour policies, encourages participation of communities in preparation and implementation of health policies, increasing access to medicines, health products. The WHO was the Co-chair of the Health Working Group established for drought response in Pakistan in 2019 by NDMA and the United Nations.

⁶ <https://www.pk.undp.org/content/pakistan/en/home/>

⁷ <http://www.fao.org/pakistan/our-office/en/>

4.14. NGOs and Rural Support Programs

i. International Union for Conservation of Nature and Natural Resources (IUCN)

The IUCN has formulated the revised National Action Program to Combat Desertification and national and provincial Conservation strategies. It has implemented some projects in arid areas of the country

ii. International Center for Agricultural Research in the Dry Areas (ICARDA)

The ICARDA supported in implementation of research unit of Barani Village Development Project in Punjab. It arranged field trials of recommended crop varieties in arid and semi-arid area, soil and water conservation and rainwater harvesting practices.

iii. World Wildlife Fund (WWF) - Pakistan

The WWF-Pakistan has worked on the security of Indus River system, wet lands, wildlife conservation and ecosystem-based climate change adaptation. On these parameters WWF-Pakistan has got approved the Concept note "Recharge Pakistan" from Green Climate Fund.

iv. ICIMOD

The ICIMOD is developing Agricultural drought outlook and Monitoring system for Hindukush region in collaboration with PMD. It is building capacity of PMD in interpretation of agro-climatic data and data products for monitoring crops. It is in the process of developing National Agricultural Drought Watch for Pakistan.

v. Rural Support Programs

The Rural support programs, working as NGOs are not for profit companies who organizes local communities into Community and Local Support Organizations. It supports informing separate or mix community institutions comprising both men and women. Provision of micro-credit, physical infrastructure schemes, capacity building of communities, productive and social sector services through sustainable community participation, disaster preparedness and management is supported to build empowered community groups. The Rural Support Programs are coordinated through Rural Support Program Network, a not-for-profit company.

NRSP supports drought and poverty reduction related initiatives in arid and semi-arid districts like Kech, Awaran, Panjgoor, Umerkot, southern Punjab and Thal desert. Other provincial/ local RSPs include Sindh Rural Support Organization. Thardeep Rural Development Program, Sindh Graduate Association, Balochistan Rural Support Program (BRSP), Sarhad Rural Support Program is working all over Khyber Pakhtunkhwa including arid and semi-arid areas and Aga Khan Rural Support Program is working in all districts of Gilgit Baltistan.

vi. National and Local NGOs

Pakistan Poverty Alleviation Fund (PPAF) is not for profit company that provides support to 130 CSOs in 147 districts⁸ for working in local communities. It supports in social mobilization by organizing community members including men and women into Community based organizations (CBOs) at mohallah, hamlet, village and Union Council levels. Provision of micro-credit, physical infrastructure

⁸ <https://www.ppaf.org.pk/about>

schemes, education and capacity building of communities, productive and social sector services assist in empowerment of the CBOs. Some NGOs working for drought include NGO Society for Conservation and Protection of Environment, Baanhn Beli, Sindh Agricultural and Forestry Workers Coordinating Organization (SAFWCO), Taraqee Foundation and Water, Environment and Sanitation Society.

4.15. Petroleum Companies

The companies provide financial support to the communities mostly in the areas where they get benefits of oil or gas extraction. ENI Private Limited is supporting natural resource management in Jamshoro. Mari Petroleum company Limited sponsored 50 hand pumps and sweet water pond in addition to education, health and technical training related donations in District Thatha and Sajawal.

4.16. Development Finance Insitutions

Asian Development Bank

The bank provides loan, equity investments and technical assistance for development initiatives while continuing support to alleviate poverty. The Bank has provided loan for disasters through NDRMF in addition to other related initiatives. ADB has assisted Pakistan in providing finances/ loans for a number of projects to support mitigation of drought conditions including Balochistan Water Resources Development Project, First and second Barani Area Development Project, Barani Village Development Project, Strengthening Food Security Post-COVID-19 and Locust Attacks, Punjab Water Resources Management Project, Flood Emergency Reconstruction and Resilience project and Preparing the Greater Thal Canal Irrigation Investment Program.

DROUGHT MONITORING, FORECASTING AND PREPAREDNESS

Drought monitoring and forecasting assists in drought risk reduction. Drought related hydro-meteorological and other relevant indices/indicators are noted and reported by Pakistan Meteorological Department (PMD), Water and Power Development Authority (WAPDA) and Provincial Irrigation and Drainage Authorities. The PMD is doing this through indices/indicators that are continuous functions of rainfall and other hydro-meteorological variables. It has established Center for National Drought/Environment monitoring and the Early Warning (NDMC) and four Regional Drought Monitoring Centers (RDMCs) and uses different indices/indicators to identify when Meteorological, agricultural and hydrological drought is occurring, its extent, and when it is ending. Forecasting of drought provides time to government decision makers and local communities for planning and implementing drought mitigation strategies. PMD's National Agro-met center for linking meteorological information with the country's agriculture sector. Daily update on desert locust situation (in the locust attack season) and quarterly soil moisture anomaly is also provided. Monitoring mean flows and Dam levels of Tarbells, Mangla, Rawal, Simly Dams leads towards hydrological drought monitoring. Other drought types are not regularly monitored.

5.1. Drought Indices/ Anomalies

The main drought indices/ anomalies mostly being used by Pakistan Meteorological Organization (Source: PMD) include Satellite Originated Indices for Drought like Land Surface Temperature (LST), Normalized Difference Vegetation Index (NDVI), Temperature Vegetation Dryness Index (TVDI), Standardized Precipitation Index (SPI), Cumulative Precipitation Anomaly (CPA) and Soil Moisture Anomaly (SMA). The values of relevant indices and anomalies are described on PMD website. The meteorological drought is monitored through drought outlook/ monitor based on SPI derived from frequency of precipitation (Figure 5.1⁹).

⁹ <https://ndmc.pmd.gov.pk/new/outlooks.php>

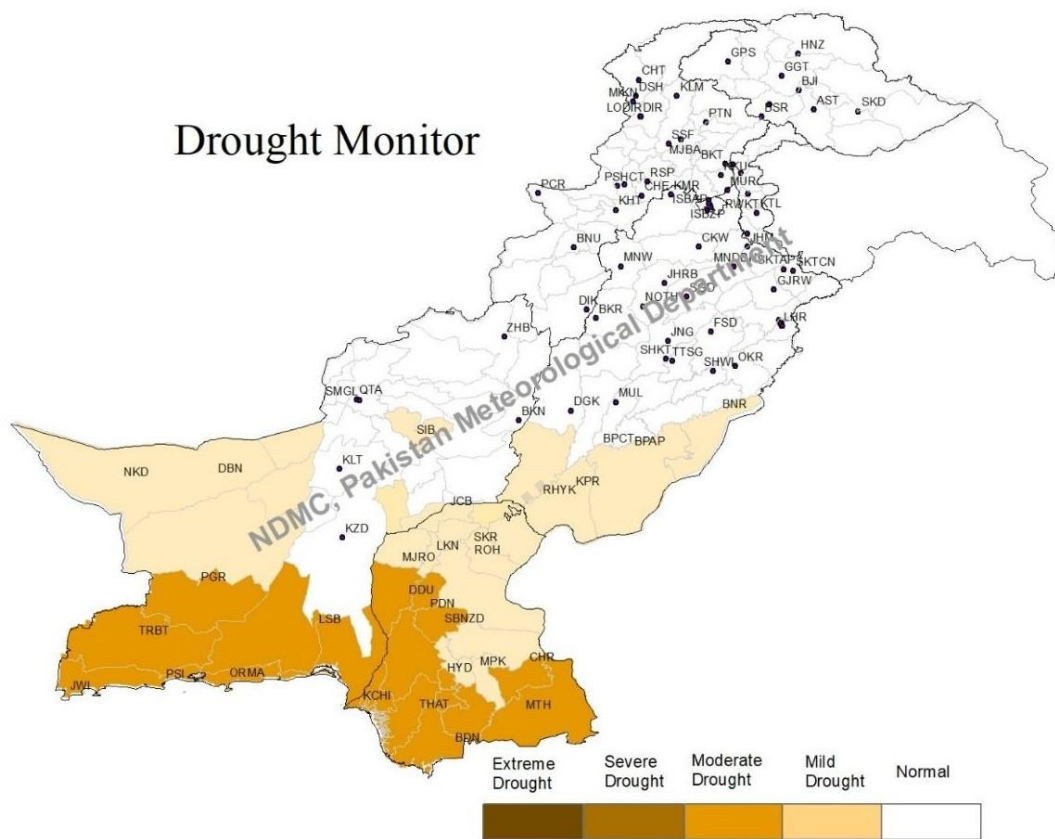


Figure 5.1. Drought Monitor 25 March 2025 (Source: PMD)

5.2. Current Monitoring, Forecasting, Data Collection, and Preparedness

National Drought Monitoring and Early Warning Center (NDMC) of PMD was formed with offices in Islamabad, Lahore, Karachi, Peshawar, and Quetta during 2004 – 2005 for monitoring drought conditions in Pakistan and issuance of advisories in time. It functions as a nucleus to monitor, collect, analyze, and consolidate drought-related data. Data from 126 meteorological observatories and almost 425 Ordinary rain gauges, and one Fenyun High Resolution Picture Transmission (HRPT) Remote Sensor are used, installed in different regions, especially the drought-prone areas in Pakistan. The humidity, wind direction, wind speed, sea level pressure, dew point, and station level pressure, soil moisture at standard depths: 5, 10, 20, 50, and 100 cm, solar radiations and snow level are transferred through General Packet Radio Services (GPRS) technology and satellite after every three hours. The Center played an important role in drought management at national, regional as well as international levels. To assess drought vulnerability, observed and gridded climatic data of precipitation, soil moisture, drought frequency, and intensity is used. The NDMC has developed drought hazard maps of 145 districts of Pakistan. Extremely, highly, moderately, low and very low vulnerable to drought districts were 19, 24, 56, 33 and 13, respectively.

PMD contributed WMO-GWP 'Handbook of Drought Indicators and Indices (WMO and GWP. 2016). Latest research articles include Investigation of seasonal droughts and related atmospheric dynamics over Potwar Plateau of Pakistan (Ain et al., 2019), Comparison of various drought indices to monitor

drought status in Pakistan (Adnan et al., 2017), Shifting of agro-climatic zones, their drought vulnerability, and precipitation and temperature trends in Pakistan (Adnan et al., 2017), Investigations into Precipitation and Drought Climatologies in South Central Asia with Special Focus on Pakistan over the Period 1951-2010 (Adnan et al., 2016) and Characterization of drought and its assessment over Sindh, Pakistan during 1951-2010 (Adnan et al., 2015).

The small dams' water level condition in Rain-fed areas are recorded. Indices including NDVI from remote sensing, SPI from data of point rainfall, Rainfall Anomaly Index (RAI), Cumulative Precipitation Anomaly (CPA), Water availability in reservoirs, Percent of normal, Probability of occurrence, Percentage departure, soil moisture analysis and Sub-surface water situation are used for drought monitoring. Mostly fortnightly bulletin of drought and weekly drought update in Urdu language are issued. The NGOs and government departments like NDMA assist in the outreach of drought advisories to concerned communities. To enhance early warning system capacities, there is a need to strengthen the observational network for drought monitoring, training and capacity building of NDMC team to bridge the gap between the existing and desired meteorological and hydrological monitoring network of PMD.

NDRMF is working on Risk modeling and Mapping through SUPARCO which also includes drought hazard. SUPARCO will develop a software with the capabilities to calculate economic losses of any disaster event. NDRMF has also approved RADAR project of PMD which will support in better collection of weather data to plan early response and implement drought mitigation initiatives.

VULNERABILITY, RISKS AND DROUGHT ADAPTATION

Vulnerability¹⁰ is the inability to respond to drought hazards when it occurs. Drought risk as defined here is the likelihood to incur damages and economic losses during and after a drought and depends on the interactions between three dimensions: 1) the severity and the probability of occurrence of a certain drought event, 2) the exposed assets and/or people, and 3) their intrinsic vulnerability or capacity to cope with the hazard (Vogt et al., 2018). Assessment of drought risks and vulnerability assists in setting priorities for policies and plans, identifying required actions during drought prevention and mitigation, biodiversity conservation and development plan preparation, instituting efficacious monitoring and early warning system for drought. It assists the implementing organizations to target drought preparedness, response and mitigation actions for the most vulnerable communities, sectors and locations with maximum risk of drought. It provides an understanding of natural and human processes that impacts vulnerability to drought and resilience by the communities and marginalized segments among the communities including women, disables persons, landless families, elderly and sick persons.

6.1. Assessment of Vulnerability and Risks

Likelihood of negative affect of drought calculated by multiplying vulnerability (V) with exposure (E) and hazard (H) is drought risk (UNEP & CTCN).

Drought risk = $V \times E \times H$ (Carrao and Barbosa, 2015)

The “H” is the likelihood of future drought occurrences based on current, past and projected drought situations. It is computed using the indices and indicators to monitor and system of early warning for drought. The “V” is assets’ likelihood and human population being impacted by droughts in an area. Physical, environmental, economic, social, and institutional aspects may be taken in consideration for assessment of vulnerability to be consolidative and inclusive and integrate various elements. A framework to calculate vulnerability of a system to drought impacted by factors including sectors, communities and people is at Figure 6.1. It is calculated by adding sensitivity (S) and exposure and deleting adaptive capacity (AC).

$V = S + E - AC$ (Godber and Wall, 2016)

The sensitivity “S” is the degree of ecosystems and communities affected or modified by perturbations, such as the change in climatic conditions by the drought. To estimate “S”, variables explaining the system of interest like agriculture, land degradation extent, population densities, water resources dependency, and income sources diversification are considered.

The exposure “E” is assets’ gauge and human population in an area, the degree by which ecosystems and communities experience stress from drought or per cent population living in vulnerable areas of drought. It is estimated considering drought variables, such as probability of incidences from historic drought happenings, spatial magnitude, predictable frequencies in climate change conditions and strength.

¹⁰ <https://www.unisdr.org/2004/campaign/booklet-eng/Pagina8ing.pdf>

The adaptive capacity “AC” is the capability of ecosystems and communities evolved to adjust environmental hazards or change in policy and expand the variability range to which it can survive, the capacity to take opportunities’ advantage or handle the consequences. Variables describing the natural, human and social capitals, political environment and economic factors including effect of poverty possessing lesser choices, poor living conditions, lack of power and capacity, gender, disability, caste, class, ethnicity and age, finances and culture are deliberated for “AC” counting.

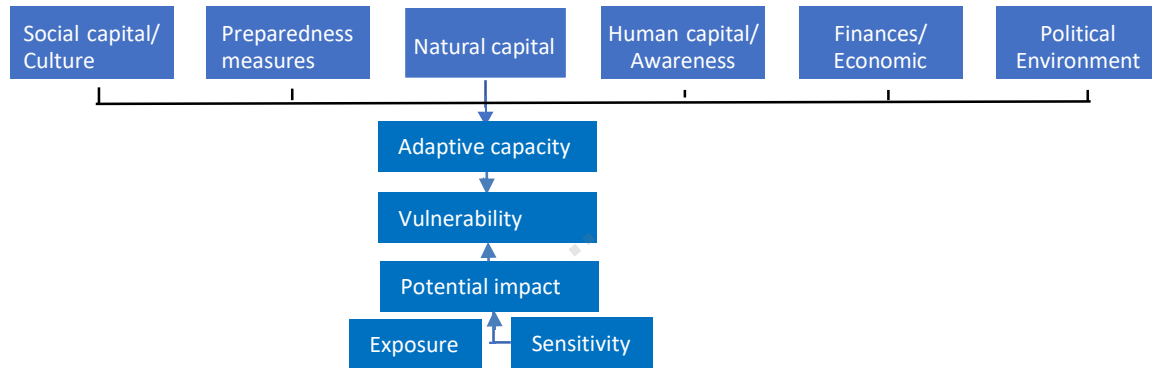


Figure 6.1. Vulnerability of a system to drought - Factors effecting

6.2. Drought Vulnerability Index and Hazard Map of Pakistan

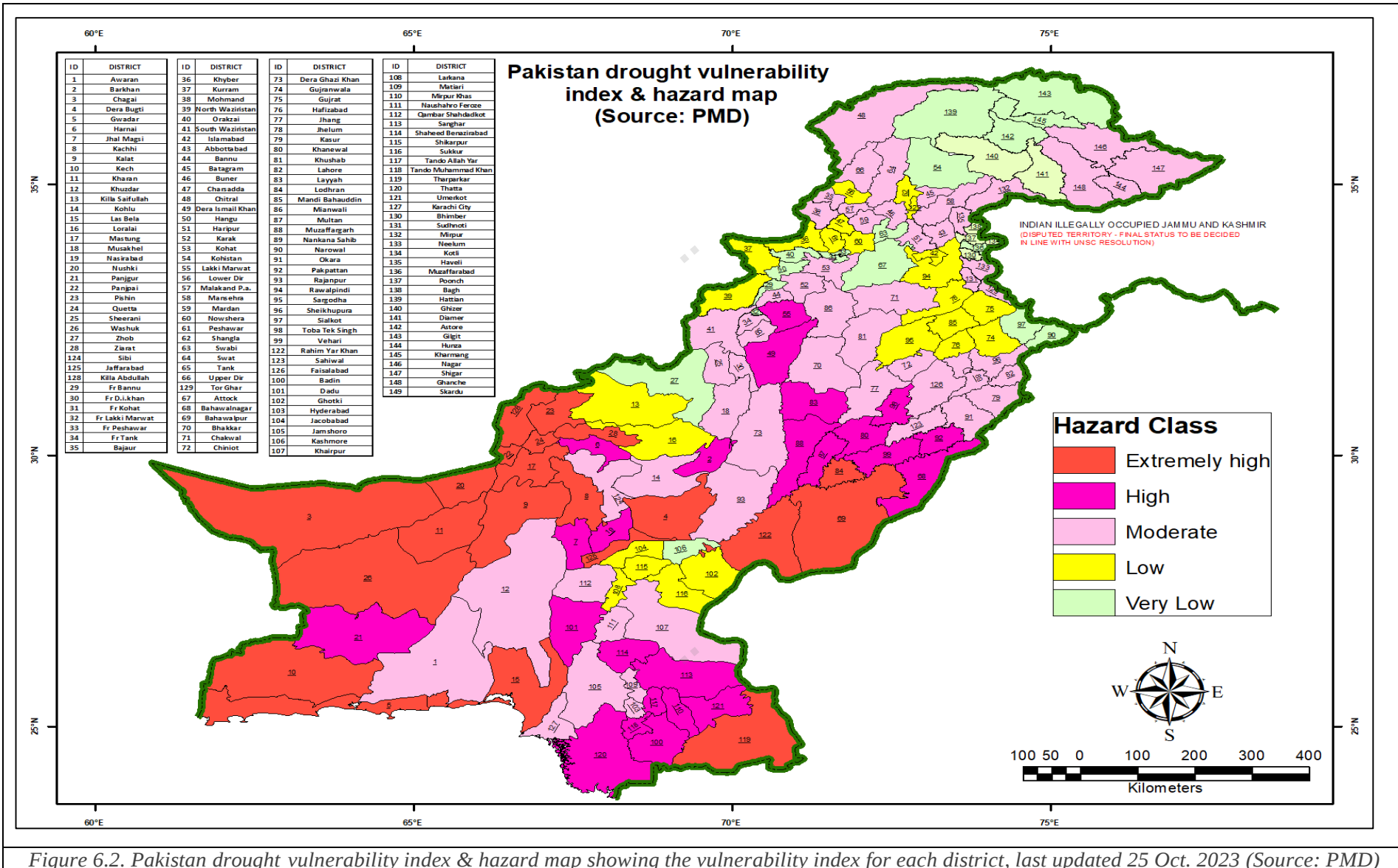
Droughts are caused by deficient rainfall. Pakistan has suffered from many droughts in the past. Some of the recorded droughts were observed during 1871, 1881, 1899, 1902, 1920, 1931, 1935, 1947, 1951, 1997-2002, 2004, 2005, 2006, 2015, 2018, 2019. But the drought of 1997-2002 was the worst in recorded history that has affected the large proportion of population of Balochistan and Sindh provinces. About 80% of the population affected in Baluchistan and Sindh.

Four million people migrated to other area for food and water. Government has received a loss of 25 billion to national exchequer. The research based on data from 1951-2010 also exhibits that drought frequency has increased in this region and drought of Mild - Moderate intensity occur every 2 of 3 years, Severe drought occurs 2 times in 10 years and extreme drought occur one time in every 15 years. Due to rise in temperature and increased frequency of droughts crop water requirement increased. Study depicts that Rabi crop requires 100-150 mm more water than actual, whereas Kharif crops demand an extra water of 250-350 mm rainfall than actual. To identify the drought vulnerable districts of Pakistan, a comprehensive study has been conducted in National Drought Monitoring Centre (NDMC). Results of the study have widely been communicated to various stakeholders. Based on PMD analysis, 19 districts of Pakistan are extremely vulnerable to drought. Policy interventions are required for allocating additional resources for high-risk zones on regular basis to mainstream drought mitigation in proactive manner.

Probable Drought prone areas in Balochistan: Most of the extremely high-hazard districts in the country are situated in Balochistan, as per Pakistan drought vulnerability index and hazard map (Figure 6.2¹¹). Extremely high hazard districts in the province include Chagai, Washuk, Kharan, Noshki, Kalat, Shaheed Sikandarabad, Kech, Quetta, Killa Abdullah, Pishin, Chaman, Lehri, Ziarat, Suhbatpur, Jaffarabad, Usta Muhammad, Dera Bugti, Gawadar, Lasbella, and Hub. In northern areas of the province, early to late winter droughts have been observed with extreme, severe, and moderate droughts returning after 35-55 years, 16-21 years, and approx. 7 years, respectively. In the eastern areas, early summer extreme, severe, and moderate droughts with return periods of approx. 60, 20, and 8 years, respectively, were noted. In the northeast, late summer extreme, severe, and moderate droughts with 65, 21, and 8 years return periods were recorded.

Probable Drought Prone Areas in Sindh: Tharparkar has an extremely high vulnerability index followed by Umerkot, Mirpur khas, Badin, Thatha, Tando Muhammad Khan, Tando Allah Yar, Sangher, Shaheed Benazirabad, and Dadu, which possess high vulnerability index (Adnan et al., 2015). Other drought-prone areas include Kohistan, Sukkar and Khairpur districts.

¹¹ https://media.springernature.com/lw685/springer-static/image/art%3A10.1007%2Fs11069-020-04116-3/MediaObjects/11069_2020_4116_Fig2_HTML.png



Probable Drought Prone Areas in Punjab: Rahim Yar Khan, Bahawalpur, and Lodhran are extremely high-hazard districts. Other drought-prone districts include Bhawalnagar, Layyah, Multan, Muzafargarh, Vehari, Khanewal, Toba Tek Singh, Kot Addu, and Pakpattan.

Probable Drought-prone Areas in Khyber Pakhtunkhwa, Gilgit-Baltistan and AJK: Laki Marwat and D. I. Khan are highly vulnerable districts in KP. However, among other area extreme drought was recorded in Chitral and Dir in 1971, in Cherate in 1984, and in Dir, Drosh, Chitral and Kakul in 2001 (Rahman, 2018). Gilgit-Baltistan and AJK do not contain extremely high or highly vulnerable areas.

6.3. Risk Insurance and Risk Transfer

In Paris Agreement, article 8, risk insurance with respect to disaster reduction is mentioned as areas of facilitation and cooperation among countries¹². The following schemes were executed at national level in Pakistan: (i) Crop Loan Insurance Scheme (CLIS), (ii) Area Yield Index Insurance (AYII) in Punjab, and (iii) Livestock Insurance Scheme for Borrowers (LISB). A National Crop Insurance Scheme (NCIS) is also being developed in Pakistan. Several NGOs are implementing community-based insurance or loss compensation programs. Drought risk transfer mechanisms is helpful in increasing resilience of poor and vulnerable populations. Insurance coverage provides immediate liquidity in case of drought. The insurance may be through the insurance companies or a community-based insurance program. The insurance companies may offer drought area loss coverage or drought family/ individual loss coverage.

¹² The Paris outcome on loss and damage.

https://unfccc.int/files/adaptation/groups_committees/loss_and_damage_executive_committee/application/pdf/ref_8_decision_xcp.21.pdf

DROUGHT COMMUNICATION AND RESPONSE ACTIONS

Effective communication of the onset of drought and the actions required to respond to drought across all stakeholders is essential for reducing impacts. Clear protocols are to be developed about who and where drought messages are made, when they are made (in response to different drought conditions), and how to respond in the event of a drought. All stakeholders, whether they be government agencies, private sector or the general population, have a responsibility to communicate and respond appropriately as a drought unfolds and conditions worsen. This chapter presents specific details and actions for communicating and responding to drought. Efficient, reliable and timely collection and exchange of information/ communication between stakeholders including organizations or persons supporting in drought response, management and mitigation and the communities impacted by the drought is necessary for proper decision making of response actions and mitigation actions for significant reduction in the drought impacts. Protocols regarding when to prepare drought messages, where to make messages for drought, who to develop messages, communicate and what response actions to be taken in case of drought are helpful in drought response and mitigation. If there is poor communication,

7.1. Drought Communication Process

It is difficult for concerned persons to get services and take decisions in case of lack of information. The mechanisms for information dissemination and communication may include:

- (i) Data collection and assessment: Assessment questionnaires containing basic data, requirements for communication with stakeholders and communication with communities (CwCom) is developed. Rapid assessment & evaluation of communication system is done through primary and secondary data collection, review and analysis. Successful events, results, issues and needs of stakeholder participation in communication and CwCom are recorded through consultation with stakeholders. The website of PMD provides reliable information on drought early warning. Information on Government's response actions can be accessed from NDMA's sources. The information regarding drought and its impacts assists in development of concept notes, PC-1s and project documents that is required for resource mobilization. The proposed initiatives are implemented through relevant stakeholders. Monitoring and assessment system at local and national level is established and initiatives are monitored, evaluated and reviewed.
- (ii) Resource material on drought: The available resource material is recorded. New resource materials including pamphlets, brochures, leaflets, handouts, booklets, posters, audio and video documentaries are developed. Common messages are worked out, got printed and disseminated through print, electronic and social media. Projects related to disasters, drought and rainfed conditions mostly assist in developing such type of resource material.
- (iii) Coordination between stakeholders for responding to drought concerns: The NDMA provides coordination during drought. The community activists' role in drought information dissemination is also important. Locally available channel like announcements in mosques, communication through mobile phones, radios and television/ cable transmission strengthen communication & information dissemination. Engaging mobile service providers can assist in mass communication. Coordination is to be improved between departments and NGOs at the national, provincial and

district levels for drought preparedness, response as well as mitigation. Ownership, adaptation, decision making, participation of communities in tackling issues like drought is improved if the thoughts of the communities in solving a problem are considered.

Donors including provincial and national governments, bi and multi-lateral agencies, private organizations and individuals assist in resource mobilization. Regarding donors, Economic Affairs Division, Government of Pakistan has a role in coordinating international donor agencies to mobilize resources. Many NGOs has to get No Objection Certificate (NOC) for working in certain districts. For utilizing international funding by NGOs approval of EAD is required. Some districts have security concerns. Response of communities on planned and implemented actions is recorded and redressal mechanism initiated for community grievances.

- (iv) Capacity building of stakeholders: Training need assessment is done and programs arranged for government departments, NGOs and other stakeholders by relevant projects, programs and institutions focusing on CwCom and other communication topics.

- (v) Communication with communities:

The relevant projects, programs and institutions identify CBOs and community activists as focal points for CwCom. While selecting the members of the CBOs, the criteria may be to select one or two members from each household of the community, giving priority to the women and poor people. Youth may also be given representation in the CBOs. In the executive committee of the CBOs only one member from a household may be accepted.

Information on 4Ws (Who, what, where & when) for CwCom is collected. Communication with communities (CwCom) strategy/ strategic plan, work plan is prepared and coordination mechanism implemented. The CwCom is discussed during meetings with stakeholders. CBOs are given awareness through awareness raising workshops, field days etc. In schools clean and green clubs are established and Government of Pakistan's clean green index focused in awareness raising sessions with them. Eco-camps arranged for stakeholder communities. During surveys information from community is taken to assist in decision making. Female as well as male members of the community are involved in such initiatives. Community representatives are provided different training regarding drought early warning, information collection, analysis, dissemination and impact assessment. The CwCom strategy/ strategic plan & work plan is reviewed and necessary adjustments are made. Try to include CwCom in plans and Budget for drought response. Encourage communities' inputs in finalizing plans & projects for response to drought. Community grievances are responded.

ADB is supporting Telemetry System Master Plan preparation through WAPDA in due consultation with Federal Flood Commission (FFC) and is also considering possible financing for telemetry system enhancement. Early warning systems and telemetry are also included in scope of ADB financed project in Baluchistan and KP. This will improve communication for drought.

7.2. Declaration of Drought Conditions

NDMA co-ordinates response in the event of any threatening disaster situation or disaster in the country. It lays down guidelines for or give directions to the concerned ministries or provincial

government and the provincial authorities regarding measures to be taken by them in response to any threatening disaster situation or disaster.

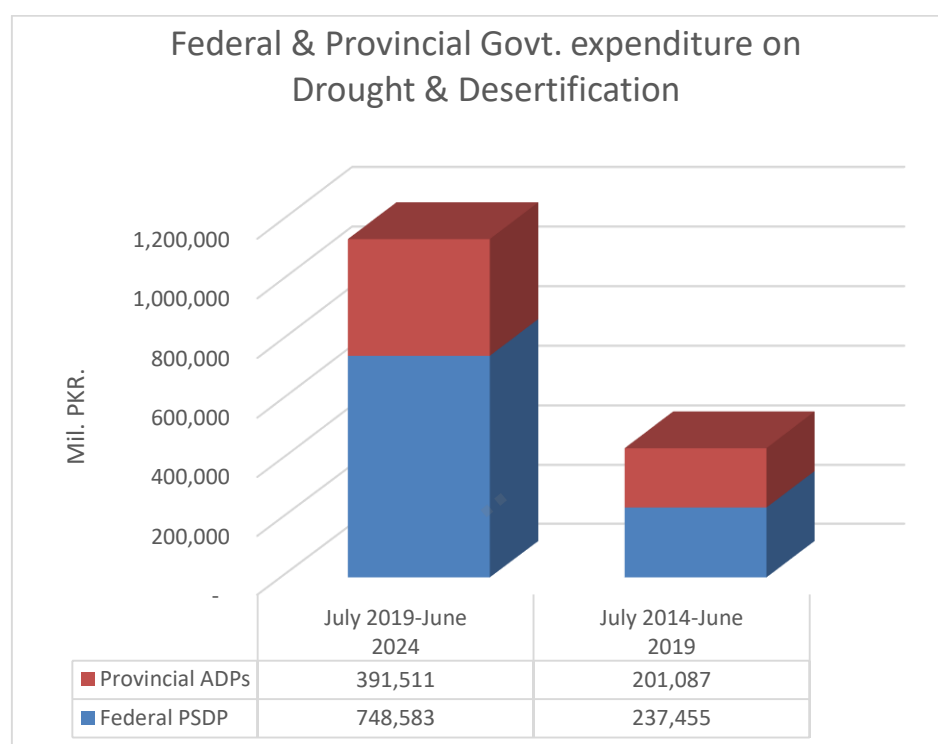
The provincial governments decide the worst drought hit areas. The District Administration issues a proper notification for the worst drought hit areas based on the decision by the provincial governments. The condition of the drought is declared by the PMD which is mentioned on its website.

DROUGHT MITIGATION AND PREPAREDNESS AT NATIONAL LEVEL

Drought mitigation comprises measures planned and implemented to reduce the incidence or minimize impacts of drought. Besides reducing impacts of drought, these measures help in restoring ecological balance, adapting to and mitigating climate change, and bringing sustainable development benefits to the local communities. However, such programs and projects may not be stand-alone interventions but should be part of developmental and budgetary planning in the domain of natural resource management, soil conservation, watershed management and sustainable forest management. Such measures are required to be mainstreamed in regular development programs of federal, provincial governments and local levels.

8.1. Federal and Provincial Governments' Expenditures for projects related to drought and desertification 2014-2021

During July 2014- June 2021, the total amount spent on projects related to drought and desertification under Federal PSDP were PKR. 986 billion. The total amount spent on such projects by provincial governments under their respective Provincial ADPs were PKR. 592.6 billion. Therefore, the total amount spent on such projects by federal and provincial governments under their respective PSDP or Provincial ADPs were PKR. 1,578.6 billion.



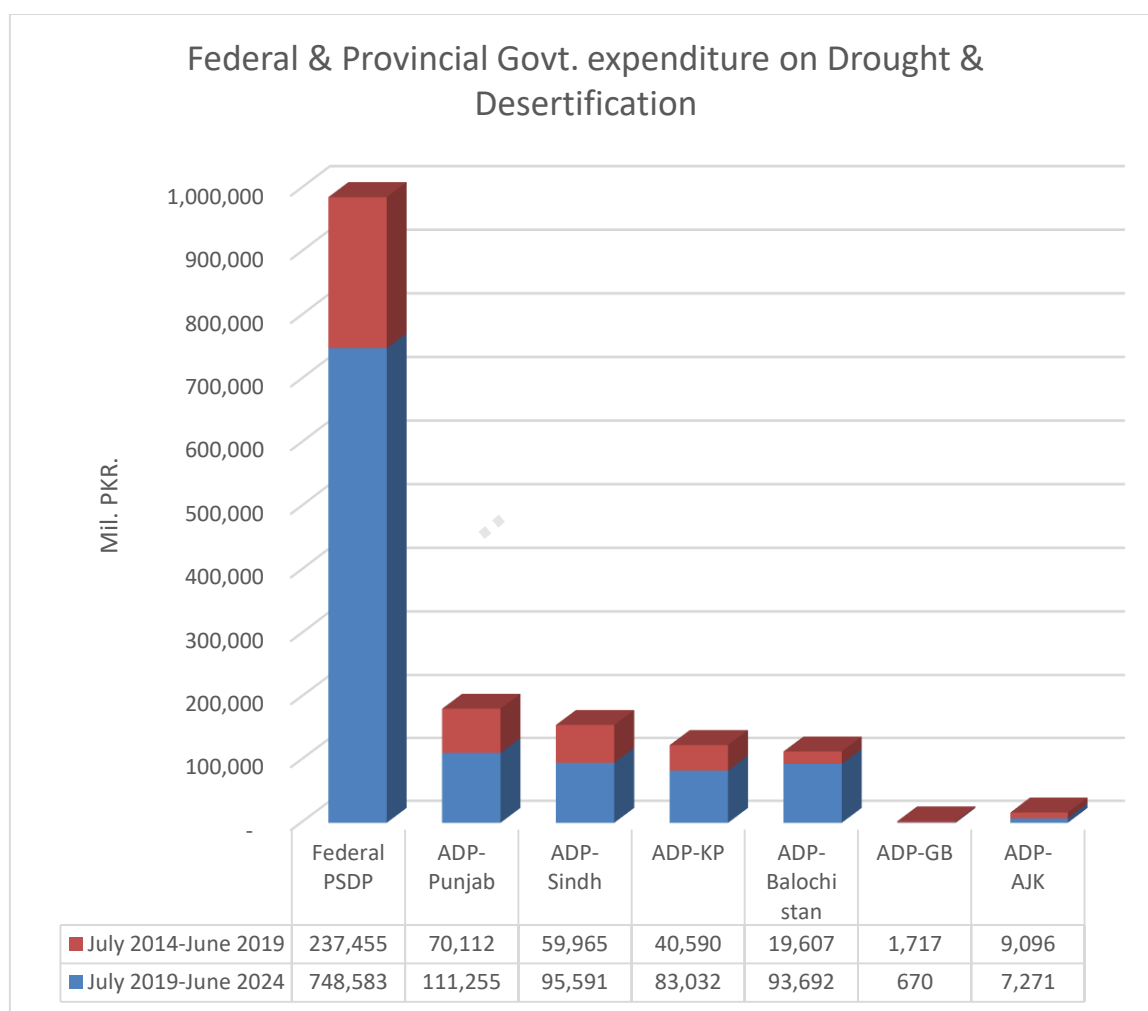


Figure 8.1: Federal and Provincial Govt. expenditures on projects related to desertification & drought

Table 8.1: Federal and Provincial Govt. expenditure on Drought & Desertification

	July 2019-June 2024	July 2014-June 2019	Total
	(Million PKR.)		
Federal PSDP	748,583	237,455	986,038
ADP-Punjab	111,255	70,112	181,367
ADP-Sindh	95,591	59,965	155,556
ADP-KP	83,032	40,590	123,622
ADP-Balochistan	93,692	19,607	113,299
ADP-GB	670	1,717	2,387
ADP-AJK	7,271	9,096	16,367
Total	1,140,094	438,542	1,578,636

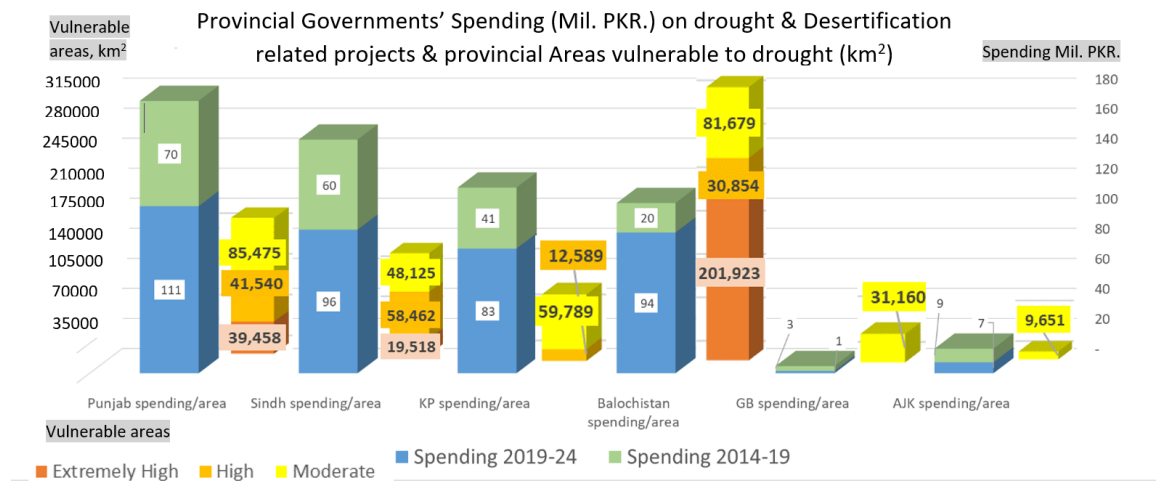


Figure 8.2: Provincial government spending (2014-2024) on drought and desertification related projects and provincial area vulnerable to drought

8.2. Proposed projects for drought mitigation and preparedness

The proposed projects and actions for drought mitigation and adaptation costing PKR. 361.2 billion are described at Section 10. The existing projects already being funded under federal PSDP are presented at Annexure XI. For effective drought management, the main components/pillars are as follows:

- Pillar 1. Assessment, Planning and Resource Mobilization
- Pillar 2. Policies, Regulations and Governance
- Pillar 3. Strengthening the Drought Monitoring, Early Warning System and Preparedness
- Pillar 4. Drought Response and Mitigation Actions at Local Level
- Pillar 5. Capacity Building and Awareness Raising

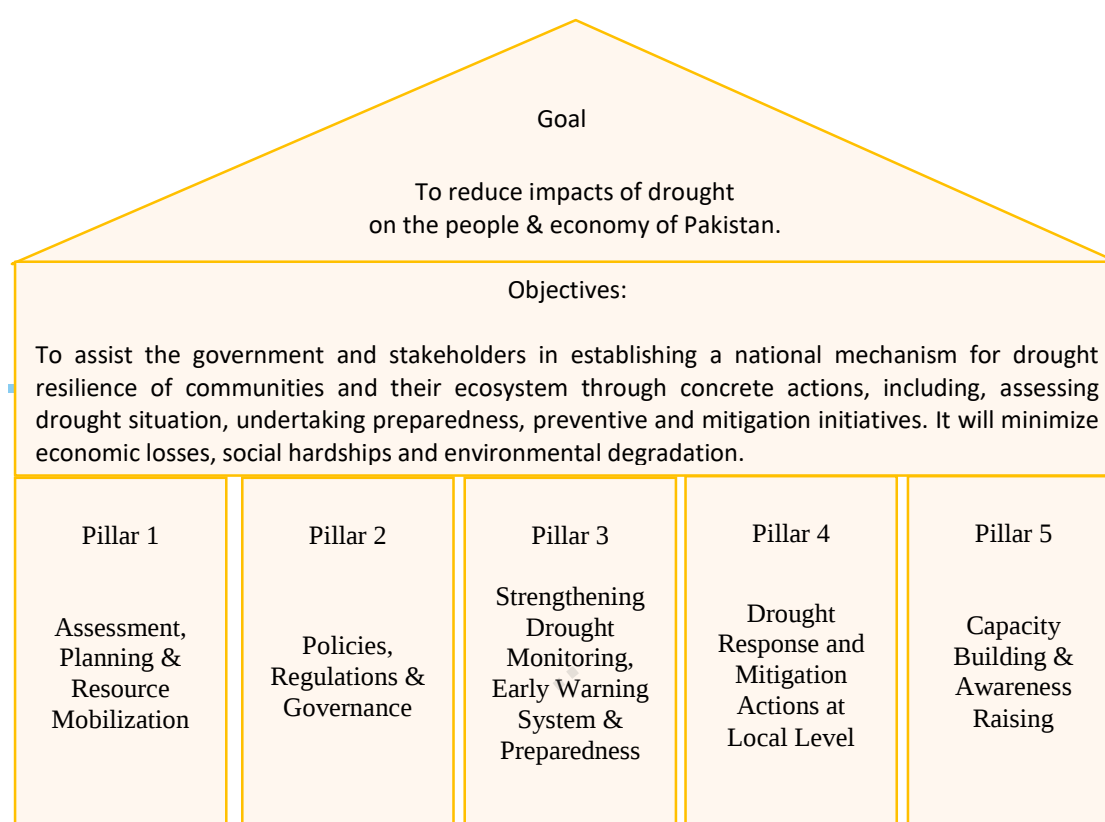


Figure 8.3. Goal, objective and pillars/components of National Drought Plan 2025-35.

ANALYSIS OF GAPS IN DROUGHT MANAGEMENT

Drought management in Pakistan faces several challenges across planning, preparedness, implementation, and monitoring. Identifying these gaps is crucial to improving the overall efficacy of drought management strategies. Here are some of the key gaps:

9.1. Absence of Drought Management in Planning and Budgetary Processes

The key gaps are:

- Absence of comprehensive Drought Management Plans at national, provincial, district and local levels.
- The effective planning is hampered by shortage of reliable and updated scientific data on climatic conditions at local level.
- The challenges to drought mitigation are exacerbated by lack of financial resources for adoption of modern technologies for drought mitigation.

9.2. Weak Policy and Institutional Coordination Mechanisms

The key gaps are:

- Presently, there are no well-defined, comprehensive drought management and land use policies and strategies at the federal and provincial levels.
- Drought is inadequately covered under National Disaster Risk Reduction Policy 2013.
- Institutional arrangements and capacities are inadequate at the federal and provincial levels to effectively manage droughts.
- Multiple federal and provincial organizations are responsible for planning, monitoring and mitigation of drought. The coordination between these organizations is weak. Provinces sometimes emphasize their autonomy, resisting federal involvement even when centralized actions are needed. Poor coordination and communication among stakeholders at different levels leads to inefficient and fragmented efforts.

9.3. Weak Regulatory Frameworks

The key gaps are:

- Regulatory frameworks for drought risk reduction are weak. The current regulatory frameworks and subsidies support excessive extraction of ground and surface water resources which may contribute to incidence and severity of drought like situations.
- National Disaster Management Act 2010 does not adequately cover drought risk reduction measures to be implemented on sustainable basis.

9.4. Limited Capacity in Drought Monitoring, Preparedness and Early Warning

The key gaps are:

- PMD has established National Drought Monitoring & Early Warning Centre, but still the

country's capacity in risk monitoring and early warning for drought preparedness is limited.

- Meteorological and hydrological monitoring infrastructure equipped with advanced technology is insufficient for timely and accurate drought forecasting.
- The scope of drought monitoring is limited. The remote drought prone areas are not covered under drought monitoring.
- Drought vulnerability index and hazard map is not updated annually with the required parameters.

9.5. Limited Water Storage and Water Management in Drought Prone Areas

The key gaps are:

- Water storage and water harvesting practices are very limited.
- Scientific mapping of the availability, distribution and quality of groundwater resources in drought-prone areas is inadequate to plan and execute drought mitigation actions.
- Use of modern technologies like Geographic Information Systems (GIS), remote sensing, and geophysical surveys is inadequate to generate information for effective water management and planning for drought mitigation and ensuring sustainable water supplies for humans, animals, agriculture and forestry.
- There is increasing sediments flow in water reservoirs, resulting from soil erosion due to poor land management practices in watershed areas.
- Lack of grazing management and overgrazing of rangelands is leading to increased soil erosion, decrease in water infiltration and increased runoff.

9.6. Limited Awareness and Capacity of Stakeholders

- There is low awareness among local communities and farmers on drought risks and the measures to mitigate them.
- Need for proactive drought management strategies is not fully realised in planning processes.
- The capacity of institutions to monitor and forecast drought and information sharing is limited.
- The access to modern technology, data, and financial support is limited by lack of financial resources.

9.7. Socioeconomic Vulnerabilities

- There is disparity in the capacity of various community groups to cope with and recover from drought effects. Most people in drought prone areas are poor so their vulnerability to the droughts is high. Women and other marginalised groups bear the most brunt from drought impacts.

PRIORITY RECOMMENDATIONS AND IMPLEMENTATION ACTIONS

The priority actions and recommendations for drought risk reduction, readiness, response and recovery of the drought affected areas and communities are as follows:

1.1 Mainstreaming of Drought in Planning and Budgetary Processes

Drought Management Plans are needed at national, provincial and district levels and mainstreamed in the planning and budgetary mechanisms. These may be mainstreamed in the overall development and budgetary mechanisms.

For accessing drought financing, Concept Notes/ PC-1s/ Project documents are to be prepared and submitted to potential donors besides, public and private sector funding. Different bilateral and multilateral donors offer support for projects on climate change and associated disasters including drought. The potential funding options include, GEF, GCF and Adaptation Fund. The GEF has country allocation for land degradation as one of the priority areas.

Furthermore, drought related indicators are required to be incorporated in the planning documents including PC-1s. Such indicators may include historical data on frequency and intensity of drought in the planned area, population and socioeconomic condition of target population and availability of early warning system. Such indicators need to be identified in consultation with relevant stakeholders at the national and provincial levels and incorporated in the planning documents.

Basic drought related data is required for developing project proposals. There is a need to collect and analyze drought related data and integrate it with science and policy aspects of drought management. For this purpose, a multi-disciplinary GIS based Management Information System to serve as a Decision Support System (DSS) is recommended to be developed and maintained.

1.2 Formulation of National Land use and Drought Management Policies

There is a need to develop and adopt the National Land use policy to manage land resource for different uses based on land capability classification to designate specific areas for forests, agriculture, urban development, conservation, and other uses. Such land use planning is required for preventing conversion of prime forest and agriculture land to other uses through effective regulatory measures.

There is a need to review existing national and provincial policies and undertake gap analysis to incorporate drought mitigation parameters in these policy documents or develop a separate National Drought Management Policy for setting out drought management priorities considering a bottom-up approach to mitigate the impacts of drought, research needs, involvement of private sector and institutional mechanisms for drought mitigation at federal, provincial and local levels and financial instruments for implementation of drought management interventions.

1.3 Improving Institutional and Coordination Mechanisms

There's is need to established institutional coordination mechanism for effective drought managements to facilitate stakeholder coordination for better planning, drought mitigation and response measures. Currently, the drought management falls within the broad scope of disaster management authorities; therefore, there is a need to establish coordination mechanism at the national level with separate Directorate/Cell headed by a Director General for Desertification/Drought mitigation within the Office of Inspector General of Forests, MoCC&EC, with following indicative functions:

- i) Facilitate national coordination, stakeholder engagement and national reporting
- ii) conduct studies on drought, e.g., historical occurrence and impact assessment of drought, using floodwater to recharge water sources and updating drought vulnerability index & hazard map of Pakistan in consultation with PMD, PARC, NDMAs, NDRMF and provincial Planning and Development Departments based on analysis of meteorological, hydrological, socioeconomic, ecological and remote sensing data and historical drought events.
- iii) Coordinate designing of concept notes and project proposals for drought mitigation, submit these to relevant donor agencies,
- iv) coordinate implementation of projects on drought and
- v) explore possibilities of establishment of Drought Management Fund.

1.4 Improve Groundwater Regulation and Management in Drought Prone Areas

There is a need to review existing national and provincial legislative frameworks to undertake gap analysis, incorporate drought mitigation parameters and improve regulations and guidelines for water harvesting and use. Improving regulations for groundwater usage and management in drought-prone areas is essential for ensuring sustainable supply of water resources for human and livestock and agricultural uses. Advanced technologies may be installed for real-time monitoring of groundwater resources and regulating efficient use of water resources by agricultural, industrial, municipal and domestic sectors.

It may be essential to define and establish clear and enforceable water rights and pricing mechanisms that prioritize essential uses such as, drinking water over other uses, regulate extraction of groundwater and incentivize adoption of water-saving and recharge technologies and practices. These include efficient irrigation systems, low-flow fixtures for household uses, managing storm water for replenishing of aquifers through restoration of wetlands and riparian buffers, and reutilizing treated wastewater. Preparing guidelines for drought emergencies, including mandatory cutbacks and emergency water supply provisions.

1.5 Strengthen Drought Forecast and Early Warning Systems

A reliable early warning systems is needed for effective drought monitoring and forecasting to minimise drought risks. The existing PMD has observational stations in

Pakistan¹³ including Sindh and Balochistan's drought prone areas like Mithi (Tharparker), Chhor (Umerkot), Dalbandin, Turbat, Punjgur may be strengthened and more observational stations may be established on need assessment for short and long-term monitoring of meteorological, agricultural, socio-economic, hydrological and ecological droughts. Such mechanism may be essential to issue timely early warning alerts and forecasts, especially for rainfall, temperature, agricultural & hydrological droughts based on advanced meteorological and GIS based technologies to reach to end users for drought preparedness and response measures during the onset of droughts.

Furthermore, modelling for drought predictions need to be supported. Research may also aim at developing appropriate mathematical models.

Establishment and strengthening of community-based drought early warning information dissemination systems would ensure a robust communication system in drought prone areas at local level. Different channels and tools of communication including announcements on loud speakers, publicity through beat of drums, social media, electronic media (FM and short-wave radio, television) and print media: brochures, pamphlets, leaf-lets, booklets, banners (roll-up), posters may be employed for effective communication at various levels.

1.6 Drought Emergency Response Preparedness

- The actions to enhance emergency response capacities may include construction/strengthening of warehouses for food, medicines, and operation centres in drought prone areas at the provincial level to execute plans for drought emergency response in drought affected areas at local level.
- Because of changing climatic conditions, there is a need to re-investigate agro-climatic zones, crop and livestock vaccination calendars in line with climate change projections.
- There is also a need of research on water resources management, benchmarking of existing on-farm soil and water conservation practices and drought tolerant livestock breeds.
- In drought prone areas, non-water related economic activities need to be promoted and available ground and surface water resources may be used efficiently for domestic purposes, livestock and social forestry.

1.7 Water Resource Development and Management in Drought Prone Areas

There is a need to harvest surface water and recharge the groundwater to use it for domestic, forest plantation and agricultural purposes and construct surface water storage structures. Water resources can be developed in the form of, ponds and mini dams, the indigenous small reservoirs for rainwater harvesting (called as Tankas in local language in Sindh), constructing lined underground water reservoirs in drought prone areas to save water as water evaporation is high, excavation of open surface dug wells and excavation, lining and cleaning of karezes (the local form of traditional underground water channel

¹³ <https://www.pmd.gov.pk/Observatories/>

systems in drought prone areas, mostly in Balochistan). The organizations like PARC and provincial agriculture and forest departments have extensive experience in command area development of ponds and mini dams and efficient use of harvested water.

- There is a need for piloting of efficient (Responsive Drip, Nano Porous Pipe, Tal-Ya) irrigation and moisture absorbent technologies (Hydertain, Groasis, Cocoon) for kitchen gardening, small scale low delta crop production and raised bed cultivation in drought prone areas.

1.8 Watershed Management

- There is a need to construct check dams to reduce soil erosion in watershed areas. Demonstration of cost-effective Hill Torrents Flood Management is required mostly in DG Khan, DI Khan & Kirthar Mountain range to conserve water and control erosion to improve health of catchments. The watershed management program shall ensure community participation and adoption of climate change resilient interventions for sustainable watershed, livelihood and food security.

1.9 Management of Forests, Cropland and Rangelands

- Forest/Tree plantation: Indigenous species may be planted to restore forest and rangeland ecosystems. The vegetation/tree cover needs to be protected by promoting alternate and efficient energy options for the local communities and enforcing laws and regulations that protect forests from illegal logging, encroachment and fire. To provide planting stock, there is a need to establish nurseries of indigenous low delta forest trees' species.
- Creating financial value of standing forests through REDD+: Reducing Emissions from Deforestation and Forest Degradation (REDD+) provide result based payments to create financial value of carbon stored in standing forests. Parties to UNFCCC adopted REDD+ at Conference of Parties (CoP 16) held in 2010. Participation of countries in REDD+ is voluntary. REDD+ is also recognized in Article 5 of the Paris Agreement.

REDD+ implementation involves three phases– Readiness Phase; Demonstration Phase and Full Implementation Phase to access results-based payments against fully measured, reported and verified actions. To access financial compensation for verified climate results countries must have National Strategy and/or Action Plan, National Forest Reference Emission Level and/or Forest Reference Level (FREL/FRL) or, if appropriate, as an interim measure, subnational FREL/FRL, Robust and transparent National Forest Monitoring System and REDD+ Safeguards Information System.

MoCCEC is embarked upon implementation of REDD+ activities in Pakistan in collaboration with provincial governments, chiefly the forestry departments to mitigate climate change through reducing carbon emissions from forestry sector. National Steering Committee of REDD+ is chaired by Secretary, MoCCEC. Provinces have REDD+ Focal Pints and Provincial REDD+ Management Committees. Pakistan has fulfilled the requirements of REDD+ and has initiated REDD+ projects. Additional REDD+ projects will be initiated.

- Crop management to save water: Agriculture departments shall promote demonstration of low delta crops like bajra variety Super 1, fruit trees and water saving cropping practices

in drought prone areas. The department may also engage the progressive farmers to multiply and provide seeds of drought resistant local varieties to other farmers.

- Rangeland and livestock management: Livestock grazing on rangelands is the main source of income for local communities in most of the drought prone areas. Overgrazing of rangelands decreases their productivity. Therefore, integrated rangeland management practices are required to promote community managed controlled grazing practices, increase vegetation-cover in rangelands, promote rangeland reseeding, develop micro-catchments for water harvesting in rangelands, establish mechanical sand barrier like semi-buried straw check-boards for sand dune stabilization, establish seed banks of local and improved grasses and shrubs at divisional/ district levels, develop watering points in range and pasture lands, and establish nurseries of mazri crop in dry areas.

The main activities for integrated livestock management include, promoting preventive measures for animal diseases, improving veterinary health services by training community activists; improving livestock breeds; hay and silage making for improving fodder availability and quality. Promoting off-farm employment opportunities as alternate income source to protect natural resources will reduce pressure on natural resources that will be helpful in their conservation.

- Locust control: During 2020, locust affected about 38 percent of Pakistan's land area destroying crops and rangelands. Remote sensing drones and community reporting can assist in early detection of locust attack. Different techniques like light traps, plowing fields to destroy locust eggs in the soil, planting trap crops to protect main crops, using predators, parasitoids, pathogens and organic pesticides can be tested in an integrated manner to control locust growth by environment friendly means.

1.10 Capacity Building and Awareness Raising

There is a need to create awareness and capacities in best management practices to mitigate drought effects through development of an outreach strategy targeting different target groups, taking into account the gender needs and concerns. Community awareness for addressing climate hazard at local level is essential for effective drought response measures. Awareness raising events shall focus on water-saving, drought-resistant agricultural practices and drought mitigation.

Training of professional (line departments, NGOs), service providers and farmers shall be conducted on efficient irrigation, water harvesting, moisture conservation, drought resilient agriculture and rangeland management. There is a need for incorporation of drought and water conservation education into school curricula. Print, electronic, social media and websites may also be engaged in information dissemination on droughts.

ACTION PLAN FOR DROUGHT MANAGEMENT

The action plan includes short term (up to 5 yrs.), medium (5-10 yrs.) & long-term (>10 yrs.) actions for drought management, as follows. The progress of implementation of the plan may be reviewed after 5 years. Component/pillar wise action plan at federal level is as follows:

#	Action	Lead Agency	Support Agency	Timeline	Tentative budget (Mil. PKR)	Remarks
Pillar 1. Drought Assessment, Planning and Resource Mobilization						
1.	Develop and disseminate drought preparedness/ management plans at the national, regional and local levels.	MoCC&EC	NDMA, Provincial P&DDs, PDMAs	Short term	300	
2.	Develop concept notes/ PC-1s/ Project documents on drought	PARC, Provincial P&D, Forest, Agriculture and Irrigation Departments	MoCC&EC	Short to medium term	1,000	
3.	Develop and incorporate disaster related indicators in the planning documents (PC-1s)	M/o Planning	Provincial P&DDs	Short term	200	
4.	Map groundwater resources of drought prone areas	Provincial Irrigation Deptts.	M/o Planning, Dev., PCRWR	Short term	800	
5.	Update drought vulnerability index & hazard map of Pakistan	NDMA, PDMAs	PMD, GCISC, NDRMF	Short term	260	
6.	Develop MIS/ Decision Support System for drought	MoCC&EC & PMD	PARC, Provincial P&DDs	Medium term	200	PD: Multilateral Banks
Pillar 2: Policies, Regulations and Governance						
7.	Develop national land use policy of drought prone areas	PARC	NDMA, Provincial Agricultural departments	Short term	100	
8.	Develop National Drought Management Policy and guidelines and mainstream drought mitigation in existing policy documents	MoCC&EC	NDMA, PDMA, Provincial P&D Departments	Short term	150	
9.	Establish Director General office for desertification/ drought mitigation	MoCC&EC	-	Short to Medium Term	200	- Budget PKR20 million per year
10.	Improve regulations for groundwater usage and	M/o Water	PARC, Provincial Irrigation and	Short term	150	

	management in drought prone areas		agriculture departments PCRWR.			
Pillar 3: Strengthening the Drought Monitoring, Early Warning System and Preparedness						
11	Strengthen National Drought Monitoring & Early Warning Centre and systems to forecast the early warning for drought	PMD/ NDM&ERC	NDMA/ NIDM	Medium term	5,000	PD: NDRMF/ GoP/ADB/ JICA/ World Bank/ GEF/ GCF
12	Strengthen community based early warning dissemination systems for drought	PMD	Provincial Planning & Development Deptts. NGOs	Medium term	2,000	
13	Re-investigate agro-climatic zones and crop calendars in line with climate change projections	PARC, PMD	Prov. Agricultural Research Centers, Provincial Crop Reporting Services	Short term	100	
14	Re-investigate livestock vaccination calendars in line with climate change projections	Provincial Livestock Depts.	NGOs, IGOs	Short term	100	
15	Undertake research on water resources management, benchmarking of existing on farm soil and water conservation practices	PARC	Provincial Irrigation and OFWM departments PCRWR. Indus River System Authority (IRSA)	Medium term	240	
16	Undertake research on drought tolerant livestock breeds	Provincial Livestock Research Institutes	PARC	Long-term	2,000	
Pillar 4: Drought Response and Mitigation Actions at Local Level						
17	Piloting of efficient irrigation and moisture absorbent technologies for arid agriculture.	PARC Prov. Irrigation and Agriculture Departments	OFWM, Prov. Research Centres, NGOs, IGOs	Long term	5,000	
18	Command area development of small reservoirs and dug-wells for arid horticulture	PARC	OFWM, Extension Departments, Prov. Research Centres	Long term	5,000	
19	Watershed management program to improve health of catchments by controlling erosion	Communities, NGOs, Forest Department	NGOs, IGOs	Long term	6,000	
20	Construct 100 check dams to reduce soil erosion	Provincial Forest and Agriculture Departments	NGOs, IGOs	Medium-term	6,000	

21	Demonstrate Hill Torrents Flood Management to mitigate adverse impacts of droughts in DG Khan, DI Khan & Kirthar Mountain range	Prov. Irrigation Departments, NGOs, IGOs	PARC, Prov. Research Centres, Prov. Forest and Agriculture Departments	Long term	4,000	
22	Lined cementation of water courses for irrigation in drought prone areas	Provincial Irrigation and Agriculture departments	NGOs, IGOs	Long-term	10,000	
23	Conduct feasibilities and construct 400 lined surface and underground ponds and mini-dams in drought prone areas	Provincial Irrigation and Forest Departments	NGOs, MOCC&EC	Long-term	48,000	
24	Excavation, lining & cleaning of karezes	Balochistan Irrigation Departments	NGOs, IGOs	Long-term	600	
25	Development of indigenous small water reservoirs for rainwater harvesting (Tankas in Sindh)	Sindh Irrigation and Forest Departments	TRDP, Baanh Beli, SCOPE NGOs	Short-term	1,200	
26	Excavation of open surface wells in drought prone areas	Provincial Irrigation Departments	NGOs, IGOs	Short-term	1,000	
27	Demonstrate low delta crops and water saving cropping practices to the local community in drought prone areas.	Provincial Agriculture Deptts.	PARC	Medium-term	10,000	
28	Promote community managed integrated rangeland management	Provincial Forest and Wildlife Deptts.	PARC	Medium-term	50,000	
29	Establish seed banks of local and improved grasses and shrubs at divisional/ district levels		NGOs, IGOs	Long-term	1,000	
30	Develop animals watering points in range and pasture lands	Provincial Forest Departments	NGOs, IGOs	Short-term	2,000	
31	Establish nurseries of mazri and bamboo crops in dry areas	Provincial Forest Departments	NGOs, IGOs	Medium-term	300	
32	Indigenous forest tree plantations	Provincial Forest and Wildlife Deptts.,	MOCC&EC, NGOs/IGOs	short-term	102,460	PD: GoP, KfW

33	Strengthen land use management and control deforestation	Provincial Forest and Wildlife Deptts, CDA	Prov. Forest Deptts., NGOs/IGOs	Long-term	10,000	
34	Develop nurseries of indigenous low delta forest trees' species	Provincial Forest Departments	NGOs/IGOs, MoCC&EC	short-term	7,300	
35	Protect forests by promoting LPG, natural gas, micro-hydel, solar energy and fuel-efficient stoves	Provincial Forest and Power Deptt.	Private LPG companies, NGOs	Long-term	500	
36	Promote preventive measures for animal diseases, Veterinary health services and improved livestock breeds by training community activists.	Provincial Livestock Deptts.	NGOs/IGOs	Medium-term	2,000	
37	Improve fodder like hay and silage making	Livestock Deptt.	NGOs/IGOs	Medium-Term	200	
38	Promote off-farm employment opportunities/ enterprises as alternate income source to protect natural resources for women	Provincial Agricultural. & Forest Departments	NGOs/IGOs	Long-term	2,000	
39	Control locust growth by environment friendly means using integrated pest management	Provincial Agriculture and Plant Protection Departments	National Locust Control Centre, PMD, PARC	Long-term	16,000	
40	Achieving targets of Land Degradation Neutrality in Pakistan	Provincial Forest and Agriculture Departments	MoCC&EC	Long-term	1,300	
41	Take drought preparedness and response actions	PDMA's	NDMA	Long-term	15,000	
Pillar 5: Capacity Building and Awareness Raising						
42	Training of professional (line departments, NGOs) service providers and farmers on efficient irrigation, water harvesting, moisture conservation, drought resilient agriculture, rangeland, solar desalinization etc.	PARC/ National Institute of Disaster management	OFWM, Extension Departments, Prov. Research Centers, NGOs, Development sectors	Short-term	3000	
43	Awareness meetings, workshops and field	Provincial Agriculture	PARC, NGOs	Short-term	5,000	PD: NDRMF/

	demonstrations for farmers on water-saving, drought-resistant agricultural practices and drought mitigation	Departments, Forest Departments, PMD				GoP/ ADB/ JICA/ World Bank/ GEF/ GCF
44	Local and foreign training workshops and exchange visits for staff of government and NGOs on drought mitigation	MOCC&EC	Provincial Forest, Agriculture, Irrigation, Wildlife, P&DDs, NGOs	Long-term	15,000	
45	Use media (print, digital, electronic) and telecommunication companies for awareness on drought and develop website on drought in Pakistan	Directorate of Drought, MoCC&EC, PMD	-	Medium-term	12,000	
46	Incorporate drought and water conservation education into school curricula, organize workshops/ campaigns for students about importance of water resources and sustainable practices	Education Department, Higher Education Commission	PMD, PCRWR, NGOs and MoCC&EC	Medium-term	1,000	
47	Research on water harvesting techniques for drought prone areas	PCRWR	-	2026- 32	700	
48	Research on: low delta crops, fruit trees & agronomic techniques ¹⁴ , less water requiring forest trees and participatory rangeland development & sand dunes stabilization (Grass grid sand barrier) in drought prone areas	AZRI Umer kot & Bhawalpur, BARC ¹⁵ Quetta, Sindh and Balochistan Forest depts, Forest Research Institute Faisalabad	PARC	2024-30	1,000	
49	Research on diseases of animals & preventive measures, fodder improvement and feed supplements for animals in drought prone areas	AZRI Umer kot & Bhawalpur, BARC Quetta	PARC	2026- 30	500	
50	Research on honeybee keeping for dry areas		PARC	2029- 35	200	

¹⁴ Crops including moong, bajra and fruits including Falsa, Olives, Grapes, Dates Pistachio and Pomegranates and agronomic techniques like zero tillage, mulching

¹⁵ Balochistan Agri. Research Center

51	Feasibility of drip irrigation for crops and grafted ber, pitcher plantation on farmers field in drought prone areas	AZRI Umer kot & Bhawalpur, BARC Quetta	PARC	2028- 32	400	
52	Improve integrated land use for rangelands/ pastures in drought prone areas	AZRI Umer kot & Bhawalpur, BARC Quetta	PARC	2028- 34	300	
53	Research on medicinal plants in dry areas requiring low inputs		PARC	2027- 33	300	
54	Research initiatives on the possibilities of drought mitigation using snow and ice reserves and routing schemes	PMD	PCRWR, GCISC, WAPDA, PARC	2025- 29	60	
55	Research on impacts of drought over seasonal crops and water resources; climate extremes like torrential rain, heat and cold wave on disease over drought vulnerable regions & chronic/seasonal diseases ¹⁶ in drought-prone areas, their association and future projection	PMD	PCRWR, GCISC, WAPDA, PARC, Prov. Agricultural Deptts, Prov. Health Deptts	2025- 29	180	
56	Establish/ strengthen research facilities like nurseries, tissue culture and biotechnology to develop high-quality drought-resistant grasses, crop and trees	NARC	PARC	2024-28	1,000	
57	Research on Locust attack and control measures	Department of Plant Protection MoNFS&R	Provincial Agriculture Depts of Punjab, Sindh & Balochistan	2025-29	500	
58	Research on flash, seasonal and conventional (annual) drought onset, propagation and impact	AZRI Umer kot & Bhawalpur, BARC Quetta	-	2025-29	400	
Total					361,200	

¹⁶ like cholera, malaria, diarrhoea, heat stroke and pneumonia

REFERENCES

1. Adnan, S., Ullah, K., Shuanglin, L., Gao, S., Khan, A. H. and Mahmood. R. 2017. Comparison of various drought indices to monitor drought status in Pakistan. *Clim Dyn* 51, 1885–1899. <https://doi.org/10.1007/s00382-017-3987-0>
2. Adnan, S., Ullah, K., Gao, S., Khosa, A. H. and Wang, Z., 2017. Shifting of agro-climatic zones, their drought vulnerability, and precipitation and temperature trends in Pakistan. *RMets*. Volume 37, Issue S1, August 2017, 529-543. <https://rmets.onlinelibrary.wiley.com/doi/abs/10.1002/joc.5019>
3. Adnan, S., Ullah, K. and Gao, S. 2016. Investigations into Precipitation and Drought Climatologies in South Central Asia with Special Focus on Pakistan over the Period 1951–2010. *AMS. Journal of Climate*. Volume 29. Issue 16. 6019–6035. <https://journals.ametsoc.org/view/journals/clim/29/16/jcli-d-15-0735.1.xml>
4. Adnan, S., Ullah, K. and Gao, S. 2015. Characterization of drought and its assessment over Sindh, Pakistan during 1951–2010. *Journal of Meteorological Research*. 29, 837–857. <https://link.springer.com/article/10.1007%2Fs13351-015-4113-z>
5. Ahmed, K., Shahid, S., Sobri, H., and Wang. X., 2015. Characterization of Seasonal Droughts in Balochistan. Heidelberg (Germany), Springer-Verlag Berlin Heiderberg 2015. <https://link.springer.com/article/10.1007/s00477-015-1117-2>
6. Ahmed, K., Shahid, S., Sobri, H., Wang, X., Nawaz N. and Khan. N., 2019. Spatiotemporal changes in aridity of Pakistan during 1901–2016. *Hydrology and Earth System Sciences*. European Geosciences Union. <https://doi.org/10.5194/hess-23-3081-2019>
7. Ahmed, S., Aslam M. and Mirza. S. N. 2012. Rangeland Degradation and Management Approaches in Balochistan, Pakistan. *Pakistan J. Bot.*, 44: 127 - 136, May 2012 Special Issue.
8. Aijaz, N. 2012. Pakistan: Outbreak of mysterious disease causes death of peacocks in Thar Desert of Sindh. *The Asian News Network*. 26 July 2023. <http://www.theasian.asia/archives/25547>
9. Ain, N. U., Latif, M., Ullah, K., Adnan, S., Ahmed, R., Umar M. and Azam. M. 2019. Investigation of seasonal droughts and related large-scale atmospheric dynamics over the Potwar Plateau of Pakistan. *Springer Nature Link*. Volume 140, pages 69–89, (2020). <https://link.springer.com/article/10.1007/s00704-019-03064-8>
10. Anjum, S.A., Saleem, M.F., Cheema, M.A., Bilal, M.F., and Khaliq, T. 2012. An assessment to vulnerability, extent, characteristics, and severity of drought hazard in Pakistan. *Pakistan Journal of Science*, 64(2). <https://nja.pastic.gov.pk/PJS/index.php/PJS/article/view/261/261>
11. Asian Development Bank. 2017. Climate change profile of Pakistan, prepared by Q. Z. Chaudhry. <https://www.adb.org/sites/default/files/publication/357876/climate-change-profile-pakistan.pdf>
12. Ayesha, S. 2020. Types of Soil in Pakistan – Soil Classification & Characteristics. *Business Finance Articles*. https://businessfinancearticles.org/types-soil-pakistan#1_Northern_Mountains_Regions

13. Imran. Z. 2023. Bulletin of the atomic scientists. February 10, 2023.
<https://thebulletin.org/2023/02/the-press-and-pulse-of-climate-change-strains-farmers-in-pakistan/>
14. Balochistan University of Information Technology, Engineering & Management Sciences (BUIEMS) and United Nations Development Programme (UNDP). 2015. Drought Risk Assessment in Balochistan province, Pakistan.
<https://www.undp.org/sites/g/files/zskgke326/files/migration/pk/Drought-Risk-Asst-Balochistan-Nov-2015-lowres.pdf>
15. Canada Waterportal. 2023. Environmental Impacts of Drought. Sept. 11, 2023.
<https://albertawater.com/impacts-of-drought/environmental-impacts-of-drought/>
16. Carrao, H. and Barbosa. P. 2015. Models of Drought Hazard, Exposure, Vulnerability and Risk for Latin America. Technical Report. European Commission– Joint Research Centre (EC-JRC) Institute for Environment and Sustainability (IES). October 27, 2015. EUROCLIMA II, Desertification, Land Degradation and Drought (DLDD), and bio-physical modeling for crop yield estimation in Latin America under a changing climate. Deliverable No. 7.
https://www.droughtmanagement.info/literature/EC-JRC-IES_Drought-Hazard-Exposure-Vulnerability-and-Risk-Latin%20America_2015.pdf
17. Chaudhry, Q.Z., Sheikh, M.M., Bari, A. and Azrr. 2002. History's worst drought conditions prevailing over Pakistan, Pakistan Meteorological Department, Islamabad, Pakistan,
<http://www.pmd.gov.pk/journal/historyworstdrought2001report.htm>
18. Climate of Pakistan, https://en.wikipedia.org/wiki/Climate_of_Pakistan
19. Climate Technology Center and Network. Drought risk mapping. <https://www.ctc-n.org/technologies/drought-risk-mapping>
20. Communication with Disaster Affected Communities Network. 2014. Practice Brief: Communicating with Communities during the First Six Weeks of an Emergency Response. October 2014. <http://www.cdacnetwork.org/contentAsset/raw-data/3b8afbbf-d9de-4a0e-be3f-71bd36ef030f/attachedFile>
21. Dawn. 2012. Dozens of wild peacocks die in Thar desert. July 30, 2012.
<https://www.dawn.com/news/738390/dozens-of-wild-peacocks-die-in-thar-desert>
22. Dawn. 2016. Report on land loss caused by sea intrusion adopted. April 29, 2016.
<https://www.dawn.com/news/1255161>
23. Durrani, Z. K., 2018. Lessons for Pakistan from Droughts in the Past. Centre for Strategic and Contemporary Research, July 20, 2018. <https://cscr.pk/explore/themes/energy-environment/lessons-pakistan-droughts-past/#:~:text=Droughts%20in%20Pakistan%20have%20occurred,making%20them%20vulnerable%20to%20drought>
24. Food and Agriculture Organization. Pakistan. Pakistan at a Glance.
<https://www.fao.org/pakistan/our-office/pakistan-at-a-glance/es/>
25. Food and Agriculture Organization. Chapter 2. Agro-Ecological Zones and Crop Production Regions. <http://www.fao.org/3/y5460e/y5460e06.htm>
26. Food and Agriculture Organization. 2000. FAO/WFP Crop and Food Supply Assessment Mission to the Baluchistan Province of Pakistan, Special report. FAO Global Information and Early Warning System on Food and Agriculture, World Food Programme. 19 June 2000.
<https://reliefweb.int/sites/reliefweb.int/files/resources/Crop%20and%20food%20supply%2>

- [Oassessment%20Baluchistan.pdf](#)
27. Gadiwala, M.S., and Burke, F. 2019. Climate Change and Precipitation in Pakistan – a Meteorological Prospect; Environmental Science,
<https://www.semanticscholar.org/paper/Climate-Change-and-Precipitation-in-Pakistan-A-Gadiwala-Burke/655bf1b4687b07f4c899b0ef4fbf604a6abb706a>
 28. Global Security. 2000-2020. Balochistan Geography.
<https://www.globalsecurity.org/military/world/pakistan/baloch-geography.htm>
 29. Godber, O. F. and Wall, R., 2016. Mediterranean goat production systems: vulnerability to population growth and climate change. Mediterranean Journal of Biosciences 2016, 1(4), 160-168. University of Bristol, United Kingdom.
 30. Government of Ghana. Ghana national drought plan.
https://knowledge.unccd.int/sites/default/files/country_profile_documents/1%2520FINAL_NDP_Ghana.pdf
 31. Government of Pakistan. 2009. Land Use Atlas of Pakistan. National Land Use Management Project. Ministry of Environment, Islamabad.
https://wedocs.unep.org/bitstream/handle/20.500.11822/9393/-Land_Use_Atlas_of_Pakistan-2009Pakistan_LandUseAtlas_2009.pdf.pdf?sequence=3&isAllowed=y
 32. Government of Pakistan. 2010. Land Use Atlas of Pakistan. Ministry of Environemt. Land Use Plan Project. https://wedocs.unep.org/bitstream/handle/20.500.11822/9393/-Land_Use_Atlas_of_Pakistan-2009Pakistan_LandUseAtlas_2009.pdf.pdf?sequence=3&isAllowed=y#:~:text=The%20major%20land%20use%20in,grazing%20lands%20in%20wet%20seasons
 33. Government of Pakistan. 2010. The National Disaster Management Act, 2010
<https://pakistancode.gov.pk/pdf/files/administratorff82dc9de8f78899b91a3be45e90b1cb.pdf#viewer.action=download>
 34. Government of Pakistan. National Forest Monitoring System, Ministry of Climate Change.
<https://www.nfmispak.org/statistical-data>
 35. Government of Pakistan. 2021. Pakistan Updated Nationally Determined Contributions, Ministry of Climate Change,
<https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Pakistan%20First/Pak-INDC.pdf>
 36. Government of Pakistan. 2021. Rules of Business 1973 (As amended up to 1st December, 2021).
[https://cabinet.gov.pk/SiteImage/Misc/files/ROB%2C%201973/ROB%20\(As%20amended%20up%20to%201st%20December%2C%202021\).pdf](https://cabinet.gov.pk/SiteImage/Misc/files/ROB%2C%201973/ROB%20(As%20amended%20up%20to%201st%20December%2C%202021).pdf)
 37. Government of Pakistan. 2022. UNCCD Country Report from Pakistan. Ministry of Climate Change, Prais 4. 15 February 2023.
 38. Government of Philippines. 2019. National Drought Plan for the Philippines,
https://knowledge.unccd.int/sites/default/files/country_profile_documents/1%2520FINAL_NDP_Philippines.pdf
 39. Government of Sindh, UNICEF, Save the Children. 1987. Comprehensive Assessment of Drought and Famine in Sind Arid Zones Leading to A Realistic Short- and Long-Term Emergency Intervention Plan. Arif Hassan, UNICEF Consultant. 30 Dec. 1987.

- http://arifhasan.org/wp-content/uploads/2012/08/AH-007_comp-assessment-droughtandfamine.pdf
40. Ghulam Rasul et al., 2011. "Glaciers and Glacial Lakes under Changing Climate in Pakistan", Pakistan Journal of Meteorology, Vol. 8, Issue 15. July 2011.
http://www.pmd.gov.pk/rnd/rnd_files/vol8_issue15/1_Glaciers%20and%20Glacial%20Lakes%20under%20Changing%20Climate%20in%20Pakistan.pdf
 41. Ikram, F., Afzaal, M., Bukhari, S.A.A. and Ahmed, B., 2017. Past and future trends in frequency of heavy rainfall events over Pakistan. Pakistan Journal of Meteorology, 12(24).
https://www.researchgate.net/publication/306378334_Past_and_future_trends_in_frequency_of_heavy_rainfall_events_over_Pakistan/link/5d36bcc7299bf1995b42a1bb/download
 42. IUCN, Pakistan. 2017. National Action Plan to Combat Desertification in Pakistan. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://sar-climate.adpc.net/wp-content/uploads/2022/06/PK-OTH-GD-116.pdf
 43. Khan. J.A. 2015. Soil survey in Pakistan, History, Achievement and Impact on Agriculture by Jarwar Attar Khan. <https://www.slideshare.net/slideshow/soil-survey-in-pakistan-history-achievement-and-impact-on-agriculture-by-jarwar-attar-khan/53195698>
 44. Khattak, M.S., Khan, A., Khan, M.A., Ahmad, W., Rehman, S., Sharif M. and Ahmad. S. 2019. Investigation of characteristics of hydrological droughts in Indus Basin. Sarhad Journal of Agriculture, 35(1): 48-56. <http://dx.doi.org/10.17582/journal.sja/2019/35.1.48.56>
 45. Mangroves for the Future Pakistan (MFF). 2016. A Handbook on Pakistan Coastal and Marine Resources
<http://www.mangrovesforthefuture.org/assets/Repository/Documents/A-Handbook-on-Pakistan-Coastal-and-Marine-Resources.pdf>
 46. Khan, A.D. 2016. Drought management and risk reduction in Pakistan) A Presentation by Mr Allah Dad Khan Former Director General Agriculture Extension KPK Province and Visiting Professor the University of Agriculture Peshawar Pakistan. December 29, 2016.
<https://www.slideshare.net/AllahDadKhan/drought-management-and-risk-reduction-in-pakistan-a-presentation-by-mr-allah-dad-khan-former-director-general-agriculture-extension-kpk-province-and-visiting-professor-the-university-of-agriculture-peshawar-pakistan>
 47. Mangrove for the Future (MFF). 2016. A Handbook on Pakistan's Coastal & Marine Resources. https://www.iucn.org/sites/dev/files/pk_coastal_resources_handbook.pdf
 48. Manzoor, A. 2015. Plains, plateaus and deserts in Pakistan. LinkedIn Corporation. April 12, 2015 <https://www.slideshare.net/aqsamanzoor/plains-plateaus-and-deserts-in-pakistan>
 49. Ministry of Agriculture and Fisheries (MAF), Timor-Leste. 2016. Rapid Drought Impact Assessment, El Niño 2015/2016. May 2016.
http://www.fao.org/fileadmin/templates/rap/files/meetings/2017/Final_MAF_El_Nino_Report.pdf
 50. Ministry of Planning, Development and Reforms. Overview of SDGs. Pakistan's commitment. <https://www.pc.gov.pk/web/sdg/sdgpak#:~:text=PAKISTAN'S%20COMMITMENT&text=Pakistan%20was%20the%20first%20country,a%20unanimous%20resolution%20of%20parliament.&text=The%20seven%20pillars%20of%20Vision,inclusive%20growth%20and%20sustainable%20development>
 51. MoCC. 2022. Development of Sub-National Forest Monitoring and MRV Systems, National REDD+ Office, Ministry of Climate Change, Pakistan.
 52. Nasir, S. M.; Afrasiyab M.; Athar M.: Application of Holdridge Life Zones (HLZ) in Pakistan; Pak. J. Bot., 47(SI): 359-366, 2015.

53. National Disaster Management Authority and United Nations. 2019. Pakistan Drought Response Plan (Jan.-Dec. 2019). Drought_rp_draft. vesion 2.3-20190305
54. National Drought Mitigation Center, University of Nebraska-Lincoln, (USA).
<https://drought.unl.edu/Education/DroughtIn-depth/TypesofDrought.aspx>
55. Pakistan Defence. 2015. Deserts of Pakistan. November 1, 2015.
<https://defence.pk/pdf/threads/deserts-of-pakistan.272202/page-5>
56. Pakistan Meteorological Department. 2015. Drought Bulletin of Pakistan. April-June 2015. Government of Pakistan. Pakistan Meteorological Department, National Drought Monitoring Centre. <https://www.pmd.gov.pk/ndmc/quater215.pdf>
57. Pakistan Meteorological Department. 2023. Drought Bulletin of Pakistan. July-September 2023. Government of Pakistan. Pakistan Meteorological Department, National Drought Monitoring Centre. <https://ndmc.pmd.gov.pk/new/assets/bulletins/1698319603.pdf>
58. Pakistan Meteorological Department. 2022. Technical Report on catastrophe due to heatwave instead of drought in the Cholistan, Punjab. 14 May 2022. Government of Pakistan. Pakistan Meteorological Department, National Drought Monitoring Centre.
<https://reliefweb.int/attachments/e579125d-de58-4fc5-bc3d-87b2e55b8706/1652945357.pdf>
59. Pakistan Meteorological Department; 2019; Drought Bulletin of Pakistan; October-December 2019; National Drought Monitoring Centre, Islamabad
<https://www.mdpi.com/2073-4441/12/2/470#:~:text=This%20province%20has%20faced%20many,on%20livelihoods%20a nd%20its%20economy>
60. Provincial Disaster Management Authority, Balochistan. 2007-2014. Droughts.
<https://www.pdma.gob.pk/natural-hazards/droughts>
61. Provincial Disaster Management Authority, Balochistan. 2019. Balochistan Drought Needs Assessment Report.
<https://pakistan.iom.int/sites/g/files/tmzbd1121/files/documents/Balochistan-Drought-Needs-Assessment.pdf>
62. Provincial Disaster Management Authority, Punjab. 2018. Disaster Risk Reduction Strategy. Provincial Disaster Response Plan. PDMA, Government of Punjab.
63. Q. Z. Chaudhry, Rasool, G., Kamal, A., Mangrio M. A. and Mahmood. S. 2015. Karachi Heat Wave Event June 2015. Islamabad: Technical Report for the Ministry of Climate Change, Pakistan.
<https://mocc.gov.pk/SiteImage/Misc/files/Final%20Heat%20Wave%20Report%203%20August%202015.pdf>
64. Rahman, G., Rahman, A. U., Samiullah, Dawood, M., Moazzam, M. F. U. and Lee. B. G. 2021. Spatio-temporal characteristics of meteorological drought in Khyber Pakhtunkhwa, Pakistan. Plos one. April 15, 2021.
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0249718>
65. Rahman, G., Rahman, A. U., Samiullah, and Dawood, M. 2018. Spatial and temporal variation of rainfall and drought in Khyber Pakhtunkhwa Province of Pakistan during 1971–2015. Arabian Journal of Geosciences 11(3):1-13. DOI:10.1007/s12517-018-3396-7.
https://www.researchgate.net/publication/322685499_Spatial_and_temporal_variation_of_rainfall_and_drought_in_Khyber_Pakhtunkhwa_Province_of_Pakistan_during_1971-2015
66. Reliefweb. 2002. Drought - Pakistan update No. 14. Situation report. UNRC/HC Pakistan. 3 June 2002. OCHA Services. <https://reliefweb.int/report/pakistan/drought-pakistan-update-no-14>

67. Reliefweb. 2018. Report on prevailing drought like situation in Sindh with particular reference to District Tharparkar. November 2018.
<https://reliefweb.int/report/pakistan/report-prevailing-drought-situation-sindh-particular-reference-district-tharparkar>
68. Reliefweb. 2022. Pakistan Drought. 2021-2022. <https://reliefweb.int/disaster/dr-2021-000064-pak>
69. Sarfaraz, S., Arsalan M. H. and Fatima. H. 2014. Regionalizing the Climate of Pakistan using Köppen Classification System. Pakistan Geographical Review. Volume 69. pp. 111-132.
https://www.researchgate.net/publication/280305039_Regionalizing_the_Climate_of_Pakistan_using_Koppen_Classification_System
70. School of Natural Resources. 2020. Types of Drought, University of Nebraska-Lincoln, <https://drought.unl.edu/Education/DroughtIn-depth/TypesofDrought.aspx>
71. The NEWS International. 2020. The making of a drought. Zafar Ahmed Khan. Political Economy. January 26, 2020. <https://www.thenews.com.pk/tns/detail/604006-the-making-of-a-drought>
72. UNCCD. 2022. Drought in Numbers 2022 - restoration for readiness and resilience. COP-15 Côte d'Ivoire. <https://www.unccd.int/sites/default/files/2022-06/Drought%20in%20Numbers%20%28English%29.pdf>
73. UNCCD. 2023. PRIAS4 2022. Submitted by Government of Pakistan. 15 February 2023. <https://www.unccd.int/our-work-impact/country-profiles/pakistan>
74. UNCCD. Model National Drought Plan. <https://www.unccd.int/sites/default/files/relevant-links/2018-04/Model%20National%20Drought%20plan.pdf>
75. UNCCD, Article 1, <https://www.unccd.int/article-1-use-terms>
76. UNCCD Terminology. <https://www.unccd.int/data-knowledge/unccd-terminology?page=3>
77. United Nations Environment Program and Climate Technology Centre and Network. Drought risk mapping. <https://www.ctc-n.org/technologies/drought-risk-mapping>
78. United Nations Department of Social Affairs. 2014. International Decade for Action, 'Water for Life', 2005-2015. https://www.un.org/waterforlifedecade/human_right_to_water.shtml
79. Vogt, J., Naumann, G., Masante, D., Spinoni, J., Cammalleri, C., Erian, W., Pischke, F., Pulwarty, R. and Marinho Ferreira Barbosa, P., Drought Risk Assessment and Management., EUR 29464 EN, Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-97470-0, doi:10.2760/919458, JRC113937.
<https://publications.jrc.ec.europa.eu/repository/handle/JRC113937>
80. Wazir, M. S., and Goujon, A. 2019. Working Papers, Assessing the 2017 Census of Pakistan Using Demographic Analysis: A Sub-National Perspective. Econstore.
<https://www.econstor.eu/bitstream/10419/207062/1/1667013416.pdf>
81. Wikipedia, Cold Desert, Skardu, https://en.wikipedia.org/wiki/Cold_Desert,_Skardu
82. Wikipedia, List of extreme weather records in Pakistan.
https://en.wikipedia.org/wiki/List_of_extreme_weather_records_in_Pakistan
83. Wikipedia, Topography of Pakistan.
https://en.wikipedia.org/wiki/Topography_of_Pakistan#:~:text=The%20topography%20of%20Pakistan%20is,Range%2C%20and%20the%20Sistan%20Basin
84. World Bank Group. 2021. Managing Groundwater Resources in Pakistan's Indus Basin. 25 March 2021. <https://www.worldbank.org/en/news/feature/2021/03/25/managing-groundwater-resources-in-pakistan-indus->

- [basin#:~:text=Groundwater%20supplies%2090%20percent%20of,canal%20water%20supply%20and%20rainfall](#)
85. World Bank Group. 2021. Pakistan, explore historical and projected climate data, climate data by sector, impacts, key vulnerabilities and what adaptation measures are being taken. Explore the overview for a general context of how climate change is affecting Pakistan. Climate Change Knowledge Portal.
<https://climateknowledgeportal.worldbank.org/country/pakistan/climate-data-historical>
 86. World Health Organization. https://www.who.int/health-topics/drought#tab=tab_1
 87. World Meteorological Organization (WMO) and Global Water Partnership (GWP). 2016. Handbook of Drought Indicators and Indices (M. Svoboda and B.A. Fuchs). Integrated Drought Management Programme (IDMP), Integrated Drought Management Tools and Guidelines Series 2. Geneva.
https://www.droughtmanagement.info/literature/GWP_Handbook_of_Drought_Indicators_and_Indices_2016.pdf
 88. World Meteorological Organization. Drought, Geneva, Switzerland,
<https://worldmetday.wmo.int/en/drought>
 89. Yang, X., Yang, Q., Zhu, H., Wang, L., Wang, C., Pang, G., Du, C., Mubeen, M., Waleed M. and Hussain. S. 2023. Quantitative Evaluation of Soil Water and Wind Erosion Rates in Pakistan. Remote Sens. 2023, 15(9), 2404; <https://doi.org/10.3390/rs15092404>
 90. Youlin, Y., Jin, L. S., Squires, V., Kyung-soo K. and Hye-min. P. 2011. Combating Desertification & Land Degradation: Proven Practices from Asia and the Pacific, UNCCD and Korea Forest Service, Republic of Korea, October 2011.
<http://www.fao.org/pakistan/resources/in-depth/desert-locust-situation-in-pakistan/en/>
 91. Zahid, M., Rasul. G. 2013. Spatial Trends of AMSR-E Soil Moisture across Agro-Climatic Zones of Pakistan 2003-2010.
 92. Zarai Taraqiati Bank Limited. Promotion of Agriculture in Balochistan (Research Study). Planning & Research Department, Zarai Taraqiati Bank Limited.
 93. Zhao, M., Huang, S., Huang, Q., Wang, H., Leng, G., & Xie, Y. 2019. Assessing socio-economic drought evolution characteristics and their possible meteorological driving force. Geomatics, Natural Hazards and Risk, 10(1), 1084–1101.
<https://doi.org/10.1080/19475705.2018.1564706>

ANNEXURE I: FEDERAL PSDP PROJECTS RELATED TO DESERTIFICATION AND DROUGHT

Costs of main projects of Federal PSDP related to desertification and drought are as follows:

#	Projects	Expenditure (million PKR.)	
		July 2019- June 2024	July 2014- June 2019
1	Up-scaling of Green Pakistan Programme (Revised)	29,564	
2	Green Pakistan Programme - Revival of Forestry Resources in Pakistan		1,144
3	Sustainable Land Management Programme to Combat Desertification in Pakistan SLMP-II	43	42
4	National Peste des Petits Ruminants (PPR) Eradication Programme; Phase-I Risk Based PPR Control in Sheep and Goats of Pakistan	514	
5	Enhancing Command Area of Small and Mini Dams in Barani Areas of Pakistan	694	
6	Locust Emergency and Food Security Project (Revised)	3,435	
7	Promotion of Olive Cultivation on Commercial Scale in Pakistan	1,041	583
8	National Program for Enhancing Command Areas in Barani Areas of Pakistan	2,012	
9	Water Conservation in Barani Areas of Khyber Pakhtunkhwa	1,900	
10	Calf feedlot fattening in Pakistan All over Pakistan including ICT, AJK, & Gilgit Baltistan	324	
11	National Programme for improvement of Watercourses in Pakistan Phase-II (NPIWC-II)	11,096	
12	PM Initiative for Save the Calf	478	
13	Prime Minister's Initiative for Backyard Poultry	137	
14	Strengthening / Up-Gradation of Agriculture and Livestock Research System of Arid Zone Research Institute, Umerkot Sindh (Revised)	266	36
15	Construction of 100 dams in Balochistan (Package-II) 26 Dams		2,271
16	Construction of 100 Small Dams in Balochistan (Package-III 20 Dams)	6,174	400
17	Construction of 100 Small Dams in Tehsil Dobandi, Gulistan Killa Abdullah	688	300
18	Construction of 20 Nos. Small Dams in Khyber Pakhtunkhwa (Zamir Gul Dam Kohat and Bada Dam Swabi)	589	1,068
19	Construction of 200 small check dams for Groundwater Recharge of Quetta	1,460	110
20	Construction of Basool Dam, Tehsil Ormara, District Gwadar	12,121	1,303
21	Construction of Bhundaro Storage Dam Angeera Zehri Area, District Khuzdar	125	45
22	Construction of Small Dams in District Mansehra KPK	2,030	
23	Construction of Small Dams, Delay action Dams, Recharge weirs and ISSO Barrier in Sindh	6,476	2,785
24	Construction of Tuk Storage Dam, Tehsil Wadh, District Khuzdar	131	65
25	Up-gradation of Arid Zone Research Institute (AZRI) to the level of AZRC and Establishment of new Adaptive Res. Cum Demonstration Institute at Seakach, Wana, South Waziristan Agency, Miranshah, North Waziristan Agencies (FATA) Tank and Matora, Lakki Mar	391	43
26	Abato, Daisara & Sanazala Dams, Chaman	14	136
27	Channelization of Nullah Deg		888
28	Construction of 100 Delay Action Dams in Balochistan (Package-3: 20 Dams)	7,064	510
29	Construction of Awaran Dam District Awaran (Revised)	3,800	
30	Construction of Chashma Akhora Khel Dam, Karak	650	
31	Construction of Gish Kaur Storage Dam, Kech (SB)	3,891	
32	Construction of Mara Tangi Dam	540	
33	Construction of Panjgur Dam, District Panjgur (Revised)	3,350	
34	Name of work: Construction of Sanam, Palai and Kundal Dams Sub Work: Construction of Sanam Dam Project District Dir Lower	2,650	
35	Construction of Ghabir Dam, Chakwal Punjab	353	
36	Construction of Sarozai Dam, Hangu	300	

37	Construction of Shehzanik Dam, Dasht (SB)	1,000	
38	Construction of Sunni Gar Dam, Khuzdar (Revised)	1,023	
39	Construction of Winder Dam, District Lasbela	9,577	949
40	Construction of Hekanog Delay Action Dam (SB)	107	
41	Construction of Tapok Storage Dam District Kech (Prov. Share= 84.846)	800	
42	Construction of Maserag Delay Action Dam (SB)	148	
43	Detailed Engineering Design & Preparation of Tender Documents of Chiniot Dam Project	225	
44	Detailed Engineering Design & Preparation of Tender Documents of Hingol Dam Project	175	
45	Diamer Basha Dam Project (Dam Part)	99,055	
46	Diamer Basha Dam Project (LA&R)	133,911	
47	Feasibility Study of Sindh Barrage Project	290	
48	Preparation of Feasibility Study of Thar Canal Project	271	
49	Feasibility Study, Detailed Engineering Design, Tender Documents and PC-1 of Jacobabad, Shikarpur and Kashmor Drainage Projects	30	
50	Construction of Garuk Storage Dam District Kharan	8,572	1,420
51	Increasing Storage capacity in command area of Tanda Dam.	1,720	
52	K4 Greater Water Supply Scheme	56,441	
53	Kachhi Canal Project (Phase-I)	5,367	28,179
54	Kachhi Canal Project (Remaining Works)	22,004	
55	Kurram Tangi Dam Project (Stage- I)	16,418	1,630
56	Mapping of All Water Resources in Southern Balochistan	262	
57	Mohmand Dam Project (Detailed Engineering Design), Mohmand Agency		190
58	Mohmand Dam Hydropower Project	57,834	17,000
59	Nai Gaj Dam Project	8,458	7,200
60	Naulong Dam Project	447	137
61	Review of Feasibility Study Updation of Detailed Engineering Design, Tender Documents & PC- I of Chashma Right Bank Canal Project (Lift-Cum-Gravity)	264	
62	Project Planning and Development Unit (PPDU)	390	
63	Raising of Mangla Dam Project	96,093	
64	Remedial Measures to Control Water logging due to Muzaffargarh & T.P Link Canal Project	7,801	
65	Remodeling of Warsak Canal System in Peshawar and Nowshera Districts	7,969	
66	Umbrella PC-II for Feasibility Study and Detailed Design of Eight Dam in Balochistan	563	
67	Construction of 100 Dams in District Areas/ Districts of Balochistan (Package-IV)	2,040	
68	Construction of 05 Nos. Dams in District Loralai	400	
69	Construction of 06 Nos. Dams in District Zhob & Sherani	100	
70	Construction of Five (05) Small Dams Namely Salari-2 Dam, Rai Jo Dat Dam, Shalmani Dam, Garwari Dam and Aamri Dam in Kohistan-1 Dadu	1,300	
71	Construction of 06 Nos Small Dams Namely Densi Koondal, Kambowah, Khirpora, Bantari, Moor, Nadi Jo Wandio Dams in Nagarparkar Area, Thar Region	1,800	
72	Construction of 06 Nos Small Dams Namely Katrah, Kouhar, Sari-II, Saroni, Wadejo & Khar Dam in Lower Kohistan	1,800	
73	Construction of Dinar Dam	420	
74	Construction of Small Dams in District Ziarat.	611	
75	Indus Basin Irrigation System (IBIS), Automation of 7 Key sites for Discharge Monitoring	20	
76	Installation of Telemetry System for Real Time Discharge Monitoring at 27 Key Sites on Indus Basin Irrigation System	100	
77	Kurram Tangi Multipurpose Dam Project (Stage-II) - Updation of Feasibility Study and Detailed Engineering Design	60	
78	Construction of Deenari Storage/Delay Action Dam District Nushki	50	
79	Construction of Dam at Roshanabad Kalat	100	

80	Rehabilitation and Conservation of Karezes for Sustainable Groundwater Management and Livelihood Improvements in Balochistan	15	
81	Chashma Right Bank Canal (CRBC) Lift-cum-Gravity Project	71	
82	Remodeling of Pat Feeder Canal System in Balochistan	5,000	
83	Water Requirement for K-IV Project Improvement of Kalri Baghar Feeder and Keenjhar Lake – Plain Cement Concrete (PCC) Lining of Kalri Baghar Feeder Upper Phase-I 50% Co-Sharing, PSDP Share Rs.19,470.467 m	1,000	
84	Construction of 200 Dams in Killa Abdullah, Gulistan & Dobandai Tehsils, District Killa Abdullah	1,400	170
85	Feasibility Study of Shatung Nullah Diversion Project Skardu Gilgit, Baltistan	153	
86	Shatung Nullah Diversion, Shardu (Feasibility) (GBP)	86	
87	Construction of Mangi Dam, Quetta	5,075	1,500
88	Construction of Mara Tangi Dam, Quetta	170	70
89	Construction of Sanam, Palai and Kundal Dams District Dir Lower		778
90	Darwat Dam Project, Jamshoro/Thatta (Fed share Rs. 10,111.31 M, Prov share: Rs. 1656.56 M)	713	4,112
91	Diamer Basha Dam Project (Dam Part)	30,819	20,736
92	Diamer Basha Dam Project (LA&R)	30,273	86,988
93	Construction of 20 Nos Small Dams in KP [9 approved schemes]	1,010	3,112
94	Construction of Delay Action Dam at Zarkhune District Quetta	86	
95	Rainee Canal Project (Phase-I & II), Ghotki, Sukkur	1,077	2,501
96	Raising of Baran Dam Bannu (Fed share Rs. 3867.248 million and Rs. 1289.082 million provincial share)	1,401	1,689
97	Raising of Mangla Dam Project, Mangla, Mirpur (AJ&K)	1,730	1,711
98	Rehabilitation of Irrigation System in KP	207	2,369
99	Remedial Measures to Control Waterlogging due to Muzaffargarh and TP Link Canal	1,319	5,930
100	Remodeling of Warsak Canal System in Peshawar & Nowsehra District. (Fed Share Rs. 5568.79 million and Rs.5568.79 million provincial share)	2,508	3,385
101	Research studies on drainage land reclamation water management and use of drainage water IWARSI, MONA,LIM		64
102	Lining of Irrigation Channels (Distributaries & Minors) in Punjab	235	2,706
103	Makki Farash Link Canal Project (Chotiari Phase-II) for Water Supply to Thar Coal Project	1,052	3,065
104	Construction and Improvement of Irrigation Infrastructure including Flood Protection Work, Channels, Road, Tube wells & Crossing Facilities in District Swabi	622	
105	Construction of 10 Nos Small Storage Check dams Arenji Area, Wadh District Khuzdar	310	
106	Construction of Khattak Banda Dam , Shakar Dara District Kohat	1,112	
107	Construction of Makh Banda Dam, District Kohat	531	
108	Construction of Pezu Dam Project District Laki Marwat	456	
109	Construction of Sari Kalah Delay Action Dam in U/C Raskoh District Kharan	267	
110	Construction of Small Dams in Khuzdar	695	
111	Feasibility Study and Detailed Design of Burj Aziz Khan Dam, District Lora Pishin, Balochistan	67	
112	Feasibility Study of Murunj Dam at Nila Kund on Kahal Hill Torrent Project (Punjab) Rajanpur, Punjab	223	
113	Sukkur Barrage Rehabilitation and Improvement Project Cost 16500 M		20
114	National Surveillance Program for Avian Influenza and New Castle Disease in Pakistan.		9
115	Bovine Spongiform Encephalopathy (BSE-Mad Cow Disease) Surveillance and Capacity Leading to O/E Negligible Risk Country Status for Pakistan		22
116	Development of Clean and True to Type Fruit Plant Nurseries at National Level		13
117	Construction of 100 small dams in Tehsil Dobandi, Gulistan Chaman, Balochistan	600	140
118	Construction of Fall Structure on Nara Canal, Resection of Rato Canal RD 0-72, Strengthening of Jamro Canal, Sindh (District Nawabshah) (Federal Share)		306
119	Construction of Bhundaro Storage Dam Angeera Zehri Area, District Khuzdar	125	45

National Drought Plan - Pakistan

120	Construction of Bohir Mass Storage Dam		38
121	Construction of Cherah Dam Rawalpindi/Islamabad (Federal share Rs. 2653.610 Million and Rs. 2653.610 Million Provincial share)		2,524
122	Construction of Dam at Aghburg Area Quetta		60
123	Construction of Dosi Dam, Gwadar		45
124	Construction of Fall Structure of Nara Canal Resection of Ranto Canal RD 0-72, Strengthening of Jamro Canal Sindh		1,345
125	Construction of Garah Storage Dam Tehsil Wadh, District Khuzdar	100	87
126	Construction of Small Dams in District Mansehra KPK	834	446
127	Construction of Small Storage Dams, Yousaf Kach, Rud Mulliazai, District Pishin		85
128	Construction of Kangori Storage Dam Shah Noorani Area, Tehsil Wadh, District Khuzdar		70
129	Construction of Khaisar Patti Delay Action Dam, District Noshki		100
130	Construction of Khazeena Dam Zamri, Muskhail		50
131	Construction of Papin Dam Punjab (Federal share Rs. 3303.540 and Rs. 2004.190 Provincial)		2,094
132	Construction of Pissijal Dam and Command Area Development, Khuzdar		100
133	Construction of Reko Delay Action Dam District Noshki		38
134	Construction of Pissi Jhal Storage Dam and Command Area Development Khuzdar		10
135	Construction of Ghabir Dam, Chakwal Punjab	590	889
136	Gomal Zam Dam Project Dera Ismail Khan / South Waziristan Agency.(local- 7698.118M,Provincial-2206M,FEC-10721.882M) Total Cost= Rs 20626 M		2,639
137	Feasibility Study for Development of Water Resources in Balochistan with Construction of Small Dams & Medium Dams		135
138	Re-construction of Shadi Kaur Dam District Gwadar		2,775
139	Construction of small Dams in Tehsil Khaliqabad, Kalat		200
140	Toiwar / Batozai Storage Dam	1,002	1,178
141	Uch Wani Chutair Ziarat		100
142	Umarzai Dam, Pishin		65
143	Wam Tangi Hamai		100
144	Irrigation System Rehabilitation Project, Punjab, (Phase-I)	192	1,082
145	Lining of Distributaries and Minors in Sindh	3,600	2,130
146	Lower Indus Right Bank Irrigation & Drainage Project (RBOD-I) Qamar- Shahdad Kot, Larkana, Dadu & Jamshoro		1,383
147	Revamping / Rehabilitation of Irrigation & Drainage System of Sindh	494	500
148	Satpara Dam		5,322
149	Construction of Anjeeri Storage/Delay Action Dam District Nushki	26	
150	Construction of Azdha Khoi Storage/Delay Action Dam District Chagai & Nushki	20	
151	Construction of Baghi Storage/Delay Action Dam Kishingi Area, District Naushki	55	
152	Construction of Bugmcadwn Storage/Delay Action Dam District Chagai	20	
153	Construction of Delay Action Dam at Hannaorak, Quetta	20	
154	Construction of Delay Action Dam at Sarghundgi District Quetta	5	
155	Construction of Delay Action Dam at Westren bypass Akhtarabad, Quetta	5	
156	Construction of Delay Action Dams in Siaro Hazar Ganji Nal Area of District Khuzdar	150	
157	Construction of Gendar Storage/Delay Action Dam Kishingi Area Nushki	20	
158	Construction of Hushbalo Dam District Mastung	70	
159	Construction of Jatti Small Storage Dam Lop Area Wadh District Khuzdar	20	
160	Construction of Juli Storage/Delay Action Dam District Chagai	20	
161	Construction of Karudi Storage/Delay Action Dam District Chagai	20	
162	Construction of Koh-e-Mahium Storage/Delay Action Dam in District Chagi	100	
163	Construction of Mashkicha Storage/Delay Action Dam District Chagai	20	
164	Construction of Mashraqi Koh-e-Sultan Storage Delay Action Dam at District chagai	5	
165	Construction of Peer Bari Storage Dam at Kach, District Khuzdar	50	
166	Construction of Posti Storage/Delay Action Dam at Boolo Arbab in District Chagai	20	

National Drought Plan - Pakistan

167	Construction of Small Storage Dam at Sardari Goz Darkhalo, Tehsil Wadh, District Khuzdar	40	
168	Construction of Small Storage Dam Kunji Ferzabad District Khuzdar	15	
169	Construction of Small Storage Dam Shank Teshil Wadh District Khuzdar	20	
170	Development of Water Resources by construction of Small Dams in District Zhob Balochistan	100	
171	Sukleji Dam (Feasibility Study) District Bolan Balochistan	80	
172	Extension of Zandera Karez System along with Excavation & Contraction of conduct channel village Zandera, District Ziarat	57	
173	Development of Yak at High Altitude Areas of Pakistan	88	
174	Demarcation of Groundwater Quality Zones in Indus Plain and Marginal Areas for Sustainable Development and Management of Groundwater (Lower Indus Plain) PCRWR		30
175	Integrated Water Resources Management in the Highly Depleted Pishin-Lora Basin of Balochistan, PCRWR		29
176	Exploration of Groundwater Potential and Promotion of Intervention for Rainwater Harvesting and Bio-Saline Agriculture in Thar, PCRWR		14
177	Improved Land and Water Conservation Practices to Enhance Waste Land Productivity in Thal Desert, PCRWR		11
178	Chao Tangi Small Dam, SWA		675
179	6 Nos. Flood Dispersal Structure along with Conveyance System on Nari River, District Bolan		420
180	Bazai Irrigation Scheme Revised PC-I, Khyber Pakhtunkhwa (Mardan)		77
181	Construction of Mohra Shera Dam, Rawalpindi Punjab (Small)		120
182	Construction of Mujahid Dam, Rawalpindi, Punjab (Small)		182
183	Correcting Approach of River Chenab to Control erosive action along its R/B opposite RD 0+00 M.Garh Flood Bund to RD 131+500 Khangarh Flood Bund in District Muzaffargarh		30
184	Construction of Spur 34, 35 on Right Bank of Indus River, D.I. Khan		132
185	Detailed Engg. Design for Winder Dam Lasbela, Balochistan		166
186	Greater Thal Canal (Phase - I) (Bhakkar, Layyah, Khushab & Jhang)		10
187	Rehabilitation of Flood 2010 Damages (RBOD-I) Larkana, Dadu, Qambar & Shahdadkot (Sindh)		94
Total		748,583	237,455

ANNEXURE II: ADP-SINDH PROJECTS RELATED TO DESERTIFICATION AND DROUGHT

Costs of main projects of ADP-Sindh related to desertification and drought are as follows:

#	Projects	Expenditure (Million PKR.)	
		July 2019- June 2024	July 2014- June 2019
1	Provision of Subsidy Assistance on Solar Pumps/ Tubewells to Farmers in Sindh	182	
2	Provision of solar submersible pumps on subsidized cost for Agriculture purpose in District Tharparkar	44	
3	Transforming the Indus Basin with Climate Resilient Agriculture and Water Management.	203	
4	Integrated Water Resource Management in Sindh	1,736	
5	Lining of watercourses in Non Command Areas for Lift pumps/Tubewells Already working in Sindh.	81	
6	Additional Lining of Watercourses in Sindh.	4,189	
7	Improvement of new / fresh water courses in Sindh	199	
8	Provision of subsidy assistance on solar power for high efficiency irrigation system (HEIS)	185	
9	Construction of Water Storage Reservoirs operated on solar pumping systems	70	
10	Enhancing Tree Cover on Non-State Forest Lands and Strengthening Social Forestry activities in Sindh	50	
11	Afforestation & Reforestation of Degraded Forest Ecosystems for Enhancing Carbon Sequestration to Secure Carbon Financing (C: 397.135+R:3121.989)	227	
12	Augmenting Network of Social Forestry Plantation over Non-Forest Lands in Hyderabad and Mirpurkhas Civil Division	24	
13	Installation of Solar Energy System for 12 No. Pumps @ Larkano South (Mashori) Pumping Station.	20	
14	Provision of Solar Water Pumps/ Tubewells on Subsidized rates to Farmers in Sindh		193
15	Pilot project for sustainable Agriculture through storage Tanks		
16	Sustainable Agriculture Through Provision of Water Storage Tanks & Rehabilitation & Lining of Water Courses (Total Rs. 91.951 M GoS share Rs. 74.040 M Farmers share Rs. 17.911 M)(SDG #6)		336
17	Provision of water storage tanks to the Farmers of Barani and Water Scarcity Areas in Sindh		15
18	Project on Sustainable Livestock Development for Rural Sindh		29
19	Generation & Dev. of effective Vaccines to prevent Recurring infections of Newcastle Disease in Peacock & Rural Poultry (C: 13.162 + R: 46.788)		11
20	Surveillance and Characterization of Circulating Pathogens of Poultry in Sindh including Avian Influenza Containment Programme (Revised)		181
21	Expansion of Poultry Hatcheries & Backyard Farming in Sindh including Poultry Controlled Atmosphere Shed - Revised	16	34
22	Programme for Women Empowerment through Rehabilitation of Rural Poultry in Sindh - Revised		34
23	Green Pakistan Program-Revival of Forestry and Wildlife Resources in Pakistan	1,354	
24	Revegetation of Reserve Forests of Sindh including Infrastructure Development for Repairing Environmental Damage and Restoring Ecosystem Service	112	
25	Expansion of Poultry Hatcheries & Backyard Farming in Sindh including Poultry Controlled Atmosphere Shed (Revised on 17.06.10) (N. Feroze, Ghotki, Kashmore, Tharparkar, Umerkot & Karachi) (C:125.591 + R:121.785)	241	
26	Introduction of High Yielding Boer Goat Breed in Sindh (Khairpur, Larkana, Hyderabad, Matiari, SBA, T. Allahyar, Badin & Umerkot) (R: 59.500)	15	
27	Conservation, Development and Management of Indus Delta Mangroves to Check Sea Intrusion		419
28	Introduction of High Yielding Boer Goat Breed in Sindh		15

29	Possible Role of Mangroves in Curbing Sea Intrusion in Indus Delta (SDG # 15)	188	314
30	Mass Scale Tree Plantation Outside Forest Area to Mitigate Climate Change Effects in Sindh		205
31	Enhancing Tree Cover on State Forest Lands in Sindh	157	254
32	Sarsabz Sindh Making Sindh Green and Environment Friendly (SDG # 15)	140	
33	Ground Water Investigation and Mapping in Sindh	6	
34	Demarcation Reforestation & Regeneration of Vacated Forest Land (C:29.695+R:105.305) (SDG 15)	8	
35	Completion of leftover/remaining targets of Bahman Nature Park Larkano (C: 44.802+R:15.198) (SDG # 15)	8	
36	Development and Improvement of Protected Forestry by Creating Controlled Grazing Blocks with Community Participation in Kohistan & Registan (SDG # 15)		5
37	Habitat Restoration & Development of Water Harvesting Facilities at Khirthar National Park.		11
38	Sindh Water Sector Improvement Project Phase-I (WSIP-I)		2
39	Construction of Pumping Stations of 80 Cusecs to Control Water Logging Salinity and Drain out monsoon Water at Chamber, Tando Allahyar	29	150
40	Boring & Installation of 250 Nos Tubewells of 2.0 Cusecs on Solar Energy	1,757	
41	Construction of Tubewells & Pumping Stations on Solar Energy System of Drainage Division SBA.	40	
42	Conversion of Tubewells & Pumping Stations on Solar System of Drainage Division Sanghar	20	
43	Conversion of Tubewells and Pumping Stations on Solar System in Three SCARP Projects.	399	
44	Installation of Solar Tubewells in Fresh Zone of Thar Desert of Talukas Mithi, Diplo, Chachro, Islamkot, Nangarparkar, Dahli & Kaloi	497	
45	Construction of Small Surface Drainage Solar Pumping Station (10.00 Cusecs) Deh Sinhori.	90	
46	Installation of New Solar Tube-wells (25 Nos.) in District, Sanghar, SBA & Tando Allahyar	10	
47	Installation of Deep Well Solar Tube-wells in Sweet Area of Johi, Thana Bola Khan and Thana Ahmed Khan District Jamshoro	224	
48	Installation of Solar System Tubewell up to 2 Cusec	423	
49	Construction of New Solar Pumping Station at Deh Ghulam Shah RD 342/343 of Rohri Main Canal (Left Side) and Installation of 11 Nos. Tube-wells in Deh Mud Aleem, Deh Tharo Shah, UC Hot Khan Jalbani & UC Halani in Tubewell Division Naushahru-	90	
50	Installation of 26 No. Solar Tubewells for Drinking/ Irrigation Purpose of Villages Usmanabad, Muhammad Hassan Shoro, Wali Muhammad Shoro, Ali Shoro, Ibrahim Shoro, Ayoub Shoro, Abdullah Shoro, Muhammad Hussain Shoro, Badal Shoro	70	
52	Constructing Stone Pitching on Weak Portion of Rohri Main Canal in Rohri Division, Moro, Dad & Hala Division (Revised)		20
53	Re-Sectioning of Rice Canal from RD-0 to 80		75
54	Sindh Flood Emergency Reconstruction Project for Bunds & Canals (Flood 2010-11)	1,593	2,556
55	CC Lining of Faiz Bux / Mohabbat Wah & Mahar Minor		230
56	Construction Stone Protection Wall and Stone Pitching B/S along Sattah Branch RD-0 to 10 passing City Area of Chuhar Jamali		105
57	Rehabilitation of Gates in Rohri Canal Circle through Mechanical Circle		83
58	Stone pitching along Dadu Canal @ RD 28 to 29 IP, 26 to 47 IP, 75, D/S RD 81 to 102, 105, 126 to 128 NIP, RD 130 to 131 IP 145 to 146 IP, 181 to 183, 190 to 192 BS, RD 199 to 201, 218 to 220 BS 252 to 257 IP 310 to 330 BS 410 to 420 BS		40
59	Providing Retaining Wall, Stone Pitching and Earth Work along Ghotki Feeder at RD-51, 58, 60, 63, 127, RD-323, 324, 347, 348 & 397		253
60	Re-construction Rehabilitation of Regulator RD- 45 B.S Feeder		550
61	Rehabilitation / Replacement & Repair of Regulator / Gates of Guddu Barrage Region		47
62	Rehabilitation of Qadirpur Minor-II RD-0 to 40 including Structure Works		37

63	Rehabilitation of Khesano Minor-II, Hadeki Disty from RD-0 to 53, Mell Minor Rd-0 to 25 & Lining of Noori Disty from RD-0 to 38 (Revised)		120
64	Rehabilitation of Ratodero Branch from RD- 0 to Tail		61
65	Rehabilitation of Lundi Wah, Jari Wah and Kazi Wah of Ghotki Area Water Board		123
66	Rehabilitation of Masu Wah RD - 100 to 107		30
67	Construction of Protection Wall (Retaining Wall) along Kohri Disty near Ratodero City in Ratodero Sub-Division		14
68	Construction Retaining Wall along Dadu Canal RD-210 Near Agani Village and RD-282 NIP Side in Northern Dadu Division, Larkana		16
69	Restoration Work of J-Spur at Mile 1/6 Nasrat Loop Bund		(130)
70	Remaining Work along J-Spur at Mile 0/7 Abad Manguli Extension Bund in Northern Dadu Division Larkana (Revised)		38
71	Restoration of Flood Damages to Gaj Diversion Bund at RD-2+700, 5+000, 12+000 & 13+000 in Southern Dadu Division	74	200
72	Constructing Stone Pitching along Rohri Main Canal from RD 193 to 205 B/S & 228 to 234 B/S, 236 to 253 B/S & 270 to 277 IP side, 290 to 294 B/S, 296 to 305 IP side, 297 to 308 NIP side & 228 to 312 NIP side, 330 to 350 B/S, Earth work along Rohri Main Canal 201 to 207 IP side, 204 to 207 NIP, 260 to 265 IP side, 276 to 281 B/S, 326 to 330 IP side, 305 to 330 NIP Side & Stone pitching and Raising Strengthening Banks of RMC RD-415 to 425 B/S & 445 to 457+500 NIP side	301	711
73	Constructing Stone Pitching along Rohri Main Canal from RD-25 to 183 both sides eroded / damaged portions and Construction Protection Wall on B/Sides of RD-73.2 to 79.2 and RD-73.2 to RD-81.0 along Rohri Main Canal, Deh Luqman & Khanpur Taluka Khairpur (Revised)		359
74	Construction Retaining Wall along Abul Wah from RD-55+00 to 58+00 and 92+00 to 94+00 Both Sides Gambat & Ranipur City area and Construction Retaining Wall along Mehrab Wah from RD-0+00 to 5+00 and 14+00 to 19+00 Both Sides Sobhodero City area	17	216
75	Rehabilitation along Pandhro Wah from RD-0 to 139.2 Veeho Wah from RD-0 to 108.7 and Ali Nawaz Wah from RD-0 to 163		195
76	Constructing Stone Pitching along Nasrat Branch from RD-0 to 22 & 35 to 52 Both Sides, RD-69 to 89 NIP Side & 100 to 130 Both Sides, RD-137.6 to 154.5 & 200 to 220.625 Both Sides & Earth work from RD-22 & 35 to 52 Both Sides		203
77	Earth Work along Kurkaim Minor from RD-0 to 46+400 (Revised)	46	31
78	Adding Spans to Aral Regulator and Remodeling of Leading Channels		190
79	Construction of Retaining Wall along Mirwah Canal from RD-150 to 155 L/Side, 149 to 151 R/Side and 154 to 155 R/Side	158	140
80	Remodeling of Masu Wah from RD- 0.0 to 131 & its System		75
81	Restoration & Rehabilitation of Irrigation Network of Guddu Barrage Region affected during Heavy Monsoon Rains 2012, Rehabilitation of Unhar Canal System RD-7 to 17 both sides, Khariro Disty, Nasir Branch, Nar Minor and Anees Minor both sides & Constructing flank wall at D/S Head Regulator of Allahabad Moosa Branch and Re-sectioning & stone pitching along BS Feeder RD- 50 to 78 NIP 61 to 78 IP 82 to 90 NIP 228 to 250 IP side various portions		860
82	Constructing Stone Pitching and Apron along KK Bund Mile 8/0 to 10/0 and 12/4 to 13/4		305
83	Construction of 23 Nos Desalination /R.O. Plants around Manchhar Lake (3rd Revised)		67
84	Strengthening and Beautification Right Side Bunder Wall		5
85	Construction of Pre-stressed Concrete Road Bridge at RD-81.0 & Rehabilitation of Ruk Complex X-Regulator and its Gates at RD-82.4 along Rice Canal		55
86	Rehabilitation work of Damaged D- 2R Ex: Choi Canal Begari System including D2L & D3L		222
87	Providing Stone Pitching along Daro Branch RD 0 to 50 and Pinyari Branch RD 130 to 145 both side (Pinyari Circle)		92

88	Reconstruction of Head Regulator Daro Branch and Tail Regulator Daro Branch RD 168 and Protection Wall Town area along Pinyari Branch 0 to 6 both side (Pinyari Circle) (Revised)		52
89	Earth Work / Stone Pitching along Desert Canal from Mile 18 to 63 Both Sides (Various Portions)		227
90	Retaining wall along Dadu Canal RD 598 to 608 NIP, 598 to 605 IP (Opposite Dadu Town-Regulator 85 mile D/S Retaining wall 04 RDs Both sides, Retaining Wall Mehar Branch RD 7 to 13 near Village Malook Kalhoro, X-Regulator 95th mile D/S retaining Wall 04 RD's Both sides and Rehabilitation of Mahota X- Regulator RD-231 - (Revised)		314
91	Construction of Pumping Scheme along MNV Drain for Feeding Tail of Pakka Disty and Khudabad Minor		62
92	Rehabilitation of Hydraulic Structure of Dhamraho System and Ghar Branch System, Construction of Residences of AXENs Kamber, Dhamraho & Mehar Sub Divisions and Remaining and allied works of Kudan Pumping Station		55
93	Remodeling / Re-sectioning of Branches, Minors (Revised)		58
94	Remodeling / Re-sectioning of Darro Branch and Pinyari Branch (PS-88) District Thatta		125
95	Rehabilitation / Re-sectioning of Johi Branch from Head to Tail (RD-0.0 to 238.560) in Southern Dadu Division & Lining of Pahore and Kharoo Minor	142	147
96	Rehabilitation of Dhori Disty, Imdad Minor, Gandakha Right Minor, Noorpur Disty, Patuja Disty, Qubo Disty, Chowki Minor & Shah Beg Disty		70
97	Construction of Protection (Retaining Wall) along Akil Disty RD-7 to RD-28 B/S (in portions) & Juneja Minor RD-6 to RD-8 B/S (in portions)		49
98	Construction of Protection (Retaining Wall) along Warah Branch RD-130 to RD-154 B/S (in portions) & Providing Stone Pitching along Tanwary Disty at RD-0 to 10 B/S, RD-13 IP Side, RD- 31 B/S, RD-41 B/S, RD-50, 51, RD-73 to 75 B/S (SDG # 15)		193
99	Rehabilitation of Ghaibidero Channel, Sultan Minor & Jumro Minor of Ghaibidero System (Revised) (SDG # 6 & 15)		455
100	Rehabilitation of Rabi Disty from RD-0 to 78+200 in SMB Division Shahdadt (Revised)		130
101	Construction of Protection wall along NW canal at RD 83.5 Both sides U/S & D/S Ruk X-Reg & Providing Stone Pitching along NW Canal RD-26,27,28 IP Side RD-69 IP Side, RD-75 B/S RD-81,82,83 B/S, RD-84 B/S, RD-89 B/S, RD-95 to 98, RD-111 to 118 B/S, RD-119 B/S, RD-152 B/S, RD-164, 165 B/S and Warah Branch from RD-00 to 03 B/S in Garhi Yasin Sub-Division and Restoration of Banks along Shahdadt Branch RD-00 to 21, RD- 80 to 95 and De-Silting along Shahdadt Branch RD-10 to 20, RD-64 to 95 and Providing Stone Pitching along Shahdadt Branch RD-00 to 05 B/S, RD-18 IP Side, IP Side, 35 B/S & 88 IP Side and Dismantling of damaged road bridge along Shahdadt Branch De-Silting work along NW Canal from RD-83.5 to 180 in Garhi Yasin Sub-Division	365	214
102	Earthwork and Stone Pitching along Rice Canal RD-130 to RD-140 both sides RD-279 NIP Side RD-284 IP Side, RD-288, 289 NIP Side and RD- 288 IP Side 24500 feet Earth Work along stone pitching along Noor Wah Branch RD-15 to 25 both sides Ganwar Branch down stream Head Regulator and Kania Minor Head Regulator and Construction of Pumping Station along KN Shah Leading Channel for supplement for tail areas of Nara Disty	269	224
103	Rehabilitation of 4 Nos Pumping Stations in Rice Canal Division damaged during Flood 2010		16
104	Construction of Pumping Station along Mado Disty RD-6 for supplement Mado Disty and leading Channels from Ghar Main Drain to Mado Disty and Construction of Pumping Station along Ghar Main Drain for supplement to tail areas of Mirwah Disty Ex Ghar Branch	57	66
105	Rehabilitation of X-Regulators Warah Branch and Head Regulators along Dadu Canal in Northern Dadu Division and Stone Pitching and Raising & Strengthening along Dadu Canal from RD-23 to 410 in Northern Dadu Division and Construction of CC Lining Along Nasrat	69	325

	Minor from RD 0 to 20 (SDG # 6)		
106	Reconstruction / Shifting of Upstream Flank Wall and Construction of Divide Wall D/S Protection Wall i/c Re-sectioning of Warah Branch from RD-0 to 10 at Head Regulator of Warah Branch at Ruk Complex RD-82 & Construction D/S Protection Wall and De-silting along Warah Branch from RD-0 to 45		150
107	Up-gradation / Rehabilitation of Pumping Scheme I/C Lining of Channels in Taluka Manjhand (Revised)		430
108	Re-Sectioning & Earth work of B/S Banks of Mir Wah Canal RD-79 to 293.6		80
109	Re-Sectioning of Faiz Ganj Wah from RD-0 to 163 (SDG # 15)		68
110	Construction of Stone Pitching of Mir Wah Canal (RD-103 to 293.9) & Lalan Wah Distry		100
111	CC Lining of Shah Nawaz Wah from RD-0.0 to 53, Rahuja Minor RD-9+5 to 25+0, Kanasera Minor, Junki Minor, and Retaining Wall along Faiz Wah	90	434
112	CC Lining of Sada Rang Wah and Water Course No. 2-R Ex Sada Rang Wah and Water Course No. 103-R Mirwah		113
113	Construction Retaining wall along KF West RD- 22 to 22+530 IP RD- 24 to 25+250 NIP, RD- 27 to 33+50 NIP RD- 35+600 to 36 NIP and RD- 51+800 to 54+300 IP		70
114	Earth work for Raising / Strengthening Bank of Minors Ex: Khairpur Feeder West		38
115	Rehabilitation of Old X-Regulator along Rohri Main Canal (Stage-II) (Rohri, Dad, Hala Divisions)		50
116	Constructing Relief Escape for Nasrat Branch at RD-195 NIP side and Constructing Relief Escape for Gajrah Branch at RD-60 NIP side and Constructing Relief Escape for tail of Nasrat Branch system along Chan Bandhni distry at RD-22 (SDG# 6)	5	50
117	Rehabilitation / Lining of Irrigation Channels in SBA		1,010
118	Construction of New Bridge on Nasrat Canal New Sangi Link to Village Rais Malhar Khan Rajper, UC Gher Gaju Taluka Bhiria, Bridge on Sangi Minor at Village Dilawar Shar near Haroon Shar, UC Bhanbhri and Village Road Bridges on Nusrat Canal at RD-24 Opp: Village Saeed Khan Lakho, RD-27 Sarhar Minor-II, Mithiani at RD-51 Dalepota and Late Miner at RD-41 & Repair of X-Regulator at RD-42 and CC Lining of Darbelo Minor RD-21 to 27		24
119	Construction of Stone Pitching along Sehra Branch from RD- 21 to 23, 27 to 29, 36 to 40, 56 to 59 and adding span at RD- 42 and 63, X-Regulator including Rehabilitation of Darbelo Distry & Raising & Strengthening of Sail Distry, Budika Distry and Re- sectioning of Kandiaro Escape RD-0 to 4		382
120	Rehabilitation & Desilting of Mashakh Hoti Distry RD - 0 to 60.2		12
121	CC Lining of Chaker Distry i/c Constructing of new & temporary outlets from RD - 0 to 44.5 & 44.5 to 114.10 and Removing of spoils along Zour Minor from RD - 0 to 49 both sides		105
122	Constructing Stone Pitching along Nasir Branch from RD-0 to 220 Both Sides (eroded portions)		339
123	Rehabilitation & Renovation of Sumpwell, water supply connection and residential building i/c drainage system and road in barrage colony Sukkur		24
124	Up-gradation / Construction of Saeed Khan Pumping Station at Ghallian Bund at Mile 1/0 Ex: Indus River and CC Lining Miano Minor from RD-00 to 21.3		80
125	Rehabilitation of Thar Canal System & Lining of Sohrab Distry about 24 RDs		290
126	CC Lining of Mir Rukan Minor RD -0 to 69, Lakhmir Minor RD -0 to 24		115
127	Rehabilitation of Sakro Branch & Infrastructure at Taluka Mirpur Sakro District Thatta		50
128	Stone Apron / Stone Pitching at RD- 23, 24, 25 Right Side and Left Side at RD-140 to 146 L/Side & RD-184 to 186 L/Side Upper Nara Canal (SDG# 6)	14	299
129	De-silting of Salehpat Drain from RD-0 to 90 along Upper Nara Canal and Restoration of damaged portion of Drain at RD-183 L/Side of Nara Canal		8
130	Providing Stone Pitching along PFL RD 120 to 130 IP side RD 135 to 140 NIP side, RD 152 to 160 and 161 to 163 NIP side Village Abral and Re- Sectioning of Gunj Bahar Branch and Repair of Head Regulator, Road Bridge, dumping of stone pitching and Rehabilitation of	520	274

	Laikpur Ex: Ali Bahar Disty and protection wall and Earth work and stone pitching along Raj wah Ex: PFL RD 0 to 30 and Earth work and stone pitching along Ghari Wah Ex: Pinyari Br.RD 4 to 6 with cattle ramp at RD 06 Reconstruction/ repair of regulators in Sujawal District (Revised) (SDG# 6)		
131	Rehabilitation / Re-Sectioning of Matli Branch 0 to tail & Manik Wah 0 to tail and Bridge over Phuleli in Matli City		40
132	Rehabilitation of Saida Wah Regulator of Jalalani Sub Division of Guni Division & Remodeling / Rehabilitation of Main Guni Canal RD 0 to 210 & Hassan Ali Branch RD 0 to 60.5		35
133	Remodeling / Raising & Strengthening the Banks of Adio Disty (Adio Wah) from RD- 0 to 84 B/Sides and Bridge near Village Abdul Qayoom Mazari		37
134	Construction of Protection Wall to Kashmore city along Kandhkot Branch (Raj Wah) from RD- 0 to 11	27	130
135	Restoration / Rehabilitation of Hairo Disty from RD- 8 to 53 and extension from RD- 53 to 83		25
136	Rehabilitation & Renovation of KK Feeder RD- 0 to 84		12
137	Lining of Gandher Disty RD- 0 to 40.200		17
138	De-silting along BS Feeder RD-0 to RD-45		357
139	Lining of New Hazaro Disty RD- 0 to 40		38
140	Lining of Shahpur Distributary from RD- 00 to 30.0		30
141	Rehabilitation of Lal Shahbaz and Kotri Minor		100
142	Remodeling of Noor Wah		223
143	Normal / Emergent Works for Restoration for Irrigation & Drainage Networks		500
144	Restoration / Rehabilitation of Sultani Branch, Mir Wah System, Morjhar Branch System and Imam Wah Jagir System		386
145	Construction Pumping Scheme along LS Bund mile 77/2 by pumping Water from River Indus for Supplement Tail Areas of Dadu Canal System	70	120
146	Rectification of Regulator and allied guided system of Head Regulator of Warah Branch at RD-82 of Rice Canal		148
147	Construction Pre-stressed Bridge at RD-263 RMC Constructing Tyndel Landhi along Kot Diji -Regulator at RD-158.2, Patti Machi X-Regulator, Repair of Jhando Mashaikh Rest House with Compound wall & Construction / Extension water course 10-R at RD-21 Garhi Pathan Bund Khairpur West Feeder (SDG #6)		256
148	Conversion of Energy Source of the Pumping Station of Patni and Umerkash Wah on Solar Energy for Ensuring the Water Supplies in Tail Reach of Patni System & Construction of Bridge 500 ft from Katcha Bund Pano Akil		157
149	CC Lining of Sui Qandar Branch, Pae Minor, Dhardo Minor and Bhubhar Minor & Matiari Minor		349
150	Rehabilitation & Strengthening of KB Feeder lower RD 52 to 56, RD 60 to 70 (IP side) & Rehabilitation of Puricha Minor and Baghar Escape & Repair of 04 Nos Road Bridges and Rehabilitation of Road Bridge at RD 65 & RD 100 and Link canal and repair of Gates & Gearing of RD 22 Ex: Regulator and RD 77 Ex: Regulator along KB Feeder Lower and Rehabilitation of Sondo Disty Ghar Massan, Minor and Rehabilitation of Existing Pumping Station along KB Feeder Canal at RD-99+0 R/Side		509
151	Rehabilitation of Modules along Gaja Branch, Re-Sectioning & Repair of Modules RD- 0 to 65 Both Sides, Shorki Minor RD- 0 to 53 Both Sides and Re-Sectioning / Rehabilitation of Kazia Branch and Shadi Large including Bridge over Akram Wah Escape RD-64 of Kadhan Sub Division (Revised) (SDG # 17)		145
152	Rehabilitation of Tajo Dero Sub Branch RD-0 to 90, Garhi Chand Disty RD-0 to 100 & Lund Minor RD-0 to 20.5		135
153	CC Lining of Muhammad Khan Disty		20

154	Remodeling of Jan Muhammad Distry Ex: Mirza Branch at RD 75.5 of X-Regulator, Head Regulator, Road bridges & Water Courses Taluka Thul District Jacobabad		105
155	Construction of Supplementary Channel IE Tando Masti Fall to Sanharo Wah to Mohabbat Wah along Rohri Main Canal, Taluka Kotdigi, District Khairpur		20
156	New Manufacturing / Replacement of Gates of Head Regulator and X- ing Regulators of Kotri Barrage Region (SDG # 7)	25	155
157	Pilot Project for Lining of Rohri Canal from RD-616 to RD-647		42
158	Rehabilitation of Pontoon Bulk Head Gates & Gearing Mechanical System Including Painting off-taking Canal Head Regulator and Sub- Regulator Gates and Mechanical Structure of Kotri Barrage Head Works (SDG # 7)	286	187
159	Realignment / Construction of Bund from North Side of Malir River, Karachi		405
160	Cement Concrete Lining of Sangro Distry System	93	
161	Rehabilitation and Lining of Jamrao Canal (i) Rehabilitation of Jamrao Canal Old from Mile 0 to 49 Mile, (ii) Rehabilitation of Twin Jamrao Canal Old from Mile 0 to 59 Mile and (iii) CC Lining Jamrao Canal West from Mile 0 to 300 Tail (SDG #6)	98	6,840
162	Cement Concrete Lining of Mir Minor From RD-0 to 34+500	41	
163	C.C Lining of Jiskani Distry-I from RD- 000 to 46+500 RDs	389	
164	C.C Lining of Menglo Minor from RD- 0.000 to 38+200	255	
165	C.C Lining of Lundki from RD-00 to Tail and Gachero Minor from RD-00 to 14+500	948	
166	Cement Concrete Lining along Dalipota- Minor from RD-0+000 to 45+100	265	
167	Cement Concrete Lining of Shahpur Minor from RD-0+000 to RD-15+000	165	
168	Cement Concrete Lining of Kunner-II Distry from RD-0+000 to RD-21+000 (Revised on 10.05.23)	202	
169	C.C Lining of Johi Branch From 0.00 Mile to 28.0 mile	1,064	
170	Cement Concrete Lining of Sherkhan Distry from RD-0+000 to 60+000	132	
171	Cement Concrete Lining of Begna Distry from RD-0+000 to 64+500	761	
172	Cement Concrete Lining from Head to Tail of Attarki Minor and Bhorga Minor (Revised on 25.05.2024)	398	
173	Cement Concrete Lining from Head to Tail of Karampur Distry and Ghar Marho Distry	373	
174	Cement Concrete Lining of Inam & Abad Minor from RD-0.00 to 32 & 2 RDs	138	
175	Cement Concrete Lining of Jherruk Distry from RD-0+000 to Tail (Revised on 29.04.2024)	501	
176	Cement Concrete Lining from Head to Tail of Ghar Machi Minor, Hala Minor, Sonada Distry	410	
177	Cement Concrete Lining of Ghadap Branch from RD-0+000 to 47+100	612	
178	Cement Concrete Lining along Padhar Minor from RD-0+00 to 43+350	311	
179	Cement Concrete Lining along Shadi Wah Small from RD-0+000 to 51+500	318	
180	Cement Concrete Lining of Bulri Distry from RD 0 to 62.400	657	
181	Cement Concrete Lining of Shorki Minor RD-0 to 53.200	374	
182	Cement Concrete Lining of Nasrat Canal from RD-218+000 to 316+100	2,743	
183	Cement Concrete Lining of Patni Distry from RD-0+000 to 72+400 (Revised on 05.10.23)	930	
184	C.C Lining Along Faiz Ganj Wah 80 to 163+/ CC Lining of Halepota Minor from RD- 0+00 to 9+400 & CC Lining of Ali Nawaz Wah from RD.64+ to 139+200	837	
185	C.C Lining along Sunni Guni Branch Ex- Akram Wah and Rehabilitation of its Regulating Structures	1,802	
186	Lining of Adio Distry and Khoski Minor	439	
187	Cement concrete Lining of Daleri Distry system	190	
188	Cement Concrete Lining of Geri Minor from RD-0 to 30+500	111	
189	C.C Lining of Nabisar Branch	448	
190	C.C Lining Sarfaraz Branch RD-0+00 to 46+00	517	

191	C.C Lining Chang Minor RD+00 to 34+600	205	
192	C.C Lining of Jagir Minor from RD 0.0 to 22.092 in Southern Dadu Division	57	
193	C.C Lining Khairpur Feeder East Canal RD-12.8 to 42.8	400	
194	C.C Lining of Ahmedpur Minor RD-0 to 15 Abad Minor RD-0 to 24 and Piryalo Minor RD-0 to 38.500	150	
195	Construction of C.C. Lining of Tanwary Disty RD.0 to 110	459	
196	Construction of C.C. Lining of Gul Shah Disty RD-0 to 60	197	
197	Construction of C.C. Lining of Let Minor from RD-0+00 to 59+00 and Poran Minor RD - 0+00 to 13+800	475	
198	Construction of C.C. Lining of Hyderabad Branch from RD-0+000 to 87+500 at Ex- Rohri Main Canal	1,380	
199	Rehabilitation / Lining of Bago Wah, Dahar Wah Upper (its off-taking channels) / Rehabilitation of Irrigation Colony Ghotki and Pano Akil including Drainage System and Rehabilitation / Brick Lining of Pir Wah RD- 7 to 24	311	200
200	Providing Water from Lower Nara Canal RD-455 to Tar Hashim Via Jasro and Construction Reservoir (Revised)		2,012
201	Providing Stone Pitching along SM Branch RD-124 to 224 IP Side (Outer Slope) and Rehabilitation of SM Branch RD-124 to 224 IP Side and De-Silting work along SM Branch RD-120 to 224 in SM Branch Sub-Division No. II & III		20
202	Construction of Retaining wall along Sathio Wah from RD-0 to 8 R/S (Village Wari Goth) RD-8 to 14 R/S (Village Dogar / Mahar) and RD-24 to 27 B/S (Village Khadim Hussain Katohar)		70
203	Rehabilitation of Bumbly Sub-Branch, Lathwaro Minor		129
204	Construction Irrigation Channel Shaheed Benazir Bhutto Minor Ex- Warah Branch at RD-156 NIP Side (Revised)		26
205	Construction Retaining Wall along Saidu Dero Minor RD-0 to 12.0 B/S (Naudero Town Limit) (Revised)		70
206	Sindh Barrages Improvement Project (Phase-I) - Rehabilitation and Modernization of Guddu Barrage - (Total: Rs. 20,241.00 M) IDA Share (90%) Rs 18,271.00 M (FEC) & GoS Share (10%) Rs1,970.00 M) (SDG # 6 & 7)	1,108	220
207	Providing Stone Pitching from RD-0+500 to RD to RD-7+500(6500) and Construction of Reatining Wall from RD-0+000 to 0+500 & RD-7+000 to 8+800(2300) along Rajib Canal	122	
208	Remodeling and Rehabilitation of N. W. Canal & Khirthar Branch-Total Cost Rs. 2968.951 Million	400	
209	Sindh Water & Agriculture Transformation (SWAT) Project Irrigation Component	20	
210	Raising and Strengthening along Rice Canal RD-82.5 to 83.5 RD-130 to 138 RD-148 to 151 RD-225 to 229 RD-230 to 235 RD-272 to 287 RD-314 to RD-315 RD-339 to RD-342 & RD-365 in Rice Canal Division Larkana	40	
211	De-silting of Rice Canal RD-80 to 82+500 RD-83 to 86 & 110+00 to 220 in Rice Canal Division Larkana	326	
212	Construction of DOS along Rice Canal IP & NIP side (34 Nos.) in Rice Canal Division Larkana	30	
213	Repair Replacement Regulator Gates of Rice Canal Division Larkana	100	
214	Painting of Main Barrage Gates and Structures of Kotri Barrage Head Works, Jamshoro	69	
215	Rehabilitation of Wadhu Wah & Fasadi Wah with C.C Lining and Repair of Brick Lining.	225	
216	Rehabilitation of Changing of Location of Saeed Khan Pumping Station including lining of remaining reaches of Saeed Khan Disty.	50	
217	Restoration/ Emergency work along Mithrao Division, Thar Division, Jamrao Division & Nara Canal Division of Area Water Board Mirpurkhas	50	

218	Construction/ Replacement of X-Regulator Mile 28th, 37th, 56th, 58th & 60 of Begari Canal Division Jacobabad	2,240	
219	Shaheed Benazir Bhutto-Extension of Sweet Water Supply Scheme for Thar (Umerkot to Keetari)	20	
220	Construction/ Replacement of X-Regulators on Gul Disty off takes from Mile 56, Tajo Dero Branch and Lal Shahbaz Disty Off takes from 58 & Bulra Disty off takes from Mile 60 of Begari Canal & 9th Mile of Begari Canal	787	
221	Constructing of Retaining wall Begari Canal at RD-33 L/S, Mirza Wah at Mile 12 X Regulator D/S both sides and Road Bridge Miza Wah at Mile 13.	99	
222	Raising of Lying Supplement Minor Ex-Raj Wah Branch to Takol Branch RD-0+00 to 9+00 and Repair of Suprio Bund Sluice at RD-68 Crossing Lal Minor RD-13 is Rice Canal Division Larkana	25	
223	Rehabilitation of Nasir Branch System Ex- Fuleli Canal Badin	135	
224	Construction of New Head Makhdoom Sahar Pumping Station including Lining of Makhdoom Sahar Canal from RD - 22+000 to 26+00 and Stone Pitching River Side of Canal from RD - 0+000 to 10+000	10	
225	Re-construction / Rectification of Modules of Sattah & Malia Branch including Rehabilitation Works	56	
226	Boring & Installation of 15 Nos. New 2.0 Cusecs (Fresh Water) Solar Energy Tubwells & Construction of Operator Quarter, Pump House, Discharge Box Approach Path & Water Course for 15 No. New 2.0 Cusecs (Fresh Water) Solar Energy	13	
227	C.C. Lining of Mahar Minor from RD-0 to Tail	8	
228	Re-adjustment of Bed of Aqueduct crossing of Dall Disty RD - 18+300 over Indus link in Shahbaz Irrigation Division Sehwan	3	
229	Emergent Work Recoupment/ Restoration of Damage/ Launched Bund Apron and stone pitching along Hajipur (H.P) Bund Mile 6/2 to 6/7 of Upper Pinyari Division, Hyderabad.	150	
230	Constructing "J" Spur along Ulra Jagir Bund Mile 4/0+125 & Constructing 2 No "T" Spurs at Mile 4/2+300 & Mile 4/4+580		800
231	CC Lining of Thar Tail Disty and Mandhel Disty of Umerkot Sub Division (Revised)		321
232	CC Lining of Phakka Disty RD-0 to 65 Division Southern Dadu		130
233	Rehabilitation of Dahar Wah Upper System including Narly Minor (SDG# 6)		22
234	Stone Pitching Work along BS Feeder from RD-50 to 269 B/S in various portions		3
235	Construction of Bund Sluice at RD- 248, 275 & 295 F P Bund		32
236	Cement Concrete Lining of Mell Minor from RD-0 to 34.00 in Tando Adam-II Sub-Division		75
237	Enhancing Capacity of New Support Channel from Raj-Wah RD-34 to Kakol Wah RD-40. Rehabilitation of Kakol Wah from RD-40 to RD-49 and Two Gates of Raj Wah at Manjan		119
238	Lining of Gharib Disty		50
239	Providing Stone Pitching from RD-240 to 263.5 along F.P Bund Saifullah Magsi Branch Division, Shahdadt		17
240	Remodeling / Rehabilitation of Raees Wah, Chotta Begari & Choi Shakh in District Shikarpur (revised) (SDG# 6)		198
241	Remodeling of Khair Shah Minor		58
242	Lining of Hearan Disty (Re-Revised)		26
243	CC Lining of Puran Disty RD-0 to 135.5		100
244	Normal Emergent Flood / Rain Damages in Sindh		263
245	Lining & Retaining Wall of Sone Wah Disty, Taluka Thul		45
246	CC Lining of Chiber Minor RD 0 to 10+0 & Bhogri Minor RD 0 to 19		45
247	Establishment of Mechanical Circle- II and Rehabilitation / Restoration of Infrastructure in Mechanical Circle, Mirpurkhas		38
248	Extension of Modules from Jamaro Canal (Karichan) - revised		198
249	CC Lining of Digri Disty including Structures (93 RDs) Revised		128
250	Lining of Rohri Main Canal RD 645.670 to RD 680	166	5,024

251	Construction of Stone Spurs and Studs, Construction of Trench Bund Mile 43/2 to 44/2 at Munarki, Recouping of apron along with 20 ft: wide Stone Berm between Studs and Spurs, Construction of Drain with Pumping Station, Construction of Road (Revised)		2,000
252	Providing Stone Studs and Spurs along HP Bund between Mile 3/0 to 14/7 and Recouping Stone Apron and Damaged Stone Pitching along HP Bund (Various Reaches) (SDG #6)		750
253	Re-Construction Work along SM Branch RD-0.0 to 120 in SM Branch Division (revised) (SDG # 17)		13
254	Constructing Cement Concrete Lining of Salhani Forest Minor from RD-0 to 17		132
255	Providing & Installation of Solar Energy System at 132 Mile Dadu Canal (Tail) Pumping Station (SDG# 6)	44	57
256	Sindh Resilience Project (Irrigation Component) for Strengthening Flood Embankments & Constructing Small Dams including Systems for Improving Resilience (World Bank Funded), (SDG #6)	580	124
257	Restoration of Flood & Rain Damages Emergent Works (revised) (SDG # 7)		270
258	C Lining of Gajra Branch (Revised)		973
259	CC Lining of Nabisar Branch Canal System of Mithrao Division (Phase-I)		175
260	Construction of C Lining of Baberloi / Mourth Minor from RD -0.0 to 16 Tail, Taluka Khairpur		51
261	Construction Stone Apron Studs Recoupment of stone Apron Along Ulra Jagir Bund Mile 4/4+580 to 6/5		569
262	Constructing of Three Nos. T-head spurs, One No. J-Spurs and Four Nos, Studs along Old Tori Bund from Mile 0/6 to mile 1/4		575
263	Construction T-Head Spur at LS Bund mile 16/3+520, 16/5+580, 16/1 and Providing Stone Pitching and Stone Apron along LS Bund Mile 16/0 to 17/0 (Hakra Point) in Northern Dadu Division	522	500
264	Construction of T-Head Spurs at LS Bund Mile 40/4+500 Moria Loop Bund Mile 0/0+400 & 0/1+600 in Northern Dadu Division-Revised	17	522
265	Re-coupment of Damaged Stone Apron and Stone Pitching of Spurs 0/5, 1/1, 1/6 & 2/3 along Ruk Loop Bund		270
266	Construction and Rehabilitation of Structures along Ghaibidero System Larkano Division Larkano		16
267	Shaheed Benazir Bhutto Sweet Water Project for Thar (Umerkot to Keetari) - Providing Water from Thar Wah of Umerkot to Keetari Taluka Chachro Via Dhalo Jo Tar, Kaplore, Viklore Tar, Budha Sandha, Vechlo Par, Ratan Jo Tar and Constructing of Underground Reservoirs - (Revised)	2,685	2,075
268	Providing Embankment and Common Bank at Thull Mohabbad Chori from Hakim Shah Regulator of Warach Branch	20	
269	Lining of Surhari, Brandi, Maldasi, Shahdadpur Minors and Ujjano, Lundo Distry	340	
270	Construction of Retaining wall along Mirwah Ex-Ghar Branch RD-20 to 30 B/S, Mohabbat Minor b/w Thull Distry & Chori Branch, Warah Div. and reconstruction of Modules RD-0 to RD-70 and Raising & Strengthening of banks of Sanhro Cheelo	189	
271	Left Over Essential Works of Sehwan Area District Jamshoro & Dadu (Construction of Lift Channels over RBOD System for Feeding Tail Reaches of Dadu Canal)	50	
272	Renovation / Re-Construction of road Bridge over Mirwah Canal at RD-33 near Railway Station Begmangi, Installation of Steel grill over Retaining Wall along Mirwah Canal B/S RD-69 to 79, 70+200, 72+180, 73+450, 74+200, 75+150, 76+200, 77+15 & 78+570 Both Sides & Garhi Pull to Bhurghari X-Regulator, Providing Stone Ptching along Mirwah Canal from RD-208 to 230 & 231 to 291 B/S (Revised on 23.02.22)	56	
273	Constructing Stone Pitching at RD-9+00 to 15+00 RMC B/S and Downstream Fall Structure 16, 17, 18, 19 & 20 B/Sides.	179	

274	Construction of Retaining wall along Mirwah Canal from RD-144 to 150 B/S and Ali Bahar Wah from RD-12 to 20/BS, RD-29 to 33 L/Side & RD- 44 to 46+500 B/S including Construction of Office Block of XEN East Division, Khairpur and Providing Stone Pitching on Ali Bahar Wah (Damaged Reaches)	58	
275	C.C. Lining of Khanti Naseer Link Canal from RD-0+00 to 18+800	731	
276	Improvement of Irrigation System of Ghotki Feeder Canal Area Water Board Ghotki	996	
277	Renovation, Reconstruction and Improvement of Landhi's on all Canal System of Sindh (Phase-I).	48	
278	Renovation / Reconstruction of Regulator on Distries and Minors in Sindh	400	
279	Providing Stone Apron, Stone Pitching, Earth Work along L.S Bund Mile 18/0 to 20/0 in Northern Dadu Division Larkano. Total Cost Rs.241.586 Million) (GOP Share 65%) & (GOS Share 35%) - NDRMF	5	
280	Constructing Stone Pitching along RMC from RD-25 to 191.2 @ Eroded Portion. (Revised on 23.02.22)		
281	Recoupment of Damaged T-Head Spur along Agani Akil Loop Bund 2/6+250, Stone Apron at Mole of 0/4 and 0/7 Mole Spurs and 09 Nos. Stone Studs in Larkano Sub Division.	116	
282	Rehabilitation of Salar Disty and its off-taking system and stone pitching along Mastoi Disty RD-8 to RD-16 and construction of protection wall along Kehar Minor RD-15+500 to RD-18+000 B/S (2500 ft.). Construction of culvert (Two) along Kehar Minor @ RD-16+500 and 170+000.	3	
283	Improvement of Fulleli Canal System	1,628	
284	Remedial Works to improve Feeding of Manchar Lake from existing Irrigation System	244	
285	Completion of Remaining Works & Commissioning of Substantially Executed Schemes Past Years	936	
286	Rehabilitation of Shah Awais Pumping Scheme in Shahbaz Irrigation Division Sehwan (Revised 21-03-23)	16	
287	Construction of 01 No. New Pumping Scheme Near Village Noorpur in Taluka Manjhand (Revised 21-03-23)	35	
288	Construction of Stone Pitching and Earth Work along Various Portions along B.S Feeder Main Canal from RD-193 to 269 (Revised 05-08-22)	100	
289	Construction of 02 Nos. New Pumping Schemes Near Village Dari Gancha and Village Kalri in Taluka Manjhand (Revised 21-03-23)	56	
290	Flood Emergent Works for Fiscal Year 2019 - 20	927	
291	Construction of Culverts (Bridge) on Shahbaz Minor, Taluka Sakrand, Shaheed Benazirabad	27	
292	Construction Retaining Wall along Qutub Minor RD-3 To 6 IP Side = (2800 ft) NIP Side – (2550 ft) in Northern Dadu Division Larkano	32	
293	Development of Crop Need Based Decision Support System (DSS) for Efficient Canal Operations and Utilization of Ground Water Potential.	20	
294	Construction Retaining Wall along Bakrani Disty at RD-2 Both Sides (1000 ft)	15	
295	Retaining wall along Gaj Diverson Bund in Southern Dadu Division.	1,441	
296	Strengthening / Earth work from RD-20.0 to 75.0 & Stone Pitching from RD-20.0 to 75.0 along F.P. Bund in Southern Dadu Division	448	
297	Providing 04 Nos. J-Head Spurs with Apron and Stone Pitching for Centralizing the River Flow Up-stream of Guddu Barrage Region	896	
298	Re-sectioning and Sand Coring of Gharaghat Bund mile 0/0 to 2/4 and Haibat Bund mile 0/0 to 5/0 in Begari Division Kashmore.	875	
299	Construction of J-Spurs U/S Left Guide Bank to Centralize the Flow of Indus River Water under Thatta Sujawal Road Bridge (Doolah Bridge) in Kalri Baghar Division Thatta.	1,938	
300	Construction of C.C. Lining from Head to Tail of Kot Lalu Minor, Magsi Minor, Drakhi Minor & Gabri Minor including allied structures in Nasrat Division.	370	
301	Construction of C.C. Lining from Head to Tail of Pubjo Minor & Kazi Ahmed Minor including allied structures in Dad Division.	340	

302	C.C. Lining of Hamerji Minor from RD-0 to 64.025, Lining of Lakha Minor from RD-0 to 30 and Lining of Geru Minor from RD-0 to 21 West Division.	346	
303	C.C. Lining of Dodha Minor from RD-0 to 27 including Construction of Head Regulator and C.C. Lining of Sangi Distry from RD-0 to 57	658	
304	C.C. Lining of Santrahu Minor off-takes from Nara Canal RD-238	176	
305	Lining Work of Kudan Shakh RD-16+00 To 32+00 = 16 RDs Rice Canal Division Taluka K.N Shah	158	
306	Rehabilitation / Improvement of Irrigation Network in Warah Division, Shahdadt Kot Irrigation Division & Saifullah Magsi Branch Division.	164	
307	Re-section /De-silting of Rice Canal & Dadu Canal District Larkano.	100	
308	C.C. Lining of Reti Minor from RD-0 to 74.5 (Revised on 22.05.23)	70	
309	Cement Concrete Lining of Ali Bahar Branch from RD-0+00 to RD-20+900	323	
310	C.C. Lining of Paban Minor Ex-Daro Branch RD-0 to RD-20 Lower Pinyari Division.	92	
311	C.C. Lining of Tando Ghulam Ali Distry from RD-0 to RD-39 Phulleli Canal Division (Revised on 10-05-23).		
312	Rehabilitation of Channels of Ghotki Feeder in Ghotki Feeder A.W.B.(Revised on 22.05.23)	92	
313	Construction of C.C. Lining along Daulatpur Distry from RD-100+00 to Tail.	323	
314	C.C. Lining of Nagna Distry from RD-0.00 to 82+500 (Revised 05-08-22)	285	
315	C.C. Lining of Sorhadi Branch from RD-0 to 95	673	
316	C.C. Lining of Sherwah from RD-0 to 70.50	572	
317	C.C. Lining of Raj Wah from RD-0 to 55	199	
318	C.C. Lining of Dadhrako Distry from RD-0 to 36.0	208	
319	C.C. Lining of Sultani Branch & its 6 Nos. off-taking channels.	2,328	
320	C.C. Lining of Oderolal Branch from RD 0+000 to 201+000	3,233	
321	Improvement of Farash Complex Existing Irrigation Network for Ensured water saving for Thar Coal and the safety of Thar Coal Carrier Channel	1,603	
322	C.C. Lining along Gillispie Distry, Jatoi Distry, Nabi Bux Minor, Bakrani Minor, Larkano Minor and Fateh Wah Minor	179	
323	C.C Lining of Kandiyari Minor RD - 0 to 28	127	
324	C.C Lining of Kobri Minor RD - 0 to 44 & Construction of Bridge Over Mirwah Canal at RD-260 b/w Deh Jalbani Thari Mirwah	235	
325	Construction of Bridge over Desert Pat Feeder at RD 20 to 21 & Remaining Works of Bridge over Pat Feeder near Buxapur Renovation & Repair of Geehal Pur Minor/ Construction of Flank wall damaged portion of D/S 0 mile Head Regulator Desert Canal	13	138
326	Construction of X-Regulators along Garhi Chand Distry RD-45, Jani Dero Distry RD-24.5, Replacement of Deck Slab and Flaxier Apron Road Bridge over B.S Feeder RD-114 and Construction of Road Bridge RD-37 Qaser Shakh and Hairo Shakh RD-8	39	
327	C.C. Lining of Dilshad Minor, Samathri Minor and Chotiari Minor in Sanghar Sub-Division		250
328	C.C. Lining of Naukot Branch Canal System and Akuto Distry of Mithrao Division		100
329	Emergent Works in Anticipation of Flood 2017 and Rain Emergency		1,500
330	C.C Lining along Mehrabpur Branch RD 0 to 28+200, Khuda Bux Minor RD 0 to 29, Langerji Minor RD 0 to 19+500 & Repair / Replacement of X-Regulator Chiber Minor at RD-27 (Revised)		525
331	C.C. Lining of Akal Minor RD-0/0 to 13/0 (Tail) and Bhan Minor RD-0/0 to 14/0 (Tail) off-takes from Naukot Branch of Mithrao Canal including Structures		114
332	Construction of Retaining Wall along Sehra Branch from RD-40 to 42 NIP Side in Tharu Shah Irrigation Sub-Division and Construction of Bridge over Nathar Detha Minor RD-06 (Revised) (SDG# 6)		32
333	Rehabilitation of Kotri Barrage & Allied works up to 4 RD Akram Wah, K.B. Feeder & Combined Channel under Kotri Barrage Division		60
334	C.C. Lining of Desert Minor from RD-0 to 22		30
335	C.C. Lining of Kaleri Distry and Rashdi Minor		75
336	C.C. Lining of Belaro Distry & Theaba Minor in NCAWB		208

337	Lining of Lakhaki Distry		332
338	Lining of Chatto Distry and Kinjhar Minor	35	95
339	Constructing 03 Nos. T-Head Spurs along K.K. Bund at mile 12/2, 12/6 and 13/2 & Providing Stone Apron and Pitching from mile 13/4 to 14/4	37	
340	C.C. Lining of Daulatpur Distry Taluka Kazi Ahmed (Revised) (SDG# 6)		199
341	Construction / Replacement of Regulator at 19th Mile of Begari Canal (B.C)		268
342	Lining of Daro Bazar Minor from RD 0 to 40 I/C Construction of Modules		16
343	Construction of Pakka Channel from Danistar Pumping Scheme to Inlet Point of Danistar Canal I/C LS Bund Crossing Structure		111
344	C Lining of Government Lift Channel @ RD 158 R / Side and RD 171 R / Side along Upper Nara Canal and Stone Apron @ RD 52 to 54 R / Side and RD - 96 L / Side of Upper Nara Canal	109	78
345	Construction of Pumping Scheme over Indus Link (RBOD) for Feeding Tail Area of Dal Distry		31
346	Rehabilitation of Rice Canal RD-372 to 407 and its off-takes systems viz, Mehar Branch, Dhamrao Branch and Sehar Branch		165
347	Construction of Stone Studs & Pitching along Upper Nara Canal b/w RD-225 to 575 and Rehabilitation of Khipro Canal from 14th Mile to 49th Mile & Constructing Pre-stressed Bridge at RD 415 Nara Canal (Revised)		667
348	Rehabilitation of Irrigation Channels & Infrastructure at Taluka Ghorabari, Thatta		291
349	De-silting along Rohri Main Canal system from RD-891 to 1038 and its off-taking channels, Nasir Branch System from RD-0 to 80 and RD-247 to 354 and its off-taking channels including Repair/ Reconstruction of Modules in Nasir Division Hyderabad		505
350	Assuring Water Supply for Karachi upgrading Keenjhar Lake System (under Urban Water Supply) (Revised)		3,073
351	Remodeling of Regulators of Gungri Large RD 20, Sujawal X-Regulator RD 90 and Chahto Large RD 108 of Darro Branch and Providing gates in Regulators of (i) Chahto X- Regulator RD 108 of Darro Branch, (ii) Head Regulator Sattah Branch RD 170 to Darro Branch, (iii) Sattah Branch X-Regulator RD 14, 26, 70 (iv) Malia Branch Head Regulator RD 190 of Pinyari Branch, (v) Malia Branch X-Regulator RD 6, (vi) Mirkhana X-Regulator RD 130 of Pinyari Branch (vii) Begnah X- Regulator RD 160 of Pinyari Branch and CC Lining along Fateh Wah RD- 3 to 7 in City Area of Mirpur Bathoro		340
352	Re-Sectioning of Bathoro Branch Drain from RD 0 to 107.0 and Construction of Arbab Link Drain RD 0 to 10 & Extension of 5R Karo Gungro Branch Drain from RD 26 to 36		30
353	Control of Water logging & Salinity in Dehs Barachari, Maldasi, Shahdadpur and Tando Adam Taluka Shahdadpur & Tandojam, District Sanghar.		51
354	Lining of Sangi Minor from RD-0 to 28		122
355	Rehabilitation / Replacement X- Regulators & Head Regulators in SIDA.		186
356	Construction of Mohan & Haleli Recharge Dam in Central Kohistan		269
357	Construction of 2 Nos. Small Storage & Delay Action Dams Miskeen Jahan Khan Khoso and Bartlao Dam in Taluka Nagarparkar		77
358	Construction of Ashoro Kach Diversion Bund Dam in Central Kohistan		115
359	Construction of Kali Das Dam and Veera Wah Dam in Nagarparkar Area (Thar Region)		9
360	Construction of Recharge Dam across Angai-II Nai in Central Kohistan (Revised)		1
361	Construction of Gravity Weir / Recharge Dam across Gamrach Dhoro in Central Kohistan & Construction of Guwari Recharge Dam in Central Kohistan near Jhangara Taluka Sehwan		230
362	Rehabilitation / Restoration of Malir Weirs – I, II, III & Thado Dam	54	273
363	Construction of Six (06) Nos Umeed- Jo-Wandio, Ranasar, Gotrawa, Abasar, Khane-Jo-Wandio and Khetlai Dams in Nagarparkar Area (Thar Region)	315	311

National Drought Plan - Pakistan

364	Construction of 4 Nos. Small / Recharge Dam in Small Dams Organization in Sindh (i) Lahoot Recharge Dam in Gaddap Karachi (ii) Pharphe Recharge Dam across Pharphe Nai in Upper Kohistan (iii) 02 Nos. Small Recharge Dams namely Mivo Dam and Mani Jo Wandio in Nagarparkar Area (Thar Region)	752	
365	Sindh Resilience Project (Irrigation Component) for Construction of Small Dams including System for Improving Resilience - Phase II (Through Additional Financing) -	10,395	
366	Construction of 09 Nos. Tarries namely Saeedo Rind, Mubarak Rind, Kagio Manjhay, Chawar, Parno, Tharparkar.	5,050	
367	Construction of Dillan Dam - II and Restoration of Downstream of Dillan Dam -I in Upper Kohistan - I Dadu	171	
368	Makhi Farash Link Canal Project (Chotiari Phase-II) for Water Supply to Thar Coal	5,306	
369	Sindh Barrage Improvement Project Phase- II, Rehabilitation and Modernization of Sukkur Barrage	100	
371	Construction of Three (03) Nos Recharge Dams Dillan, Naing & Mazarani Recharge Dam in Upper & Central Kohistan (Revised)		80
372	Construction of Dams / Reservoirs of Rainy Water in Natural Flows of Hills in Taluka Nagarparkar U.C. Adhigam	48	95
373	Construction of Re-Charge Dam across Dhal Nai in Central Kohistan		50
374	Construction of Gravity Weir Dam across Dhadhar Nai, Upper Kohistan		50
Total		95,591	59,965

ANNEXURE III: ADP-BALUCHISTAN PROJECTS RELATED TO DESERTIFICATION AND DROUGHT

Costs of main projects of ADP-Balochistan related to desertification and drought are as follows:

#	Projects	Expenditure (million PKR.)	
		July 2019- June 2024	July 2014- June 2019
1	Sabakzai Dam Command Area Development Project (Phase-II) (Phase-1 Exp. 119.519 Million).		106
2	Kachhi Canal Command Area Development.	718.4	786.6
3	National Programme For Imp: of Water Courses & Water Storage Tanks Phase-II (Balochistan Component) 5 Years	3,928	
4	National Programme For Enhancing Command Area of Small & Mini Dams In Barani Areas of Pakistan(Bal: Comp) 5 Years	1,483	
5	Introduction of Low Water Required Crops.	81	95
6	Installation of Solar Operated System in District Sibi, Bakhtirabad, Lahri.		10
7	Construction of Local Bores, PVC & Pounds with Solar Systems In District Barkhan.		5
8	Provision of PVC Pipeline, Water Ponds, Water Channels, Trenches For Grapes Orchard & Land Leveling In Pb-36 Kalat.		5
9	Installation of Solar Operated System Up to 150 Rft 2" For Agricultural Purpose in U/C Shahabzai, & Others Shirani Cum Zhob.		20
10	Provision of Solar Scheme For Agriculture Purpose (OFWM).		90
11	Construction of Bandat and Land Leveling For Agriculture Purpose In U/Cs of Subdivision Buleda, District Kech		9
12	On Farm Water Management & Efficiency Enhancement Program (70/30 Gob/Farmer Sharing).	791	
13	Introduction of Modern Agriculture Through Tunnel Farming In District Ziarat	38	
14	Promotion of Tunnel Farming In Balochistan	453	
15	Date Plant In Panjgor	167	
16	Sustainable Land Management Program (Phase II).		32
17	Intensifying Horticultural Development By Improvement of Crop Productivity.		53
18	Green Tunnel, Saraghurgai, Jamil Ur Rehman.		3
19	Oil Extraction Machines For Olive and Fruit Khuzdar, Nall and Musakhail.		20
20	Establishment of Almond and Pomegranate Nursery In Balochistan.		5
21	Establishment of Stone Fruit Nurseries In Balochistan		5
22	Awareness Programs On Livestock Products & Disease.		18
23	Establishment of Camel Research Cum Camel Milk Processing Unit at Musakhail.		5
24	Establishment of Camel Research Cum Camel Milk Processing Unit at Washuk.		35
25	Backyard Rural Poultry Balochistan (Provincial Share)	271	
26	Mass Scale Vaccination Medication & Establishing Animal Health Information System	123	
27	Fight Against Congo Virus.	157	35
28	Upscaling of Green Pak Programme (Forestry Component)	1,842	
29	Multi-Sectoral Project For Conservation of Juniper Forest (Devolved).	170	132
30	Water Conservation Practices Through The Construction of Water Storage Tanks For Agriculture Purpose (30 Nos) In District Chagai.	3	
31	Agriculture Bore with Solar Operated Irrigation System For Agriculture Purpose For The Farmers of UC Kaisak Shahrak	10	
32	Agriculture Bore and Solar System For Killi Naimatullah District Ziarat.	5	
33	Agriculture Bore with Solar Machinery at Winder, Hub	3	
34	Agriculture Bore with Solar Operated Irrigation System For Farmers of Mc Bulida District Kech	10	

35	Agriculture Solar Systems In UC Patkin, Tomulk, Raskoh, Tootazi, District Kharan	10	
36	Agriculture Bore and Solar System For Killi Gogi District Ziarat.	5	
37	Solar Operated Pumping System For Farmer of Menaz Buleda	9	
38	Solar Agriculture Bores For Farmers of UC Malant, Gomazi, Balicha & Pulabad	10	
39	Solar Operated Pumping System For Farmer of Kochag Buleda	9	
40	Solar Agriculture Bore For Farmers of Bit, Reko and Jantari Kuar Buleda	4	
41	Provision of Mobile Workshops For Quetta, Loralai, Turbat, Sibi, Nasirabad, Khuzdar and Rakshan Divisions.	48	
42	Agriculture Bores In UC Miskan Kalat, UC Jamak , UC Gazi, UC Tootazai, UC Joda District Kharan	8	
43	Water Resource Utilization By Drilling & Development of Bores & Installation of Solar System To Expand The Agricultural Lands In District Chagai	30	
44	Solar Operated Pumping System For Farmer of Reko Ronghan, Sorap, Buleda	10	
45	Provision of Agriculture Tubewell with Solar System at UC Nichara District Kalat Ghulam Rasool S O Mazar Khan	3	
46	Agriculture Bore and Solar System For Killi Zareen Chongi Ahmedoon District Ziarat.	5	
47	Agriculture Bore and Solar System For Killi Syedan District Ziarat.	5	
48	Solar Operated Pumping System For Farmer of Mc Buleda	10	
49	Agriculture Bore with Solar Operated Irrigation System For Farmers of Bit Kore Pusht Buleda, District Kech	10	
50	Agriculture Solar Systems In UC Miskan Kalat, UC Jamak & Gazi, UC Tootazi, UC Ulmark, UC Sarawan, District Kharan	10	
51	Solar Agriculture Bores For Farmers of UC Rodbund, Kohad, Mir Abad, Srinkin, Kolaho	10	
52	Agriculture Bore and Solar System For Killi Janan District Ziarat.	5	
53	Solar Agriculture Bores For Various Farmer of Mc Tump Area	10	
54	Agriculture Bore and Solar System For Killi Bala Chongi Ahmedoon District Ziarat.	5	
55	Agriculture Bore and Solar System For Killi Panizai Ahmedoon District Ziarat.	5	
56	Agriculture Bore and Solar System For Killi Tangyan District Ziarat.	5	
57	Agriculture Bore and Solar System For Killi Sarmkhsai District Ziarat.	5	
58	Instalation of High Efficiency System with Local Bores & construction of Water Storage Tanks/Land Development for Agricultural Purposes Through Water Management in Zhob, Killa Saifullah & Sherani	50	
59	Construction of Muglo Small Water Storage Reservoir Land for Agriculture and Drinking Purpose Tehsil Dasht, District Kech	8	
60	Drilling of Agricultural Bore with Solar Operated Irrigation System and Construction of W/Storage Tank (50x50x4.5) For Farmers of Soragi Koshk & UC Gokdan, Kech	21	
61	Drilling of Agriculture Bore, Provision & Installation of Solar Operated Irrigation System For Farmers of Nasir Abad	33	
62	Agricultural Productivity Enhancement Through Laying of PVC Pipe, D/D Bore Solar System and Pumping Machinery at Buleda Kech	20	
63	Construction of Agriculture Ponds In UC Sarawan, Ulmark, Norozkalat, Miskan-E-Kalat, Joda Kalat, Jamak, Raskoh, Totazai & Tomulk, District Kharan.	24	
64	1- Construction of Water storage tank 60x60x4.5, 50x50x4.5 2- Promotion & Installation of PVC Pipe 3" Diameters, 4" Diameters B-Class, 3- Local Bore Along with Solar System at Pb-38.	30	
65	Provision and Installation of Agriculture Solar Pumping System On Already Existing Bores For Agriculture Farmers Khuzdar	30	
66	Drilling and Development of Agriculture Bores Along with Solar Pumping System For Agriculture Farmers of Khuzdar.	30	
67	Provision and Installation of High Density Poly Then (HDP) Pipe Line On Farm Water Management Agriculture Purpose For Farmers of Huzdar.	30	
68	Provision and Installation of Submersible Pumping Machinery at Already Existing Bores For Agriculture Purpose Khuzdar.	30	
69	Installation of PVC Pipe For Agriculture Purpose In Tehsil Killa Abdullah.	15	

70	Agriculture Productivity Enhancement Through Installation of Solar Systems In Killa Abdullah.	24	
71	Provision of Reservoir Water storage tank Talab For District Harnai.	5	
72	Agriculture Productivity Enhancement Through Installation of Pumping Machinery For The Farmers of Tehsil Killa Abdullah	20	
73	Agriculture Productivity Enhancement Through Water storage tank, Lining of PVC Pipe and Bore with Solar System In Gulsitan Killa Abdullah	19	
74	Agriculture Productivity Enhancement Drilling and Development of Bore and Installation of Solar Pumping System In Killi Mehmood Saigi Tehsil Gulistan	12	
75	Agricultural Productivity Enhancement Through Provision of Solar Tube Wells Construction of Water storage tank, water course and Installation of PVC Pipes In Killi Haji A. Bari Prakhai Tehsil Dobandi	45	
76	Agriculture Development Programme Through Water Management Resources (OFWM) at Loralai Tehsil Bori & Mekhtar Loralai	50	
77	Improvement of Agricultural Production Through Construction of Water storage tank, Lining of Water Courses & Installation of PVC Pipes For Former of District Loralai	40	
78	Protection Bund & 4 Nos of Talab at Village Shabir Bhanger D.M Jamali.	32	
79	Enhancing Agricultural Command Area By Providing and Installation of RCC Pipe Line, Construction of Water Storage Tanks Through Agricultural On Farm Water Management Nushki	18	
80	Provision of PVC Pipe For Agriculture Purpose To The Former of Halqa Pb20 Pishin 3 Pishin	15	
81	Agriculture Development Program Through Water Management Resources (OFWM) District Washuk	26	
82	Construction of Water Storage Tank In All U/Cs In District Ziarat	492	
83	Construction of Flood Protection Wall In All U/Cs In District Ziarat	426	
84	Installation of Solar System For Agriculture Purpose In Jhal Dasht and Mand, Kech	30	
85	Installation of Solar System For Agriculture Purpose In Dasht Nigore and Mand, Kech	30	
86	Agriculture Bore with Solar System Abdul Salam S/O Abdul Rauf Usmanzai Khar Shang Sinjavi. Construction of Open Surface	2	
87	Construction of Small Storage Water Reservoir Detention Bund Makes and Dalee For Agricultural & Drinking Purposes Tehsil Dasht, District Kech	5	
88	Agriculture Resource Development Components Through OFWM Anjira Tehsil Zehri District Khuzdar	10	
89	Uplifting of Livelihood of Farming Community Through OFWM Components In District Chagai	3	
90	Enhancing Agriculture Production Using Efficient Irrigation System	11	
91	Supervision & Installation: of Submersible Machinery, Drilling & Development of Bores & Installation: of PVC Pipes For Agriculture Purpose 22 U/C,Pb-10.	5	
92	Project For Olive Expansion In Balochistan	162	
93	Promotion of Olive Plantation In Tehsil Kanraj District Labela.	66	
94	Promotion & Development of Olive Crop In Balochistan	170	
95	Promotion & Development of Pistachio In Balochistan.	35	
96	Promotion & Development of Saffron Cultivation	35	
97	Enhancement of Agriculture Productivity Through Capital OFWM In District Ziarat and Sanjavi	73	
98	Agriculture Bore Solar System District Kohlu	78	
99	Agriculture Water Resource Management In District Noshki	20	
100	Agriculture Productivity Enhancement Through Laying of PVC Pipe, Diameters Bore, Solar System and Pumping Machinery In Killa Abdullah.	120	
101	Construction of Ponds & Laying of Pipe Line For Agriculture Purpose In Tehsil Ziarat & Sanjavi	92	
102	Zafran Cultivation Plan	11	
103	Mirani Dam Command Area	20	

104	Poverty Alleviation & Counter of Covid-19 Effects Through Agriculture OFWM Components For The Farming Community of District Nushki.	41	
105	Installation of 10 No. of Bores & 11 Nos. of Solar System For Agriculture Purpose In Gulistan District Killa Abdullah.	13	
106	Provision & Installation of PVC Pipe 3" For Killi Dub, Zarak Mehmood Abad, H. Baso, Golai, Saeedabad & Adjacent Areas at Pishin.	12	
107	Construction of Water Pond For UC Haji Khan Toba Kakari Tehsil Barshore.	3	
108	Provision of PVC Pipeline 3" For UC Yaro-I & li District Pishin.	1	
109	Construction of Pond For Water Storage For Killi Mullah Shado Hafiz Habibullah Pishin	1	
110	Agriculture Development Program Through Water Management Resources (OFWM) Loralai.	3	
111	Establishment of Tube Well Malik Faisal Khuwajakhail at Goth Tehsil Bandiko Road Lasbella.	1	
112	Construction of Water Channel In District Ziarat.	3	
113	Supply of HDPE Pipe For UC Saro, Kach, Kawas, Zandra, Ziarat, Mana, Sapezandi District Ziarat.	3	
114	Construction Water Channel Through Agriculture Development Programme Through Water Management (OFWM) Zhob.	3	
115	Mitigating The Natural Climates In Agriculture Sector By Providing Various OFWM Components In The Tehsil Moola District Khuzdar	50	
116	Agriculture Development Program Through Water Management Resources (OFWM) 50x50 Numbers of Talab In Various Areas of District Pishin.	49	
117	Water Resources Management For Agricultural Growth Through Water Management Interventions In District Killa Saifullah	8	
118	Improvement In Livelihood Through OFWM Components at Various Sites In District Chagai	20	
119	Improvement In Livelihood Through OFWM Components In District Chaghi	25	
120	Transformation In Agriculture For Productivity Enhancement OFWM Components In District Chaghi	39	
121	Agricultural Prod Through Water Management Scheme In UC Wahvi-I, Wahvi-li, Sharqi Luni, Gharbi Luni, Palos Kalan, Thal Chutiali, Thal Sharqi, Thal Gharbi Duki	40	
122	Construction of Water Course From Gazgi Baint To Gazg City Attaabad For Water Supply & Agricultural Purpose Kalat.	13	
123	Mirani Dam Command Area Development Project (Phase-II) (Phase-I Exp. 105 Million).	200	241
124	Provision of 1000 Solar Tube Wells For Agriculture Purpose Based On Border Proximity of The Villages.	1,797	
125	Agriculture Development Scheme for Water Resource Management in District. Pishin.		5
126	Agriculture Development Scheme for Water Resource Management in District. Killa Abdullah.		10
127	Agriculture Development Scheme for Water Resource Management in District. Loralai.		5
128	Water Management Program (Water Courses, Ponds etc.).		1,484
129	Management of Water Resources for Agriculture Development in Potential Areas in District Sherani Cum Zhob.		48
130	Settlement of Kachhi Area.		45
131	Construction of Water Channel at Tehsil Nighari Yousaf Chotai, Village Mir Sardar Khan Rind, Mirozai Wah New Rehanzai		17
132	Development Schemes Water Management at Tehsil Khaliq Abad & Kalat		17
133	Command Area Development Kachhi Kanal Phase-I Part-B	531	
134	Provision/Installation of Local Bore, Solar System, PVC Pipes, etc. for Agriculture purpose		111
135	Agriculture Productivity Enhancement Through Water Resource Management Tehsil Dobandi & Gulistan		50
136	Repair/Maintenance of Karezes & Construction of Protection Wall & Water storage tank Gishkore etc.	10	30
137	Agriculture Development Through Water Resources Management Killa Saifullah (OFWM).		30
138	Establishment / Development of Chilgoza Nursery	34	

139	Improvement of Rangelands For Food Security & Livelihoods Improvements Suleiman Range, Balochistan	153	
140	Strengthening of Fragile Eco- System Trees Prone To Falling Due To Erosion In Various State / Protected Forest of Balochistan	58	
141	Forestry Through Drip Irrigation As Pilot Project at Chiltan, Khazaband and Mariabad, Coastal Belt	79	
142	Extension of Mangrove Plantation In Kalamat, Jiwani & Gaddani		14
143	Balochistan Water Resources Development Project (BWRDP).	16,544	
144	Desertification, conduction and enhancement of Vegetative Cover Through Sand Dune Stabilization, and Plantation in Nushki, Chaghai, Kharan, Q. Abdullah, Ksf & Washuk.		44
145	Establishment of Nursery For Juniper at Harboi Kalat, Ziarat, Zarghoon Area, Toba Achakzai Parakhi.		42
146	Establishment of Nursery For Chilgoza, Walnuts, Pistachio & Shina.		81
147	Conservation of Forests.		44
148	Re-Vegetation and Restoration of Rangeland.	30	94
149	Establishment of National Park at Ziarat.	26	51
150	Mesquite Forest Management For Fuel Wood & Charcoal Supply In Balochistan		4
151	Strength: of Network of Protected Areas in Balochistan for Biodiversity Conservation, Education and Scientific Research.	97	23
152	Conservation of Forest & Wild Life In Communities Protected Forest and Wild Life Areas Through Social Services & Others	74	
153	Construction of Flood Protection Bund at Bakhtiarabad City Tehsil Lehri	25	
154	Soil & Water Conservation In Bayyana Bakhtiar Morazai, Qilla Saifullah.		30
155	Construction of Forest Park in Khaliqabad District. Kalat.		14
156	Kot-Khan Muhammad Irrigation Scheme Musa Khel.		48
157	Construction of Regai Mir Ali Khail Perennial Irrigation Scheme District. Zhob (Revised).		396
158	Small Scale Irrigation Project (I.D.A. Assisted).		802
159	Small Irrigation Schemes for District. Qilla Saifullah.		218
160	Small Irrigation Schemes In Musakhail.		91
161	Construction of Protection Walls at District Harnai.		100
162	Irrigation Schemes In Kachhi District.		114
163	Completion of Flood Protection Wall Surdabka Killi Shahnawaz.		
164	Construction of Serkhi Check Dam Kujja Area Choharkot District Barkhan.	50	
165	Construction of Flood Canal Murad Wah Gola To Miran Much In Tehsil Lehri District Sibi	38	
166	Construction of Peenghorra Zamur Chur Dam Lop Area Dera Bugti	11	
167	Construction of Pahari Dam Tooba Dera Bugti	11	
168	Construction of Check Dam In Achanak Bazar, Dasht Kech	18	
169	Construction of Narghat Chuody Check Dam (Warishi Rehmani) Baghaow Area District Barkhan	6	
170	Construction of Check Dams In Upstream Side of Kach Delay Action Dam In Sara Khula Area.	60	
171	Construction of Delay Action Dam Shorma Kaur Nodiz District Kech.	75	
172	Construction of Gratto Dam Lack Rohil & Check Dam Goth Haji Dhani Bux Tehsil Dureji	8	
173	Construction of Thopu Dam Spezandi	38	
174	Construction of 05 Nos of Small Dams In Zhob.	506	
175	Construction of Sara Khula Dam District Quetta	253	
176	Construction of 04 No. Delay Action Dams In U/C Raskoh District Kharan.	682	
177	Construction of Shank Delay Action / Storage Dam at Tootak Area Khuzdar.	245	
178	Construction of Delay Action Dam Washain Giddar, District Surab.	165	
179	Construction of Sehren Wali Check Dam Dhaman Baghao Area District Barkhan.	28	
180	Construction of Waram Berbani Dam Vitakary Area District Barkhan.	107	
181	Construction of Kohly Tah Jamal Check Dam Baghao Area District Barkhan	48	
182	Construction of Manadani Kach Dam Qasmani Area Rakhni District Barkhan	34	

183	Construction of Sara Khula Landwar Check Dam In District Sherani	6	
184	Construction of Delay Action Dam Dwalgad Shin Ghar Area Tehsil Sherani	50	
185	Construction of Katki / Khaisar Delay Action Dam In Johan Area	190	
186	Construction of Pishuk Storage/ Delay Action Dam In District Chagai.	133	
187	Construction of Gohar Choto Dam Dera Bugti	25	
188	Agricultural Resource Utilization Through Various OFWM Components In Tehsil Zehri District Khuzdar	10	
189	Construction of Flood Protection Bund, Check Dams and Other Irrigation Schemes in District. Lasbella.		19
190	Construction of Katto Flood Irrigation Scheme in Dureji, District. Labella.		18
191	Construction of New Aqueduct at Rd8+125 of Main Labella Canal + Construction of New Aqueduct Rd15+465 Memon Garah Labella Canal.		83
192	Construction of Small Irrigation Schemes in District. Ziarat.		118
193	Improvement/Provision of Irrigation Water System at District Killa Saifullah (BDA).		205
194	Repair of Bandat and Small Dams Gwadar.		50
195	Repair of Bandat and Small Dams Gwadar.		39
196	Construction of Protection Bundats & Water Channel in District. Musa Khail.		19
197	Cleaning of Karezes Pb-50 Kech (Up & Down).		50
198	Small Irrigation Schemes In District Musa Khail.		30
199	Construction of Untum Flood Protection Scheme in District. Nasirabad.	5	65
200	Construction Karezes and Protection Bandats in District. Musakhel.		4
201	Construction of Retaining Wall at Both Side of Kanj River 1.5 Km at Tehsil Mawand, District Kohlu.		14
202	Extension and Improvement of Karezes, Qilla Saifullah		30
203	Construction of Various Development Schemes of irrigation (Retaining Wall at Pb-6 Quetta).		27
204	Construction of Talaabs & Protection Bands at Different Villages of District Kachhi. (Through LG)		10
205	Excavation of Well For Agriculture Purpose For The Lands of Mohammad Ibrahim & Others In Killi Tora Derga District Zhob		2
206	Development Schemes of District, Qilla Saifullah (Extension & Improvement of Karezes In District. Qilla Saifullah).	46	50
207	Completion of In Complete Schemes (Small Scale Irrigation Projects Project).		491
208	Pazha Weir Perennial Irrigation Scheme In Kohlu.	80	187
209	Purpoghani Irrigation Scheme Moranj Tehsil Phelawagh District Dera Bugti.		5
210	Completion of 2 No Gravity Dam Shin Ghar Manda, Pashtoonabad, Quetta		28
211	Construction of Danga/Flood Protection & Installation of Bore In Tehsil Sui & Phelawagh District Dera Bugti.		12
212	Construction of Flood Protection Walls In Pb-19 at Zhob		61
213	Construction of Protection Bunds In District Nushki.		4
214	Construction of Flood Protection Wall Haji Paind Khan Hussainzai, Zhob		5
215	Construction of Water Pond, Channels and Retaining Walls For District Bela.		17
216	De-Silting and Provision of Flood Protection at Buleda River Sub Division Buleda, Kech (BDA)		13
217	Construction of Flood Protection Wall for Protection of Agricultural/ Houses in Various U/C Area District. Sherani.		18
218	Khanozai-Balozai Headworks Pishin		46
219	Construction of Flood Protection Wall at Barakzai Mir Ali Khail Area Pb-19 District Zhob.		9
220	Flood Protection Wall Killi Dab Shah Azam Spin Tangi District Harnai.		2
221	Construction of Fiber Flood Protection Bund, Check Dams Abdul Other Irrigation Schemes Tehsil Bori Mekhtar and Loralai City		45
222	Construction of Flood Protection Walls In U/C Bostan, Mughtian, Bhutai Nasaran, Malazai etc.		7

223	Construction of Protection Walls at Khaliqabad.		12
224	Construction of Delay Action Dam & (10) Protection Walls In Kohlu.		20
225	Construction of Flood Drain/ Cross Culverts at Union Council No.43.		3
226	Rehabilitation of Bore Nallah Irrigation Channel Nushki.		15
227	Flood Protection Band For Village Ghulam Bolak & Talli.		15
228	Construction of Flood Protection Walls District Harnai		36
229	Construction of Flood Protection Upper & Lower Tuka, Peer Shore.		12
230	Flood Protection Walls Including Graveyard Walls Koz Shinghari Walls 22 U/C Including M/C Huramzai etc. Pb-10		12
231	Construction of Flood Protection Bund for Agricultural Land Near Khan Wah & construction of 1 No. Cunent on Lehri River 1 No. Spur (R)		12
232	Construction of Flood Protection Wall at Moola, Karkh, Baghbana, Tootak, Parkoh & Zehri		56
233	Construction of Irrigation Channels at Mola, Karkh & Zehri		20
234	Flood Protection of Khost Bazar District Harnai		7
235	Flood Protection of Lands Along Left & Right Bank of Kech Kur District. Kech (Devolved).		120
236	Construction of Shore Protection Wall at Pishukan (West Bay) Gwadar (1.2 Km).		56
237	Improvement of Pat Feeder, Khirther Canal Distributaries.		443
238	Restoration and Improvement of Spillway Manki Delay Action Dukki Area Loralai		33
239	Construction of Flood Water Reservoir, For Irrigation Purpose at Nili Bostan		25
240	Delay Action Dam Kohe Nazo at Surab, 01 Local Bore For Jatt Shoran, 02 No Local Bore For Machhi Shoran		121
241	Lining of Flood Channal of Upside Takhtani Nala.		38
242	Flood Protection Bund Around Dera Allah Yar District Jaffarabad		150
243	06 Nos. Flood Dispersal Structure Along with Conveyance System On Nari River, District Bolan (5% Gob Share)		201
244	Balochistan Integrated Water Resource Management Project (BIWRMP).	10,923.7	13.3
245	Protection Band In Balanari District Kachhi.		23
246	Construction of Flood Protection Band of Left Side of Kech Khaur (Phase Iv)	274	
247	Extension of Mazoo Karez Kawas Area Ziarat.	15	
248	Construction of Flood Protection Bund Tejaban District Kech	10	
249	Construction of Flood Protection Bund Miskihoshab District Kech	25	
250	Construction of Flood Protection Bund Shapok District Kech	10	
251	Construction of Goangao Flood Protection Bund Left & Right Bank at Katato River Gaongao Ferozabad Area District Khuzdar	120	
252	Raising of Bunds of Kirther Canal System		32
253	Protection Bund at Akhter Abad of Surani Kech, Ginna Kech & Mohd Hassan Bazara, Kech.		16
254	Rehabilitation of Tomni Dam Barkhan		5
255	Raising & Strengthening of Flood Protection Band & Construction of Council On State Feeder Lehri etc.		53
256	Construction of Flood Protection Wall/Channels at Mandokhail Area/Kakar Khurasan Area Pb-19		70
257	Construction of Flood Protection Walls In District Haranai.		10
258	Protection Wall of Naal River at Jhao.		208
259	Rehabilitation of Water Channels Dhadar/ Balanari etc. District Kachhi.		26
260	Construction of Protection Band/Ganda Jat In Bhag, Bala Nari, Khattan, Sani Shoran.		28
261	Construction of R/S Protection Bund On Meer Wah In Tehsil Lehri.		3
262	Construction of Storm Water Channel From Anjira Chashma To Anjira Village, Khuzdar		30
263	Construction of Storm Water Channel Form Soro To Bundarow Dam, Anjira Zehri		30
264	Construction of Flood Pro: at Killi Kach Baqidat Hurramzai & Surrounding In Kingry, Musakhel.		5
265	Construction of Channel Syphon Walls Killi Urgoi Urbooz Harnai.		20
266	Construction of Flood Protection Walls Shadezai Zhob.		25
267	Flood Protection Wall Yawala Zhob River District. Qilla Saifullah.		5

268	Storm Channel & Flood Protection For Graveyard & Orchards For Ziarat Town.		12
269	Flood Protection Band at Asfandiyar Village Kashmir Abad Qilla Saifullah.		10
270	Construction of PCC Water Channel In Sanni Area, Mashkaf & Dhadar.		30
271	10 Mini Weirs in Bela, Lakhra, Uthal, Kanraj etc. in Labella District		15
272	Rest: of Channel B & Clearance of Channel, In Oba Liari, Oba-2 Lakhra and Kuk Chanal Lakhra.		8
273	Construction of Small Dams/Karezat Flood Protection Walls & Drilling of Bores Laying of Pipe Line in District. Ziarat	94	
274	Rehabilitation of Nurg Tar Flood Irrigation Scheme	401	50
275	De-Silting of Khirther Canal and Its Distributaries.	100	110
276	Rehabilitation & Distributaries of Pat Feeder Canal System, Jaffarabad and Naseerabad.	220	100
277	Construction of Dam On Takri River In Toba Area District Killa Abdullah	110	
278	Stone Masonry Wall For Abadi Kawas Gharbi Killi Shaheed Baba Nazar Muhammad Ziarat.	60	
279	Construction of Channels In Murda Karez Area Tehsil Chaman.	30	
280	Rehabilitation and De-Silting of Main Patfeeder and Kirther Canals	488	
281	Construction of Diversion Cum Water Controlling Band with Regulating Gates Zangi Nawar Area District Nushki	40	
282	Construction of Flood Protection Bands, Kishari, Langra, Qazi Aziz Bug, Mulla Bilal Daroo Wala, Umeedali Shikari Tehsil Bela.	15	
283	Construction of Distribution System For Flood Canals Moosa Wah, Buledi Wah and Muharam On Nari River Tehsil Bhag District Kachhi	31	
284	Construction / Rehabilitation of Existing Flood Irrigation Scheme at Banj Mithri District Kachhi.	13	
285	Clearing & RCC Covering of Main Nala Hub.	85	
286	Rehab: of Karez & Construction of Water Pound at U/C North One District Sherani.	9	
287	Construction of Flood Protection Wall Ghuryasa Sadar Area	5	
288	Construction of Flood Dispersal Structure and Reservoir Killi Mahol Sedan Loralai.	14	
289	Pacca Mori with Protection bund 600 Ft Motiyani Chak Wayaro Seth Ramzan Suk. Uthal & Protection bund Chbechi Dora Naka Son: Cleaning of Rakh Essa Phorai 3km M. Oba Liari	6	
290	Construction of Peer Ibrahim Plum Concrete Storage Dam at Karkh Area District Khuzdar	81	
291	Construction of Flood Protection Bund For Village Khorri Kumbro District Khuzdar.	15	
292	Extension & Improvement of Channel Arri Pir Perennial Irrigation Scheme Dureji	45	
293	Rehab:/ Construction of Water Pond and Flood Canal Chal & Dadh Wah, Iqbal Amanullah, Takari Ramzan, Chakar Ramezai, Mitha Khan Wah Sunni & Anwar Khatan	3	
294	Rehabilitation/Construction/ Excavation of Flood Canal Bebrag Wah, Tehsil Sunni Circle Shoran District Kachi	30	
295	Rehab:/ Construction of Flood Protection Band at Chakar Mari, Dhadar District Kachi	10	
296	Construction of Flood Irrigation Scheme Murad Wah Baghdar Shumali	38	
297	Raising/ Strengthening of Flood Protection Bund Wazir Machi Tehsil Lehri District Sibi	10	
298	Construction of Protection Wall Killi Mir Ayub Norgamaja Deed Zehri, Kandkashmi, Tirasani, Samwanicheel, Dehzehri, Gaz An, Bhapo & Zalikan.	21	
299	Construction of Protection Wall Roll, Mardan, Chadi Zehri.	8	
300	Construction of Protection Band Main Road To Killi Sheri Karkh, Sarap, Nokjo, Sun, Hako, Lakharo, Chutta, Jattak, Bhalonk, Gulbhit, Mulki Karkh, etc.	16	
301	Bed Clearance of Gus Flood Irrigation Canal In Tehsil Jhal Magsi	10	
302	Bed Clearance of Yakdar Flood Irrigation Canal In U/C Safrani District Jhal Magsi	10	
303	Construction of Protection Band/Wall of Eastward side of Lunda Dora Near Lakara Road Moza Madi Uthal Bela.	12	
304	Construction of Flood Protection Scheme Killi Mehmoodabad Khiderzai Durg Musakhail.	5	
305	Protection Band Killi Aseyaban District Nushki	15	
306	Construction of Protection Bundat at UC Tomul, Miskan-Kalat, Joda- Kalar, Tootazi, Sarawan, Noroz-Kalat & Teh Kharan	47	
307	Construction of Flood Canal Meero Wah Shoran, District Kachhi.	104	

308	Construction of Flood Retention Wall Kili Molvi Ataullah, Dad M. Ghibzai, Shad Kahol, J/Piralizai, Habibzai, Dadan Machka, Gulstan, Raz M. G. Nabi Sydan, New Mjak, Mezai	10	
309	Rehabilitation of Super Passage 15 Nos of Escape Canal.	25	
310	Construction of Channel at Aghbarg, Tehsil Sanjavi, District Ziarat.	10	
311	Extension of Irrigation Channel at Killi Salari Sherani.	5	
312	Construction of Distribution System Between Gullawair and Jatali Flood Canals In Tehsil Lehri District Sibi.	58	
313	Construction of Flood Protection Bund Airport Villas Near Airport Road.	13	
314	Construction of Protection Bund For Village Shaalbaghdar In Tehsil Lehri District Sibi	1	
315	Construction of Off Shore Water Reservoir For Groundwater Recharge, Agriculture and Drinking Purpose	10	
316	Rehabilitation of Bund and Canal at Tunia Village In Tehsil Lehri District Sibi	10	
317	Construction of Bund / Ganda and Outlets at Moza Hayat Khan (Village Wazira) in Tehsil Lehri District Sibi	11	
318	Rehabilitation of Jawad Abad Minor, 9I Minor of Mohabat Distributary and Construction of Umer Kot Minor of Jhat Pat Distributary.	30	40
319	Construction of Weir On 1st Distribution System Fugal River Tehsil Lehri	43	
320	Construction of Water Reservoir For Village In Tehsil Lehri	50	
321	Construction of Flood Protection Bund , Water Reservoir and Flood Canal Khanoo Village Tehsil Lehri Sibi	20	
322	Construction of Gabion Spurs and Construction of Cunnet on Khan Wah River (4 No 50 Ft Each cunnet 50 Ft) In Tehsil Lehri	5	
323	Construction of Flood Protection Wall Main Khairwah Distribution Irrigation System Down Stream Tehsil Lehri.	3	
324	Extension and Repair Flood Protection Band Jhal Magsi Town		10
325	Desilting and Rehabilitation Scape Distributary.		10
326	Rehabilitation & Cleaning of Gus Canal In UC Safrani District Jhal Magsi.		10
327	Rehabilitation & Cleaning of Flood Irrigation Canal In UC Singhar		15
328	Raising, Strengthening & Bern Cutting of Dhori Distry From Rd 0 To Rd 52.		10
329	Improvement & Rehabilitation of F & P Bund Kot Magsi To Chukhi Village		15
330	Rehabilitation & Improvement of Flood Protection Band Dhori In UC Not Magsi		15
331	Cleaning and Desilting of Flood Irrigation Canal In U/C Mat Sindhar.		10
332	Cleaning and Desilting of Flood Irrigation Canal In U/C Safrani.		20
333	Cleaning and Desilting of Flood Irrigation Canals In U/C Jhall Magsi		10
334	Cleaning and Desilting of Flood Irrigation Canals U/C Hatyari		14
335	Rehabilitation and Cleaning of Yakdar Flood Canal-Ii In U/C Safrani		4
336	Rehabilitation and Cleaning Yakdar Flood Canal-Iii In U/C Safrani.		4
337	Rehabilitation and Cleaning Yakdar Wah Iv/Canal Iv In U/C Safrani		4
338	Construction of Flood Protection Bonds In Tehsil Dhadar, Bala Nari, Mach, Sanni, Bolan Wear.		20
339	Construction of Water Reservoir at Tehsil Bala Nari and Sanni District Kachhi.		4
340	Construction of Water Reservoirs In Garh & Kontri Area.		20
341	Sanzala Delay Action Dam		7
342	Sawar Kaur Dam District. Gwadar (Revised).		152
343	Repair and Rehabilitation of Wali Tangi Dam with Installation of T/Well and WSS Network.		129
344	Construction of Shromag Kocha Dam Buleda In Pb-49 District Turbat.		
345	Construction of Simsori Dam Buleda In Pb-49 District Turbat.		
346	Construction of Dambany Dam Bit Buleda In Pb-49 District Turbat.		
347	Construction of Kan Tangi Delay Action Dam, Qilla Saifullah.		21
348	Construction of Gat Shalezai Gravity Dam In Muslim Bagh, Qilla Saifullah.		74
349	Construction of Dam Gokar Loghai Including Water Channel For Landlord, Musakhail		19
350	PC-II For Consultancy Services/Feasibility Study of Raising, Strengthening & Stone Pitching of F.P.B. Pat Feeder & Khirtheer Canal System		31

351	Rehab: of Barnimai Dam Spillway & Construction of Flood Protection Wall 10 No & 6 No Delay Action Dams In Bori, Makhtar & Loralai.		49
352	Construction of Nicke Lahree Dam Waram Area in District. Barkhan		3
353	Emergent Shore Protection West Bay of Jiwani		61
354	Completion of Incomplete Schemes (Construction of Small Dams Projects)		421
355	Construction of Khurasan Dam at District Killa Saifullah		25
356	Construction of 05 Nos Delay Action Dam In Pb-13		50
357	Construction of Delay Action Dam Shinghari Saimzai		15
358	Construction of Dams / Small Scale Irrigation Schemes In Hanna, Kuchlak, Chashma, Aghbarg, Nosar & Sara Gurgai (BDA).		15
359	Construction of Dam In Dandro Area District Kachhi.		20
360	Construction/Rehabilitation of Protection Bands Tehsil Mach Gishtri.		10
361	Res: of Flood Damages of 1st Distribution Irrigation Scheme Fugal Tehsil Lehri		15
362	Restoration of Flood Damages of 3rd Distribution Irrigation Scheme Fugal Tehsil Lehri		20
363	Rehabilitation & Restoration of Small Storage Reservoirs Nadagi Kaur, Belag, Dor Dagar & Hotag.		25
364	Reservoir For Murad Wah Shumali Near Tower Tehsil Lehri		10
365	Rehabilitation / Restoration of Apeeg Delay Action Dam Tehsil Tump.		20
366	Construction of Flood Protection Bund Khalilabad Turbat.		25
367	Construction of Flood Protection Bund Patan Kahoor To Shezadar Bazar Turbat.		20
368	Construction/Rehabilitation of Khan Wah Irrigation Chanel, Durug, District Musakhel		10
369	Rehabilitation and Cleaning Yakdar Flood Canal-V In U/C Safrani		4
370	Raising & Strengthening of Dori Band Distry (Remaining Works).		20
371	Constuction of Flood Protection and Infiltration Gallary and Remodeling Saliza Irrigation Channel		30
372	Construction of Flood Protection Wall Killi Zarak Abad Kingri.		10
373	Delay Action Dam Sman-E- Koor Absar Kech.	50	
374	Construction of Protection Band For Per Goth and Adjoining Villages Lunda Dhora Uthal	37	
375	Construction of Gill Daff Flood Protection Wall Tamboo Area Kholu	5	
376	Construction of Delay Action Dam Dram-Kol Pidark In District Kech.	60	
377	Rehabilitation & Restoration of Small Storage Reservoir Sohree Bal Dasht.	35	
378	Construction of Flood Protection Wall For Graveyard Killi Badini District Noshki.	15	
379	Structure Work & Minor of Begari Canal Jhal Magsi.	163	
380	Extension & Improvement of Sara Khula Karez In Kan Mehterzai Area District. Killa Saifullah.	10	
381	Extension & Improvement of Khaizal Karez In Kan Mehterzai Area District.Killa Saifullah	10	
382	Construction of Flood Protection Bund of Left and Right Side of Kech Kaur Phase-ii	297	
383	Irrigation & Protection Scheme In Surgardern Gwash Kharan	55	
384	Construction of Delay Action Dam Killi Nazray Shamoza Toi District Musakhail.	60	
385	Construction of Flood Protection Band at Chorbok Kallag Sani District Kech.	10	
386	Construction of Delay Action Dam at Innayatullah Karez District. Qilla Abdullah.	51	156
387	Rehabilitation of Bellar Storage Dam Pasni District Gawadar.		95
388	Command Area Development (Shadi Kaur Dam) Provincial Share of Construction of Shadi Kaur Dam (Federally Funded Project)		308
389	Construction of Check Dam at Ochari, Lop Rakhan & Phulyani Eshani Barkhan		10
390	Construction of Delay Action Dam at Moma Samad Khan Rakhni Barkhan		10
391	Construction of Check Dam at Ochari, Lop Rakhan & Phulyani Eshani Barkhan		15
392	Construction of 100 No Check Dams In Quetta Valley.		285
393	Construction of Flood Protection Walls & Earthen Bund in Chaman Area Pb-li District. Killa Abdullah		30
394	Construction of Zindra Tangi Dam Ziarat		184
395	Restoration of Kanangaha Dam Agharg Irrigation Scheme Quetta.		14
396	Restoration of Rehabilitation of Earth Kholi Dam District Qilla Saifullah.		59

397	Construction of Yasini Dam Muslim Bagh District Qilla Saifullah.		26
398	Construction of Rodhan Delay Action Dam Kallag District Kech.		25
399	Construction of Khazobi Killi Khadozai Delay Action Dam Including Flood Perennial W.C. System In Toi Sar Area.	46	40
400	Construction of Pulinaki Dam at Ormara Gwadar	29	
401	Construction of 1 Nos of Dams Tehsil Ormara Gwadar	45	
402	Small Dams / Water Shed Management Around Quetta	744	
403	Construction of Chashma Dor Small Storage/Delay Action Dam In Zehri Area District Khuzdar	14	
404	Construction of Flood Protection Wall For Kili Raheem Khan Balochi, Kili Chung & Ghulam Muhammad District Barkhan	6	
405	Construction of Check Dam Shanika Akhtarzai UC Mandozai District Pishin	13	
406	Construction of Gravity Check Dam Malak Noor Ali Warjaroba Bagh Tehsil Barshore District Pishin	13	
407	Construction of Sakery Wali Check Dam Sooman Area, Dungee Lahree Dam Mohma Samad Khan Area and De-Silting of Nahar Kot Dam Barkhan	74	
408	Construction of Dam at Haji Shams Jalalzai Area District Killa Saifullah	15	
409	Construction Check Dams Hazarganji, Quetta	28	
410	Construction of Dam Tahgai Tor Tangi District Zhob	14	
411	Raising of Dam Body Restoration of Spill Way Gokar Delay Action Dam Zawar Meran District Musakhail	71	
412	Construction of Provincial Dams In Balochistan.	850	4,091
413	Delay Action Dam at Zaryavvillag, Hub.	4	
414	Flood Protection Bund In Yaloo To Dashtughalzal In District Kalat	10	
415	Land Acquisition, Compensation, Re- Settlement and Security Agreement For Naulog Dam District Jhalmagsi	9,354	
416	Flood Protection Bund at Sorap Kaur Korey Posht Sorap Near Iqbal Haji Wahid Bakhsh Agriculture Fram Buleda	4	
417	Extension of Flood Protection Bund at Shapuk	10	
418	Flood Protection Bund at Solovi Kaur Nako Hamza Solo Buleda	3	
419	Flood Protection Band at Hospital Bazar Kohad Tump	4	
420	Construction of Flood Protection Wall Kawas Sharki District Ziarat.	5	
421	Remaining Work of Lopo Dam at Ajeera District Kalat Old PSDP 2013.14 S.No.430 & 455.		28
422	Construction/Restoration of Small Irrigation Bundats in Different Areas of District. Gwadar.		5
423	Construction of Kharh Tangi Dam U/C Wah Hasan Khel District Musa Khail,Pb-15.		55
424	Construction of Kahjori Dam District Musa Khail.Pb-15	65	50
425	Extension of Pat Feeder Canal Third Party Validation of Work Done.		3
426	Construction of Basol Dam District Gawadar (Provincial Share).	230	1,550
427	Construction of Mara Tangi Dam Loralai (Provincial Share).		50
428	Construction of 100 Small Dams In Tehsil Dobandi, Gulistan, Killa Abdullah & Chaman (Provincial Share).	173	130
429	Toiwar / Batozai Storage Dam, District Killa Saifullah.	27	170
430	Con of Jabadar Delay Action Dam Kekain District Kech	29	
431	Flood Protection Bund In Kohing In District Kalat	8	
432	Kooki Check Dam Kalat	10	
433	Construction of Kun Delay Action Dam.		60
434	Construction of Hanjeer Man Azambel Delay Action Dam Zeedi.		197
435	Construction of Dasht Goran Dam Along with Water Channel for Beeh Sui. (DBDP)		15
436	Construction of Kinri Dam.		90
437	Construction of Small Dams In District Zhob.	90	60
438	Construction of Dam In District Pishin.		60
439	Construction of Water Storage Dam Gazain, Gawash Panjgoor		24
440	Construction of Earthen /Gravity / Gabion Check Dams In Various Areas of District Zhob.		25

441	Construction of Garuk Storage Dam District. Kharan.	911	100
442	Construction of Khanki Rindh Dam Suman Area District Barkhan.		14
443	Construction of Hoti Dam at Baghao District Barkhan.		9
444	Construction of Lanjani Dam Khatta Chowki Area District Barkhan.		16
445	Construction of Peer Wali Dam Damani Area District Barkhan.	20	20
446	Small Check Dams, Pir Bambul, Wasra Landhi, Sand, Lohi Kanraj		35
447	Construction of Jalab Gandain Dam, Dasht District Mastung.	20	10
448	Construction of Dam at Killi Wani Samazai Dam Zhob		7
449	Construction of Protection Bund In Mach & Balanari.		30
450	Construction of Toba Check Dam Dera Bugti.	10	
451	Construction of Garruki Delay Action Dam at Gokdan District Kech.	125	
452	Construction. of Dam at Panjpai Sardar Aurenzaib Sumalani.	10	
453	Construction of Dam at Killi Kan Mehtarzai Muslim Bagh.	44	
454	Imp: of Dam Body/Spillway Kannero Dam District Gawadar.	10	
455	Construction of Gajro Dam Mithri UC Khurkhera Tehsil Sonmiani	25	
456	Construction of Aneero Dam Mithri UC Khurkhera Tehsil Sonmiani.	38	
457	Construction of Karkacha Dam UC Hara Sethar Tehsil Lakhra	108	
458	Construction of Shenzani Storage Dam District Gwadar	537	
459	Improvement of Spillway & Delay Action Dam District Kech.	12	
460	Construction of Desilting of Dara Dra Delay Action Dam Kan Methertzai Area & Construction of Killi Sarana Check Dam Muslimbagh Killa Saifullah.	10	
461	Construction of Check Dams and Other Retention Structures In Balochistan.	2,993	
462	Raising of Khanozai Storage Dam For Aug: of WSS For Khanozai Town with Establishment of Two Water Supply Scheme.	30	
463	Construction of Dhonghi Lahree Check Dam Badyani Area (Takhra)	10	
464	Construction of Kharrah Check Dam Chowdhi Bhghao Area	15	
465	Construction of Channal Check Dam Khatta Chowki Lanjani Area (Takhra)*	5	
466	Construction of Storage Dam at Hetan Kallag Sani.	20	
467	Construction of Darat Dam Kup Dilgawash.	10	
468	Rehabilitation of Bhal Dam Tehsil Qadirabad District Dera Bugti.	10	
469	Construction of Darwazago Tang Kachao Dam.	70	
470	Construction of Tang Dam (Tang River) (Sb).	123	
471	Check Dam Mashkichah District Chagai.	25	
472	Construction of Check Dam in Chandai Gud in Kan Mehtarzai Area District. Killa Saifullah	15	
473	Construction of Bolan Dam.	1,500	
474	Construction of Kach Delay Action Dam Sara Khula Area District Quetta	245	
475	Raising / Strengthening of Existing Sara Ghurgai Delay Action Dam District Quetta	20	
476	Kapoto Check Dam Prince Area Kalat	10	
477	Dabak Dam Kach Hasanzai	107	
478	Baran Lop Check Dam Iskalko Kalat	10	
479	Construction of Bhala Kodi Check Dam Zakrani Area District Barkhan	40	
480	Construction of Ari Chur Dam Area Rarkhan District Barkhan	78	
481	Construction of Delay Action Dam Juhlain Kaur Chakkul UC Kalag	26	
482	Construction of Rohri Gravity Dam at Watta Area Uthal District Lasbella.	37	
483	Construction of Storage Dam Diz Paroom District Panjgoor.	66	
484	Construction of Zakhori Storage Dam Raesh	62	
485	Restoration of Bolan Weir Irrigation Scheme of Bolan River District Kachhi.	111	
486	Restoration of Sassi Punnu Delay Action Dam In Sassi Area Tehsil Sonmiani.	114	
487	Construction of Wahi Dam at U/C Jam Yousuf Abaddanda Bela District Lasbela.	122	
488	Construction of Sia Pusht Small / Check Dam Ghafoorabad.	17	
489	Construction of Daht-E- Baba Check Dam District Mastung.	76	
490	Construction of Sothgaan Dam Noroz.	119	
491	Construction of Jazdar Kaur Delay Action Dam	62	

492	Construction of Panjgur Dam Ad Development of Command Area. Cost Sharing Basis.(Sb).	75	
493	Construction of Shehzanik Dam and Development of Command Area. Cost Sharing Basis. (84.85:15.15) (Sb).	45	
494	Construction of Delay Action Dam at Hurmozain Zehri District Khuzdar	48	
495	Construction of Gaur Pad / Singindas Delay Action Dam In District Kalat	80	
496	Construction of Garrap Iskalko Delay Action Dam In District Kalat	55	
497	Construction of Kund Velra Check Dam Nahar Kot Area District Barkhan	36	
498	Construction of Wah Bani Check Dam Baghaow Area District Barkhan	35	
499	Construction of Khohw Wala Ghat Check Dam Kurwah Area Chohar Kot District Barkhan	34	
500	Construction of Soukhi Dam Rakhni Area District Barkhan	43	
501	Construction of Ohee Dam Daghar Area Nahar Kot District Barkhan	47	
502	Construction of Ghair Khalok Check Dam UC Umeedabad Dureji	60	
503	Construction of Gish Kaur Dam and Development of Command Area. Cost Sharing Basis. (97.84:2.16) (Sb).	45	
504	Construction of Katrach Dam In Lohi	45	
505	Construction of Deerjah Gravity Dam at Kenhwari Area Uthal District Lasbela.	61	
506	Peerkas Storage Dam	204	
507	Construction of Piun Jhal Delay Action Dam Shoran Area Kachhi.	58	
508	Construction of Dam at Murgheikai Shrgalai Barshore	50	
509	Construction of Delay Action Dam at Zarkhune District Quetta	75	
510	Construction of Sno of Delay Action Dam In District Killa Saifullah	611	
511	Cibst If Jurram Khurasan Delay Action Dam In Murgha Faqirzai Area, District Ksf	127	
512	Construction of Sparatga Delay Action Dam In Loi Bund Area District Killa Saifullah	38	
513	Construction of Awaran Dam and Development of Command Area. Cost Sharing Basis. (Sb).	125	
514	Construction of Delay Action Dam Soatkal Turbat, District Kech	75	
515	Construction of Laangra Dam Wasral Landhi Tehsil Uthal, District Lasbela.	93	
516	Construction of Arch Dam Hasanzai Baghbana Area, Khuzdar	70	
517	Construction Gargol Dam Area Muhammad Samad Khan, Check Dam Jokhyon Area Choor Kot and Chaddry Walai Dam Halyani Area Takhra Barkhan	68	
518	Construction of Pandran Chek Dam In District Kalat	5	
519	Construction of Kala Ghat Check Dam Sooman Area, Bibber Tak Dam, Sher Sherani Sooman Dam & Ghurthy Wala Gambrak Dam, Barkhan	63	
520	Construction of Daha Bak Dam Area Zadien Rakhani Area District Barkhan	8	
521	Construction of Flood Protection Scheme of Basti Durkani , Raheem Shah, Grave Yard of Kandhar Area District Barkhan	7	
522	Flood Protection Bund, Wall at Chotal Area Kapoto District Kalat	4	
523	Construction of Delay Action Dam Darwazi Takari Area Musakhel	30	
524	Construction of Kala Ghat Check Dam Sooman Area, Bibber Tak Dam, Sher Sherani Sooman Dam & Ghurthy Wala Gambrak Dam, Barkhan	15	
525	Construction of Delay Action Dam Darwazi Takari Area Musakhel	15	
526	Improvement of Kiken Delay Action Dam Kech	9	
527	Construction of Thathani Githan Delay Action Dam Nag Zamuran In Kech	29	
528	Construction of Check Dam Dashtuk Zamuran In Kech	12	
529	Construction of Check Dam Sirkazey Zamuran Kech	23	
530	Construction of Zarutti Dam Washuk	10	
531	Construction of Babka Gravity Dam, Zarghoon Ghar Area Harnai	57	
532	Construction of Dhor Sangar Delay Action Dam at Tehsil Zehri Khuzdar	13	
533	Construction of Kuch Darwani Check Dam Baghaow Area District Barkhan	6	
534	Construction of Gendari -II Storage Dam/Delay Action Dam Noshki	70	
535	Construction of Earthen Delay Action Dam In Killi Narezai Zhare Lakai Area of Zhob	47	
536	Construction of Check Dam In Hotanmarriphellawagh District Derabugti	39	
537	Construction of Nag Kaur Delay Action Dam Nag Zamuran In Kech	30	
538	Construction of Murgha Marghazu & Shinki Khezai Delay Action Dam District Killa Saifullah	235	

539	Zarhghaiz Dam District Killa Saifullah	110	
540	Construction of Manday Tak Wakaam / Rabaat Dam District Duki	310	
541	Pehee Jahal Gravity Dam Nemargh	55	
542	Construction of Narriro Storage Dam Wahear Area Tehsil Wadh Khuzdar	125	
543	Construction of Kurdan Storage Dam In Saroona Area Khuzdar	185	
544	Construction of Mona Khal Small Storage Dam In Wahear Area Tehsil Wadh Khuzdar	103	
545	Construction of Flood Protection Bund/Wall For Kishari Masjid Aranj Area Karkh Khuzdar	12	
546	Construction of 3 Nos of Detention Bands In Gwadar	104	
547	Rehabilitation and De- Silting Talani To Muchh Lehri	52	
548	Construction of Flood Protection Walls at Tehsil Killa Abdullah.	15	
549	Construction/Improvement of Flood Protection Gabion Wall at Sanger Zehri Area Khuzdar	15	
550	Extension of Flood Protection Bund Left Side of Kech at Gokdan From Rd.8150 To Onward Kech	7	
551	Construction of Small Storage Water Reservoir Banuq-E- Bug Karkak, Dasht Kech	15	
552	Construction of Irrigation Channel at Killi Shore, Marpani, Khidrani, Zavi, Shaikan, and Killi Dagha Area Harnai	15	
553	Construction of Flood Protection Wall at Killi Shore, Urbooz, Paswai, Marpani, Khidrani, Dagha, and Killi Zaavi Area Harnai	16	
554	Restoration of Six (06) Nos Irrigation Schemes at Killi Tor Shor, Shinkach, Sozoo, Nakas, Khost, Killi Punga Harnai.	10	
555	Construction of Flood Protection Wall at Union Council Shahrag, Khost, Nakas-I & II & U/C Zardaloo Area Harnai	15	
556	Construction of Flood Protection Wall at Killi Zarmana, Sarkan, Ghurmi, Ghwaza, Ghareebabad, Jalalabad, Shena Kachi & Killi Wamtangi Area Harnai.	14	
557	Rehabilitation of Wamtangi Irrigation Scheme Harnai.	6	
558	Construction of Irrigation Channel at Nakas, Shahrag and Khost Area Harnai.	8	
559	Construction of Water/Irrigation Channel at Sarkan, Ghurmi, Zarmana and Killi Mihhi Area Harnai	10	
560	Construction of Flood Protection Wall at Mohalla New Jalal Abad and Killi Marhazai Harnai	10	
561	Lining of Minor at Rd 60 L/S Marshala Minor Bari Shakh Naseerabad	3	
562	Construction of Flood Protection Wall Hana Urak Area Quetta.	2	
563	Construction of Flood Protection Wall at Tehsil Harnai, Tehsil Shahrug and Spin Tangi etc.	10	
564	Construction of Flood Protection Wall at Union Council No 4, 5, 6, 7, 8 and 9 Sarmakai, Karam, Manikhwa, Danasar, Lowara Respectively Sherani	8	
565	Construction of F/Protection Wall at Union Council No 10 To 15 Mani Khwa, Mani Khwa, Camp, Camp, Southern Harifal-I, Northern Harifal-I Respectively Sherani	8	
566	Rehabilitation of Gangha Channel Shoran Tehsil Sunni Kachhi	30	
567	Construction of Water Channel Tuniya To Lehri, Tehsil Shoran Kachhi	14	
568	Construction of PCC Protection Wall at Killa Ghulam Nabi Jafarabad District Khuzdar	4	
569	Construction of Flood Protection Bunds and Gabions In UC Sarawan, UC Ulmark District Kharan	4	
570	Rehabilitation of Gajan Channel Tehsil Gandawah, District Jhal Magsi	6	
571	Construction of Flood Protection Bund Goth Mat Kaloo Village District Jhal Magsi	10	
572	Protection Wall at Kund Kirta Bolan Kachhi	4	
573	Construction of Flood Protection Wall & PCC In Kili Malangzai Chotank Khaliqabad Area District Kalat	3	
574	Construction /Rehabilitation of Protection Band at Arifabad Tehsil Sunni Kachhi	15	
575	Construction/Rehabilitation of Flood Protection Band at Allahabad, Jam Barari, Killi Sardar Satakzai U/C Sardar Satakzai, Barari Jarokhan, Jam Barari & Allahabad, Kachhi	8	
576	Construction/Rehabilitation of Flood Channel at Aerri, Sinawah, Sianch Shoran, Flood Protection Band Goths Amanullah & Nobat Jataoi, Zahur Laghari etc. Sunni, Kachi	6	
577	Construction/ Rehabilitation of Flood Canal at Sianch Sinawah Tehsil Sunni Kachi	10	
578	Construction of Flood Protection Wall at Ghunda Mara Qilla Saifullah	8	

579	Rehabilitation of Kan Mehterzai Karez Qilla Saifullah	15	
580	Construction of Distribution Weir In Talaq Headerzai Area Qilla Saifullah	10	
581	Construction of Flood Protection In Gawal Ismailzai Qilla Saifullah	10	
582	Construction of Flood Protection In Barat Khail Qilla Saifullah	10	
583	Construction of Delay Action Deam In Ali Khail Qilla Saifullah	30	
584	Construction of Flood Protection Wall at Killi Arzan Zai Marof Zai Killi Shenki Ghondi Tora Sha U/C Badin Zai I , Zhob	9	
585	Construction of Flood Protection / Diversion Bund at Nizar Abad Tetyani Tump Kech	13	
586	Construction of Flood Protection Bund at Waja Murad Bazar Tump.	14	
587	Construction of Flood Protection Bund at Haji Taj Bazar Hoth Abad & Srinkin Tump	3	
588	Construction of Flood Protection Bund at Zbarag Kaur Nasir Abad Kech	20	
589	Construction of Flood Protection Bund Qabristan Bazar Baloch Abad Kech	2	
590	Construction of 100 Karezs In District Pangjur	35	
591	Rehabilitation of Konal Dam Pichhing and Spill Way Bakar Dera Bugti	36	
592	Desilting Khair Wah To Much Lehri District Sibi	15	
593	Construction of Reservoir For Moza Much In Tehsil Lehri District Sibi	18	
594	Repair of Poi Karez	70	
595	Construction of Flood Protection Bund at Mureedan Kaur Reko Buleda District Kech	2	
596	Construction of Flood Protection Bund at Sindati, Kaur Koshk Buleda, District Kech	11	
597	Extension of Flood Protection Bund On Madicol Kaurat Rek-E- Sar Bit Buleda Village Kech	9	
598	Construction of Flood Protection Bund at Gish Kaur Reko Ronghan , District Kech	10	
599	Construction of Flood Protection Bund at Gish Kaur Farooqabad Mehnaz , Buleda District Kech	2	
600	Extension & Improvement of Ferozi Kan Karez & Yaqooba Karez Muslim Bag Hares District Killa Saifullah.	8	
601	Extension & Improvement of Bagh Wala Loi Kreez & Kach Karez Bagh Wala & All Shar Karez Muslim Bagh Area District Killa Saifullah	9	
602	Construction of Flood Protection Wall at Wall Kach and Kanchoghahi Area and Suri Mehtarzai Area Muslim Bagh District Killa Saifullah.	15	
603	Construction of Flood Protection Band Kech Kaur, Chad E Kaur Allah Bakht & Ext: Maskeen Kaur Jusak Turbat, District Kech	34	
604	Protection Wall Zmdan Bakhtyar, Walik Pirandar, Durski, Dak Nondara, Murad Jan Daro Kcha, Sherago Master Hussain Shandi, M Ashraf Biznjo, Jan M Zelg Jaho	41	
605	Construction of Protection Wall Shandi Muhalla, Barkat Juman Shah Siahdamb, Hammal Wastti Pirandar Abdullah Jan Bizanjo Zelag Wall M Azim Mazar Gazi Awaran	17	
606	Protection Wall Abdul Jabbar Bizanjo, Gili School , Otan Kaur, Lugon Bedi, Jamal Khan Zelag Jaho, Bazdad Ragti, Ghulam Qadir Chanal, Esa Ali M Shandi Awaran	20	
607	Construction of Protection Wall Nako Dad Mohd Jhal Jhao, Ashfaq Allah Dad Kambaro, Abdul Samad Azoo, Ellahe Bakhsh Nadago and Adjoining Areas Awaran	72	
608	Construction of Protection Wall Buzdad Karki, Nako Ali Jan Mash, Haji M Baran Kumbi, Qadir Bux Peran, Ahmad Jan Mirwani, Naibat, Khoromusht Arika, Wali Jan Murad Koch	45	
609	Protection Wall Latif Sowali ,Bazag Goz, Mula Khuda Bux, Ghulami Siah Damb, Ellahe Bakhsh Lal Bazar, Saleem Shandi, Fazal Baran, Molvi Allah Dad, Awaran	17	
610	Construction of Protection Wall Cherag Miran,Gazi Zor Abad, Ellahe Bux, Hayat Teertej, Khalid Zahro Zelag Pirandar, Fazal Chanal, Amir Bakhsh, Master Sarwar Awaran	18	
611	Protection Wall Zakir Sarmastani, Dar Bent Gajjaro Koto Jaho, Mula Khudo Garai, Fareed Keshari, Sawali Goth Nondara, Ahmad Khan Goth Kandari, Wasti Kandari	13	
612	Construction of Protection Wall Akhter Karim Kumbi Jahoo, Haji Yaseen Kandari, Qadir Bakhsh Khlid Abad Mashkey Awaran	9	
613	Rehabilitation & Restoration of Small Storage Water Reservoir Jadokki Dasht Kech	8	
614	Rehabilitation and Restoration of Small Water Reservoir Dammu Wadd and Gazibahl Wadd Dasht Kech	11	

615	Construction of Flood Protection Wall at Goragi Kaur Murad Jan Rahi Mohallah Ball Cross Kech	6	
616	Reh and Restoration of Small Storage Water Eservoir Dawahi Dagar Dasht Balinagwar Kech	7	
617	Reh and Restoration of Small Storage Water Reservoir Shambay Chill Dagar atSangie Dasht Kech	10	
618	Construction of Flood Protection Bund Left Side of Dasht River From Breedag-E-Kaur to Meerani Dam	29	
619	Rehabilitation and Restoration of Small Water Reservoir Miruchil Dasht Kech	1	
620	Construction of Check Dam Sur Ghownad Fato Dumarar Gharshinan Tehsil Nana Sahib District Pishin	2	
621	Construction of Ghezh Fewara Dam Toba Kakari Tehsil Barshore District Pishin	3	
622	Lining of Minor atRd,70+00/S Marshala Water Cours of Bari Shakh Tehseel Tamboo District Nasirabad	18	
623	Lining of Minor and Water Courses at Village B.K.Buledi, Ajab Buledi, A.K.Buledi, R.K.Buledi, Bari Shakh, Tehsil Tamboo	55	
624	Construction of Flood Protection Wall In Different Unions Sherani	22	
625	Construction of Flood Protection Wall Left, Right Apshan Kaur Ilyas Jama Masjid Mohalla Kashap, Kech	14	
626	Construction of Flood Protection Wall Lift& Right Side at Kashap Village District Kech	11	
627	Construction of Flood Protection Bund Dalser Bazar Mand Sub-divison Tump Kech	11	
628	Construction of Flood Protection Bund Dalay Kaur Nasir Abad Kech	17	
629	Construction of Flood Protection Work Master Rafiq, Gichki Bazar & High School Bazar Kech	14	
630	Construction of P.P.C Wall Haji Muhammad Kareem Bazar Kohpushat Mond District Kech	14	
631	Construction of Flood Protection Bund Pcc Walls at different Areas of U/C Pullabad Tehsil Tump	10	
632	Construction of Flood Protection Bund Bast Balicha Tehsil Tump	11	
633	Construction of Flood Protection Bund Dhora Gulsheera Gongoo To Ali Muhammad Angaria House Lasbela	8	
634	Construction of Flood Drain In U/C 1&2 Quetta	43	
635	Construction of Flood Protection Wall In U/C 3 Quetta	10	
636	Construction of Various Detention Bands In Different Areas of District Gwadar	24	
637	Construction of Miner For Mozanoro and Mehrabwahundronpetfeede R Canal Naseerabad	50	
638	Construction of Flood Protection Bund /Wall For Killi Gameshi Feroz Abad, Killi Haji Ameen Koshak, and Killi Shumali Kanak Khuzdar	30	
639	Construction of Flood Protection Bund /Wall For Killi Sunni, Killi Nawah, Killi Riaz Ahmad Peshi Kattan and Killi Raheem Abad Khairawa Khuzdar	30	
640	Construction of Flood Protection Bund /Wall For Damb Aajib Nal and Killi Anwar Abad Kodah Nal Khuzdar	30	
641	Construction of Protection Wall at Killi Gharib Abad, Nushki.	1	
642	Construction of Flood Protection Bund Killi Badal Karez, Nushki.	2	
643	Construction of Flood Protection Bund Laruk Mall, Nushki.	2	
644	Construction of Flood Protection Bund For Killi Mohammad Khan Mall, Nushki.	10	
645	Construction of Flood Protection Bund For Killi Reco, Nushki.	10	
646	Construction of Flood Protection Wall For Agriculture Lands & Abadies For Nokjow Area, Nushki.	2	
647	Construction of Flood Protection Wall Killi Qadir Bakhsh Kisankori, Nushki.	1	
648	Construction of Flood Protection Wall Killi Khairazai Kishingi, Nushki.	2	
649	Extension of Rodlin Flood Channel Merging Into Main Junction Nalla District Loralai	53	
650	Construction of Divide Wall of Uch Canal at Rd +000 Sohbatpur	11	
651	Bhal Safai of Uch Canal From Rd.70 To 114 (28.313375, 68.402811) Sohbarpur	13	
652	Construction of Vrb Near S.P Office Kanrani Muhallah and Goth Nazir Khan at 1-R Drain 28.304621, 68.322682/28.31861, 68.32216	11	

653	Rehabilitation of Main Regulator Gates of Uch Canal at Rd+000 and Construction of Vrb at Rd .68+000 28.31990, 68.413153/ 28.252856, 68.222208 Sohbarpur	8	
654	Flood Protection Bund For Various Killi Mirwani Drakhla, Khalil Badari, Laiso Garuk, Jamel Hazar Ganji Nal & Sndal Karaiz Hazar Ganji Nall Wadh	30	
655	Construction of Small Water Reserviors for Agricultural and Drinking Purposes at Panjaa Dasht Different Area Kech	10	
656	Construction of Small Water Reserviors for Agricultural and Drinking Purposes at Mosmee Dasht Different Area Kech	10	
657	Construction /Cleaning of Different Karezat at Pull Abad Kect Turbat	38	
658	Construction of Flood Protection Bund at Pullabad Kech	68	
659	Protection Bund Rehabilitation atTuna Wah Tehsil Sunni.	90	
660	Construction / Protection Bund at Goths Arbab Qadir Bux Aerri, Bahadur Aerri, Raheem Bangulzai, Atta & Other Areas of Tehsil Bhag.	9	
661	Construction of Untum Flood Protection Scheme in District. Nasirabad.	158	
662	Construction of Flood Protection Gabion Wall Kandhi Tehsil Zehri District Khuzdar	8	
663	Flood Protection Wall at Bani Kaur Mehnaz Buleda	4	
664	Construction of Flood Protection Gabion Wall Kochave & Tarasani Zehri District Khuzdar	8	
665	Rehabilitation and Improvement of Hairdin Drain In District Sohbat Pur.	4	
666	Construction of Flood Protection Bund Left & Right Side Do Kuurm	15	
667	Construction of Dam Killi Shana Talanga Dana Abdullah Zai	15	
668	Construction of Flood Protection Bund Left and Right of Garruki Kaur Near Sorap at Gokdan District Kech	19	
669	Construction of Flood Protection Bund Kech Kaur From Shenzdar Toward Gokdan, Kech	27	
670	Construction/Rehabilitation & Restoration of Small Storage Walter Reserviour Hama Kohak Tehsil Dasht Kech	5	
671	Construction of Flood Protection Gabion Wall Kili Mahamodani, Sulmanjo, Zareena Dhandar, Tehsil Zehri District Khuzdar	8	
672	Construction of Flood Protection Gabion Wall Sarap, Bhalonk Tehsil Karkh District Khuzdar	8	
673	Construction of Flood Protection Band In Ucs Padag, Yakmach, Chagai & Aminabad District Chagai	29	
674	Construction of Flood Protection Gabion Wall Kolachi Zeedi District Khuzdar	6	
675	Construction of Flood Channels in Different Areas of Ward No.49-50-51-52 and Samungli Flod Protection Wall in Shekh Manda Haji Wali Shamshozai Areaquetta	8	
676	Restoration of Escape Distry From Rd 4 000 To 55000, Jhal Magsi	9	
677	Flood Protection Bund from Rais Naseer to Babu Abdul Karim Iltazai Kotra Village Tehsil Gandawah District Jhalmagsi	7	
678	Construction of Flood Protection Gabion Wall Mishk & Kandh Tehsil Zehri District Khuzdar	8	
679	Construction of Gabion Wall For Kili Mir Abdul Karim Mandehaji Khaliqabad Distt Kalat	3	
680	Flood Protection Bund at Shapkol Kaur Badal Bazar Jat	4	
681	Flood Protection Bund Qazi Ismail Graveyard Tehsil Gandawah District Jhal Magsi	6	
682	Flood Protection Wall at Konari Kaur Menaz Buleda	3	
683	Lining of Fatehpur Channel (19000 Rft) Tehsil Gandawah District Jhal Magsi	7	
684	Flood Protection Bund at Zondan Kuar Abdullah Muradabad Gili Kochag Buleda	3	
685	Flood Protection Band at Gazzain Kaur Khairabad	6	
686	Rehabilitation and Improvement Carrier-1 Main Drain and its Sub Drains (10m) and Construction of Aqueduct on Naseer Main Drain Near Goth Habib Rehman(8.20m	4	
687	Flood Protection Wall for Agricultural Land and Houses atKili Andarabad, Jalalabad, Ghareebabad and Kili Urbooz District Harnai.	3	
688	Irrigation Channel atKhost, Zardaloo, Sarlaza, Pandoba Area District Harnai.	8	
689	Remodeling & Rehabilitation of North West Canal & Khirther Canal	30	
690	Construction of Flood Protection Gabion Wall Kocha Bhapave, Tarasani Tehsil Zehri District Khuzdar	10	
691	Construction of Flood Protection Bund Mat Sindhar Village District Jhal Magsi	8	

692	Construction of Flood Protection Gabion Wall Chasma Aalro Tehsil Zehri District Khuzdar	8	
693	Construction of Protection Band Wall at Koshk River District Khuzdar	3	
694	Construction of Flood Protection Bund for Village Kach Walhari Khan Marghzani District Sibi	5	
695	Flood Protection Bund Left and Right Barani Kaur Kohshak Buleda	4	
696	Rehabilitation of Flood Canal Dai Wah Tehsil Lehri, District Sibi	4	
697	Flood Protection Bund at Haji Yaqoob, Karim Jan , Qadir Bakhsh Gish Kaur Solo Buleda	8	
698	Flood Protection Bund Kichi Jadeed District Jhal Magsi	8	
699	Strengthening of Right Side Embankment of Rupa Distributary From Rd 0 000 to Rd: 30 000 District Naseerabad	5	
700	Construction of Flood Protection Gabion Wall for Kili Peer Shaher Tehsil Zehri District Khuzdar	6	
701	Flood Protection Wall For Agricultural Land and Houses at Zardaloo Area District Harnai.	4	
702	Flood Protection Wall For Agricultural Land and Houses at Zarghoon Ghar Area District Harnai.	6	
703	Construction of Flood Protection Bunds, Gabions on River Buddo, District Kharan	9	
704	Raising Strengthening of Flood Protection Bund Dhori from 0 000 to 52 000 (Khirthar Canal) Jhal Magsi	7	
705	Flood Protection Bund at Kech Kaur Gowanki Shahrak	10	
706	Construction of Spurs Along with Banks of Kech River Turbat, District Kech	2	
707	Flood Protection Band at Jalai Joo Konshkalat	4	
708	Desilting of State Feeder Flood Canal Tehsil Lehri District Sibi	10	
709	Construction of Flood Protection Bund in Puss Sher District Kalat	5	
710	Construction of Flood Protection Band at Kasanotump, Noken Kantump, Pullabad Tump & Asiaabad Tump District Kech.	3	
711	Construction of Flood Management Scheme at Baranchina Khaliqabad River Distt Kalat	5	
712	Extension of Flood Protection Bund at Kessak Village Kaur	5	
713	Flood Protection Bund at Muslimabad Buleda	8	
714	Flood Protection Wall Left Right Side at Hoshab-E- Rotag Kaur Haji Ellahi Bakhsh Bazar Koshak Buleda	3	
715	Construction of Deenari Storage - Delay Action Dam Noshki	68	
716	Flood Protection Wall at Khuda Nawab Bazar Hothabad	4	
717	Desilting of Fugal Wah at 3rd Distribution Irrigation Scheme in Tehsil Lehri District Sibi	10	
718	Construction of Flood Protection Band Khandozai Baghbana & Noghay Tehsil Baghbana District Khuzdar	8	
719	Rehabilitation of Flood Irrigation Scheme District Jhal Magsi	9	
720	Construction of Flood Protection Bund Shahap Kaur Rood Bun Tump District Kech	39	
721	Construction of Protection Bund Left & Right Side of Nodiz River District Kech	75	
722	Lining of Minor and 9 Nos off Take Structure at Rd.60.70,80 Bari Distributary at Tamboo	11	
723	Construction of Flood Protection Wall for Land & Orchards along Sori Mehtarzai Nasai Tehsil Muslim Bagh	11	
724	Construction of Flood Protection Works Along Right Bank of Keel Kaur at Village Karki District Kech	33	
725	Construction of Flood Protection Gabian Wall on Mureedan Kaur at Reko Buleda Village District Kech	12	
726	Construction of Flood Protection Bund On Sharak at Kech Kaur District Kech	20	
727	Construction of Khareechra Check Dam Nahar Kot Area District Barkhan	40	
728	Construction of Flood Protection Bund, Old Shambani & Bujerani Village Tehsil Jhal Magsi District Jhal Magsi.	50	
729	Construction of Protection Bands at Killi Bhanlonk Killi Lakharo, Killi Sarap, Killi Jattak Killi Nokjo Killi Sun Chako, Tehsil Karkh	16	
730	Construction of Flood Protection Wall Ghot Nadi Rage Begow District Barakan.	28	
731	Construction of Protection Bund/Wall at Sakai Kalat, Gichk Panjgor	5	

732	Construction of 10 Water Ponds at Bag District Sibi.	30	
733	Construction of Loi Band Bara Ragha at Killi Omza Mursenzai District Zhob	22	
734	Construction of Flood Irrigation Minor and Construction of 4 Nos Vrb In U/C Hathyari	38	
735	Construction of Left Side Flood Embankment State Feeder Tehsil Lehri District Sibi	10	
736	Construction / Cleaning of Irrigation Flood Channel Hazara Town Gulzari Town and Bahadur Abad Quetta	11	
737	Rehabilitation& Resto: of Small Storage Water Reservoir Gowarag-E-Dap Hotag, Pullan Bazar Hotag & Peer Muhdbazar Hotag Tehsil Dasht District Kech	25	
738	Rehabilitation & Restoration of Small Storage Water Reservoir Kottoack and Kocha Hotag Tehsil Dasht District Kech	26	
739	Rehabilitation & Restoration of Small Storage Water Reservoir Wadd Gizdar , Kursheed Niguwar Band Tehsil Dasht District Kech	11	
740	Rehabilitation and Restoration of Small Storage Water Reservoir Solani Dagar, Shay Zangee Bazar Tehsil Dasht District Kech	15	
741	Rehabilitation & Restoration of Small Storage Water Reservoir Dahag, Tehsil Dasht District Kech	6	
742	Rehabilitation and Restoration of Small Storage Water Reservoir Sorogo Tesil Dasht District Kech	2	
743	Rehabilitation and Restoration of Small Storage Water Reservoir Solee Dasht District Kech	19	
744	Lining of Panjuk Channel Tehsil Gandawah District Jhal Magsi	60	
745	Construction of Flood Protection Walls Tehsil Toi Sar Area Muskhail	5	
746	Construction of Flood Protection Walls Tehsil Durug Area Muskhail	5	
747	Construction of Flood Protection Bund Goth Allah Bachaya Chankara Tehsil Lakhra	39	
748	Extension of Pat Feeder Canal Project (Clearance of Liabilities of Contractors)	752	
749	Flood Protection Bund Miandad Jamali Lohi	6	
750	Construction of X- Regulator Gate at Sindhar distry and Removal of Deposited Material In Canal Bed From Rd. 624+000 (Baba Kot) To Rd 680+500	38	
751	Construction of Flood Protection Bund Haji Abdul Salam River Baghbana Khuzdar	11	
752	Construction of Check Dam at Killi Azizullah Cheenali Area District Loralai	11	
753	Construction of Retention Structure / Rehabilitation of Murad Wah Flood River Goth Ali Mardan Domki Sibi	51	
754	Construction of Concrete Lining of Irrigation Nallah (Sariabarea) District Quetta	39	
755	Lining of Flood Channel Saraghurgi Near IB Office Nawakilli Quetta	29	
756	Construction of Miandaar Storage/Delay Action Dam Tehsil Wadh Khuzdar	60	
757	Construction of RCC Flood Channel of Mulakhail Abad Near Eastern Bypass Quetta	17	
758	Construction of Flood Protection Wall For The Killi Bahadur Abadbrewary Area District Quetta	7	
759	Lining of Flood Channel Killiumer Near Davi Masjid For Hanan Agha & Others	3	
760	Construction of Protection Bandh /Wall at Killi Kach Shamoza and Killi Yousaf Kach Tehsil Nana Sab District Pishin	50	
761	Construction of Flood Protection Bund For Village Wazira In Tehsil Lehri District Sibi	10	
762	Flood Protection Band/Retaining Wall/PCC Wall For Dada Grave Yard, Nadir Khosa, Jamia Masjid Jya, Umeri Khaskheli, Attalh Ghulam Ali, Molvi Inayat Chhib Bela.	20	
763	Construction of Flood Protection Mouza Rood Kala Landi, Musakhel	3	
764	Protection Bund Iftikhar Abdul Hakeem Qalandarai Bagh Bana Khuzdar	5	
765	Construction of Flood Protection Bund Left & Right Side Do Kuurm	15	
766	Construction of Flood Protection Bund atDoosai Area Khor, Khuzdar	15	
767	Construction of Flood Protection Bunds In Aminabad & Cheather Area District Chagai	66	
768	Construction of Flood Protection Bund Rodhan Kaur Miree In District Kech	17	
769	Construction of Flood Protection Bund Kech Kaur at Gokdan District Kech	43	
770	Extension of Flood Protection Bund at Soraf Kaur (Right Side) at Gokdan District Kech	6	
771	Construction of Spurs On Left Side of Flood Protection Bund at Kech Kaur District Kech	17	
772	Construction of Water Ponds Channels and Flood Protection Bund, District Sibi	63	

773	Construction of Flood Protection Wall In UC 1 & UC li Harnai	5	
774	Construction of Water Channel Cungi Valla Shark, UC I Sadar Valla Mati Ullah Rasool, Sanunddi Valla Sar Kailli Gachina Valla Akatar, Kali Pasya Valla	5	
775	Bed Clearance of Distributaries, Minors and Construction of Vrbs On Khirther Canal System District Jaffarabad	148	
776	Construction of The Flood Protection Bund For Kanoji, Killi Noor Jan Tuk, Killi M. Arif Shahizai Tuk, Killi Lasani Abobaker Garuk Nall District Khuzdar	17	
777	Construction of Flood Protection Bund For Killi Shafi M. Kanjar, Thana Saroona Tehsil Wadh Distt: Khuzdar	27	
778	Construction of Flood Protection Bund For Killi Jan M. Madresa Korarro, Killi Khair M. Denaili, Killi Shadainzai, Kili Kahndozai Nall Distt: Khuzdar	5	
779	Construction of The Flood Protection Bund For Killi Sher Jan, Killi Masjid Pali Mass Area Tehsil Wadh Distt: Khuzdar	5	
780	Construction of Flood Protection Wall Killi Molvi Noor Ul Haq Spena Teza & Killi Malak Bacha Khorgai, Gulistan, Killa Abdullah.	8	
781	Construction of Protection Bund at Azam Khan Damb Hazarganji Nall, District Khuzdar	8	
782	Restoration and Rehabilitation of Small Irrigation Bundat /Water Pond In Different Area of District Gawadar	7	
783	Rest./Rehabilitation of Small Irrigation Bundat/Water Pond in Different Area of Kulanch & Rehabilitation of Small Irrigation Bundat/Water Pond in Different area of Nalint Tehsil Pasni Gwadar	29	
784	Restoration and Rehabilitation of Small Irrigation Bundat /Water Pond In Different Area of Tehsil Jiwani District Gawadar	5	
785	Construction of 3 Nos of Mini Dam In District Gwadar	65	
786	Construction of 2 Nos Offshore / Coastal Water Reservoirs For Ground Water Recharge, Agriculture and Drinking Purpose In District Gawadar	55	
787	Construction of Flood Protection Wall In District Ziarat.	5	
788	Construction of Flood Drain Labour Colony Near Molakhailabad, Mehmod Barech, Umar Airport Sheikh Manda, Sheikhmanda, & Protection Wal Zadran Colny	81	
789	Construction of Flood Drain In Keechi Baig, Quetta	5	
790	Construction of Wall & Drain In Hanna Area, Quetta	5	
791	Shore Protection and Wave Break For Protection of Goth Ramzan Faqeer and Goth M. Ayoub Khaskheli at Dam Bandar Tehsil So	4	
792	Flood Protection Bund Union Council Mall Malik Hafeezullah Hambhi, District Sibi.	5	
793	Construction of Flood Protection Band Killi Khan Zaman Quetta Road Loralai.	3	
794	Construction of Irrigation Channel at Shahdi Khan Bulkhkharan Kharan	18	
795	Construction of Guide Embankment and Protection Work at Gishtri Both Sie In Mach Kachhi	12	
796	Construction of Flood Protection Bund Allah Bahth Bazaar Kech	30	
797	Construction of Flood Protection Band at Garuk Kaur UC Ginnah Kech	24	
798	Construction of Flood Protection Gabion Wall Haji Majeed, Liaqat Ali, Abdul Haq, Mir Abdul Manan, Hanif Jamot and Saraap at Karkh Area Khuzdar	24	
799	Construction of Flood Protection Gabion Wall at Roll Mordan Zehri Area, Khuzdar	10	
800	Construction of Flood Protection Gabion Wall at Janh Bent Moola Area, Khuzdar.	15	
801	Construction of Flood Protection Gabion Wall at Samwani Yakbozi Zehri Area, Khuzdar	15	
802	Construction of Flood Protection Gabion Wall at Chot Jo, Dehzeheri Zehri, Ali Hasan Dandar, Lakharo, Pishuk Katano Area, Khuzdar.	16	
803	Construction of Flood Protection Gabion Wall/Band Kili Ali Hassan Dadar at Zehri Area, Tarasani Khuzdar	15	
804	Construction /Cleaning of Irrigation Flood Channel at Gulzari Town, Pashtoon Bagh and Hazara Town, Quetta	10	
805	Construction of Flood Protection Scheme For Lands of Chooar Kot Area of Dhoulah River and Rind Gol Kujja Area Barkhan	34	
806	Construction of Flood Protection Wall Tehsil Toi Sar, Tehsil Drug, Tehsil Kingri Musakhail	55	

807	Construction of Flood Protection Wall In Different Unions Sherani	8	
808	Construction of Protection Wall atKilli Malik Taj Muhammad Maroofzai and Protection Wall atKilli Akhter Muhammad Bara, District Duki	12	
809	Construction of Protection Wall atKilli Malik Naseer-Ud-Din Marjanai, District Duki	10	
810	Construction of Protection Wall atKilli Sardar Tahir Khan Nimaki, District Duki	15	
811	Construction of Protection Wall In Killi Matwarkh Dilawer Shamizai and Killi Kach Sadozai Malik Shereen, District Duki	10	
812	Construction / Rehabilitation of Water Channels atKilli Wahvi, District Duki	30	
813	Lining of Flood Channel Siah Aab Shoran Tehsil Sunni Kachhi	30	
814	Lining of Neghari Flood Channel Tehsil Dhadar Kachhi	15	
815	Construction of Flood Protection Band On Bolan River Kachhi.	20	
816	Construction of Flood Protection Band Kech Kaur Band Ginnah Turbat, District Kech	32	
817	Construction of Flood Protection Band Kech Kaur Right Side and Left Side Turbat District Kech	15	
818	Construction of Flood Protection Bund at Madag E Kalat/ Madag E Kaur Dandar District Kech	10	
819	Construction of Flood Protection Bund Ambani Pull Sami at Kech Kaur Kech	21	
820	Construction of Flood Protection Bund Ali Jan Koshk Buleda Kech	8	
821	Construction of Flood Protection Bund at Sakidad Bazar Dana Sar Shahrak Kech	8	
822	Construction of Flood Protection Bund Zirnaan Kaur at Obaidullah Bazar Alandoor Buleda, Kech	10	
823	Construction of Flood Protection Bund Killi Hakeem Abdul Majeed Tahsil Gazg Kalat.	33	
824	Construction of Flood Protection Wall For Agriculture Lands and Houses of Killi Mazghar Manaki Mana Bazar Zhob	10	
825	Construction of Flood Protection Wall In Sirki Talari Area Chaman	10	
826	Construction of Flood Protection Wall In Boghra Area Chaman	10	
827	Improvement of Karez Lining of Channels of Sirki Tolari Karez Chaman	10	
828	Construction of 5 Detention Bunds / Small Water Reservoirs for Ground Water Recharge, Agriculture and Drinking purposes in District Gwadar	90	
829	Raising/Strengthening & Revamping of Drainage System Carrier Drain-Ii & Outfall Drain District Jaffarabad.	196	
830	Repair and Remodeling of Khanwah Jaffarabad	20	
831	Lining of Qaiser Wah Phase-Ii Jaffarabad	30	
832	Construction of Flood Protection Bund at Mazeer Kalar Sigik Village Baloor Kech	10	
833	Re-Modeling of Safi Kot / Khatol Irrigation Scheme Zhob	302	
834	Construction of Flood Protection Wall In Both Banks of Zhob In U/Cs Killi Seenai and Akozai In Zhob	12	
835	Construction of Flood Protection Wall at Killi Khaizai Goti Shalla Quetta	28	
836	Construction of Flood Protection Wall and Water Pond atKilli Chairman Manan Alizai Pishin	16	
837	Construction of Flood Protection Wall Killi Munir Khan Raigi Bostan Pishin	8	
838	Construction of Flood Protection Bund Cheery Shayhaq A Joo Bullo Mand, Kech	11	
839	Construction of Spurs at village Trihar In Tehsil Lehri, District Sibi	4	
840	Construction of Flood Protection Bund Sari Shayhaq A Joo Bullo Mand, Kech	11	
841	Emergency Flood Assistance Project	11,725	
842	Construction of Flood Protection Wall Left/Right Side at Kotori Kaur Wester Side Farooqabad Buleda Kech	7	
843	Ext of Flood Protection Bund For Dil Jam E Kadh at Kech Kaur Near Jusak Kech	24	
844	Remodeling of Khanwah/ Shahwah Jaffarabad	19	
845	Extension of 9al Minor of Mohbatpur Distry Pat Feeder Canal Jaffarabad	15	
846	Construction of Flood Protection Wall at Killa Saifullah	196	
847	Construction of Flood Protection Bund/Wall For Randhar Saroona Area Tehsil Wadh Khuzdar	26	

848	Construction of Flood Protection Bund/Wall For Agricultural Lands of Sajid Moosiani and Others Bhalonk Area Karkh Khuzdar	15	
849	Construction of Flood Protection Bund Jangi Khan Goth & Other Abadies Tehsil Hub District Labella	20	
850	Raising and Strengthening Embankment of Reservoir Murad Wah Shumali In Tehsil Lehri District Sibi	9	
851	Construction of Flood Protection Wall Gohar Nadi Rage Olayne Bagaow, Distt: Barkhan.	6	
852	Construction of Allah Warai Flood Irrigation Minor District Jhal Magsi	5	
853	Shore Protection and Wave Break For Protection of Goth Ramzan Faqeer and Goth M. Ayoub Khaskheli at Dam Bandar Tehsil So	10	
854	Digging of Wells and Installation of Water Monitoring Instruments On 18 Basins of Balochistan	11	
855	De-Silting of Sindhar Distry District Jhal Magsi	6	
856	4 Nos Regulator Gates at Perennial Channel and Retaining Wall at Jhal Magsi Town Area District Jhal Magsi.	4	
857	Construction of Flood Protection Bunds For Houses and Agricultural Lands In Kili Arbabzai Karamzai Khaliqabad Distt Kalat	6	
858	Construction of Gabion Wall For Both Banks of Chatti Village In Distt Kalat	5	
859	Construction of Flood Protection Bund at Haji Taj Bazar Hoth Abad & Srinkin Tump	12	
860	Flood Protection Bund Left & Right Side at Shahdad Kaur Reko Buleda	3	
861	Flood Protection Wall at Noor Mohd Kaur Abdul Rasheed Sanjar Bazar Mehnaz Buleda	3	
862	Flood Protection Wall at Mohd Abad Kaur Mehnaz Saghir Buledi Area	3	
863	Flood Protection Band at Dazin Bazar	4	
864	Construction of Flood Protection Band Kech Kaur Right Side and Left Side Turbat District Kech	45	
865	Flood Protection Band at Malant Bazar	4	
866	Construction of Zandara Kareez District Ziarat.	5	
867	Construction of Kareez For Killi Aghbarg Tehsil Sinjavi District Ziarat.	5	
868	Construction of Flood River From Murad Wah Mitha Khan Distribution Scheme To Much In Tehsil Lehri District Sibi	10	
869	Construction of Flood Protection Gabion Wall Roll Mordan Tehsil Zehri District Khuzdar	8	
870	Construction of Flood Protection Band and Gabions Killi Koh Pusht, UC Rashkoh, Tomulk, UC Totazai, District Kharan	10	
871	Construction of Flood Protection Gabion Wall Baloch Khan, Nokjo, Kharok, Chutta Tehsil Karkh District Khuzdar	8	
872	Construction of Flood Protection Gabion Wall Gulainzer, Yakbozi Tehsil Zehri District Khuzdar	8	
873	Construction of Flood Protection Gabion Wall Kuan, Paniwand, Kharzan, Tehsil Moola District Khuzdar	9	
874	Flood Protection Bund For Agriculture Land Mouza Khari Tehsil Gandawah District Jhal Magsi.	4	
875	Construction of Flood Protection Gabion Wall Gabion Nichari, Sarap, Tehsil Zehri District Khuzdar	8	
876	Restoration of Ganderi Viala Killi Shaikhan at District Harnai	4	
877	Flood Protection Bund at Jamadar Abdul Rehman Orchard Land Gali Buleda	4	
878	Construction of Flood Protection Bund For Village Mall Gishkori District Sibi	4	
879	Flood Protection Wall at Masjid Kaur Reko Buleda	3	
880	Raising Strengthening of Flood Protection Bund Kot Magsi To Chukhi District Jhal Magsi	9	
881	Construction of Guide Bund of Mast Thal Peer Koh Dera Bugti	10	
882	Rehabilitation of Yakdar Flood Canal Tehsil Jhal Magsi District Jhal Magsi	9	
883	Construction of Protection Band at Cheeri Bazar Tump, Rudbuntump, Sari Bazar Tump & Karim Bazar Danuk District Kech.	3	

National Drought Plan - Pakistan

884	Flood Protection Wall at Left & Right Side At kohey Bun Kaur Kamrede Wali Mohd Bazar Rek E Sar Bit Buleda	4	
885	Flood Protection Bund at Jintari Kaur Abdul Hameed Abad Buleda	3	
886	Flood Protection Wall For Killi Zargi District Ziarat.	4	
887	Construction of Sasnak Manna Kareez District Ziarat.	6	
888	Provision of Kareez For Killi Zargai District Ziarat.	4	
889	Construction of Amur Bhotani Flood Irrigation Minor District Jhal Magsi	6	
890	Flood Protection Structure Killi Gom Kalat	9	
891	Solar Bore with Accessories at Uthal, Lakhra Bela Hub and Dureji, District Labella (35 Nos)	40	
892	Rehabilitation of Minor System of Manjhoo Shori Sub Division Naseerabad	9	
893	Construction of Kareez For Killi Shenlaiz, Sui, Rakini, Dagger, Tehsil Sinjavi District Ziarat.	6	
894	Bed Clearance of Nindani Irrigation Channel District Jhal Magsi	5	
895	Provision of Water Channal For Killi Kach District Ziarat.	6	
896	Construction of Kareez For Killi Porna Sinjavi Tehsil Sinjavi District Ziarat.	6	
897	Construction of FPB Kech Kaur at Gokdan District Kech	1	
898	Construction of Flood Protection Bunds and Gabions In UC Ulmark, District Kharan	8	
899	Construction of Flood Protection Band Wall For Salehzai Ferozabad District Khuzdar	3	
900	Protection Band For Chakkar Khan Village Sakran Hub	4	
901	Construction of Flood Protection Wall Zardalo Cost Shahrag, Wall Choki, Roghi, Arbuz, Harnai Town Area, Babiyan I, Babiyan II, Nakas Gochina Harnai.	4	
902	Protection Wall & Regulator Gate at Dhora Flood Irrigation Scheme District Jhal Magsi	10	
903	Flood Diversion Embankment at Konara U C Khari District Jhal Magsi	3	
904	Flood Protection Bund New Shambani Village Jhal Magsi	10	
905	Restoration of Sarwati Flood Protection Diversion Bund District Harnai	4	
906	Flood Protection Wall at Zirdan Kaur Hamid Sohrab Bazar Alandor	3	
907	Protection Band at Old Jalal Khan, Mehboob Abad, Bijarabad and Others Teh Bhag District Kachhi	5	
908	Flood Protection Wall at Mohd Abad Kaur Mehnaz Haji Boher Area Buleda	3	
909	Flood Protection Band at Kahori Zainab Manindi Kolaho	4	
910	Ext of Flood Protection Bund and Construction New 4 No of Spurs at Kill Kaur Sari Karki	7	
911	Construction of Flood Protection Band Bridge Bagar & District Sohbat Pur	3	
912	Flood Protection Wall at Zindagir Kaur Muslim Abad Mehnaz Buleda	4	
913	Strengthening of Right Side Embankment of Umrani Distributary From Rd 0 000 To Rd: 37 000 District Naseerabad	5	
914	Rehabilitation and Improvement of 1-R Main Drain In District Sohbat Pur.	4	
915	Construction of Dam In Tayyab Sani Kachhi.	50	
Total		93.692	19,607

ANNEXURE IV: ADP-PUNJAB PROJECTS RELATED TO DESERTIFICATION AND DROUGHT

Costs of main projects of ADP-Punjab related to desertification and drought are as follows:

#	Projects	Expenditure (mil. PKR.)	
		July 2019- June 2024	July 2014- June 2019
1	Water Productivity Enhancement through Regenerative Climate Smart Agriculture (WP-RCA) (2022-23 to 2024-25) 01982206443 / 30-08-2022 / Okara	45	-
2	Piloting Precision Agriculture Technologies in the Selected Agro-Ecological Zones of Punjab (Smart DLI 11) (2022-23 to 2024-25) 01982206294 / 18-08-2022 / Faisalabad	2,616	-
3	National Program for Improvement of Watercourses in Pakistan Phase-II (2019-20 to 2024-25) 01991904799 / 29-08-2019 / Punjab	12,131	-
4	National Oil Seed Enhancement Program (2019-20 to 2023-24) (SMART, DLI-4b)	1,824	-
5	Development of Culturable Waste Land in Riverine Areas through Development Irrigation Conveyance Network	68	-
6	Punjab Resilient and Inclusive Agriculture Transformation (PRIAT) (2022-23 to 2026-27)		-
7	Punjab Resilient and Inclusive Agriculture Transformation (PRIAT)	22,487	-
8	National Program for Enhancing Command Area in Barani Areas of Pakistan	874	-
9	Transforming the Indus Basin with Climate Resilient Agriculture and Climate-Smart Water Management	405	-
10	Promotion of Gram Cultivation through Climate Smart Technologies in Thal Areas of the Punjab	57	-
11	Tree planting along ROW Ghazi Barotha Hydro Project, Attock	186	-
12	Strengthening of Punjab Forestry Research Institute Faisalabad	200	-
13	Establishment of Dargai Gill Forest Park, Sheikhpura	367	-
14	Strengthening of Protection Regime in Changa Manga Irrigated Plantation, Kasur	279	-
15	Substitution of Solar Pumps in Depalpur Plantation, Okara	118	-
16	Upscaling of Green Pakistan Program, Punjab	8,006	-
17	Chief Minister's "Plant for Pakistan" Initiative	300	-
18	Effective Control of Peste des Petitis Ruminants (PPR) in Punjab through Improved Production Capacity	164	-
19	Provision of Mobile Veterinary Services at Door Step of Livestock Farmers in Cholistan	96	-
20	Southern Punjab Poverty Alleviation Project (SPPAP)-IFAD Assisted	18,152	-
21	Koh-E-Suleman Improvement Project (KSIP)	2,400	-
22	Integrated Master Plan of Punjab Barani Tract	137	-
23	Water Resource Development in Expanded Areas of ABAD	341	-
24	Construction of 20 Nos. of kunds in Cholistan tehsil Yazman District Bahawalpur	63	-
25	Integrated Master plan of Cholistan 01022002050 / 09-03-2021 /Bahawalpur	30	-
26	Construction and Rehabilitation of 20 Nos. Kunds in Cholistan Tehsil Yazman District Bahawalpur	30	-
27	Construction of 1 No. Kund at Toba Karishan Dedth wala near Bahoo Chat wala & Desiltation of Toba Karishan Dedth wala & Construction of 1 No. Kund at Goma wala Dahar near Qila Islamgarh & Water Filtration Plant Basti Resham Ram Bhail Chak No. 167/7R U/C 178/7R District Rahimyar Khan.	5	-
28	Integrated Farms Development in Punjab Barani Tract by ABAD	367	-
29	Technical Feasibility of Kotli Sattian and Santh Ni Khuri Dam Dams in Tehsil Kotli Sattian	3	-
30	Checking Erosive Action of River Chenab Near Village Talibwala, Sargodha	57	-
31	Rehabilitation and Modernization of Islam Barrage, Bahawalpur	4,801	-
32	Project Readiness Financing Facility for Punjab Water Resources Management 01991807358 / 01-08-2019 / Punjab	657	-

33	Lining of Sohawa Disty RD 72-Tail, Ala Minor, Jayya Minor from RD 0+000 to 7+150 Tail and Shunari Minor, M.B.Din	115	-
34	Concrete lining of Para Disty from RD 0+000 to 44+483, Pakpattan	20	-
35	Lining of Rajwah 1-CR Tehsil Arifwala District Pakpattan	40	-
36	Construction of Flood bund from Hairo Flood Bund to Raikh Baghwala Flood Bund on Right Side of River Indus (to protect head regulator of Kadra Creek and adjoining abadies) 01072102049 / 28-01-2022 / Rajanpur	250	-
37	Concrete Lining of Khanpur Minor, Muzaffargarh	30	-
38	Concrete Lining of Gattoo Left Mouza Ahmed Mohana Muzaffargarh Canal, Muzaffargarh	40	-
39	Improvement and Remodeling of Desert Branch Canal District Bahawalpur	25	-
40	Restoration of water logged area in District Faisalabad	100	-
41	Concrete lining of Bhabrana Minor from RD: 0+000 to 21+604 (Tail) 01982209272 / 16-09-2022 / Sargodha	48	-
42	Concrete lining of Salam Disty from RD: 0+000 to 31+307 (Tail) 01982209274 / 16-09-2022 / Sargodha	13	-
43	Concrete lining of Rattokala Disty from RD: 40+000 to 71+500 & RD 79+500 to 82+066 (Tail) 01982209275 / 16-09-2022 / Sargodha	21	-
44	Concrete Lining of Western Feeder Disty from RD: 10+966 to RD: 56+000 (Tail) 01332354010 / 21-02-2024 / Sargodha	15	-
45	Concrete Lining of Icher Minor from RD: 0+000 to RD: 13+860 (Tail) 01332354011 / 21-02-2024 / Sargodha	15	-
46	Concrete lining of New Hocha Minor From RD: 0+000 to 8+645 tail 01981908441 / 04-02-2020 / Faisalabad	32	-
47	Concrete Lining of Gharial Disty RD 0+000 to 30+350 (Tail) & Hachar Disty RD 0+000 to 22+200 (Tail) 01982105317 / 16-08-2021 / Gujranwala	80	-
48	PC-I for improving shortage of water supply in Shikhanwala disty, Concrete Lining of Chichoki Malian Disty System, Ahmadwala Minor, Muniawala Minor and Hardo Minor	20	-
49	Construction of Kashmir Minor, Chak 177/P to Kartarpur, District Nankana Sahib	273	-
50	Concrete lining of Harpoki Disty from RD: 0+000 to 74+300(Tail) 01982113540 / 16-05-2022 / Gujranwala	161	-
51	Concrete lining of Muniya Wala Sub Minor from RD: 0+000 to 11+500 (Tail) 01982113544 / 16-05-2022 / Sheikhpura	22	-
52	Concrete lining of Kurilke Minor from RD: 0+000 to 51+400 (Tail) 01982209276 / 16-09-2022 /Sheikhpura	63	-
53	Rehabilitation of MBL From Head to Tail 01981707420 / 16-01-2018 / Kasur	540	-
54	Construction of Gated Head Regulators from RD:205+000 to 283+000 of BRBD Link Canal 01982104057 / 03-09-2021 / Kasur	201	-
55	Concrete Lining of Pattoki Lift Irrigation Channel RD 0+000 - 25+500 01982105316 / 06-04-2021 / Kasur	116	-
56	Concrete lining of Chor Kot Disty from RD: 96+400 to 147+483 (Tail) 01982209278 / 16-09-2022 / Kasur	56	-
57	Concrete lining of Chunnian Disty from RD: 65+500 to 104+982 (Tail) 01982209279 / 16-09-2022 / Kasur	56	-
58	Concrete lining of Kalair Kalan Disty from RD: 31+903 to 71+370 (Tail) 01982209334 / 20-09-2022 / Kasur	79	-
59	Concrete lining of Jandran Disty from RD: 0+000 to 13+950 (Tail) 01982209336 / 20-09-2022 / Kasur	15	-
60	Concrete lining of Ladhuwanga Disty from RD 53+335 to 97+000 Tail, Pakpattan 01982107579 / 16-08-2021 / Pakpattan	79	-

61	Concrete lining of Madina Disty RD Multan 01981908443 / 04-02-2020 / Multan	24	-
62	Concrete lining of Shershah Disty from RD: 0+000 to 23+932 (Tail) 01982113539 / 16-05-2022 / Multan	12	-
63	Concrete lining of Jampur Disty from RD: 52+100 to 66+200 (Tail) 01982209325 / 20-09-2022 / Multan	5	-
64	Concrete lining of Alipur Minor from RD: 12+500 to 34+900 (Tail) 01982209326 / 20-09-2022 / Multan	29	-
65	Rehabilitation of Sahiban Distributary and its System 01982206896 / Un-Approved / Dera Ghazi Khan	5	-
66	Rehabilitation of Dammar wala Distributary & its System 01982206898 / Un-Approved / Dera Ghazi Khan	5	-
67	Constructing Flood Carrying Channel Hill Torrent Crossing at RD:123+000 of Dajal Branch 01982104042 / 16-09-2021 / Rajanpur	452	-
68	Rehabilitation & Concrete Side Protection / Lining of Dinga Disty and its System 01982105434 / 06-01-2022 / Muzaffargarh	593	-
69	Concrete lining of 2-R Ghazi Disty RD:24+450 to 65+000 District Muzaffargarh 01982113421 / 06-04-2022 / Muzaffargarh	32	-
70	Improvement and Remodeling of Desert Branch Canal District Bahawalpur 01982107624 / 20-01-2022 / Bahawalpur	78	-
71	Concrete Lining of Irrigation Channels in Punjab to Improve Water Delivery Performance and Conveyance Efficiency 01992106134 / 07-10-2021 / Punjab	525	-
72	Concrete Lining of Irrigation Channels to Improve Water Delivery Performance & Conveyance Efficiency-II	44,271	-
73	PC-1 for Remaining Land Acquisition for GTC Project	3,711	-
74	Rehabilitation / Restoration of Jalala Flood Protection Bund from RD: 0+000 to RD 26+700 (NDRMF) 01981906934 / 03-06-2019 / Sialkot	94	-
75	Rehabilitaion / Restoration of Hajipur Gujran Flood Protection Bund RD: 0+000 to RD 37+750 (NDRMF) 01981906933 / 28-05-2019 / Narowal	257	-
76	Protection of village abadies Shahpur Chanjora, Fatehpur Gujran and Sukho Chak against the erosive action of Bein Nullah in District Narowal (NDRMF) 01981906935 / 28-05-2019 / Narowal	78	-
77	Rehabilitation / Restoration of Jalala Flood Protection Bund from RD: 0+000 to RD 26+700 (NDRMF) 01171902351 / 03-06-2019 / Sialkot	69	-
78	Rehabilitaion / Restoration of Hajipur Gujran Flood Protection Bund RD: 0+000 to RD 37+750 (NDRMF) 01161902350 / 28-05-2019 / Narowal	160	-
79	Protection of village abadies Shahpur Chanjora, Fatehpur Gujran and Sukho Chak against the erosive action of Bein Nullah in District Narowal (NDRMF) 01161902352 / 28-05-2019 / Narowal	55	-
80	Rehabilitation of old Deg Nullah from Deg Diversion Channel to QB Link Canal (NDRMF) 01211902358 / 17-05-2019 / Sheikhpura	123	-
81	Rehabilitation of Chichawatni irrigated Plantation, Sahiwal	29	45
82	Afforestation along Vehari Burewala D.M. Road to Railway Crossing V-Chowk Vehari (KM.364-367/L) and D.M. Road D.M. from P.I Link Canal to Burewala City (KM.345-347/L) District Vehari	78	-
83	Afforestation of Blank Areas in Irrigated Plantations of Punjab	319	97

84	Water resource development through Construction of rain water harvesting structure in Potohar Region GoP 190.875 Benef 36.125 01381602007 / 01-07-2017 / Attock, Chakwal, Jhelum, Rawalpindi	161	35
85	Providing Flood Protection along Right Bank of Chenab River Downstream Qadirabad Barrage. 01151601766 / 13-01-2017 / Mandi Bahauddin	149	131
86	Flood Protection of Sialkot against Aik, Bhed, and Palkhu Nullah 01171400650 / 10-06-2015 / Sialkot	42	2,207
87	Enhancing Capacity of Nullah Bhed and Laila Drain in District Sheikhupura 01211400621 / 26-05-2015 / Sheikhupura	54	982
88	Construction of Mole Head Spur for Protection of Nawan Kot Village and Other Infrastructure. 01211501145 / 15-09-2015 / Sheikhupura	6	69
89	Flood protection of Kamoki and adjoining areas 01211501146 / 02-09-2015 / Sheikhupura	135	1,835
90	Channelization of Deg Diversion Channel 01211700220 / 01-07-2017 / Sheikhupura	2,633	283
91	Channelization of Deg Nullah (Land Acquisition Punjab Component) 01211603607 / 30-11-2016 / Sheikhupura	691	125
92	Construction of Spur at Chorkin, District D.G. Khan	140	-
93	Protection of Aurangabad Village by Excavating Cunnet and constructing Gunda Bund to Change the Main River Course at River Ravi 01361601767 / 01-07-2016 / Sahiwal		92
94	Construction of Guide Spur near Ameerpur/ Sheikh Tayyab at River Ravi 01361601768 / 01-07-2017 / Sahiwal	78	54
95	Construction of Nuthani Flood Carrying Channel from RD: 0+000 to 21000 in D.G. Khan District (Clearing the Liabilities) 01041606630 / 01-07-2016 / DG Khan	604	423
96	Extension of Beghari Flood Carrying Channel from RD 41+600 to 56+600 outfall in River Indus DG Khan	72	-
97	Management of Hill Torrents / Flood Protection of Rajanpur District 01071400651 / 10-03-2016 / Rajanpur	128	37
98	Construction of Spur at Lalu Daira Shah, District D. G. Khan	295	-
99	Construction of Flood Bund along River Indus from Rakh Bagh Wala to Bait Wagwar Kot Mithan District Rajanpur RD 0-275 01071601772 / 13-12-2016 / Rajanpur	170	966
100	Protecting Shehr Sultan flood bund at RD 20+000 to RD 32+000 from erosive action of river Chenab to save the abadies Mouza Bindah Ishaq and Faizpur (clearing the liabilities) 01061601776 / 10-05-2017 / Muzaffargarh	221	-
101	Providing River Training Works along Rangpur Flood Bund 01061800039 / 01-07-2018 / Muzaffargarh	279	27
102	Construction of Head Regulator and allied structures on Lala Creek for protecting District Layyah from Floods 01051700041 / 01-06-2017 / Layyah	210	318
103	Protection of Public Infra Structure in the Vicinity of Moza Mongar, Tehsil Karor Lal Hussain District Layyah	335	-
104	Protection of Irrigation Infrastructures and abadies between RD:206-224 of Minchin Flood Bund	339	-
105	Raising & Strengthening of Gunda Bund near Maddokana Guide Wall Spur 01081700396 / 11-01-2018 / Chiniot	145	-
106	Management of Hill Torrents in DG Khan Irrigation Zone Sori Lund, Vidore, Mithawan, Kaha and Chachar (Sori Lund Hill Torrents) 01381400336 / 08-12-2014 / Dera Ghazi Khan, Rajanpur	97	843
107	Construction of Jalalpur Irrigation Project and its System 01281800034 / 01-07-2018 / Jhelum	15,938	735
108	Rehabilitation of Shoria, Dhingana and Darkhast Distys Systems in District D.G. Khan	300	-
109	Drought Reduction in D.G. Khan area through Construction of Mini Reservoirs 01382100681 / 08-04-2021 / Dera Ghazi Khan, Rajanpur	350	-
110	Pakpattan canal and Sulemanki Barrage Improvement Project (PCSBIP) 01351300001 / 28-08-2013 / Pakpattan	415	5,336
111	Improving Conveyance Capacity of Gugera Branch of Lower Bari Doab Canal (LBDC)	75	-

National Drought Plan - Pakistan

112	Project Preparation of Punjab Irrigated Agriculture Improvement Programme PIAIP (PC II) 01371300031 / 11-11-2016 / Punjab	42	558
113	Punjab irrigated agriculture productivity improvement project (PIPIP)	17,880	4,670
114	Disaster & Climate Resilience Improvement Project (DCRIP) 01371500665 / 09-07-2015 / Punjab	2,997	3,242
115	Rehabilitation of Khadir Feeder, Khadir Disty and Chenab Escape. 01371603473 / 01-07-2016 / Punjab	144	211
116	Lower Bari Doab Canal Improvement Project PC I 01380600003 / 07-03-2007 / Kasur, Khanewal, Okara, Sahiwal	660	13,043
117	Rehabilitation improvement of Machinery and Channels of Pai Khel Lift Irrigation Scheme Mianwali	23	20
118	Lining of Jhano Chak Minor M.B.Din 01151902529 / 25-11-2019 / Mandi Bahauddin	20	-
119	Upgradation of Existing old Machinery of Lift Irrigation Schemes and Lining of Channels in Mianwali Canal Division, Mianwali.	82	50
120	Construction of J-Head Spur and Excavation of Cunnit to Streamline river flow away from left bank of River Indus near village Alluwali, Dhingana & Doaba in district Mianawali	258	20
121	Rehabilitation of Manchar High Level Channel RD 0 to RD 19500 and 1R Minor RD 0 to RD 7 Tail Gujranwala	60	20
122	Rehabilitation of Muridke Distributary System. Sheikhpura	10	436
123	Research and Promotion of medicinal plants in Punjab	6	-
124	Rehabilitation of eroded, gullied land through soil conservation measures in hill torrents / barani areas of southern Punjab.	18	-
125	Developing Pothwar into an olive valley	850	642
126	Establishment of Centre of Excellence for olive Research and Training (CEFORT) at Barani Agriculture Research Institute Chakwal	80	-
127	Enhancement of honey production by using modern techniques	4	-
128	Promotion of High value Agriculture through Solarization of Drip & sprinkler Irrigation Systems	68	-
129	Development of Pabbi National Park 01131900974 / 01-07-2019 / Gujrat	172	-
130	Up-Scaling of Green Pakistan Programme (Revised) 01371603580 / 01-07-2016 / Punjab	7,556	450
131	Conservation, Propagation and Promotion of Neglected Indigenous Wild Fruit Tree Species	16	-
132	Construction of Flood Bund to Protect Agricultural Land and Village Abadi to Bhimber along Left Bank of Nullah Bunuhan in District Jhelum	52	52
133	Restoration of J Head Spur No 3 on Indus between Dhingana and Doaba and Dhingana village & Construction of Jhead Spur RD 35+600/L near village Dobba Minawali	360	-
134	Punjab Barrages Improvement Phase II Project (PBIP II) Jinnah Barrage 01321000002 / 09-12-2010 / Mianwali	540	4,878
135	Rehabilitation and up gradation of Trimmu Barrage, Punjnad Head Works Sulemanki 01101400008 / 03-07-2014 / Jhang	10,882	4,717
136	New Khanki Barrage Construction Project 01120900007 / 03-09-2009 / Gujranwala	32,455	8,685
137	Construction of Mian Jhanda Minor, Chak 177/P to Kartar Pura, District Nankana Sahib	148	-
138	Remodeling of 3 No. Aqueducts along B.S. Link Canal, Kasur	49	225
139	Rehabilitation of MBL From Head to Tail 01181700205 / 01-07-2017 / Kasur	387	-
140	Side Protection of Jandraka Disty RD 9+000 to RD 74+877 01341700201 / 01-07-2017 / Okara	71	-
141	Lining of Nehranwala Disty RD 0 to 14+383 01341700380 / 01-07-2017 / Okara	75	-
142	Construction of VR Bridge at RD 1136+150 of Sukhnai Drain (Old River Sukh Beas) (Less to Rs. 50 Million) (Clearing the Liabilities) 01361606628 / 29-12-2016 / Khanewal	4	-
143	Remodeling of SMB Link Canal and Enhancing Capacity of Mailsi Syphon 01251400449 / 25-02-2015 / Vehari	3,011	480
144	Lining of Lal Distributary 01041501143 / 02-09-2015 / Dera Ghazi Khan	64	4
145	Concrete Lining of Maggi Magassom Link RD 0 to 58500 01061400328 / 18-12-2014 / Muzaffargarh	43	309

146	Rehabilitation and Lining of Adil Wah Disty and Its System 01061601750 / 01-07-2016 / Muzaffargarh	285	125
147	Rehabilitation of Ahmadpur Branch System 01021400330 / 08-12-2014 / Bahawalpur	308	506
148	Rehabilitation of Eastern Sadiqia Canal for Restoring its Design Capacity in Reach RD 0-195 01011601752 / 13-12-2016 / Bahawalnagar	423	89
149	Rehabilitation of 6R/Hakra with System 01011601753 / 09-12-2016 / Bahawalnagar	398	63
150	Rehabilitation of 7R/Hakra with System 01011601754 / 09-12-2016 / Bahawalnagar	365	50
151	Rehabilitation of Hakra Branch from RD 0+000 to 286+920 01011800033 / 01-07-2018 / Bahawalnagar	869	-
152	Rehabilitation of Ahmadpur Lamma Disty System 01031400331 / 18-12-2014 / Rahim Yar Khan	657	183
153	Selective Lining of Irrigation Channels in Punjab Phase III 01371400649 / 01-07-2014 / Punjab	1,876	728
154	Improvement of Irrigation Water Supply at Tail Reaches of Irrigation Channels of Minors in Selected Area of Punjab	1,143	-
155	Rehabilitation of Trimmu Sidhnai Link Canal 01381501259 / 20-10-2015 / Jhang, Toba Tek Singh	389	1,050
156	Greater Thal Canal Project Phase-II (Chobara Branch) 01381501533 / 05-01-2016 / Bhakkar, Khushab, Layyah, Mianwali		700
157	Land Acquisition for Jalalpur Irrigation Project	1,249	2,338
158	Concrete Lining of Rajbah, Akal Pur, Norewala, District Jhang	8,516	-
159	Lining of Bungahayat Disty RD 81+670 to 110+272 Tail in Tehsil and District Pakpattan	44	-
160	Concrete Lining of 1-L/Shahiwal Minor RD 0+000 to 37+500 District Bahawalpur	52	-
161	Concrete Lining of 2-R Mohal Disty RD 0 to 69+000 District Bahawalpur	113	-
162	Concrete Lining of Mithra Disty RD 0+000 to Tail (40+550) District Bahawalpur	99	-
163	Construction of Chahan Dam Project 01291200030 / 26-03-2012 / Rawalpindi	94	811
164	Construction of Mohata Dam 01291400337 / 01-01-2015 / Rawalpindi	2,426	1,084
165	Construction of Dadhocha Dam 01291601780 / 01-07-2017 / Rawalpindi	2,585	-
166	Construction of Papin Dam Project 01291800004 / 01-07-2018 / Rawalpindi	840	-
167	Construction of Mohra Shera Dam in District Rawalpindi	675	123
168	Construction of Mujahid Dam District Rawalpindi	501	71
169	Construction of Small Dams in District Attock Phase II Shahbazpur, Tajabara and Sadrial Dams (Revised) 01260700003 / 19-11-2007 / Attock	8	8
170	Construction of Sowrra Dam Project in District Attock	55	580
171	Raising of Shahpur Dam 01261400671 / 18-10-2014 / Attock	24	186
172	Construction of Dhrabi and Minwal Dam (Revised), Chakwal		479
173	Construction of Small Dams in District Chakwal Phase II (Dhok Hum, Mundi Dam, Dhok Jhang and Uthwal /Lakhwal Dam (Revised)		971
174	Construction of Tamman Dam 01271400154 / 16-10-2014 / Chakwal	778	1,022
175	Construction of Sorra Dam, Dera Ghazi Khan	767	-
176	Land acquisition of Sorra Dam Project 01982111665 / 16-08-2021 / Dera Ghazi Khan	181	-
177	Construction of Ghabir Dam (Land Acquisition and Command Area Development Punjab Component) 01271501147 / 11-09-2015 / Chakwal	135	437
178	Construction of Pindori Dam 01281200031 / 20-05-2013 / Jhelum	1	772
179	Rehabilitation and Improvement of Existing Dams and Irrigation Channels in Small Dams Organization	0	351
180	Sustainable Land Management Programme to Combat Desertification in Pakistan (Punjab Component)	59	232
181	Catchment / Command Area Development of Mini Dams Ponds in Potohar Region for High Value Agriculture Production	200	-
182	Construction of 01 No. Well at Cha Daood Faqeer Wala. 01031700284 / 01-07-2017 / Rahim Yar Khan	2	-
183	Pilot testing of Innovative Technologies to improve water use efficiency	2	-
184	Recharge of Aquifer for Groundwater Management in Punjab	388	-

185	Eco Conservation / Preservation of Lal Sohanra National Park Bahawalpur	120	-
186	Channelization of Nullah Broach Tehsil Isa Khel District Mianwali	272	-
187	Development of Groundwater Resources with 3d-ERM & Geo-Logging Technology (Smart DLI 11) (2021-2022 to 2022-23) 01372100587 / 02-08-2021 / Punjab	46	-
188	Channelization of Jabba Nullah Tehsil & District Mianwali	358	-
189	Channelization of Rakka and Darsola Nullah Tehsil Isakhel District Mianwali	146	-
190	Protection of Bhakhar Flood Bund from Erosive Action Between RD 0+000 to 76+000 to Save the Abadies, Agriculture Land & Other Infrastructure of Bhakkar City	563	-
191	Protection of Abadies and Infrastructure from Devastation of Chachali Nullah Tehsil Isa Khel District Mianwali	163	-
192	Flood Protection of Sialkot against Aik, Bhed, and Palkhu Nullah	2,991	-
193	Afforestation of Marginal Lands in Murree		36
194	Afforestation in Murree Hills Rawalpindi		19
195	Propagation and Promotion of Indigenous Forest Tree Species to Conserve Biodiversity Faisalabad		13
196	Afforestation on Resumed Land transferred to Forest Department in Chakwal Forest Division		44
197	Survey & Establishment of Orchard of Endangered Species in Punjab 01091700339 / 01-07-2017 / Faisalabad		13
198	Development of Integrated Management of Citrus Orchards to Enhance the Yield & Improvement of Fruit quality		14
199	Construction of watercourses & laser leveling equipment at Chak No 105/ML, District Layyah		8
200	Rehabilitation of Shorkot Irrigated Plantation Jhang		81
201	Rehabilitation of Kamalia Irrigated Plantation, Toba Tek Singh		77
202	Integrated Afforestation & Eco-Development of Karrianwala Forest 24-11-2014 Gujrat		32
203	Rehabilitation of Daphar and Pakhowal Irrigated Plantation, Mandi Bahauddin		62
204	Development of changa manga forest park, Kasur		78
205	Afforestation of Blank Areas in Changa Manga Plantation, Kasur		9
206	Rehabilitation of Changa Manga Irrigated Plantation, Kasur		68
207	Ecological Afforestation in Kharian, Gujrat		78
208	Afforestation and landscaping of shahdra reserve forests land bank near mehmoob booti landfill, Lahore		68
209	Establishment of Shahbaz Sharif Forest Park Depalpur Plantation, Depalpur		32
210	Mechanization of Forestry Operations and Fire Fighting Techniques		60
211	Rehabilitation of Chichawatni irrigated Plantation, Sahiwal		64
212	Rehabilitation of Khanewal Irrigated Plantation, Khanewal		99
213	Afforestation of Forest Land Retrieved from Encroachers in Rajanpur Forest Division		136
214	Implementation of Management Plan in Southern Zone. Inayat, Machu and Rajan Shah Layyah		91
215	Development of GIS based Forest Management System in Punjab		71
216	Afforestation and Soil Conservation in Scrub Forest		50
217	Afforestation in Riparian Forests of Central Zone.		85
218	Social Forestry to Increase Tree Cover on Farmlands		286
219	Establishment of Short Rotation Plantation in Punjab. Shorkot, MLN, BWP and Pakhowal		165
220	Afforestation under Approved Management Plans in Irrigated Plantations of the Punjab		43
221	Implementation of Management Plan in Northern Zone. Kundian and Bhakkar Plantation		107
222	Maintenance of Road Side Plantation Raised under KPRRP Phase-I		97
223	Enhancement of livestock production and productivity through strategic deworming and vaccination		1,321
224	Preservation of Fodder as Silage at LESs in Punjab.		89
225	Enhance Rangelands Production and Planting of Fodder Trees for Farmer Community		673

226	Development of Range Lands in Punjab		38
227	Rehabilitation & Re-seeding of retrieved Rangeland in Bhakkar & Layyah District		70
228	Establishment and Rehabilitation of Forest Parks in Punjab 01381700118 / 01-07-2017 /		26
229	Improvement and Rehabilitation of Irrigated Plantations in Central Zone 01381700119 / 01-07-2017 / Kasur, Okara		103
230	Improvement and Rehabilitation of Irrigated Plantations in Northern Zone 01381700120 / 01-07-2017 / Bhakkar, Khushab, Mianwali		95
231	Improvement and Rehabilitation of Irrigated Plantations in Southern Zone 01381700121 / 01-07-2017 / Khanewal, Layyah, Sahiwal		85
232	Afforestation along Important Highways in Punjab		29
233	Afforestation of Blank Reaches along Important Highways in the Punjab 01381700124 / 01-07-2017 / Bhakkar, Kasur, Khushab, Mianwali, Okara, Sargodha		138
234	Diversification to high value cropping through promotion of horticulture		642
235	Provision of additional research facilities for development of heat resilient maize hybrids at Maize & Millet Research institute (SMART, DLI-2,11) 01381500995 / 01-07-2015 / Faisalabad, Sahiwal		40
236	Optimizing watercourse conveyance efficiency through enhancing lining length (SMART, DLI-11) 01371500999 / 01-07-2015 / Punjab		3,462
237	Water Resource Development through Construction of 400 Mini Dams along with Command area Development in Potohar Region Barani Areas of Punjab (GoPb 928.45, Beneficiary 180)		786
238	Rain Water Harvesting Project for all villages in Potohar Area by ABAD		13
239	Mitigation of Water Logging in District R.Y. Khan		27
240	Construction of Flood Protection Works along Rayya Flood Bund at RD 32+000 to Protect village Daud Khas district Narowal		350
241	Construction of Nutkani Flood Carrying Channel RD 0+000 - 21+000 in District Dera Ghazi Khan.		459
242	Enhancing Capacity of Nullah Bhed and Laila Drain in District Sheikhpura		303
243	Remodeling / Restoration of Ghulam Wah flood embankment from RD 3+240 to 45+689 tail Vehari		35
244	Construction of J Head Spur at RD 40 and RD 53 Down Stream Ghazi Ghat Flood Bund, D.G. Khan		100
245	Construction of J-Head Spur at RD:4000 of Fazil Shah Flood Bund (Clearing the Liabilities of Land Acquisition) 01221606636 / 01-07-2016 / Khanewal		8
246	Raising and strengthening of Sanawan Flood Bund RD 0+000 42+000 and Embankment along T.P. Link Canal RD 6+700 to 18+500, Muzaffargarh		145
247	Protecting 1 AR Minor, Area of Lundi Pitafi and Bait Daryai from Hectic Erosive Action of River Indus, Muzaffargarh		100
248	Protection of Chandar Bhan Flood Bund RD 55+000 to 67+000, Alipur District Muzaffargarh		50
249	Construction of Flood Embankments and Protection Works along left and right Bank of River Indus for bridge near Mianpur Linkage N-5 Arbi tibba with Rahimyar khan		499
250	Desilting and Strengthening Banks of Drains Construction of Flood Bund Along Drains and Closing / Strengthening Breaches along Nullahs District Narowal, Gujranwala & Sheikhpura		369
251	Project Preparation of Punjab Irrigated Agriculture Improvement Programme PIAIP (PC II) 01371300031 / 11-11-2016 / Punjab		558
252	Punjab irrigated agriculture productivity improvement project (PIPIP)		4,670
253	Flood Emergency Reconstruction and Resilience Project (Irrigation Components)		1,070
254	Lining of Mian Singh Minor Gujranwala		39
255	Lining of Mian Singh Minor (Clearing the Liabilities) Gujranwala		292
256	Construction of Mian Janda Minor, Chak 177/P to Kartar Pura, District Nankana Sahib		116
257	Providing River Training Works over river Ravi due to construction of Mal Fatyana Bridge, TT Singh		150

National Drought Plan - Pakistan

258	Restoration of J Head Spur No 3 on Indus between Dhingana and Doaba and Dhingana village & Construction of Jhead Spur RD 35+600/L near village Dobba Minawali		100
259	Pakpattan canal and Sulemanki Barrage Improvement Project (PCSBIP) 01351300001 / 28-08-2013 / Pakpattan		2,433
260	Construction of Mian Jhanda Minor, Chak 177/P to Kartar Pura, District Nankana Sahib		-
261	Lining of Sohag Disty RD 24000-72900 Tail, Pakpattan		14
262	Lining of Malkan Hans minior Disty from RD 0+ 000 to 56+110 Tail, Pakpattan		24
263	Lining of Noor Pur Disty RD 0 to 107037, Pakpattan		119
264	Concrete lining of Tajwana & Hussainwah Minors in Union Council Dad kamera District Vehari		16
265	Rehabilitation of Bahishty Disty with System, DG Khan		205
266	Lining of Noor Wah Distributory, DG Khan		40
267	Rehabilitation of Jatoi Branch RD 0 to 140 (Tail), Muzaffargarh		201
268	Rehabilitation of Degi Distributory with System, Rahimyar khan		74
269	Rehabilitation/Lining of Sharqpur Disty & System.		540
270	Engineering Design of Jalalpur Irrigation Project.		181
271	Reclamation of Agriculture Land Effected due to Water Logging in Bahawalpur Zone.		5
272	Rehabilitation and Raising of Qibla Bandi Dam, Attock		205
273	Construction of Arrar Mughlan Dam in District Chakwal		429
274	Construction of Spur at Basti Rindan DG Khan		444
275	Lower Bari Doab Canal Improvement Project PC I		2,532
276	Rehabilitation of Naushera Disty system, Gujranwala		-
277	Remodeling of Pindi Bhattian Flood Protection Bund from RD 18000 to 74650 Hafizabad		80
278	Recharge of Aquifer for Groundwater Management in Punjab		65
279	Eco Conservation / Preservation of Lal Sohanra National Park Bahawalpur		34
280	Channelization of Nullah Broach Tehsil Isa Khel District Mianwali		215
281	Flood Protection Bund Basti Darbar Hazrat Sultan Bahoo Jhang		176
282	Channelization of nallah Bhimber, Gujrat		139
283	Rehabilitation of BRBD from RD 0+000 to RD 50+000 including flood inlets, Sialkot		80
284	Rehabilitation of BRBD Link Canal RD 178+000 to 260+000 Sheikhpura		9
285	Promotion of High Value Agriculture through Provision of Climate Smart Technology Package		225
286	Rainwater management in cotton fields to Minimize impacts of climate change		7
287	Channelization of Jabba Nullah Tehsil & District Mianwali		50
288	Channelization of Aik Nullah and Improving Drainage System in District Sialkot		229
289	Protection of Abadies and Infrastructure from Devastation of Chachali Nullah Tehsil Isa Khel District Mianwali		113
290	Flood Protection of Sialkot against Aik, Bhed, and Palkhu Nullah		1,150
291	Chief Ministers special initiative for mass afforestation in Punjab		31
Total		265,110	99,512

ANNEXURE V: ADP-KHYBER PAKHTUNKHWA PROJECTS RELATED TO DESERTIFICATION AND DROUGHT

Costs of main projects of ADP-Khyber Pakhtunkhwa related to desertification and drought are as follows:

#	Projects	Expenditure (mil. PKR.)	
		July 2019- June 2024	July 2014- June 2019
1	170074 - Culturable Waste Land Development in Khyber Pakhtunkhwa.	71	76
2	180406 - Strengthening & Improvement of Existing Govt Fruit Nursery Farms	42	
3	1 210674 - Reclamation of Culturable Waste Land and Solarization of Agriculture Tube Wells.	516	
4	210671 - Promotion of Honey Production for Livelihood Improvement in Khyber Pakhtunkhwa.	148	
5	130036 - Sustainable Agriculture Development for Food Security through Integrated Approach in Khyber Pakhtunkhwa.		190
6	90299 - Small Farmers Land Development /Reclamation in Khyber Pakhtunkhwa.		44
7	130332 - Gomal Zam Dam Command Area Development and On Farm Water Management for High Value and High Efficiency Agriculture Project (USAID-Assisted).	351	317
8	110170 - Rehabilitation of Flood Affected Land through Plantation of New Orchards in Khyber Pakhtunkhwa.		
9	180035 - Provision of Interest Free Loan to the Farmers of Command Area under Gomal Zam Dam - Command Area Project.	87	44
10	"210763 - Introduction of Semi-Environmentally controlled Poultry Housing System and revival/revitalization of existing Poultry Forms in Khyber Pakhtunkhwa.	196	
11	"120638 - Plantation of Five Million Olive Saplings in Khyber Pakhtunkhwa and Maintenance of Model Farm, Sangbhatti."		644
12	210393 - Promotion of Olive in Merged Areas.	180	
13	190103 - Save the Calf Program in Khyber Pakhtunkhwa (Provincial Share-PM's Agriculture Emergency Program).	475	
14	190104 - Feedlot Fattening Program in Khyber Pakhtunkhwa (Provincial Share-PM's Agriculture Emergency Program).	551	
15	190105 - Poverty Alleviation through Development of Rural Poultry in Khyber Pakhtunkhwa (Provincial Share-PM's Agriculture Emergency Program).	622	
16	191103 - 190053 - Establishment and construction/reconstruction of Veterinary Facilities and Provision of De-wormer, vaccine, and medicine for all existing regular Veterinary institutions in Tribal Districts. [MA]	291	
17	200019 - Livelihood Improvement through Livestock Development in Hazara Division of Khyber Pakhtunkhwa (JICA assisted).	102	
18	220883 - Integrated Livestock Development Programme Khyber Pakhtunkhwa (Phase-I)	123	
19	160534 - Mass Vaccination Treatment and Artificial Insemination in Khyber Pakhtunkhwa		86
20	90299 - Land Development /Reclamation in Khyber Pakhtunkhwa.		950
21	160402 - Reclamation of Degraded Soils Through Soil Conservation Practices in Khyber Pakhtunkhwa (80:20)		44
22	150064 - Improvement and Lining of Water Courses in Khyber Pakhtunkhwa		129
23	150065 - Special Programme for On-Farm Water Management Activities in Khyber Pakhtunkhwa		729
24	170094 - Improvement & Lining of Water Courses and Construction of Water Storage Tanks in Khyber Pakhtunkhwa for Conservation of Water Resources.		383
25	150095 - Gulley Plugging Through Check dams in Khyber Pakhtunkhwa		20
26	"150096 - Construction of Water Storage Reservoirs in Khyber Pakhtunkhwa		10

27	170096 - Agriculture Land Conservation and Water Harvesting for Food Security in Khyber Pakhtunkhwa.		79
28	190106 - National Program for Improvement of Water Courses in Pakistan Phase-II (Provincial Share-PM's Agriculture Emergency Program).	2,871	
29	190107 - National Program for Enhancement of Command Area of Small & Mini Dams in Barani Areas (Provincial Share-PM's Agriculture Emergency Program).	419	
30	190108 - Water Conservation in Barani Areas of Khyber Pakhtunkhwa (Provincial Share-PM's Agriculture Emergency Program).	3,912	
31	220582 - Enhancement of Agriculture Land Productivity through Improved Soil & Water Conservation practices in Khyber Pakhtunkhwa	316	
32	191002 - 170178-Establishment of 6 No. Dates Farms in NWA. [MA]	9	
33	191008 - 170019 - Promotion of Olive Cultivation / Grafting for Oil Production in Bajaur Agency. [MA]	17	
34	191026 - 190002 - Promotion of Agricultural & Horticultural Activities in Merged Areas. [MA]	256	
35	"191088 - 170353-Uplifting the Scio-Economic Condition & Gender Mainstreaming of Livestock Farmers Through PPP in FATA. [MA]"	4	
36	191104 - 190054 - Creation of Disease free zone through mass vaccination & Treatment in feasible Districts on pilot basis [MA]	32	
37	191106 - 190334 - Construction of Ground water recharge Facilities in Merged Areas on 80:20 cost share basis [MA]	71	
38	191099 - 180323 - Small Ruminants (Sheep & Goat) Development Program in Tribal Districts. [MA]	17	
39	195179 - Culturable Waste Land Development & Solarization of Existing Agriculture Tube/Open Wells in newly Merged Districts of Khyber Pakhtunkhwa. (AIP)	993	
40	195181 - Merged Areas contribution to the Prime Minister's National Agriculture Emergency Programme (AIP)	490	
41	195184 - Integrated livestock development in Merged Areas. (AIP)	2,560	
42	"210602 - Introduction of Semi-Environmentally controlled Poultry Housing System and revival/revitalization of existing Poultry Forms in Merged Areas	167	
43	195185 - Livestock Productivity Enhancement in Merged Areas (AIP)	622	
44	195182 - Rain Water Harvesting in Merged Areas of Khyber Pakhtunkhwa. (AIP)	1,116	
45	130191 - Sustainable Land Management Programme to combat Desertification and land Degradation in Khyber Pakhtunkhwa. (SLMP) (UNDP Assisted).		27
46	110627 - Rehabilitation and Improvement of Natural Resources in Malakand.		71
47	130292 - Forestry Resource Improvement in Upper Chitral.		6
48	110625 - Enhancement of Forest Resource Base in Southern Forest Circle.		78
49	110626 - Conservation and Improvement of Forest Ecosystems in Hazara.		65
50	120758 - Integrated Watershed Management Project for Uplands of Khyber Pakhtunkhwa.		92
51	120761 - Propagation & Mass Afforestation of Indigenous Species (Walnut, Chilghoza, Ash & Chinar) in Malakand and Hazara Divisions.		4
52	120762 - Avenue Plantation on Government Land along Canals, Roads and Railway Tracks in Southern Circle.		11
53	130286 - Energy Plantation for Marginal and Problematic Lands in Khyber Pakhtunkhwa.		8
54	140034 - Billion Trees Tsunami Afforestation Project in Khyber Pakhtunkhwa.		716
55	140704 - Enhancement of Resilience and Livelihood Improvement through Forestry Interventions in Central and Southern Districts of Khyber Pakhtunkhwa.		32
56	140705 - Promotion of Fast Growing & Multi-Purpose Trees in Hazara and Southern Circles.		8
57	140816 - Collection and Storage of Seed of Forest Species		12
58	140817 - Afforestation of Drylands through Rainwater Harvesting in Southern Districts of Khyber Pakhtunkhwa		30
59	"160192 - Billion Trees Afforestation Project in Khyber Pakhtunkhwa (Phase-II)."		2,700

60	170102 - Billion Tree Afforestation Project in Khyber Pakhtunkhwa Phase-III	969	4,805
61	180418 - Fire Prevention & Control in Forest of Khyber Pakhtunkhwa.	41	
62	180424 - Creation of Forest Knowledge Parks in Southern Districts.	81	
63	190145 - 10-BTTP Up-Scaling Green Pakistan Program, Revival of Forestry Resources in Khyber Pakhtunkhwa (ADP & PSDP Funded).	6,563	
64	190147 - Collection and Storage of Seeds of Forest Species, Operationalization of Seed Storages and Up-gradation of Seeds Testing Laboratory (Phase-II).	35	
65	210391 - Billion Tree Afforestation Support Project - BTASP (KFW ASSISTED)	51	
66	220049 - Introduction to Cultivation of the Magic Crops, Quinoa as a new Livelihood Species with Farm Forestry Species in Khyber Pakhtunkhwa	12	
67	220292 - Development of designated forests carbon stock assessment for REDD + and Promotion of Carbon Credit Marketing in Khyber Pakhtunkhwa	4	
68	210503 - Livelihood Improvement in Poverty reduction through Non-Timber Forest Product (NTFP) activities in Khyber Pakhtunkhwa.	41	
69	220053 - Diversifying Livelihood opportunities through Value Chain Development of High Values Chilghoza Pine Forests in Khyber Pakhtunkhwa.	12	
70	120766 - Artificial Propagation & Development of Improved Methods of Collection, Storage, Processing and Marketing of High Value Forest Medicinal Herbs of Uplands.		13
71	120767 - Conservation, Promotion and Propagation of Taxus Baccata & Development of Improved Methods of its Leaves Collection, Storage, Processing and Marketing.		5
72	170111 - Conservation and Regeneration of Medicinal & Aromatic Plants in Khyber Pakhtunkhwa.	13	6
73	191432 - 180057 - Mitigation of Climate Change effect through raising of plantation in District South Waziristan. [MA]	58	
74	191433 - 180059 - Afforestation in Ping area of Sub-Division Tank [MA]	19	
75	191434 - 180060 - Energy Plantation in Sub-Division D.I Khan. [MA]	19	
76	191435 - 180061 - Promotion of Forestry Activities in Sub-Division Bannu [MA]	13	
77	191439 - 180307 - Afforestation over waste community lands in Sub-Division Peshawar. [MA]	33	
78	191444 - 150238 - Plantation at Upper Side of Baran Dam, FR Bannu. [MA]	17	
79	191460 - 170205 - Plantation of Fruit and Forest Trees Species in FR Peshawar [MA]	24	
80	191467 - 170312 - Afforestation / Fruit Tree Plantation in South Waziristan Agency. [MA]	32	
81	191426 - 130248 - Amelioration of Environment around the Dams and Waste lands in NWA. [MA]	72	
82	191431 - 180056 - Livelihood improvement through promotion of green growth in District North Waziristan. [MA]	38	
83	150649 - Introduction of Range Management Initiatives in Khyber Pakhtunkhwa	(32)	32
84	191461 - 170182 - Afforestation of Fast Growing Species on Waste Lands in NWA. [MA]	33	
85	191429 - 180051 - Promotion of Energy Plantation in District Kurram. [MA]	47	
86	191456 - 170122 - Afforestation of Fast Growing Species on Denuded Waste Lands in Kurram Agency. [MA]	27	
87	191464 - 170221 - Afforestation Over Waste Community Land in FR Kohat. [MA]	26	
88	191465 - 170284 - Enhancement of Tree Cover in FR D.I. Khan. [MA]	62	
89	191466 - 170254 - Block and Linear Plantation in FR Tank. [MA]	34	
90	191468 - 160152 - Stabilization of Fragile Slopes through plantation in Sunpog and Khanki area in Orakzai Agency.[MA]	112	
91	191450 - 140051 - Afforestation on Waste Community Land in Khyber Agency. (Revised) [MA]	90	
92	191452 - 170090 - Afforestation Over Denuded/ Barren Community Land in Khyber Agency. [MA]	39	
93	191485 - 180047 - Amelioration of degraded environment in District Khyber . [MA]	93	
94	220228 - Enhancement of Tree Cover in Newly Merged Areas	3	
95	191459 - 160239 - Afforestation of the Catchment Area of Existing Dams in Mohmand Agency. [MA]	40	

96	191455 - 170023 - Integrated Watershed Management in Bajaur Agency. [MA]	45	
97	191448 - 140198 - Community Plantation in Khyber Agency / FR Peshawar. (Revised) [MA]	121	
98	191473 - 170354 -Strengthening of Forestry Sector in FATA. (Ph-II) [MA]	89	
99	130388 - Expansion of Non-Timber Forest Products (NTFP) Activities for Livelihood Improvement of Local Communities in Khyber Pakhtunkhwa		12
100	140706 - Promotion of NTFP through Value Chain Development		7
101	150694 - Promoting Sustainable Use of NTFPs in Khyber Pakhtunkhwa		2
102	191436 - 180277 - Livelihood Improvement through NTFP activities in District South Waziristan. [MA]	3	
103	191489 - 190343 - Promotion of NTFPs in Merged Areas (South). [MA]	3	
104	191487 - 180345 - Poverty Reduction Through NTFP Activities in District North Waziristan. [MA]	2	
105	191488 - 190270 - Promotion of NTFPs in Merged Areas (North). [MA]	24	
106	195217 - Merged Areas Integrated Development Forestry Sector Project. (AIP)(Forestry Component)	246	
107	220080 - Promotion livelihood opportunities through NTFP interventions in Merged Areas (AIP-ii)	3	
108	220297 - Promotion of Chilghoza intervention and Research activities in North and South Waziristan	3	
109	191430 - 180053 -Development of NTFP in District Orakzai. [MA]	2	
110	191437 - 180259 - Promotion of Community-based Non Timber Forest Products (NTFP) in District Mohmand. [MA]	3	
111	160162 - Livelihood Improvement Through Apiculture in Central Southern Forest Region of Khyber Pakhtunkhwa		15
112	191422 - 180493 -Strengthening of NTFP in TDs. [MA]	1	
113	191449 - 120303 -Development of NTFP Activities in FATA. (Revised) [MA]	93	
114	191420 - 180578 -Development of NTFP activities in Sub-Division Lakki. [MA]	3	
115	195327 - Merged Areas Integrated Development Forestry Sector Project. (AIP) (Wildlife Component)	237	
116	191671 - 140225-FATA Water Resources Development Project (FWRDP). (GoP Component) (ADB Assisted). [MA]	451	
117	130022 - Extension & Improvement of spur No 18 on R/B of Indus River District D.I. Khan.		204
118	130668 - Improvement /Extension to Guide Bund for the Protection of Area between Guide Bund and up to Spur No.01 of Dera Darya Khan Bridge, District D.I Khan.	90	46
119	140561 - Provision of Flood Embankment along Paharpur Disty between RD.00-56000 in reaches & Restoration of damaged Canal Prism of Girsal and Mala Minor, District D.I. Khan.		14
120	150335 - Development & Rehabilitation of irrigation infrastructure, Flood Protection Works including Rod Kohi System in Kulachi area District D.I. Khan.		50
121	150339 - Adjustment of Head Regulator structures of D-8 & 8-A in CRBC network i/c remodeling of D-9 & its Head Regulators District D.I. Khan.		30
122	150928 - Construction of Flood Protection Bund at required places in u/c Lunda Sharif, District D.I. Khan		30
123	150929 - Construction /Extension of Panyala Protection Bund along-with Bridge and Conversion of Existing Tube-Wells on Solar System District D.I. Khan.		100
124	80337 - Detail Design & Construction of intake structure for Baran Dam Bannu.		53
125	120728 - Raising of Baran Dam Bannu (Detail Design Component).		63
126	140534 - Construction of Sitti Kali Dam District Bannu.	450	310
127	150930 - Construction and Improvement of Flood Protection Bund / Canal Patrol Road and Irrigation Channels in District Bannu.		64
128	170522 - Raising of Baran Dam District Bannu (25% Provincial Share)	1,250	30
129	150343 - Construction of Latamber Dam District Karak.	409	308
130	150918 - Construction of Flood Protection Works and Improvement of Civil Channels in Takhti Nasrati, Warana, Latamber and Chokara Areas, District Karak.	45	44

131	150919 - Construction of Flood Protection Works and Improvement of Civil Channels in Sabir Abad, Banda Dawood Shah and Karak City Areas, District Karak.	40	45
132	150920 - Construction and Improvement of Flood Protection Works and Irrigation Channels in District Hangu.		32
133	140530 - F/S for increasing storage capacity and Improvement in Command Area of Tanda Dam, District Kohat.		21
134	130554 - Improvement /restoration of augmentation channel for Warsak Lift Canal from Bara River & Urmar minor, Warsak Gravity Canal.		29
135	140799 - Flood Management of Shah Alam and Naguman Rivers District Peshawar.		245
136	170334 - Diversion of Tarkho Algada to Kashu Algada, district Karak.	223	12
137	4 - Improvement /restoration of augmentation channel for Warsak Lift Canal from Bara River & Urmar minor, Warsak Gravity Canal.		33
138	140876 - Restoration and Improvement of Canal Sections, Structures & Road along Warsak Lift Canal, Peshawar.		79
139	141049 - Flood Protection Wall in Sufaid Sang Area U/C Kafoor Dheri, Peshawar.		20
140	130547 - Flood Management of Khiali River District Charsadda.		189
141	150392 - Improvement of Jeo Sheikh Canal and its offtaking civil Kathas District Peshawar.	29	131
142	150893 - Improvement of Northern Eastern Drains /Khawars including construction of Flood Protection Works in Peshawar Valley.		15
143	150895 - Construction of Flood Protection works in UC Kafoor Dheri, Dag, Raggi, Shahi Bala and mathra area, District Peshawar.		65
144	150896 - Construction of Flood Protection wall on Bara River starting from Ring road till Chamkani bridge at required places, District Peshawar.		15
145	150898 - Revamping/ desilting and rehabilitation of Storm Water Drains / Khawars and Flood Protection Works in Badaber and Koh-e-Daman and adjoining area, District Peshawar.		85
146	150899 - Solarization of existing irrigation Tube wells in Badaber and Koh-e-Daman and adjoining area, District Peshawar.	50	198
147	"150900 - Construction of Flood Protection Works in Urmar and adjoining area in District Peshawar."		60
148	160282 - Rehabilitation of Irrigation tubewells/lift irrigation schemes & Solarization in Tube well irrigation division Peshawar	126	125
149	160298 - Reconstruction of Horseshoe bund on Bara River for feeding Sangoo & Sheikhan branch canals, District Peshawar.		29
150	160309 - Construction of Diversion Weir for Kabul River Canal District Peshawar PSDP Cost Rs.966.759 (M) (Provincial Share)		18
151	150909 - Construction /Restoration of Flood Protection Works and Civil Channels in Shabqadar Area District Charsadda.		51
152	170323 - Construction of flood protection wall along Dallas drain district Peshawar.		7
153	170660 - Construction and Solarization of existing and new Irrigation Tube Wells in Peshawar.	50	100
154	190304 - Construction of flood protection work on both sides of Chora Khwar near Chitral Colony & Construction of FPW at Regi Lalma and construction of water channel in Lakaray Kaniza UC-42 Malakandar Chora Khwar District Peshawar	99	
155	140533 - Improvement of Doaba Canal from RD 0-9000 & Michni Shabqader Branches, District Charsadda.	201	275
156	140535 - Revamping of Jindi River District Charsadda.		779
157	130440 - Construction of Flood Protection Structures in Suria Khail & Walai Khwars District Nowshera and Akram Abad Naguman River.		24
158	150907 - Construction of Flood Protection Works in Umerzai and Hisara Yaseen Zai Areas District Charsadda.		37
159	160285 - Improvement /Construction of Canals, Channels, Drainage system and Flood Protection Structures in District Charsadda	707	320
160	170319 - Improvement of Sholgra Canal System district Charsadda	115	50

161	130539 - Construction of Jalozei Dam, District Nowshera.		529
162	130540 - Revamping and Providing Flood Protection Works in Hill Torrents in Nowshera District.		365
163	140522 - Construction of Shah Kaleem Dam District Nowshera		510
164	190391 - Improvement and Rehabilitation of Palai Dam Canal System and Improvement and Rehabilitation of Tangi Irrigation Scheme in District Charsadda	136	
165	140523 - Construction of Flood Embankment on Right Side of Kabul River (Reach No. 1), District Nowshera.	113	543
166	140524 - Construction of Flood Embankment on Right Side of Kabul River (Reach No. 2), District Nowshera.	368	465
167	140525 - Construction of Flood Embankment on Right Side of Kabul River (Reach No. 3), District Nowshera. (ADB Assisted)	1,137	1,135
168	140526 - Construction of Flood Embankment from Kheshki to Nowshera Kalan on Left Side of Kabul River, District Nowshera.		1,067
169	140539 - Restoration of different Khwars in Nowshera Cantonment, District Nowshera.		30
170	140554 - Construction of Flood Protection Works R/S Indus River Near Rana Dheri District Swabi.		8
171	140572 - Improvement of Canal and Patrol Road/Bridges along Pehur Main Canal and its Sub System, District Swabi.		50
172	150379 - Construction of Marobi Dam District Nowshera.	1,213	258
173	150383 - Construction of Protection Structures on R/S of Kabul River U/S and D/S Nowshera Mardan Road Bridge, District Nowshera. (ADB Assisted)	1,403	1,213
174	150588 - Construction of Flood Protection Works and bridges on Nullahs and Khawars District Nowshera.	110	386
175	150715 - Construction of Protection Structures on L/S of Kabul River U/S and D/S Nowshera Mardan Road Bridge, District Nowshera.		381
176	150901 - Construction of Flood Protection Works in Tehsil Pabbi, District Nowshera.		25
177	150903 - Construction of retaining wall and Improvement of Right Bank of Jue Zardad canal District Nowshera.		6
178	150904 - Construction of Flood protection wall in Bara River near village Kandar, Akbarpura District Nowshera.		19
179	150905 - Construction of Flood Protection work and roads along Khawars / Drains at Amangarh, Kheshki bala and Payan, District Nowshera.		40
180	140573 - Construction of Flood Protection Structure and Rehabilitation of Drainage System along Badri Nullah, Parthogai Drainage System, River Indus and other Small Tributaries in District Swabi.		120
181	140574 - Rehabilitation /Improvement of Drainage System and construction of Flood Protection Works along Badri nullah, Naranji nullah, Shagai nullah, Bazagi drainage system with their tributaries in District Swabi.		120
182	140579 - Construction /Rehabilitation of Naranji minor No. 1 District Swabi.		5
183	140560 - Construction of Flood protection works and restoration of damaged weir in Gaddar nullah at village Hamza		8
184	160297 - Construction of Flood Structures on left bank of Kabul River near Pir Sabaq village, District Nowshera.		32
185	170665 - Construction of Flood Embankment on Kabul River upper side of Motorway Interchange District Nowshera. (ADB Assisted)	991	72
186	160272 - Construction of Jaroba Dam District Nowshera	471	159
187	190306 - Construction of new solar irrigation tube wells and solarization of existing tube wells district Nowshera	659	
188	190309 - Construction & improvement of drainage system, channels/canals, ponds, roads, bridges/culverts and flood protection works in district Nowshera	555	
189	130026 - Detailed Design and Construction of Pehur High Level Canal Extension District Swabi (ADB Loan)	(236)	236

190	150592 - Improvement of Maira Branch and its Sub-Systems & Roads along Maira Branch, Tor Dher Minor, Haleem Garhi Baado Baba, District Swabi.	256	158
191	150762 - Construction of Tube Wells on Solar System based, including conversion of existing irrigation tube-wells into Solar System, District Swabi.	41	141
192	150775 - Construction of Canal Patrol Roads & Flood Protection works in Tarakai, Dobian and adjoining areas in District Swabi.	149	224
193	150912 - Construction of Flood protection works at Badri Nullah, Zandai nullah and Totalay Kanda at UC Saleem Khan, UC Maneri Bala, UC Maneri Payan and UC Panjpir, District Swabi.		30
194	150914 - Construction of FPW & revamping/clearance of drainage system/imp. of irrigation infrastructure/ponds/roads /tubewell in Panjmand Topi Maini, Pabeni Khwar, Badri Nulah, River Indus, UC Zaida & other small tributaries to protect village abadis & Agricultural. lands from flood in Swabi	145	150
195	150358 - Remodeling of Bari bund disty: RD:45000 to tail District Mardan.		10
196	120881 - Construction of Rangmala Irrigation Scheme in Malakand.		26
197	160291 - Construction and Improvement of Irrigation Infrastructure including FPW, Channels / Ponds, Roads, Tube Wells & drainage system in Tordher, Jalabi, Jalsai, Lahore, Ambar and other areas of District Swabi	310	83
198	160553 - Improvement and extension of irrigation channels, flood protection and bridges in district Swabi	30	49
199	160597 - Improvement & construction of irrigation facilities i/c FPWs, tubewells & roads on canals & drains in UCs Dagi, Tarakai, Torlandai, Asota, Sheikh Jana, Karnal Sher Kalay, Shewa, Parmmoli, Narangi, Yar Hussain, Kalu Khan, Adina & other adj. areas Distt Swabi.	77	99
200	190344 - Construction of CPR along left side of Machai Branch from RD 113000 to RD 142000 including VR Bridge.	20	
201	190396 - Improvement/construction of channels, flood protection works, drains, roads, bridges/ causeway & installation of solar irrigation tube wells in tehsils Topi, Swabi & Lahore of district Swabi	1,621	
202	160301 - Improvement/lining of Rashakai Minor & Upgradation of Canal Patrol Road /VR Culverts along Rashakai Minor, Bara Banda Minor, Nowshera Minor & Torlandi Minor, Mardan Irrigation Division	211	
203	160642 - Improvement/rehabilitation of drainage system and construction of flood protection works in village Tor Dher, District Swabi.		21
204	190305 - Construction & improvement of roads, flood protection works/culverts & drains in Union Councils Ghala Dher, Muhabatabad, Hoti, Parhoti, Sikandary & Gulli Bagh District Mardan	112	
205	190430 - Construction and improvement of flood protection works Culverts, Drains and Roads in Union Council Baghi Irum, Kas Korona, Manga, Khazana Dehri, Chamtar, Mahoderi, Mohabat Abad, Bijlighar, Dagai, District Mardan.	124	
206	150945 - Construction /Improvement of Flood protection Works and Irrigation Channels in District Malakand.	60	59
207	170321 - Improvement of Abazai canal system and allied structures district Malakand.	244	65
208	140565 - Rehabilitation /Improvement of Leganai Civil Canal and Construction / Installation of Lift Irrigation Schemes in District Buner.	21	61
209	140802 - Improvement /Construction of Irrigation Facilities and Flood Protection Works in District Malakand.		87
210	150892 - Construction of Flood Protection works/ retaining Walls at Koz Kar and Manz Kar and Alpuri and Jarando bela District Shangla.		15
211	150931 - Rehabilitation and Restoration of Budal, Shahi Dehrai and Bame Irrigation Schemes District Buner.	20	51
212	150934 - Construction /Improvement of Flood protection Works and Irrigation Channels in District Shangla.	43	70
213	190410 - Construction/Improvement of Flood Protection Works, Channels, Tubewells and Crossing Facilities on need basis in Tehsils Alpuri and Bisham District Shangla	107	

214	130021 - Construction of Bagh Dheri Flow Irrigation Scheme District Swat.		772
215	140569 - Channelization /Railing of Marghuzar, Jambil and Mingora Khwar, District Swat.		80
216	140564 - Improvement /Development of Irrigation Facilities and Construction of Causeway and FPW in District Swat.	495	715
217	140755 - Development of Irrigation Infrastructure and construction of Flood Protection Works in Adenzai area of District Dir Lower.		40
218	150418 - Construction of Flood Protection Structures, Bridges and Improvement / Restoration of existing structures on Swat River and its Tributaries in Tehsil Matta District Swat.	(358)	358
219	150423 - Restoration /Improvement of Small Irrigation Channels and ponds in Tehsil Matta District Swat.	286	89
220	150933 - Improvement and development of irrigation facilities, construction of Flood protection works and revamping of Drains and Khawars in Odigram, Ghalaygai, Gobdhara and adjoining areas, District Swat.	88	92
221	150935 - Construction /Improvement of Flood Protection Works, Roads and Water Channels in Kabal, Ningolai, Kanju, Sherpalam and adjoining areas District Swat.	174	178
222	150936 - Construction / Improvement of Flood Protection Works and Water Channels in Fateh Pur, Khwaza Khela, Char Bagh and adjoining areas District Swat.	44	98
223	140849 - F/S and construction for extension at Balambat Irrigation Scheme, Dir Lower.		4
224	"150341 - Lining of Balambat Irrigation Scheme in District Dir (Lower) Phase-II."		14
225	150940 - Construction /Restoration of Flood protection Bund, Irrigation Channels on Panjkora River and its Tributaries from Rabat to Shagoo Kas District Dir (Lower).		85
226	150941 - Construction of Flood protection Bund and Irrigation Channels in Samer Bagh and adjoining areas in Dir (Lower)		52
227	150942 - Construction of Flood protection Works and Irrigation Channels in Maidan and adjoining areas, District Dir (Lower).		75
228	150943 - Construction of Flood protection Works and Irrigation Channels in Adenzai Area in District Dir (Lower).		52
229	180603 - Construction of Barawai irrigation Scheme in Tehsil Matta, District Swat.	98	
230	190303 - Construction of Chaprial Channel and Improvement & Extension of Fatehpur & Barat Khel Irrigation Channels District Swat	161	
231	190310 - Re-alignment of Nipki Khail Irrigation Channel district Swat	142	
232	190508 - Reconstruction/Rehabilitaion of Canal Petrol road/ Flood Protection works in Tehsil Kabal District Swat.	275	
233	160287 - Construction and Improvement of Irrigation Infrastructure including FPW, channels roads & Tube Wells in Adenzai and adjoining areas of District Dir Lower.	109	119
234	190495 - Construction of Flood Protection walls/ irrigation channels/Installation of Irrigation tube wells at UCs Daoba, Darsamand, Torawari, Naryab, Naryab-II, Tall urban, Tall Rural, Karbogha Sharif, Dallen Distt Hangu.	80	
235	"190523 - Construction/ Improvement of Canal Petrol roads/Rehabilitation/improvement of Drainage System including Flood Protection Walls/ Construction of Bridges in Tehsil Baka Khel Bannu.	98	
236	190525 - Construction/ Improvement of Canal Petrol roads/ Rehabilitation / improvement of Installation of Solar tube Wells at Us ALO, Kharki, Dheri, Qasmi, Shamoziya, Main Essa, Kati Garhi, Babozai VC Shah Bathkhela VC Dewan Khel District Mardan.	133	
237	190526 - Rehab./Improvement of Irrigation facilities including revamping of drainage system in UCs Shahbaz Ghari, Baghicha Dheri, Ghari Dolat Zai, Kot Dolat Zai, Kot Ismail Zai, Gujrat, Bakshali, Mardan.	57	
238	190528 - Rehabilitaion/improvement of irrigation facilities including revamping of drainage system in Babibi, Katahat Fatma, Garyal, Shahbaz Ghari, Ghari Daulatzai, Rural Mardan, Gujrat, Bahshali, Baghicha Dheri and construction/ imp. of canal petrol road from Quaid-e-Azam College to ring road District Mardan	121	

239	200192 - Rehabilitation/Improvement of Gandially Disty RD 66+000 to 77+000 in reaches and Babri Banda Minor RD- 0+00 to 3+500 in reaches District Kohat.	15	
240	200227 - Construction and Improvement of flood protection works and civil irrigation channels in Tehsil Bahrain Swat	104	
241	"200230 - Revamping of Irrigation Channels and Drainage system in Shamizai area Swat	50	
242	200233 - Construction/Rehabilitation of Canal Roads/Bridges/Culverts/Retaining Walls/Flood Protection Walls and Installation of 06 Solar Tube Wells at UCs Gumbat, Ismailzai, Bala Garhi,, Kandar, Toru, Mayar, Mohib banda, Kot Dolat Zai, Baar Nala Mehmood Abad Mardan	90	
243	200234 - Design and Construction of Mori Lasht Pipe Irrigation Scheme and Construction of Irrigation Channels/Syphen Irrigation in Kalash Valleys District Chitral District Lower Chitral	74	
244	200238 - Improvement/Rehabilitation of drainage system i/c Flood Protection Works and Bridges/CPR (SB) Tube Wells in Tehsil Nowshera, Jehangira and Pabbi Nowshera	179	
245	200242 - Construction of different canal roads and overhead bridges/Lining/Pavement of canals/construction of nullah/water channels/FPW at UCs Urmar Payan, Mera Kachuri, Tarnab, Budhni, Phandu, Chamkani, Mian Gujar and Hindki Daman etc. District Peshawar	293	
246	"200301 - Flood Protection Works/Irrigation Channels/Solar Irrigation Tube Wells/Canal Roads and other Allied Works in UC 36,42, 43, 44, 48, 64, 65, 66, 69, 70, 71, 80, 92, Peshawa	133	
247	200310 - Installation of solar based irrigation Tube wells in D.I. Khan	32	
248	200418 - 200418- Improvement and extension of Balambat Irrigation scheme (District Dir Lower)(Non-ADP)	76	
249	210423 - Construction of improvement and extension of Jinkikhel, Azikhel and Matozai Irrigation channel District Swat	78	
250	210426 - Solarization, Improvement, Rehabilitation, and Augmentation of existing Tube Wells in District Peshawar	39	
251	210432 - Flood Management & Rehabilitation of Swat and Panjkora Rivers in Malakand Division	41	
252	210433 - Rehabilitation of Kunhar & Siran River in Hazara Division	113	
253	210453 - Updation of Feasibility Study and Detailed Design of Tank Zam Dam, Chodwan Zam and Daraband Zam Dams District Tank and D.I. Khan	71	
254	210455 - Construction of Flood Protection works, Irrigation Channels and Ponds and Installation of Solar Irrigation Tube Wells in Khyber Pakhtunkhwa	692	
255	210458 - Construction/Rehabilitation of Canals & Drains Patrol Roads/ Bridges and Culverts /Retailing Walls Flood Protection Wall, Revamping of Drainage System at UCs Manga, khazana deri, Chamtar Bajli Ghar, Bagh Irum, Baghdada, Dagai, Kas Koroona, Mardan Khas, Mardan Cantonment, Bicketgunj, Maho Dheri and Muhabat Abad District Mardan.	49	
256	210030 - Installation of Solar Irrigation Tube Wells in District Nowshera	190	
257	210031 - Modification of Spillway, Exit Channel and Improvement of Irrigation System/Allied Components of Kundal Dam District Swabi	460	
258	210076 - Construction of Chashma Akhora Khel Dam Project, District Karak (Cost Sharing Project)	16	
259	210077 - Construction of Sarazoi Dam Project, District Hangu (Cost Sharing Project)	13	
260	210665 - Rehabilitation/ improvement of canals and other Irrigation infrastructure in Khyber Pakhtunkhwa.	522	
261	210663 - Rehabilitation/ improvement of canal section and Patrol road of disty 06 from Rd: 45+000 (Utmanzai bypass) to RD: 68+970 (Motorway interchange District Charsadda).	67	
262	210664 - F/S and construction of solar lift Irrigation schemes in Khyber Pakhtunkhwa	60	
263	210667 - Construction of Lining and Protection Wall of Canal along with its Beatification in District Mardan	107	
264	210699 - Construction and Improvement of irrigation channels, storage ponds, solar tube wells and flood protection works in Tehsil Hangu District Hangu	48	

265	210673 - Construction of Chashma Right Bank Canal (Lift Cum Gravity) Project D.I Khan	1	
266	210754 - Uplift of Barandoo Water Channel of Amnawar Shalbandi, District Buner.	17	
267	210756 - Construction of Flood Protection Wall and Fencing along Budni Nullah District Peshawar.	51	
268	210942 - Construction of Flood Protection Works and Irrigation Channels , Irrigation facilities, Roads along the storm water drains, flood carrier channels, VR Culverts, Small Bridges on Khwars & Nullahs, Installation of Solar Tube Wells etc. in UC Shawar, Gwalera, Biha, Arkot, Pir Kally, Kuza Bandai, Bara Bandai, VC Labat, Taghma & Shalhand District Swat	96	
269	"211001 - 211001- Construction/Rehabilitation of Roads and Crossing Facilities along natural drains, Flood Carrier Channels and Water Channels, Installation of Solar Tube Wells Lift Irrigation Schemes, Flood & Irrigation Infrastructures and Water Ponds in Tehsil Matta District Swat.	217	
270	120732 - Construction of Ganoorai Irrigation Channel, District Dir Upper.		25
271	130676 - Provision of irrigation channel in Kalkot, District Dir (Upper).	102	12
272	150613 - Providing and Improving Irrigation Infrastructure Flood Works, water Channels through Gravity and Storage in Barawal area, District Dir (Upper)	50	165
273	150938 - Construction /Rehabilitation of Irrigation channel in Ushera Darra, District Dir (Upper).	57	35
274	"220151 - Construction of Flood Protection Work On Left Bank of River Indus in Mouza Noorpur Palyar Tehsil Parora District D. I. Khan"	3	
275	220656 - Construction / Improvement of Irrigation and crossing facilities & Flood infrastructure in villages Chuprial, Baidara, Shokhdara, Durushkhela, Baz Khela, Sakhra and adjoining areas District Swat.	98	
276	220657 - Flood management of Swat river and its tributaries in Tehsil Behrain District Swat.	3	
277	220664 - Construction/improvement of flood protection structures, Small irrigation schemes in villages Shawar, Arkot, Sherpalam and adjoining areas, district Swat.	2	
278	220761 - Construction of Improvement & Rehabilitation of Canal Petrol roads, flood Protection and irrigation channels along Buzali Distry, Chura minor, Palodhri (Morra Kali) District Mardan.	112	
279	220764 - Construction of Roads along Canals/ Drains Khwars & Restoration of Damages infrastructure of Kabul River Canal System, Clearance of Drain in Tehsil Pabbi / Nowshera and installation of solar irrigation Tube Wells and lift irrigation schemes at various places in District Nowshera	82	
280	220769 - Construction/Rehabilitation of canal patrol roads, bridges and revamping of drainage system, construction/ improvement of flood protection structures for the protection of village abadies and Agricultural land of different Nullahs and installation of Solar Tube wells UCs Bakhshali, Gujrat, Rural Mardan, Baghicha Dheri, Shah Bazghari, Gari Daulatzai, Garyala, Fatma, chak Hoti, Sikandari, Par Hoti abd Babini Mardan	26	
281	220934 - Construction / Rehabilitation of Canal Petrol Roads, Bridges & Revamping of Drainage System, Construction/Improvement of Flood Protection Structure for the protection of village abbadies and agricultural land of different Nullahs, installation of solar tubewells, Ponds, Channels at different UC's of District Haripur		
282	220955 - RESTORATION OF DAMAGED FLOOD STRUCTURES AND DRAINAGE SYSTEM IN KHYBER PAKHTUNKHWA (NON ADP) 2022-23	346	
283	220956 - RESTORATION OF WATER SUPPLIES IN IRRIGATION SYSTEM AND CHANNELS IN KHYBER PAKHTUNKHWA (NON ADP) 2022-23.	370	
284	220961 - Rehabilitation of damaged flood protection structures in Khyber Pakhtunkhwa	300	
285	220962 - Restoration and rehabilitation of Patrol Roads/Bridges along canals and drains damaged in flood 2022 throughout Khyber Pakhtunkhwa	54	
286	220969 - Revamping of drainage system and construction of flood protection works, bridges/CPR in district Swabi	35	

287	220998 - Reconstruction and Rehabilitation of irrigation and drainage system and flood protection works in Khyber Pakhtunkhwa (Emergency Flood Assistance Project)	13	
288	"221115 - Flood Protection Sector Project-III (FPSP-III) of NFPP-IV(counterpart share of KP)"	4	
289	150939 - Construction /Restoration of Flood protection Bund and Irrigation Channels on Panjkora River and its Tributaries in Nehagdara, Karoodarra, Chapper Darra, Sultan khel Darra and adjoining areas District Dir (Upper).	67	54
290	162 - Construction of Khandan Jonali Koch Irrigation Scheme Booni Chitral.		3
291	140541 - Restoration /Rehabilitation of Civil Channels, District Chitral.		16
292	160598 - Improvement of Irrigation Channel near Sahib Abad Markaz, District Dir Upper	7	3
293	160306 - Construction/Restoration of flood protection structure & irrigation channels in district Kohistan	36	1
294	150925 - Construction of Flood Protection Works and Irrigation Channels on Ogai Tehsil, District Mansehra.	55	76
295	150927 - Construction of Flood Protection Works and Irrigation Channels in Tehsil Battagram, District Battagram		30
296	160552 - Uplift of irrigation schemes/installation of tube wells/water ponds at Maria Umar Khan, More Baffa Khurd and Birbut in district Mansehra		4
297	160647 - Construction of Siran Right Bank Canal, District Mansehra.	821	113
298	170519 - Construction of Small Dams in District Mansehra Khyber Pakhtunkhwa (Manchura Dam Project Provincial Share 12%) and Ichar Nullah Dam Project (Provincial Share 20%)	1,549	45
299	120717 - Construction of Small Dam at Kiyala, District Abbottabad.	50	424
300	130438 - Construction of flood structure on Bagan Khatta for protection of officers colony Abbottabad.		6
301	150921 - Construction of Flood protection works/ irrigation channels and bridges on Water Channels and drainage system in Tehsil Havelian District Abbottabad.		55
302	150922 - Construction of Flood Protection works / Water Channels in Lower Galyat Areas District Abbottabad.		39
303	150923 - Construction of Flood Protection Works and Water Channels on Daur River and its Tributaries in District Haripur.		49
304	150924 - Construction of Flood Protection Works and Irrigation Channels in Kalabat and adjoining areas, District Haripur.		25
305	170594 - Construction of Flood Protection Works in U.C Banda Pir Khan, Baldheri, Jhangi, Salhad, Pawa Chamhad, Kuthiala, Pind Kagroo Khan, Jaral, Sherwan and Havelian Urban	177	30
306	130008 - Construction of Gadwalian Dam, District Haripur.	1	769
307	160273 - Construction of Chapra Dam in District Haripur.	617	96
308	160274 - Feasibility study / Preparation of comprehensive Flood Management plan for Khyber Pakhtunkhwa	115	
309	170324 - Rehabilitation of canal roads, culverts and construction of flood protection walls, improvement of civil channels & installation of solar irrigation tube wells in district Haripur.	407	60
310	190429 - Restoration and Rehabilitation of Mumrial Irrigation Channel District Haripur.	31	
311	190452 - Construction/Improvement of Flood Protection Works, Channels and Solar Tube Wells in Haripur and Khan Pur Tehsils of District Haripur	165	
312	190463 - Construct /Establish Small irrigation reservoir/Dams/ Construction of Check Deams/Terises to preserve the Natural underground Water for Irrigation and drinking purposes in Ucs Asbanr , Khanpur, Kotigram,& Khadagzia District Dir Lower	88	
313	190471 - Construction of FPW in UC Malik Pura, Nawasher, Shiekh ul Bandi, Cantt. area of District Abbottabad	133	
314	190473 - Construction /Restoration of flood protection works/channel including roads & Culverts on canals & drains in Garh, Shah Mansoor, Zaida, Kunda, Amber, Beka, Tordher, Lahor & Jehangira district Swabi.	208	

315	190474 - Improvement and construction of irrigation facilities i.e., FPWs canal petrol roads, and drains in Ucs Chaknoda, Shiekh jana, KSK, Asota, Parmoli, Shewa, Naranji, Kalu khan, Adeena, Turlandi and Tarakai Swabi.	120	
316	190477 - Construction of small bridges, irrigation channels, FPW and canal petrol road in UC Machi, Bazar, Rustam, Charguli, Palodheri, Katakhat, Jamal Garhi, Sawaldher, Katlang-I, Katlang-II & Construction of FPW in Mathra Kanda (Pasand Kotay) & village Landi Distt Mardan.	167	
317	40400 - Construction of Bazai Irrigation Scheme in District Mardan and Malakand Agency. (Federal = Rs. 3400.661 M)		50
318	40401 - Construction of 20 Nos Small Dams in Khyber Pakhtunkhwa. (Federal PSDP Rs. 3600 M)	327	279
319	80320 - Construction of Palai, Kundal and Sanam Dams (PSDP Cost Rs. 3847.680 million)	66	903
320	040401 - Construction of 20 Nos Small Dams in Khyber Pakhtunkhwa. (Federal PSDP Rs. 3600 M)	1,128	
321	"080320 - Construction of Palai, Kundal and Sanam Dams (PSDP Cost Rs.3847.680 million)	1,119	
322	110014 - Construction of small dams in Khyber Pakhtunkhwa.	102	1,252
323	130010 - Construction of Flood Mitigation Structures in Khyber Pakhtunkhwa.		587
324	130014 - Construction /Improvement of Small Storage and flow Irrigation Schemes in Khyber Pakhtunkhwa.		190
325	130508 - Provision of Solar System in Irrigation Tube Wells on Pilot basis in Khyber Pakhtunkhwa.		224
326	130667 - Water Harvesting and Conservation Schemes in Southern Districts.	20	349
327	140527 - Improvement of Kabul River Canal System, District Nowshera and Peshawar		353
328	140531 - Construction of Flood Protection Structures to minimize flood devastation in Khyber Pakhtunkhwa.	98	645
329	140547 - Construction /Improvement of Small Irrigation Channels / Ponds in Khyber Pakhtunkhwa Phase-II.		194
330	140559 - Improvement of Rod Kohi System in Districts Tank, D.I. Khan, Karak and Lakki Marwat.		101
331	140570 - Construction of Flood Protection Embankment on Adezai River Districts Charsadda and Peshawar.		510
332	140754 - Flood Management of Panjkora River and its tributaries in Districts Dir Lower and Dir Upper.		446
333	140795 - Restoration of Damaged Civil Channels in Khyber Pakhtunkhwa	123	332
334	140810 - Improvement /Construction of Irrigation Facilities and Flood Protection Works in District Abbottabad, Haripur and Mansehra.		184
335	140819 - Improvement & Construction of Irrigation Channels and Flood Protection Works in Districts Battagram and Tor Ghar.		28
336	150328 - Extension/Improvement of Nandak Minor and Indus Branch Canal System		14
337	150428 - Up-gradation of Hydrological System & Infrastructure in Khyber Pakhtunkhwa.		28
338	150436 - Construction of Flood Protection Structures at Vulnerable Locations on Rivers, Nullahs and Khawars in Khyber Pakhtunkhwa.	511	247
339	150437 - Construction & Improvement of Small Channels & Ponds in Khyber Pakhtunkhwa.	225	136
340	150439 - Installation of Solar based Irrigation/ Augmentation Tube Wells and Small Lift Irrigation Schemes in Khyber Pakhtunkhwa.	305	192
341	150902 - Restoration of Water Channels in Marizang Khwar Dag Ismail Khel District Nowshera and Peshawar		30
342	160275 - Providing Flood Protection structures in Rivers, Nullah & hill torrents in Khyber Pakhtunkhwa	907	48
343	160280 - Construction/Improvement of Irrigation Channels, Bridges, Culverts, Small storage ponds & Drainage Systems in Khyber Pakhtunkhwa	503	54
344	160304 - Restoration / Re-construction of damaged flood structures/channels in district Swat, Shangla and Buner.	110	88

345	160307 - 160307-Review Feasibility Study, Updation of Detail Engineering Design, Tender Documents and PC-I for Chashma Right Bank Canal (Lift Cum Gravity) E/Cost Rs 477.853 (M)	10	
346	"160308 - Gomal Zam Dam Multipurpose Project Provincial Share)"		1,033
347	160459 - Construction of Flood Structures along Jabba Daudzai and Zangal Koroona areas along Kabul and Shah Alam Rivers District Nowshera & Peshawar (ADB Assisted).	885	254
348	160513 - Installation of Solar Augmentation/Irrigation Tube Wells in Khyber Pakhtunkhwa	309	238
349	"160550 - Construction and improvement of Flood Protection Works, improvement of channels and rehabilitation of canal roads Southern districts	315	
350	160551 - Construction of channels, ponds, flood protection works and installation of solar irrigation tube wells in Hazara Division	159	96
351	170335 - Remodeling of Warsak Canal System in Peshawar and Nowshera districts (Provincial Share Rs. 5568.79).	2,415	263
352	170595 -Improvement/Extension of Gomal Zam Canal Irrigation System in District Tank and D.I. Khan	50	11
353	170597 - Provision of Irrigation / Augmentation Tube Wells and Lift Irrigation Schemes at required places in Khyber Pakhtunkhwa	740	
354	170620 - Removal of deficiencies in Gomal Zam Dam Project	135	15
355	170664 - Construction of Flood Embankment from Kheski village to Motor way Bridge L/S Kabul River District Nowshera/Charsadda (Reach-1) (ADB Assisted).	1,126	90
356	180604 - Construction of Chamak Maira Dam. District Abbottabad.	330	
357	180617 - Construction of flood protection works, irrigation channels and installation of solar tube wells in Khyber Pakhtunkhwa on need basis.	1,568	
358	190301 - Feasibility Study/Detailed Designing for construction and improvement of irrigation channels in Khyber Pakhtunkhwa	59	
359	190302 - Feasibility Study/Detailed Designing of potential small dams in Khyber Pakhtunkhwa	46	
360	"150926 - Construction of Flood Protection Works and irrigation Channels in District Torgar."		50
361	191973 - 170518 Construction of Small Check Dams in District South Waziristan. [MA]	17	
362	191999 - 180498 Construction of Irrigation Channels in District South Waziristan. [MA]	20	
363	192000 - 180109 Construction Micro Hydel Power Units & Check Dams in District South Waziristan. [MA]	23	
364	193102 - Shakai Small Dam, SWA. CDWP/15/09/2017 [FDA]	528	
365	193103 - Sarobi Small Dam, NWA.	417	
366	193122 - Malana Multi-Purpose Water Project, Kurram Agency (A) BOD/22/12/2016 [FDA]	33	
367	193123 - Sadda Multipurpose Water Project, Kurram Agency (A) BOD/22/12/2016 [FDA]	33	
368	191998 - 180175 Construction of Irrigation Channels and Check Dams in District Orakzai. [MA]	9	
369	191983 - 170099 Construction of Check Dams/Ponds in District Khyber. [MA]	16	
370	191965 - 170413 Construction water storage reservoirs/ Check Dams in District Mohmand. [MA]	9	
371	191980 - 170059 Construction of Delay Action Dam in District Mohmand. [MA]	12	
372	191981 - 170061 Construction of Water storage reservoirs/ Check Dams in District Mohmand. [MA]	14	
373	191982 - 170372 Solarization of existing irrigation tube wells in District Mohmand. [MA]	17	
374	191986 - 160245 Construction of Delay Action Dam at Khapakh tehsil Halimzai in Mohmand Agency. [MA]	30	
375	192010 - 1805826 Construction of Check Dams in District Mohmand. [MA]	5	
376	193104 - Small Irrigation Schemes in other Agencies. (A) BOD/16/10/2014 [FDA]	148	
377	193107 - Abdul Shakoar Dam District Mohmand	717	
378	191978 - 170027 Construction of 08-Nos Irrigation Channels in District Bajaur. [MA]	32	
379	191979 - 170028 Construction of Check Dams/ Ponds in District Bajaur.. [MA]	13	

380	192004 - 180219 Solarization of Existing Dug Wells in District Bajaur. [MA]	7	
381	193101 - Raghagan Small Dam, Bajaur Agency CDWP/30/3/2016 [FDA]	384	
382	193109 - Supervision & Protection works of Raghagan Small Dam, Bajaur Agency. BOD/20/12/2013 [FDA]	49	
383	191959 - 160492 Solarization of 140 Completed Tube Wells in FATA. [MA]	110	
384	191960 - 170363 Construction of Potential Surface Irrigation Schemes in North Tribal Districts. [MA]	132	
385	191962 - 110331 National Program for Improvement/Lining of water courses in FATA.) [MA]	200	
386	191964 - 110261 O&M of 13 Nos completed dams in FATA. [MA]	151	
387	191968 - 170406 Construction of Water Storage Reservoirs in Tribal Districts. [MA]	50	
388	191984 - 110199 Potential of Ground Water for Ground Surface Irrigation System in FATA. [MA]	150	
389	191993 - 180191 Construction of check dams/water storage reservoirs in Tribal Districts. [MA]	67	
390	191994 - 180192 Construction of Delay Action / Check Dams in Tribal Districts. [MA]	45	
391	191976 - 170256 Construction of Irrigation Channels and Storage Reservoirs in Sub-Division Tank. [MA]	27	
392	192009 - 180449 Construction of Irrigation Channel in Sub-Division Tank. [MA]	19	
393	191974 - 170283 Construction of Irrigation Channels and Water Storage Reservoirs in Sub-Division D.I. Khan. [MA]	28	
394	191975 - 170289 Construction of Various Water Storage Tanks in Existing Tube Wells / Nallahs in Sub-Division D.I Khan. [MA]	19	
395	192012 - 180528 Construction of Irrigation Channel in Sub-Division DI. Khan [MA]	17	
396	192014 - 190089 River Training Works on Main Rivers in Tribal Districts. [MA]	145	
397	192015 - 190090 Construction of Potential Surface Irrigation Schemes in Tribal District [MA]	107	
398	192016 - 190091 Construction of Check Dams/Water Storage Reservoirs in Tribal Districts. [MA]	441	
399	192017 - 190092 Solarization of Existing Irrigation Tube Wells in Tribal Districts [MA]	140	
400	192018 - 190223 Detailed designing and formulation of project through consultant for restoration & Rehabilitation of Danday small Dam in District North. [MA]	2	
401	193110 - Parwara Small Dam, FR DI Khan. (A) [FDA]	35	
402	192013 - 170462 Sinking and Installation of Solar based Irrigation Tube Well in Sub-Division Lakki. (GD) [MA]	2	
403	193114 - Small Irrigations Schemes in FRs Bannu, Lakki, DI Khan & Tank. (A) BOD/12/5/2016 [FDA]	170	
404	193124 - Feasibility Studies and Detail design of 20 Nos Small Dams (A) BOD 25/5/2017 [FDA]	83	
405	193130 - Small Irrigation Schemes in Southern FATA (Phase-I) (A) BOD/25/05/2017 [FDA]	40	
406	193131 - Small Irrigation Schemes in Southern FATA (Phase-II) (A) BOD/25/05/2017 [FDA]	40	
407	193132 - Small Irrigation Schemes in Southern FATA (Phase-III) (A) BOD/25/05/2017 [FDA]	40	
408	210422 - Construction of Chao Tangi Dam District South Waziristan Merged Areas (for remaining works of PSDP No. 188 against earlier funds released by Finance Division)	489	
409	192006 - 180467 Solarization /Rehabilitation of existing Tube Wells/ Dug Wells in Sub-Division Kohat. [MA]	6	
410	195187 - Construction of Jabba Dam, district Khyber (AIP)	506	
411	195188 - Construction of Bara Dam, District Khyber (AIP)	77	
412	195189 - Development of Command Area under completed Small Dams (AIP)	492	
413	195191 - Construction of Check Dams/Storage Reservoirs on need basis across Merged Districts (AIP)	1,215	
414	195192 - Construction of Small Dams at Feasible sites across Merged Districts (Baz Ali Small Dam, District Kurram) (AIP)	268	

National Drought Plan - Pakistan

415	195193 - Construction /Rehabilitation of other feasible Dam schemes-- Gomal Zam Dam Multipurpose Project (AIP)	858	
416	195195 - Construction/Improvement of Irrigation Channels/Water Ponds on need basis (AIP)	1,531	
417	195196 - Need Assessment and Construction of New Solar tube Wells & Solarization of existing Tube Wells (AIP)	515	
418	195197 - Remodeling & Extension of Bara River Canal System in District Khyber (AIP)	1,107	
419	195198 - Construction of Kundiwan Weir in SW (AIP)	131	
420	200056 - Construction and Rehabilitation of Warsk Left Bank Canal District Mohmand (AIP).	935	
421	200057 - Improvement and Rehabilitation of Spaera Weir Bara Khyber District (AIP)	19	
422	200333 - F/S and Construction of Flood Protection in MAs, [AIP]	67	
423	210094 - 195192-Construction of Small Dams at Feasible sites across Merged Areas (Rs.9.00 Billion) Sub Scheme Construction of Shaktu Small Dam - TSD Bannu	225	
424	210095 - 195192-Construction of Small Dams at Feasible Sites across Merged Areas (Rs.9.00 Billion) Sub Scheme Construction of Ghozhezai Small Dam - TSD Tank	124	
425	210096 - 195192-Construction of Small Dams at Feasible sites across Merged Areas (Rs.9.00 Billion) Sub Scheme Zakar Khel Small Dam - North Waziristan	22	
426	210105 - Construction of Ramak Dam - TSD D.I. Khan	17	
427	210107 - Zangoti Small Dam - North Waziristan	22	
428	210588 - Construction of Irrigation tube wells / Lift Irrigation Schemes and Solarization of existing Irrigation Tube Wells in Merged Areas	318	
429	210589 - Construction of Check Dams & Water Reservoirs in Merged Areas	400	
430	210590 - Construction of Small Dams in Wana-South Waziristan	19	
431	210593 - Construction / Improvement of Irrigation Channels in Merged Areas	320	
432	210658 - Construction of flood protection works at critical locations in District Kurram and Khanki river - Orakzai	300	
433	210659 - Improvement of Irrigation system Barganato Dam -TSD Bannu	25	
Total		83,032	40,590

ANNEXURE VI: ADP-GILGIT BALTISTAN PROJECTS RELATED TO DESERTIFICATION AND DROUGHT

Costs of main projects of ADP-Gilgit Baltistan related to desertification and drought are as follows:

#	Projects	Expenditure (mil. PKR.)	
		July 2019- June 2024	July 2014- June 2019
1	SAIRAB Gilgit-Baltistan (Construction of new irrigation channels to bring cultivable lands under crops in Gilgit-Baltistan).	121	50
2	Imp./Rehabilitation of Barmas to Kargah Water Channel and Treks from Napura Nullah to Barmas Balla.	12	
3	Construction of Irrigation Channel in Bagardo Roundu	2	
4	Restoration of Lift Irrigation System at Thorgo Bala, Thorgo Pain and Sarfaranga.	13	
5	Construction ./Improvement of Irrigation Channel Barkolti and Bujayote Yasin.	3	
6	Repair of Water Channels at Hakis (Sherzaman to Dilmurad House), Provision of 3" Inch HDPE Pipe from Gahoo Gah t Bulbul Abad for Drinking/Irrigation Purpose and Construction. of Lift Irrigation Pump at Kashbat, Gupis	10	
7	Post-Harvest Management through Processed Food Value Chain in Baltistan Region.	12	
8	Infrastructure Imp. of Fruit Nursery Skarkoi Gilgit.	12	
9	Development and Promotion of Olive and Walnut in Diamer/Astore Region.	6	
10	Sustainable Production and Yield Enhancement of Potential Crops in District Skardu.	12	
11	Strengthening Sustainable Agriculture to Expand Opportunities for Farming Communities in District Ghanche.	17	
12	Pre and Post-Harvest Management of Potential Fruits with Special Focus on Apple and Apricot in District Kharmang.	8	
13	Establishment of Animal Disease reporting & Surveillance System in Gilgit-Baltistan.		23
14	Augmenting Animal Breeding and Nutrition Services in Gilgit-Baltistan.		23
15	Enhancement of livestock production in GB		76
16	Extension of Poultry production services in GB		19
17	Introduction of post-harvest technology and processing of fruit and vegetable in Baltistan region.		31
18	Promotion of seed and planting material (PSPM) in district Skardu.		22
19	Promotion of horticultural crops with special focus on off season vegetable farming in Diamer		14
20	Poverty reduction through promotion of Horticultural and Cereal Crop in District Diamer		2
21	Promotion of Horticulture Crop in Hunza-Nagar.		27
22	Rehabilitation of Denuded Forest areas through showing, Planning and Development of farm/social forestry with community participation in GB.		131
23	Reduced Emissions from Deforestation and Forest Degradation (REDD+) preparedness Phase for Gilgit-Baltistan.		19
24	Participatory Management of CKNP Ph-II106		20
25	Protection and Multiplication of Natural Forest through strengthening of Forest Ranges by infrastructural Development and introduction of Joint Forest Management in Gilgit Forest Division.		42
26	Sustainable Management of Deosai National Park.		30
27	Capacity enhancement of Nurseries in Baltistan Region towards achieving the MDG Targets.		19
28	Protection and Conservation of Natural Forests in Hunza/ Nagar.		18
29	Sustainable Forest Conservation in District Astore.		16
30	Rehabilitation and management of pastures to ensure sustainable supply of Forage to Wild Life in Hunza/Nagar.		2
31	Construction of RCC lining of irrigation channel (upper and lower kuhl Gilgit)		988

National Drought Plan - Pakistan

32	Construction of 360 rft RCC work at Shumari water channel (Revised)		1
33	Pipe Irrigation for Nasirabad (UR)	17	8
34	Laying of 12" diameter pipe for irrigation purpose in Nagar proper		
35	Lift Water Irrigation Scheme at Shahyar Nagar	5	
36	Construction of Pakka Channel at Gulmit Nagar Halqa-IV	4	
37	Providing/Fixing of Pipe for Irrigation System of Old Settlement Qourkondass Halqa-IV Nagar.	25	
38	Construction of Irrigation Channel for Midan-e-Sadaat	12	
39	Construction of Irrigation Channel at Somon	4	
40	Irrigation pipe line for Gulkin Gojal Hunza		4
41	Construction and provision/laying of HDPE pipe at sliding areas of water channel from Lacher to Bari Shung Doyan(UR)		4
42	Income Generation of Small Farmers Through Apiculture (Honey Bee Garming) Promotional Activities on PPP Basis in Gilgit Region.	30	5
43	Promotion of Poultry Activities/ Breed Imp. of Poultry in GB	7	18
44	"Effective Control of Ecto and Endo Parasites in Livestock of GB	12	34
45	Establishment of Animal Disease & Surveillance System in GB (Ph-III).	37	
46	Strengthening of Poultry Services Involving Private Sector in Gilgit-Region Phase-II i.e., Rehabilitation of Vet. Hospital at Gilgit.	37	
47	Strengthening/Improvement of Poultry Services Involving Private Sector in Baltistan-Region.	3	
48	Strengthening/Improvement of Poultry Services Involving Private Sector in Diamer-Region. and Construction of Vet. Dispensary at Chilim Astore and Jutal Gilgit."	5	
49	Targeting Blue Revolution Towards Food, Nutrition & Livelihood Security through Conservation of local Species in GB.	20	
50	Development of Yak at High Altitude Areas of Pakistan, Gilgit-Baltistan (Ph-II)	18	
51	Conservation and Scientific Management of High Value Juniper Forests in Gilgit-Baltistan.	19	
52	Climate Change Mitigation through Establishment of Energy Plantation at Riverbeds & Marginal Lands in Baltistan Revenue Division.	16	
53	Fire Prevention and Control in Forest GB	10	
54	Watershed Management & Soil Conservation in Catchment Areas of Ataabad Lake Site in Collaboration with the Local Community.	17	
55	Participatory Management and Development of Central Karakoram National Park, Gilgit Baltistan, Ph-II (Revised).	137	71
56	Construction of Protective Bund Along Indus Chumik Skardu	7	
57	Economic Transformation Initiative	822	1,568
Total		1,492	3,285

ANNEXURE VII: ADP-AJK PROJECTS RELATED TO DESERTIFICATION AND DROUGHT

Costs of main projects of ADP-AJK related to desertification and drought are as follows:

#	Projects	Expenditures (mil. PKR.)	
		July 2019- June 2024	July 2014- June 2019
1	Apiculture Development in AJK		8
2	Rejuvenation of Departmental Nurseries		30
3	Introduction of Plastic Tunnel Technology in AJK		38
4	Fruit Development Program (FDP) by Improving Existing Wild Fruit Flora in AJK	109	26
5	On-Farm Soil Conservation and Productivity Enhancement through Mechanized Farming in AJ&K	50	
6	Establishment of Horticultural Theme Park Bhimber	63	
7	Agro-Ecological Based Fruit, Vegetable & Apiculture Development as Enterprise in AJ&K	61	
8	Production of Quality Fruit Plants by Providing Certified Agricultural. Inputs at Departmental Nurseries	20	
9	Promotion of Olive Cultivation in AJ&K	19	
10	Promotion of Kitchen Gardening in AJK		32
11	Sheep/Goat Development Programme in AJ&K	3	
12	Promotion of Commercial Poultry Farms and Hatcheries for the Production of Eggs and Broilers Parent Flock in AJK		49
13	Rural Poultry Production for Women in AJK		79
14	Animal Health Support Services Project in AJ&K		(22)
15	Strengthening of Livestock Health Services in AJ&K	24	26
16	Rural Poultry Production for Women in AJ&K		
17	Backyard Poultry Production for Women in AJ&K	94	
18	Productivity Enhancement by Development of Irrigation Facilities along Neelum River (from LOC to Nosery)		
19	Water Conservation & Productivity Enhancement through High Efficiency Irrigation System		15
20	Rehabilitation of Water Channel Jabra to Kona and Dam Dhari to Pahl District Jhelum Valley (Hattian Bala)		43
21	Rehabilitation of Leftover Targets of National Program for Improvement of Water Courses in AJ&K	12	206
22	Protection of Precious Agricultural Land of Pindi Junjah, Thathi, Bela Mohammad Nagar & Kawlaal Sukasan Areas Through Construction of Flood Protection Infrastructure	19	20
23	Installation of Solar Tube Wells on Pilot Basis in Potential Areas of District Mirpur and Bhimber	3	18
24	Rehabilitation of Khari Irrigation Canal District Bhimber/Mirpur (PC-II)		2
25	Rehabilitation of Khari Irrigation Channel and Lining of Existing Distributaries on Upper Jhelum Canal (Phase-I)	127	3
26	Forest Fire Prevention and Control in The Forests of AJ&K	98	
27	Identification of Flood 2014 Emergency Reconstruction & Multi- Disaster Reliance Programme (PC-II)		9
28	Flood 2014 Emergency Reconstruction and Resilience Project in AJ&K	2,483	5,231
29	Disaster and Climate Resilience Improvement Project	2,561	1,327
30	Establishment of Permanent Forests Nurseries in AJ&K	42	210
31	Protection of Forests from Fire in AJ&K (Phase-II)	3	10
32	Support to Natural Regeneration in Demarcated Forests in AJK		228
33	Support to Natural Regeneration in Demarcated Forests of AJK.(Phase-II)	233	77
34	Support to Natural Regeneration in Demarcated Forests of AJK.(Phase-III)	400	
35	Support to Natural Regeneration in Demarcated Forests of AJK.(Phase-IV)	53	

National Drought Plan - Pakistan

36	Range Land Management in AJ&K.	17	
37	Reforestation Program in Demarcated Forest of North AJ&K		219
38	Reforestation Program in Demarcated Forests of South AJ&K		222
39	Reforestation Program in Demarcated Forest of Muzaffarabad Forest Circle	125	25
40	Reforestation Program in Demarcated Forest of Poonch Forest Circle	87	
41	Reforestation Program in Demarcated Forest of Mirpur Forest Circle	79	
42	Poverty Reduction Project through Participatory Watershed Development (AJK Component)		52
43	Integrated Land Management in District Muzaffarabad (Phase-V)		27
44	Integrated Land Management in District Bagh (Phase-V)		19
45	Integrated Land Management in District Poonch (Phase-V)		19
46	Integrated Community Based Watershed Management in Muzaffarabad Forest Circle		173
47	Integrated Community Based Watershed Management in Poonch Forests Circle		190
48	Integrated Community Based Watershed Management in Mirpur Forests Circle		141
49	Integrated Community Based Watershed Management in Muzaffarabad Forest Circle (Phase-II)		70
50	Integrated Community Based Watershed Management in Poonch Forest Circle (Phase-II)		67
51	Integrated Community Based Watershed Management in Mirpur Forest Circle (Phase-II)		63
52	Integrated Community Based Watershed Management in Muzaffarabad Forest Circle (Phase-III)	144	42
53	Integrated Community Based Watershed Management in Poonch Forest Circle (Phase-III)	201	57
54	Integrated Community Based Watershed Management in Mirpur Forest Circle (Phase-III)	141	45
Total		7,271	9,096

ANNEXURE VIII: NATURAL, CLIMATIC REGIONS AND AGRO-ECOLOGICAL ZONES

1.1. Natural regions of landscapes

The country has following seven natural regions of landscapes in the order of their drought proneness.

1. The Deserts

Snakes, lizards, scorpion, desert gazelles, foxes, jackals, bustards, wild cats¹⁷ etc. are among the wildlife of deserts in Pakistan.

1.1 The Thar and Nara Deserts

Thar Desert situated in eastern Sindh and south-eastern Punjab covers 320,000 km² and 90% of it lies in India¹⁸. Wild peacocks are found in this desert. Hundreds of peacocks died in 2011¹⁹ to 2012²⁰ and 2017 to 2018 due to Newcastle (Rani Khet) disease and the shortage of water²¹.

1.2 The Cholistan Desert

Spread over 25,800 km² area²² with average yearly rainfall of about 127 millimeter causing sparse vegetation²³ and containing Hakra River which is dry during most parts of the year.

1.3 The Thal Desert

It covers 20,900 km².²⁴ Greater Thal canal boosted agricultural outputs and the economy of Pakistan and improved physical environment.

1.4 The Kharan, Kech and Chaghi Deserts

The mountainous Kharan Desert, situated in Balochistan province has about 48,051 km²²⁵ area.

1.5 Katpana desert in Baltistan

Katpana desert has an average height of more than two thousand and two hundred meters above sea level. Climate is cold (27°C to -25°C), covered with snow during winter²⁶.

2. The Balochistan Plateau

Hills of Balochistan plateau are dry and situated from north-east to south-east containing river Gomul and Zhob and these are very hot in summer and cold in winter except mountainous

¹⁷ <https://defence.pk/pdf/threads/deserts-of-pakistan.272202/page-5>

¹⁸ https://en.wikipedia.org/wiki/List_of_deserts_of_Pakistan#:~:text=It%20is%20the%20world's%2017th,Gujarat%2C%20Punjab%2C%20and%20Haryana.

¹⁹ <http://www.theasian.asia/archives/25547>

²⁰ <https://www.dawn.com/news/738390/dozens-of-wild-peacocks-die-in-thar-desert>

²¹ <https://dailytimes.com.pk/12197/newcastle-kills-another-25-peafowls-in-two-days-in-thar/>

²² https://en.wikipedia.org/wiki/Cholistan_Desert#:~:text=11%20External%20links-Geography,the%20edge%20of%20the%20desert.

²³ <https://defence.pk/pdf/threads/deserts-of-pakistan.272202/page-5>

²⁴ <https://www.graana.com/blog/deserts-of-pakistan/>

²⁵ https://www.iucn.org/sites/default/files/import/downloads/kharan_brochure.pdf

²⁶ https://en.wikipedia.org/wiki/Cold_Desert,_Skardu

areas where cold weather predominates²⁷. In most of the areas, crops cannot be grown. Hingol to Kech, Mastunge Quetta and Loralai Zhob are more productive than other areas in the plateau. In Kech date is the main fruit and wheat, rice and vegetables the main crops. In other areas crops including maize, wheat, barley, lucerne and potato and orchards including apple, grapes, apricot, peach, plum, almond and pomegranate are grown if irrigation water is available. The height of the plateau is more than 2000 feet up to 11,000 feet above sea level²⁸. Karezes (with under-ground channels with parts of open spaces) were the principal water supply and irrigation sources but the extension of the tube wells and subsidized flat rate of electricity encourages farmers to operate tube wells for longer duration resulting in depletion of groundwater and drying of water in Karezes.

3. The North-western Mountains

Most parts of North-western Mountains have sparse vegetation, low rainfall, are away from the monsoon. Soils are calcareous and loamy. Main crops are wheat, maize, apples, plums, peaches, apricots and grapes.

4. The Pothowar Plateau

Pothowar Plateau in northeastern Pakistan, forms the northern part of Punjab. These are mostly rain-fed areas, with average rainfall between 380 millimeters to more than 500 millimeters yearly with lesser rainfall and arid type climate in south-west areas. Soils are mostly silt-loam, silty and clay loam²⁹.

5. The Upper and Lower Indus Plains

In the upper plains of Indus, rivers Indus, Sutlej, Chenab and Jhelum flow. Although all the food crops are grown here but wheat and rice amongst the main food crops, berseem as fodder and sugarcane, cotton amongst the main cash crops. The soils are clayey and silty. In lower Indus areas Banana is the main fruit crop³⁰.

6. The Coastal Areas

Coastal areas cover about nine hundred and ninety kilometers in Balochistan and Sindh provinces³¹. More than fifty-four lac acres have been engulfed by the sea during the last thirty years³². Sea water intrusion into the freshwater aquifers and lands of coastal areas is increasing salinity levels in the soils causing failures of crops and fodder.

7. The Northern Mountains

The Himalayas run across 2,500 km from east to west, the highest peak is Nanga Parbat (8,126 m). Average height of Karakoram Mountains is 6,000 m, the highest peak is Mount Godwin Austin (K-2, 8,610 m). A fast-flowing river is passing through most area of the range. The Hindu Kush Mountains has mountain peaks like Tirich Mir (7,708 m) and is at the borders of Afghanistan and China. The northern dry mountains have clayey soils and calcareous up to about 2,100 meters'

²⁷ <https://www.slideshare.net/agsamanzoor/plains-plateaus-and-deserts-in-pakistan>

²⁸ <https://www.globalsecurity.org/military/world/pakistan/baloch-geography.htm>

²⁹ <https://www.soils4teachers.org/physical-properties/>

³⁰ https://businessfinancearticles.org/types-soil-pakistan#1_Northern_Mountains_Regions

³¹ https://bepa.gob.pk/download/66/research-and-publication/8700/rs_pakistan_coastal_resources_handbook.pdf

³² <https://www.dawn.com/news/1255161>

altitude and non-calcareous and acidic above this altitude. Maize wheat and rice are the main crops³³.

1.2. Climatic Regions

Following are the five major climatic regions³⁴ in Pakistan based on aridity and humidity:

1. Arid and Hyper Arid Regions

These regions include desert and surrounding areas. Arid and hyper-arid region's rainfall is one hundred and fifty millimeters to two hundred and fifty millimeters and less than one hundred and fifty millimeters, respectively. Often drought is observed. Many rangeland species of flora have been disappeared due to over-grazing. One fifth of Pakistan is hyper-arid.

2. Semi-Arid Regions

This region's yearly rainfall is two hundred and fifty millimeters to five hundred millimeters. Districts of this region include Kohat, Northwestern and central Dir, Mardan, Peshawar, Lahore, Faisalabad, Sheikhupura, Gujranwala, Sargodha (Central districts of Punjab) etc. More than three-fourths of the area of Pakistan lies in semi-arid to hyper arid.

3. Sub-Humid Regions

Sub-humid regions' yearly rainfall is between five hundred millimeters to one thousand millimeters. Districts include Islamabad, Rawalpindi, Sialkot, Attock, Chakwal, Jhelum, Parachinar and Abbottabad.

4. Humid Regions

Humid regions yearly rainfall is more than seventeen hundred millimeters. Northeast areas of Pakistan and Swat, Upper Hazara and Murree have such climate (Very cold winters).

5. Sub-tropical Regions

The winter rainfall is between sixty-three to ninety-five millimeters. In summer rainfall is less but occasionally up to ninety-five millimeters. Northwest areas of Pakistan including Kalat and Quetta have such climate.

³³ https://businessfinancearticles.org/types-soil-pakistan#1_Northern_Mountains_Regions

³⁴ https://balwois.com/wp-content/uploads/old_proc/ffp-1295.pdf

1.3. Agro-ecological zones

Pakistan has ten agro-ecological zones³⁵.

1. The Indus Delta

This delta is formed at the point of joining of Indus river with the sea. Average monthly rainfall in the delta is from five millimeters to seventy-five millimeters. The average daily temperature ranges from 19°C to 45°C.

2. The Irrigated Plains (Southern)

Average monthly rainfall in the southern plains is about twenty millimeters to little rains in winter. The average daily temperature ranges from 8.5°C to 45°C.

3. The Sandy Desert

Average monthly rainfall in the deserts is from thirty-two millimeters to forty-six millimeters in the northern and southern areas, respectively. The average daily temperature ranges from 7°C to 41°C. There are mostly no rains in the winter. Subtropical climate with summers very hot and winters mild prevails in the area.

4. The Irrigated Plains (Northern)

Average monthly rainfall in the Irrigated Plains (Northern) is from fourteen millimeters to one hundred and eight millimeters. The average daily temperature ranges from 6.2°C to 39.5°C. Climate is subtropical continental and semi-arid.

5. The Rain-fed areas of Lands

Average monthly rainfall in the rain-fed areas is from thirty-six millimeters to two hundred millimeters. The average daily temperature ranges from 3°C to 38°C.

6. The Wet Mountains

Average monthly rainfall in the Wet mountains is from one hundred and sixteen millimeters to two hundred and thirty-six millimeters. The average daily temperature is up to 35°C. The eastern side is humid.

7. The Northern Dry Mountains

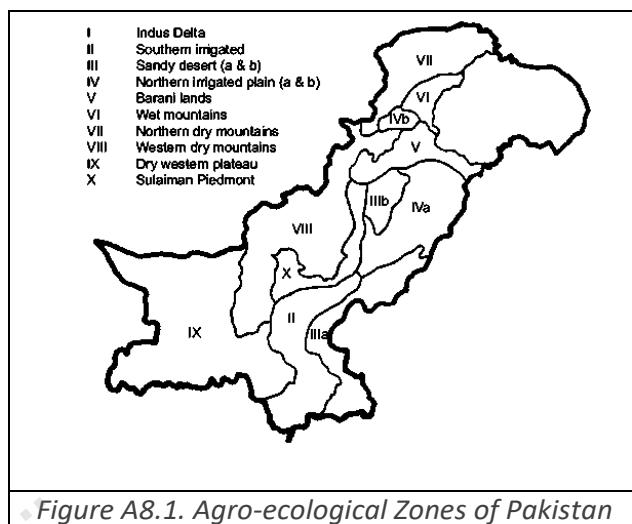


Figure A8.1. Agro-ecological Zones of Pakistan

³⁵ CHAPTER 2. AGRO-ECOLOGICAL ZONES AND CROP PRODUCTION REGIONS
<http://www.fao.org/3/y5460e/y5460e06.htm>

Average monthly rainfall in the northern dry mountains is from ten millimeters to one hundred millimeters. The average daily minimum temperature mostly ranges from 1°C to 7°C.

8. The Western Dry Mountains

Average monthly rainfall in the Western dry mountains is from five millimeters to ninety-five millimeters. The average daily temperature mostly ranges from -3°C to 39°C.

9. The Dry Western Plateau

This is desert and climate is arid tropical. The average monthly temperature range is 3°C to 44°C. The average monthly rainfall in summer is meagre (two to four mm) while in the extreme southeastern areas it is about thirty-six mm.

10. The Sulaiman Piedmont

The area is hot and arid. The average daily temperature range is 5.7°C to 40°C. The monthly rainfall is thirteen to thirty-eight millimeters.

ANNEXURE IX: LAND CAPABILITY CLASSIFICATION

The Land Capability classification is primarily based on the relative degree, or severity, of limitations of a particular piece of land for agricultural use. The first four classes are meant for arable use and the last four for non-arable use i.e. for forestry and range. CLASS I (Very Good Agriculture Land) Soils having no limitations for general arable use. CLASS II (Good Agricultural Land) Soils having minor limitations for arable use. CLASS III (Moderate Agriculture Land) Soil having moderate degree of limitations. CLASS IV (Poor or Marginal Agriculture Land) Soils with severe degree of limitations. Land Capability Classes V to VIII are related to forestry and range. CLASS V (Good Forest or Rangeland) Soils with minor or no limitations for forestry or range development. CLASS VI (Moderate Forest or Rangeland) Soils with moderate degree of limitations for forestry or range development. CLASS VII (Poor Forest or Rangeland) Soils having severe limitations for forestry and range development. CLASS VIII (Non-Agricultural Land) Soils having no potential for agriculture, including forestry and rangeland. Depending upon whether land capability is assessed under irrigated or dry farmed conditions, the land capability classes relevant to arable farming(I-IV) are distinguished by a prefix 'ir' (irrigated) or 'd' (dry farming). Further differentiation is made on the basis of limitations. An area of about 61.7 million hectares of land has been classified according to this system.

The following table shows all the eight land capability classes prevalent in Pakistan³⁶:

Table A9.1. Land Capability Classes of Pakistan

Land Capability Class	Punjab	Sindh	KP	Balochistan	GB	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
Total	20,033	11,614	8,434	34,403	5,780	1,279	81,543	100.0

³⁶ <https://www.slideshare.net/FAOoftheUN/soil-survey-in-pakistan-history-achievement-and-impact-on-agriculture-by-jarwar-attar-khan> published on 2015

ANNEXURE X: DROUGHT RISK REDUCTION - GENDER ACTION PLAN

Disasters like drought have a devastating impact on the economy and human development, creating hardships for households, particularly poor people who are forced to divert scarce resources from productive activities towards survival, recovery and rebuilding. The impact of disasters is disproportionately greater on women, children and other vulnerable groups. When a disaster strikes, even among the most vulnerable communities, women and girls face additional challenges. Women are more vulnerable in relief camps, face crowding and stampedes at distribution points, and are particularly at risk from threats to personal safety. Recovery is also more difficult for women, with agricultural and livestock rearing activities disrupted and limited livelihood opportunities compared to men. Education for girls, maternal and reproductive health care, and many other services are affected, particularly when critical infrastructure is destroyed, which is often the case. Perhaps most worrying of all, women and girls become more vulnerable to gender-based violence after disasters hit. Outcome of action plan of disaster risk reduction include safety and resilience is strengthened through gender responsive climate disaster risk reduction, preparedness, response planning and implementation. The action plan of disaster risk reduction as described in Pakistan's Climate Change Gender Action Plan is as follows:

#	Objectives	Action
1	Ensure the inclusion of women, particularly those from vulnerable communities, in all policy, planning and decision making	➤ Establish requirements for the inclusion of women and women led organizations in all disaster risk reduction (DRR) policy making and planning bodies at the national and provincial levels ➤ Set up a coalition to lobby for equal representation of women in national and provincial policy making, and to provide women a platform to voice their concerns ➤ Set quotas for the inclusion of women in all district and municipal DRR authorities ➤ Develop mechanisms for community consultations that include women, particularly in disaster prone areas, to make local DRR plans responsive to the needs of women and girls ➤ Ensure that women are included in relief camp planning and management so that the needs of women and girls, including safety concerns, can be fully addressed ➤ Champion local knowledge and best practices on DRR at the community level, using perspectives and knowledge from the elderly and from indigenous communities, to design and implement gender responsive DRR response plans that are context specific ➤ Identify key stakeholders, such as community elders, religious leaders, journalists and civil society activists, to serve as allies and to support and promote an enhanced role for women in DRR decision making at the local level
2	Strengthen and institutionalize gender	➤ Review current DRR policies, plans and guidelines to identify gaps in gender inclusion and opportunities for strengthening inclusion, and to recommend revisions

	mainstreaming in all policies and programs for disaster risk reduction, as well as within management authorities and bodies	➤ Use findings from the DRR policy review to develop a gender inclusion policy for DRR to guide future planning and implementation ➤ Amend legislation or enact new legislation to ensure that gender inclusion is legally mandated in all DRR policy, planning and implementation, as well as in all departments and ministries ➤ Establish a sub-commission on DRR at the NCSW to lobby for and support work on gender integration in DRR policy, planning and decision making, and to serve as a coordinating body for gender responsive actions across ministries ➤ Designate gender focal points in all DRR related ministries, departments and agencies ➤ Ensure that funds are set aside in budgets for DRR activities that focus on the needs of women ➤ Hold policy dialogues with parliamentarians on gender equity in DRR in the context of climate change challenges
3	Build stakeholder capacity on linkages to gender in programs for disaster risk reduction	➤ Map key stakeholders and identify their capacity needs for gender responsive DRR activities ➤ Based on stakeholder mapping, conduct training and capacity development to strengthen gender responsiveness in DRR activities ➤ Conduct awareness raising and training workshops on the linkages between gender, DRR and climate challenges ➤ Work with the media, including through training, to build capacities for gender focused reporting in the wake of disasters ➤ Identify ambassadors at the community level (women, youth, religious leaders) to promote dialogue on gender responsive DRR and to strengthen community mobilization ➤ Develop learning materials to integrate gender- DRR-climate knowledge into the curricula of schools, colleges and universities ➤ Develop a communications campaign to build awareness on gender and disasters, with the inclusion of intergenerational knowledge
4	Facilitate and empower women on disaster risk reduction knowledge, tools and networks	➤ Ensure early warning systems are adapted to local contexts and designed to reach women, taking into account differences in the ways that women and men are able to access information ➤ Provide safe and adequate facilities in tsunami shelters, relief camps and other emergency protection spaces, designed to meet the needs, including safety concerns, of women and children ➤ Expand post-disaster relief systems, including emergency cash transfer schemes, rations distribution drives and healthcare, to ensure that women are directly able to access these services ➤ Include disaster vulnerability in targeting criteria used in existing cash transfer schemes for women (Benazir Income Support Program) to ensure that they are able to access benefits quickly and

		automatically in the wake of a disaster ➤ Ensure that eligibility requirements and paperwork, such as possession of computerized national identity cards (CNICs) and bank accounts, do not prevent women from accessing emergency services ➤ Design and implement disaster insurance schemes, particularly for women who depend on land and natural resources for their livelihood ➤ Provide interest-free loans to women running businesses or carrying out income generation activities affected by disasters ➤ Ensure that post-disaster reconstruction prioritizes the housing needs of women led households and the education of girls ➤ Set up a helpline for the reporting of gender-based violence and child marriage, to protect women and girls during disasters (similar to the Ministry of Human Rights helpline)
5	Collect and make accessible gender disaggregated data on the impact of disasters and risk reduction activities to identify and understand women's needs and priorities	➤ Conduct disaster risk assessments for all disaster-prone areas, with particular focus on the needs of and challenges faced by women ➤ Conduct a gaps analysis on the need for gender disaggregated data for DRR, including the establishment of uniform definitions to ensure consistency in data collection ➤ Collect gender disaggregated data on all aspects of DRR to capture the differential impact of disasters on women and men ➤ Conduct area specific post disaster needs assessments focusing on the priorities and concerns of women and girls ➤ Document internal displacement and migration related health and safety needs of women ➤ Conduct research on the links between gender-based violence and disasters ➤ Document local knowledge and traditional best practices on disaster management and risk reduction (adaptation, coping, recovery) ➤ Build the capacity of national institutions focusing on the links between climate change and DRR to strengthen understanding of the differential impacts on women of climate related disasters ➤ Work with institutions focusing on climate applied research to ensure that research is gender inclusive and gender responsive
6	Monitor and evaluate ccGAP implementation to strengthen gender responsive action for disaster risk reduction	➤ Develop benchmarks and indicators to monitor progress on implementation of gender sensitive DRR actions ➤ Establish a mechanism for periodic review of progress on ccGAP implementation

ANNEXURE XI: ON-GOING FEDERAL PSDP PROJECTS FOR DROUGHT PREPAREDNESS, ADAPTATION AND MITIGATION

On-going main projects related to drought are described below:

PSDP projects

- i. Conserve and develop water resources and raise awareness

Action/ Activity	Lead agency	Indicative timeframe	TF 01.07.2024, Mil. Rs.
1. Prime Minister's National Programme for Solarization of Agriculture Tubewells	Ministry of National Food Security and Research (MoNFS&R)	2024-30	139,513
2. Horticulture Support Program (HSP)		2024-30	1,000
3. National Program for Animal Disease Surveillance and Control - Track and Traceability – Compliance with National and International Standards		2024-30	4,000
4. National Peste des Petits Ruminants (PPR) Eradication Programme; Phase-I Risk Based PPR Control in Sheep and Goats of Pakistan		2024-30	1,274
5. Water Conservation in Barani Area of Khyber Pakhtunkhwa		2024-30	3,190
6. Construction of 100 Delay Action Dams in Balochistan (Package-3: 20 Dams)	Ministry of Water Resources	2024-26	1,293
7. Construction of 05 Nos. of Dams in District Loralai		2024-26	100
8. Construction of 200 Dams in Killa Abdullah, Gulistan and Dobandi Tehsil			1,367
9. Garuk Storage Dam District Kharan [Cost Rs.10511.186 m]			17,761
10. Kurram Tangi Dam Project (Stage-I)			2,211
11. Mapping of All Water Resources in Southern Balochistan (SB)			228
12. Nai Gaj Dam Project, (Dadu, Sindh)			26,787
13. Naulong Storage Dam Project, Jhal Magsi, Balochistan			39,080.
14. Raising of Mangla Dam Project, Mangla, Mirpur (AJ&K)			762
15. Construction of Awaran Dam (revised)		2024 –27	19,779
16. Construction of Chashma Akhora Khel Dam Project, District Karak (Cost Sharing Project)			1,215
17. Construction of Gish Kaur Storage Dam, Kech (SB)			7,898
18. Construction of Mara-Tangi Dam District Loralai			1,469
19. Construction of Hekanog Delay Action Dam (SB)			178
20. Construction of Topak Dam (SB) (Prov. Share= 84.846)			448
21. Construction of Panjgur Storage Dam (SB)			18,990
22. Construction of Shehzanik Dam, in District (Gwadar) (SB)			1,630
23. Construction of Sunni Gar Dam (SB)			4,091
24. Construction of Sarozai Dam, Hangu			415

Action/ Activity	Lead agency	Indicative timeframe	TF 01.07.2024, Mil. Rs.
25. Construction of Maserag Delay Action Dam (SB)	Ministry of Water		254
26. Increasing Storage Capacity and Improvement in Command Area of Tanda Dam Kohat KP			825
27. Construction of 100 Dams in District Areas/ Districts of Balochistan (Package-IV)			11,472
28. Construction of Sanam, Palai and Kundal Dams, District Dir Lower			2,640
29. Construction of Sari Kalah Delay Action Dam in U/C Raskoh District Kharan			61
30. Construction of Ghabir Dam, Chakwal			4,472
31. Construction of Winder Dam, District Lasbela			4,300
32. Construction of 5 Small Dams Namely Salari-2 Dam, Rai Jo Dat Dam, Shalmani Dam, Garwari Dam and Aamri Dam in Kohistan-1 Dadu		2024 – 26	670
33. Construction of 06 Nos Small Dams Namely Densi Koondal, Kambowah, Khirpora, Bantari, Moor, Nadi Jo Wandio Dams in Nagarparkar Area, Thar Region			174
34. Construction of 06 Nos Small Dams Namely Katrah, Kouhar, Sari-II, Saroni, Wadejo & Khar Dam in Lower Kohistan			118
35. Construction of Dinar Dam Killa Abdullah			183
36. Construction of Small Dams in Districts Ziarat			936
37. Construction of Dam at Roshanabad Kalat			250
38. Remodeling of Pat Feeder Canal System in Balochistan District Naseerabad			56,793
39. Kachhi Canal (Remaining work)		2024 – 28	917
40. Kachhi Canal Project (Phase-I)			148

ii. Forest trees plantation and wildlife Conservation

Action/ Activity	Lead agency	Coordinating agencies	Indicative timeframe	TF 01.07.2024, Mil. Rs
41. Green Pakistan Programme (Revised)	MoCCEC	Provincial Forest and Wildlife Depts.	2024- 28	95,620

iii. Increasing command area of water resources and growing low delta crops

Action/ Activity	Lead agency	Coordinating agencies	Indicative timeframe	TF 01.07.2024, Mil.Rs.
42. National Program for Enhancing the Command Area in Barani Areas of Pakistan			2024- 25	7,347

National Drought Plan - Pakistan

43. Promotion of Olive cultivation on commercial scale in Pakistan - Phase II	NFS&R Division	Provincial Agriculture Departments		3,390
---	----------------	------------------------------------	--	-------

iv. Animal Husbandry for drought prone areas

Action/ Activity	Lead agency	Coordinating agencies	Indicative timeframe	TF 01.07.2022, Mil. Rs
44. National PPR/ Peste Des Petits Ruminants Eradication Program: Phase I – Risk Based PPR Control in Sheep/ Goats	MoNFS&R	Provincial Livestock Dept.	2024 – 28	1,273

v. Projects on large dams and canal

The projects on large dams under PSDP are as follows:

45. Diamer-Basha Dam Project (Dam Part)	2024 –32	380,630
46. Diamer-Basha Dam Project (Resettlement & Land Acquisition)		40,789
47. Mohmand Dam Hydropower Project	2024-26	234,724
48. Chashma Right Bank Canal (CRBC) Left Cum Gravity Project	2024-28	189,535

ANNEXURE XII: PROVINCIAL DROUGHT PLAN - SINDH

A12.1. Executive Summary

Sindh province covers about 18% of the country's area and 25% of the country's population. About 60% of the provincial area is arid and 66% groundwater is brackish. District Tharparker has extremely high vulnerability index for drought followed by Umerkot, Mirpurkhas, Badin, Thatha, Tando Muhammad Khan, Tando Allah Yar, Sangher, Shaheed Benazirabad, Dadu, Kambar Shadadkot, and Jamshoro. Arid zones comprise of Thar, Nara and Kohistan, cover around 48% of the total area and 1% of the water resources of the province.

Thar region comprises District Tharparker, and a part of Mirpurkhas and Umerkot districts covering 22,000 Square kilometers. Water table depth for portable water is approximately 350-400 feet on average, which further decreases during droughts. The wells are mostly about one kilometer away from the houses and women have to take several trips to meet household needs for water. More than 80% of groundwater is brackish. There are also eighteen small Dams and 594 reverse osmosis (RO) plants in the district. About 79% of households own farmlands, the majority having about two acres per household. Around 95% of agriculture is rainfed. During 1999 crop production completely failed and new grasses could not be grown on grazing areas in Thar. During drought, the fruits of a local tree are used as human food. **Kohistan region** covers 23,000 Square kilometers. Livestock and subsistence agriculture are major sources of income. If timely and sufficient rains are not received during monsoon, drought-like conditions prevail causing a shortage of water, food, feed, and fodder for livestock. **Nara region** consists of desert parts of Sanghar, Khairpur, and Sakhar districts covering 23,000 km². The main causes of drought include population growth, deforestation and land degradation, overgrazing, Climate change, increased anthropogenic activities, inappropriate use of land without considering land capability classification and soil problems, mostly causing increased vulnerability to drought.

District Tharparker: The district is divided into two and spread over an area of About 20,000 Square kilometers. District Tharparker comprises over 7 Talukas (Tehsils) and 172 villages (Dehs) out of which nine villages come under irrigated area. Total cultivable land is 2.00(M) hectares out of which only 24000 hectares come under irrigated area and the remaining area comes under Barani tract. Sugarcane, cotton, red chilies, wheat and vegetables are the main crops of irrigated areas. At the same time, Pearl millet (bajra), cluster bean (guar), moong, moth, cowpeas, sesame are the main crops of Barani areas and their cultivation is depending upon the timely and subsequent interval of required rainfall. In some parts of Barani tract where sweet underground water is available particularly in Taluka Nagarparkar and small portion in Taluka Islamkot, Mithi and Diplo, cultivation is also done through the open well. The crops like Chilies, Onion, Wheat and Vegetable are grown there.

Barani Area: Barani area of District Tharparker covers almost 95% area from agriculture point of view, as only twenty-four thousand hectares come under the barrage area from total two million hectares' land. During year 2018, only 25% growers cultivated their lands because either the intensity of the monsoon rains was low or most of the areas of Talukas Islamkot and Nangarparkar were not blessed with these rains. The crops i.e. Bajra, Guar, Moth, Moong etc. which were cultivated, dried up before maturity because required

rains at frequent intervals were not occurring and growers did not get their expenses which they invested on cultivation.

Barrage area: The barrage area of the District Tharparkar also comes under the end of the level system of Sukkur barrage command and during current Kharif season availability of irrigation water was worst. Growers' sown nursery of chilies crop and 90% seedlings were damaged as irrigation water was not available or the availability in the interval of a long period and the crop do not sustain such stress of water, cultivation of other major Kharif crops i.e., cotton & sugarcane, was only 20%, due to acute shortage of irrigation water & long period rotation. The crops were not in good condition and it is estimated that minimum yield will be achieved. Agriculture is on underground water in the rainfed area. In some parts of the rainfed tract where sweet water is available, particularly in Taluka Nagarparkar and a small portion in Taluka Diplo, cultivation is done through the open wells. The crops like chilies, onion, wheat, and vegetables are grown. Monsoon rains on a small scale had adverse effects on water-table of the well. The growers utilize seepage water from wells for agriculture purposes on a small scale and the sowing of onion crops and other Rabi vegetables is continued in this area.

Sweet Water Zone in District Tharparker: In the Barani portion of Tharparkar district, sweet water is available in the southwest areas of Taluka Islamkot, Diplo, and Nagarparkar Talukas. Sweet water is available at depths ranging from 15 to 80 feet. Crops are cultivated in an area of 1000 to 1200 acres. Crops like onion, chilies, and rabi vegetables are grown there.

DISTRICT UMERKOT

The total Geographical area of district Umerkot is 5,608 square Kilometers or 500,881 Hectares, geographically divided into two portions (viz: irrigated and desert areas). It has a subtropical climate. The district contains four Talukas (viz: Umerkot, Pithoro, Samaro, and Kunri) and 27 Union Councils. The Desert area includes two tapas of Umerkot Taluka namely, Kaplore and Deenore at 105,546 hectares (261,555 acres). Crops sown in desert areas include pearl millet, guar, moong, till, and moth cultivated at 1,215 hectares, 4050 hectares, 2020 hectares, 1200 hectares, and 2000 hectares, respectively.

District Umerkot has a population of about 1.1 million organized in 0.21 million households. Some 52% of the district's total population, 46% of its rural and 74% of its urban, live in the Umerkot subdistrict. The family size in the rural and urban parts of the sub-district is 5.1 and 4.9 persons in a family, respectively. The sub-district is the main administrative unit with important governmental and non-governmental offices and other service centers. Most of the communities have access to basic health and educational facilities. People move from one place to another using privately operated jeeps and Khekhra (which is the US Army's abandoned trucks still serving as the main mode of transport in the desert). These vehicles fulfill multiple transportation needs for humans, goods, and animals, sometimes at the same time. Some communities may need to travel more than 10 kilometers before being able to access metaled roads to reach towns like Umerkot and Kunri. However, their definition of 'good quality' is not comparable to the quality of even unfiltered water supplied to Umerkot through the irrigation network. An overwhelming majority of the villages reported brackish water dug wells. The villagers are aware of the idea of rainwater harvesting and doing so though their tools and capacities. This, however, may not be adequate to store the amount of water enough to fulfill their need for longer period. Some of these water storage facilities may be communal such

as tarries which essentially are low basins at the foot of sand dunes which accumulate rainwater and hold it for some time due to clayey soils. Besides these communal structures, households also make their own private arrangements by constructing underground tankas (tanks) for rainwater harvesting in their courtyards which can be used later when all other sources are exhausted. Almost every household in an average village has at least one such tanka. Recently some NGOs and Government agencies have started providing Reverse Osmosis (RO) plants to some communities.

Livestock and agriculture are the major livelihood sources in Umerkot. In fact, in the agro-ecological setting of the district, livestock and agriculture nexus plays an important role in providing livelihood and food security. Where the storage of agricultural residues serves as the most important strategy to feed animals during drought spells, animals serve not only as assets that can be liquidated in times of need such as drought but also serve as the only source of animal protein. It is very clear that neither selling local vegetables nor commercial rearing of livestock is the major occupation of the locals.

The sub-district irrigated region falls in the tail reach of the Nara Canal. Major sub-canals and distributaries that irrigate the lands in this region are Thar Canal, Attai Minor, Chore Wah, Kot Wah, Karana Minor, Noor Wah, Thar Tail Distry, Soofi Distry and Mandal Distry. The availability of irrigation implies that the lands in this region can be cultivated in both Rabi and Kharif seasons. Kharif season crops include cotton, cluster bean, Indian squash, millet, sesame, and chilies. The Rabi crops include wheat, rapeseed, and psyllium. The crop cultivation methods include ridges for cotton, cluster bean, and chilies; drilling for millet, wheat rapeseed, and Psyllium; and, broadcast for millet, sesame, and wheat. Land preparation involves two plows (locally named goba), levelers, chisels, and cultivators. Farmers use all recommended fertilizers such as Nitrogen and Phosphorus, weedicides, and pesticides. Some conventional methods of weed control (e.g., inter-culture), and pest control (e.g., burning tires and camel bones) were also reported.

Worst drought years in the province include 1871, 1881, 1899, 1931, 1942, 1951-2, 1958, 1966, 1969, 1972-4, 1987-8, 1999-2001, 2003-4 and 2006. From 1968 to 2015, 16 drought events were noted in Tharparker. During 1999 – 2002, approximately 1.4 million persons, 5.6 million cattle, and 5.06 million hectares of cropped areas were affected and dropout in school children was about 27%, groundwater depletion in Tharparker was up to 40 feet, springs dried up and water quality became more-poor. Rain-fed crops failed. Reduced supply of daily-use food items resulted in increased prices. The villagers had to sell either their livestock or get high-interest loans. The decrease in the market value of goats and cows in August 2002 was 50% and 53%, respectively from the average prices during good years. Goat and cow sales increased by 100% and 166%, respectively. Sheep sales were doubled. Availability of drinking water and water for livestock, pasture, rangelands, and fodder was reduced due to drought. During droughts by 2002, about 88% of cattle and 22% of sheep and goats were taken to productive areas. Some people migrated to other parts of the country as laborers. Due to mass migration in productive areas, the labor rate decreased. Wheat shortage increased flour prices in Tharparker by about 20% in August 1999.

In 2002, about 57% of families migrated from Tharparker to productive areas. Migration of the male family members resulted in shifting the responsibility of purchasing food and other daily use items to women and children. As more cash is required, the children also go to earn their livelihoods. During droughts, increased incidences of sexual exploitation were also noted. Drop out of primary school students was increased by

30% in 1999 due to large scale migration from drought areas. Malnutrition increased by about eighty percent of expected weight of Protein Calorie. Malnutrition resulted in night blindness and decreased weight, especially in pregnant women, lactating mothers and the children. Droughts 2014, caused about 180 deaths of human beings. Reduced economic activities cause reduced demand for handicrafts. During the 2014 drought in Tharparker, the population of the rare peacock was reduced causing the threat of extinction. Laws related to drought include laws for environmental and wildlife protection, land acquisition and improvement, irrigation, agricultural marketing, and forest. Sindh's Agriculture policy is focused on the sustainable management of natural resources. The main organizations dealing with drought include the Provincial Disaster Management Authority, Forest and Wildlife Department, Agriculture, Supply and Prices Department, Irrigation Department, Livestock Department, Environment Climate Change & Coastal Development Department, Local Government, Rural Development and Housing Town Planning Department, Public Health Engineering Department, Health Department, P&DD, Arid zone research Institute, Umerkot, Agricultural-Research Institutes viz; Tando Jam, Sakrand, Mirpurkhas, Dokri, Drip Irrigation Research Tando Jam and Silviculture Research Station Miani. Relevant NGOs include the Sindh Rural Support Organization, Thardeep Rural Development Program, Sindh Graduate Association, Baanhn Beli, Society for Conservation and Protection of Environment, Thardeep Micro-Finance Foundation, and Sindh Agricultural and Forestry Workers Coordinating Organization.

The ongoing programs and projects being implemented in drought prone areas and important actions proposed to mitigate drought risk include improved rangeland management, forest trees plantation and nursery raising; Enhancing Tree Cover on State Forest Lands; Sarsabz Sindh, Demarcation, Reforestation & Regeneration of Vacated Forest Land; Completion of leftover / remaining targets of Bahman Nature Park Larkano projects); water resources monitoring and impact assessment (Sindh: Ground Water Investigation and Mapping); conservation and development of new and alternative water resources and raise awareness (Lining of Distributaries and Minors, Integrated Water Resource Management), quality water supply (Shaheed Benazir Bhutto Sweet Water Project), livestock vaccination and poultry management, establishment of Provincial Drought Management Fund, community based drought early warning dissemination and response system, regulations for groundwater usage and management, demonstration of the low delta crops and practices to the local community, adoption of coordinated response, public private partnership, outreach of drought and its mitigation measures and improve emergency response capacities, educating communities on drought response measures and climate change adaptation, development of concept notes, project documents, doing research on seeds of drought tolerant varieties of crops, promotion of seed banks, development of crop calendars, provision of urea molasses mineral/vitamin block, demonstration of honey bee production, fodder improvement, feed supplements, research on drought tolerant livestock breeds, training community activists for animal health and production, conducting feasibility studies to divert flood water to drought hit areas, demonstration of ecotourism, increase the natural gas implement coverage, promotion of LPG and energy efficient stoves, increasing the coverage of protected areas in drought prone regions, development of Drought Mitigation Plans at provincial and district levels.

A12.2. Context

Sindh province is spread over 18% of the country's area, i.e., 140,914 square kms. and the population is 49.6 million³⁷. About 60% is arid getting less than 5 inches average annual precipitation, mostly during monsoon.

³⁷ GoP. 2019-20. Pakistan Economic Survey.

About 25% of the area is irrigated. About 66% groundwater is brackish. Waterlogging and salinity has affected around 80% agricultural land³⁸. From 1951 to 2010, occurrence of mild droughts was enhanced in northern, and extreme and high drought was enhanced in southern areas which are more vulnerable to drought and have more than 82% contribution of monsoon rainfall. The province contributes about one third to the GDP of Pakistan³⁹. The multi-dimensional poverty in rural areas was 75.7% in 2014-15⁴⁰. Severely poverty hit parts include drought affected district; Tharparkar, Umerkot, Sanghar and waterlogged areas along right bank of Indus river, Jamshoro - Kashmore. There is the Kirthar National Park comprising of 308,733 sq. km area⁴¹. Sindh has three barrages across Indus River namely Guddu, Sukkur, and Kotri.

Climate change has led to consistent droughts in Pakistan, with less rain experienced in the province of Sindh. This has brought successive droughts and the lack of food to these regions. In 2019, a lack of rain followed by floods created a shortage of food in Sindh and also in other parts of the country. Integrated Food Security Phase Classification has marked Sindh with a high prevalence of food insecurity, malnutrition & poverty. Around 23% of the rural population are estimated in Phase 3 (Crisis) and Phase 4 (Emergency).

A12.3. Areas affected by drought and aridity in Sindh

District Tharparkar has an extremely high vulnerability index for drought followed by Umerkot, Mirpurkhas, Badin, Thatha, Tando Muhammad Khan, Tando Allah Yar, Sangher, Shaheed Benazirabad and Dadu which possess high vulnerability index⁴². The drought risk is also very high in Kambar Shadadkot and Jamshoro⁴³. Arid zones comprise of Thar, Nara, and Kohistan regions. Such areas have about 48 percent of the total area of Sindh province and only 1% of the water resources of the province⁴⁴. Integrated Food Security Phase Classification (IPC) has marked Sindh with a high prevalence of food insecurity, malnutrition and poverty⁴⁵.

Thar region receives mean annual rainfall of 200-250 mm comprised of District Tharparkar, and a part of Mirpurkhas and Umerkot districts covering 22,000 square kilometers⁴⁶. Water table depth for portable water is approximately 350-400 feet on the average, that further decreases during droughts. The wells are mostly about one kilometer far from the houses and women have to take several trips to meet household needs of water. More than eighty per cent groundwater is brackish and not fit for human use. There are also eighteen small Dams. The government has established 594 reverse osmosis (RO) plants in the district, 516 plants had capacity of 15,000 gallons

³⁸ Govt. of Pakistan. 2008. Disaster Risk Magt. Plan, Sindh province, Nov. 2008. PDMA, Sindh

³⁹ https://en.wikipedia.org/wiki/Economy_of_Sindh

⁴⁰ GoP. 2015-16. Pakistan Economic Survey.

⁴¹ https://en.wikipedia.org/wiki/List_of_national_parks_of_Pakistan

⁴² https://www.researchgate.net/figure/Drought-hazard-map-showing-the-vulnerability-index-for-each-district-of-Sindh_fig6_284183676

⁴³ https://reliefweb.int/sites/reliefweb.int/files/resources/drought_rp_draft_20190305.pdf

⁴⁴ Thardeep Rural Development Program. 2004. Drought situation in arid areas of Sindh, Assessment report 2004. TRDP and Novib

⁴⁵ IPC Acute Malnutrition Analysis of 9 districts of Sindh, Apr. 2021-Feb. 2022, <https://reliefweb.int/report/pakistan/sindh-pakistan-ipc-acute-food-insecurity-analysis-april-2021-february-2022-issued>

⁴⁶ Thardeep Rural Development Program. 2004. Drought situation in arid areas of Sindh, Assessment report 2004. TRDP and Novib

per day (GPD) after 24 hours working to serve 100 households. Out of these about seventy per cent RO plants were found to be functional, out of these 57 per cent were providing safe water for human use. Poor maintenance and power supply were the main issues. During a study, seventy-eight RO plants with a capacity of 50,000 – 100,000 GPD were found to be functional⁴⁷.

About seventy-nine percent of households own farmlands, the majority having about two acres per household. Around 95% of agriculture is rain-fed. Approximately ninety-five percent own livestock. More than 50% receive on-farm income. During a study in 2015, about sixty-four percent did not adopt any preventive measures for drought⁴⁸. Good years of rain result in the growth of grasses in rangelands to serve as livestock fodder and the recharging of open ponds and tankas as small water storage structures at the household level. In 1999 crop production failed and new grasses could not be grown on grazing areas in Thar⁴⁹. During drought, fruits of a local tree Kandi or Jand (*Prosopis cineraria*), and Sangri pods are used as human food.

Kohistan region receives mean annual rainfall of 200-250 mm and covers 23,000 square kilometers. It covers the flat lands of Kachho from South Manchar Lake to the north, Kubo Saeed Khan areas, and the western hilly tract. Population density in Thar is almost double that in Nara or Kohistan. The major sources of income include livestock and subsistence agriculture. If timely and sufficient rains are not received during monsoon, drought-like conditions prevail causing a shortage of water, food, feed and fodder for livestock. The limited availability of electricity, roads, remoteness and isolation from productive areas increase the sufferings of the people. Majority of the people have to take debt to meet their daily requirements from moneylenders whose interest rate is very high⁵⁰. **Nara region** consists of desert parts of Sanghar, Khairpur and Sakhar districts covering 23,000 square kms. The mean annual rainfall of lower Nara region is 150-200 mm.

A12.4. Main causes of Drought in Sindh

Main causes of drought are as follows:

1. Climate change

Due to climate change impacts, frequency and severity of floods and drought, especially hydrological drought is expected to be enhanced due to precipitation regime's high variability. Extreme events are expected to be increased due to changes in thermal regime and precipitation patterns causing increased glacier melting and later on reduced river flows and intensification in scarcity of water. Heatwave mostly before the monsoon season cause flash droughts in the region.

2. Decrease/ Changes in monsoon rainfall pattern

⁴⁷ National University of Sciences and Technology (NUST), Islamabad. 2018. Technical assessment of RO Plants Tharparker, Sindh.

⁴⁸ Lead- Pakistan. 2017. Loss and damage from drought in Pakistan: Notes from Tharparker

⁴⁹ Thardeep Rural Development Program. 1999. An assessment of Drought in Tharparker Arid zone.

⁵⁰ Thardeep Rural Development Program. 2004. Drought situation in arid areas of Sindh, Assessment report 2004. TRDP and Novib

Monsoon rainfall contributes almost 80 percent of the annual rainfall in the province. Changes or decrease in the monsoon rainfall pattern is the main cause of drought in the province.

3. Population growth

Due to increase in population, the consumption of household firewood and water is increasing at a high rate.

4. Deforestation and Land degradation

Conversion of forest land to non-forestry purposes causes increase in soil erosion, land degradation and ultimately drought. Land degradation and soil erosion lead to weakening of the resilience of ecosystem and livelihood of the population when confronted with drought.

5. Overgrazing

Six million heads of livestock are reared in arid zone of Sindh being major livelihood source of the people against the carrying capacity of 2-3 million heads only⁵¹. Pasture/ rangeland productivity and services and functions of ecosystem is reduced causing soil compaction, wind and water erosion and natural resilience to climate variability as a result of overgrazing. In degraded rangelands, in addition to decreased feed and fodder availability for the livestock, water penetration into the soil to support groundwater recharge is reduced causing drought like situations.

6. Increased anthropogenic activities

Anthropogenic activities like removal of natural vegetation cover, excessive cultivation of marginal lands, excessive pumping and inappropriate use of groundwater increase the use of water in access to renewable water supply and emission of greenhouse gases that lead to more erratic rains and increased temperature supporting drought phenomenon. Excessive pumping of groundwater also results in depletion of groundwater resources.

7. Inappropriate use of land without considering land capability classification

The Land Capability Classification describe soil productivity and capabilities for planning either grasslands, forest or croplands on an area. The land use is not as per land capability classification.

8. Soil Problems, mostly causing increased vulnerability to drought

9. Wind erosion.

10. Inappropriate use of irrigation water

⁵¹ Sindh Provincial Action Programme for Combating Desertification

Table A12.1. Land cover distribution in sq. kms (FAO)

District	Orchards	Crop irrigated	Crop Marginal Irrigated Saline	Crop flood plains	Crop rain fed	Forests & natural trees	Natural Vegetation in wet areas	Rangelands	Bare areas	Bare areas with sparse natural vegetation	Wet areas	Built up
Badin	15.74	4,587.36	881.89	0	0	11.66	0.04	168.87	353.94	42.84	456.00	137.80
Dadu	1.16	2,081.66	265.97	273.32	1,104.01	6.55	79.52	854.11	611.94	2,209.92	242.79	71.82
Ghotki	21.19	2,550.67	329.06	196.46	0	16.20	54.87	37.90	3.11	3,101.34	178.81	85.22
Hyderabad	108.93	501.87	35.55	48.43	3.08	7.50	23.89	26.54	16.63	90.82	32.21	114.07
Jacobabad	0.31	1,822.08	531.09	0	0	2.54	0	64.99	31.48	4.70	172.13	52.15
Jamshoro	8.96	354.08	61.26	365.09	830.96	3.69	168.31	1,915.61	2,159.68	5,100.53	210.45	105.44
Karachi	0	0	0	0	0	0	0	0	0	0	0	66.63
Karachi East	0.45	8.72	0	0	0	0	0	8.72	0.36	0	0	144.55
Karachi South	0	0	0	0	0	0	0	0.06	0.03	0	0.93	79.03
Karachi West	5.88	56.12	0	0	50.70	16.24	0.57	259.70	68.97	143.34	39.36	372.57
Kashmore	0.42	1,392.80	204.84	333.63	0	14.80	284.09	93.18	18.33	6.12	268.70	55.91
Khairpur	283.51	2,317.36	226.35	411.95	0.04	6.19	343.65	118.63	1,890.50	9,637.07	295.08	166.05
Larkana	25.40	1,072.56	108.73	240.02	0.12	186.13	10.65	85.27	0.00	188.76	0	30.20
Malir	9.82	169.56	0	0	106.87	12.40	0.05	642.58	220.88	730.76	25.41	377.77
Matari	124.40	805.07	33.00	253.11	0	4.26	78.23	9.43	4.00	3.32	49.52	50.81
Mirpurkhas	97.02	2,047.15	379.55	0	0.00	5.44	0	60.29	0.48	27.27	228.94	111.51
Naushahro Feroze	118.70	1,692.13	256.11	449.08	0	4.03	219.82	39.29	35.94	25.32	147.91	112.43
Qamber Shahdadkot	4.81	2,310.16	570.71	0	257.90	3.50	117.12	425.06	241.16	951.93	514.13	86.94
Sanghar	49.42	3,956.99	574.67	0	0	23.10	258.09	118.51	326.77	4,850.30	421.83	187.64
Shaheed Benazirabad	47.63	2,189.85	265.23	370.74	0	25.64	104.33	39.21	12.95	959.50	267.37	104.08
Shikarpur	2.31	1,743.84	136.27	192.20	0	19.47	184.11	164.93	3.94	0.01	166.01	56.13
Sukkur	81.21	994.19	217.78	359.32	0	5.45	245.80	37.47	40.41	2,666.27	112.72	96.31
Tando Allahyar	167.98	1,111.59	94.81	0	0	2.68	0	75.04	0.72	1.16	33.46	52.16
Tando Muhammad Khan	16.48	1,202.72	116.01	21.13	0	2.75	24.17	26.87	2.81	2.30	110.22	38.29
Tharparkar	1.12	102.84	7,844.27	0	747.93	23.69	43.37	76.06	823.09	9,233.71	358.48	286.75
Thatta	30.69	3,377.83	634.88	474.45	375.60	934.51	752.87	1,052.20	1,779.38	1,018.55	6,720.96	120.76
Umerkot	26.24	1,757.03	1,194.71	0	0	2.39	0.08	140.19	9.60	2,115.35	240.21	100.58

A12.5. Drought years and Drought Impacts

Years of worst drought in the province include 1871, 1881, 1899, 1931, 1942, 1999, 2003, 2020, 2021, and 2022.⁵³ From 1968 to 2015, 16 drought events were noted in Tharparker⁵⁴. In droughts during 1999–2002, approximately 1.4 million persons, 5.6 million cattle and 5.06 million hectares cropped areas were affected. It also resulted in about 27% dropout in school children⁵⁵. Drought in 2018 affected 26 districts in Sindh and Balochistan affecting about 5 million people and causing about thirty-four percent reduction in cultivation of crops⁵⁶. In 2019, a lack of rain followed by floods created a shortage of food in Sindh and also in other parts of the country. Drought/drought-like conditions have been prevailing from 2013 to 2023 which have impacted livelihood and food security in parts of Sindh, particularly in south eastern and western districts of Sindh. The districts affected by severe drought in Sindh during August 2021 include Badin, Mirpurkhas, Umerkot Sanghar Tharparker, Thatha, and Sajawal and the districts impacted by moderate drought include Dadu, Khairpur, Karachi, Larkana, Nowshero Feroz, Shaheed Benazirabad and Sukkur⁵⁷. Mild drought was recorded during August 2023 in Umerkot, Tharparker, Sanghar, Dadu, Jamshoro, Khairpur, Shahdad Kot, and Shaheed Benazirabad districts of Sindh⁵⁸. The main impacts of drought are as follows:

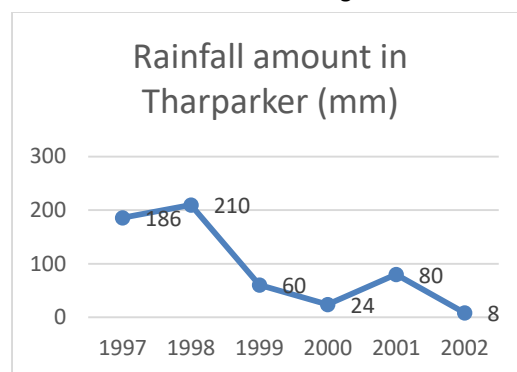


Figure A12.1. Rainfall amount in Tharparker⁵²

I. Depletion in Water Resources

During the 1999 to 2002 droughts, the depletion of groundwater in Tharparker was up to 40 feet and water quality became more poor making it not fit for drinking⁵⁹. During the 2003-4 droughts, the water level in different reservoirs decreased. Furthermore, groundwater was also impacted and springs dried up⁶⁰.

II. Reduced crop growth and crop failure

In Tharparker only at good rain years when there are at least 3 rains of above 100 mm during the growing season of a crop, farmers can get some yield of main rain-fed crops of the area, i.e., guar, millet (Bajra), and sorghum⁶¹. The seed viability is almost lost during two years of consecutive droughts⁶². During droughts of 1998- 2002, such rains were not received so rain-fed crops failed. A comparison of cropped area in Tharparker during good and drought years is given in figure Vb. Reduced supply of daily use food items resulted in increased price. The villagers had to sell their livestock to get high interest loans⁶³.

⁵² Thardeep Rural Development Program, 2002, an assessment of drought in Tharparker Arid Zone 2002.

⁵³ <https://pdma.gos.pk/drought/>

⁵⁴ Lead- Pakistan. 2017. Loss and damage from drought in Pakistan: Notes from Tharparker

⁵⁵ Govt. of Pakistan. 2008. Disaster Risk Magt. Plan, Sindh province, Nov. 2008. PDMA, Sindh

⁵⁶ https://reliefweb.int/sites/reliefweb.int/files/resources/drought_rp_draft_20190305.pdf

⁵⁷ <https://reliefweb.int/disaster/dr-2021-000064-pak>

⁵⁸ <https://ndmc.pmd.gov.pk/new/assets/bulletins/1698319603.pdf>

⁵⁹ Govt. of Pakistan. 2008. Disaster Risk Magt. Plan, Sindh province, Nov. 2008. PDMA, Sindh

⁶⁰ [Thardeep Rural Development Program Report. \(unpublished report\)](#)

⁶¹ Thardeep Rural Development Program. 2004. Drought situation in arid areas of Sindh, Assessment report 2004. TRDP and Novib

⁶² Lead- Pakistan. 2017. Loss and damage from drought in Pakistan: Notes from Tharparker

⁶³ Thardeep Rural Development Program, 2002, an assessment of drought in Tharparker Arid Zone 2002.

There was 22% and 23% reduction in the area under crops during droughts in 1998⁶⁴ and 2003-4, respectively from the area under crops during normal year 2002 – 2003 that was 1.38 million hectares.

The crop yield in cultivated areas was reduced resulting in food scarcity in the province. The crops as well as seed and sowing costs incurred by farmers was spoiled. So, the condition of food insecurity was created for the drought and progressing years⁶⁵.

Due to droughts in 2014, the damage to crops was noted between Rs.10,000 – Rs.200,000 with the average of Rs.75,000 per household⁶⁶.

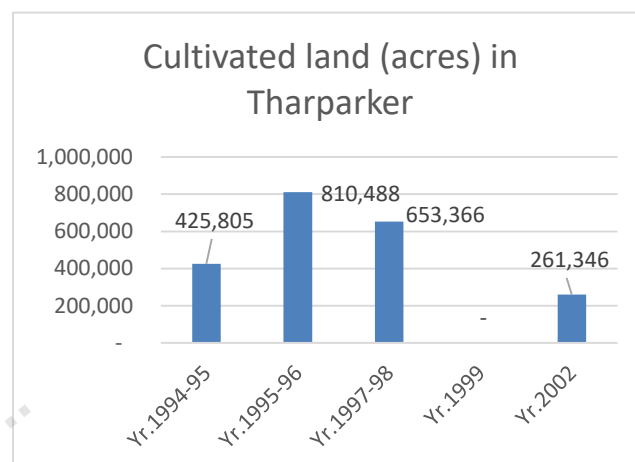


Figure A12.2. Cultivated lands in Tharparker

III. Impact on Livestock

As a result of drought from 1999 to 2002, the market value of livestock, including goat and cows, decreased in August 2002. The sale of goat, sheep, and cows increased. The fodder price increased⁶⁷.

Availability of drinking water and water for livestock, pasture, rangelands and fodder was reduced because of drought. Due to droughts in 2014, the damage to livestock was noted between Rs.24,000 – Rs.100,000 with the average of Rs.59,000 per household⁶⁸. Furthermore, the market price of livestock decreases nearing to or at the onset of drought. The people are compelled to sale the livestock and additional average loss estimated was about Rs. 36,000.

IV. Socio-economic effects of drought – Migration & Gender aspects

During droughts in 1999, by mid-September a large proportion of local people of tehsil Nagarparker migrated along with their families and herds to productive areas⁶⁹. A small portion of the population migrated to other parts of the country as labor as the opportunities of employment were reduced because of drought. Due to mass migration in productive and barrage areas, the labor rate decreases and it becomes difficult for the people to meet their livelihoods. Wheat shortage in Tharparker because of drought resulted in increased flour prices in August 1999. When the male family members migrate to irrigated areas, the responsibility of purchase of food and other daily use items is shifted to women and children. As more cash is required to purchase such items, the children also go for earning the livelihoods. During droughts, increased incidences of sexual exploitation were also noted.

I. Impact on Drop out from schools

⁶⁴ Govt. of Pakistan. 2008. Disaster Risk Mgmt. Plan, Sindh province, Nov. 2008. PDMA, Sindh

⁶⁵ [Thardeep Rural Development Program Report. \(unpublished report\)](#)

⁶⁶ Lead- Pakistan. 2017. Loss and damage from drought in Pakistan: Notes from Tharparker

⁶⁷ Thardeep Rural Development Program, 2002, An assessment of drought in Tharparker Arid Zone 2002.

⁶⁸ Lead- Pakistan. 2017. Loss and damage from drought in Pakistan: Notes from Tharparker

⁶⁹ [Thardeep Rural Development Program Report. \(unpublished report\)](#)

Drop out of primary school students was increased in 1999 due to large scale migration from drought areas⁷⁰.

II. Impact on Malnutrition, newborn children's weight

Malnutrition increased and the population of children with normal weight decreased. Malnutrition resulted in decreased hemoglobin levels of less than 10 grams per deciliter in the blood during 1999 causing night blindness and decreased weight, especially in pregnant women, lactating mothers, and children.

III. Human deaths

Droughts in 2014, affected about 20,000 square kilometers area of Tharparker mostly reducing water availability or increasing brackishness in water. Production from agricultural crops was negligible, the fodder and grazing sources were drastically reduced. Most of the livestock either died, affected by diseases or malnutrition triggering increased migration of people.

IV. Impact on Non-farm income

Due to the drought situation, economic activities are reduced causing reduced demand for handicrafts, riley making, stitching, and labor.

V. Impact on Wildlife

During the 2014 drought in Tharparker, the population of rare peacocks was reduced causing the threat of extinction⁷¹. Hundreds of peacocks died from 2011⁷² to 2012⁷³ and from 2017 to 2018 due to Newcastle (Rani Khet) disease, and the shortage of water and food⁷⁴. According to the survey from Wildlife Department in 1300 villages, the population of peacocks was 126,000 in 2012 which was reduced to 50,000 in 2017, which is caused by reduced food, water and increased incidence of diseases⁷⁵.

A12.6. Legal & Policy Framework

After approval of 18th Amendment in the Constitution of Pakistan, the sectors related to Agriculture, Forestry, Livestock, and Environment were devolved to provinces. The provincial legal and policy framework related to drought is as follows:

1. The Sindh Environmental Protection Act, 2015 envisages protection, improvement, conservation and rehabilitation of environment of Sindh with the help of legal action against polluters and green awakening of communities.
2. The Sindh Wildlife Protection, Preservation, Conservation and Management Bill, 2020 aims to enhance protection for wildlife (flora & fauna)⁷⁶.
3. The Land Improvement Act, 1883
4. The Sind Irrigation Act, 1879
5. The Sindh Land Acquisition Act, 1894

⁷⁰ [Thardeep Rural Development Program Report. \(unpublished report\)](#)

⁷¹ Lead- Pakistan. 2017. Loss and damage from drought in Pakistan: Notes from Tharparker

⁷² <http://www.theasian.asia/archives/25547>

⁷³ <https://www.dawn.com/news/738390/dozens-of-wild-peacocks-die-in-thar-desert>

⁷⁴ <https://dailytimes.com.pk/12197/newcastle-kills-another-25-peafowls-in-two-days-in-thar/>

⁷⁵ <https://www.geo.tv/mustwatch/213407-peacocks-die-as-tharparker-drought-worsens>

⁷⁶ <https://arynews.tv/en/governor-sindh-new-wildlife-protection-legislation/#:~:text=The%20Sindh%20Wildlife%20Protection%2C%20Preservation,months%20sentence%2C%20under%20the%20law.&text=It%20further%20prohibits%20the%20use%20of%20wild%20animals%20for%20fighting%20and%20baiting.>

6. The Land Prevention Act, 1900
7. The Agriculture Produce Market Act, 1939
8. The Sindh Cattle and Fodder Control Act, 1940
9. The Sindh Rural Credit & Land Transit Act, 1947
10. The Sind Tenancy Act, 1950⁷⁷
11. A preliminary draft for improved version of the Forest Act 1927, amended in 1994 is being vetted by the Government of Sindh
 1. Sindh Agriculture policy is focused to the growth rate rise by 4% to increase income from agriculture and create jobs. Other objectives of the policy focus to reduce poverty, malnutrition and food insecurity by half and sustainable management of natural resources, especially soil and water resources⁷⁸.
 2. Sindh Strategy for Sustainable Development
 3. Sindh Biodiversity Strategy & Action Plan

A12.7. Institutional Framework

The main organizations dealing with drought include the following:

1. Provincial Disaster Management Authority, Sindh

Provincial Disaster Management Authority is special initiative body dealing with early warning and post disaster issues. Examining vulnerability, monitoring, prevention or mitigation and relief in drought and flood are some of the functions of PDMA.
2. Forest and Wildlife Department, Sindh

Implementation of biological measures to combat desertification, prevent land degradation and drought that includes; afforestation, reforestation, forest management, rangelands management, arboriculture, soil and watershed management, forestry research & training and forest utilization are among the roles of Forest Department. Being easily renewable accessible and located on fertile soils, the riverine forests and irrigated plantations are meant as productive forests to meet the demands of public but water scarcity, has adversely affected on its production potential. In recent past 2005 to 2015, the forest type-wise achievements under development program are as under:

 - Riverine: Afforestation = 12,415 acres, Regeneration = 126,641 acres
 - Irrigated Plantations: Afforestation = 22,000 acres, Coconut plantation = 3,903 acres
 - Rangelands: Seeding / reseeded = 25,551 acres, Sowing / planting = 300 acres
 - Linear Plantations = 2,656 acres
 - Mangrove = 108,214 acres

Increase tree cover by bringing more area under forests is the future strategy of Forest department. Sindh Wildlife Department (SWD) is conducting zoological survey, protecting & managing biodiversity and the protected areas to management of wildlife.
3. Agriculture, Supply and Prices Department Sindh

The functions of Agriculture Department e.g., soil conservation, demonstrating improved seeds, improved agriculture methods, efficient use of water through lining of water courses, Research, dissemination of appropriate technologies and equipment are helpful as adaptation measures for drought situation. Its Directorates include Agricultural-extension, Agricultural -Research, Agricultural -Engineering, Water Management and Soil Conservation. The department has planned for lining of 33000 water

⁷⁷ <http://www.pas.gov.pk/uploads/acts/Sindh%20Act%20No.XXII%20of%202013.pdf>

⁷⁸ <https://www.dawn.com/news/1449442>

courses to solve the problem of scarcity of irrigation water through conservation strategies and provision of appropriate Agriculture implements at 50% subsidies.

On-farm Water Management wing has taken various steps to reduce water losses and conserve water by lining of water courses and Construction of water storage tanks for increased availability of water during water scarcity period. The wing has promoted the adaptation of latest technologies of water conservation like High efficiency irrigation system (Drip irrigation), tunnel/ vertical farming for high value crops with minimum use of water through various projects for the conservation of precious water resources, which is one of the basic drought mitigation actions, such as conserve and develop water resources and raise awareness among stakeholders.

Agricultural Engineering wing, Sindh has promoted precision land leveling by providing laser land leveling equipment on rental basis to farmers in Sindh.

4. Irrigation Department

Construction and maintenance of irrigation system network i.e. barrages, canals & distributaries, flood control, river and riverine surveys, tube wells and underground water utilization, drainage, storage of water, land and soil reclamation, control water logging and salinity to reduce land degradation are the main functions of Irrigation Department that is helpful in implementing adaptation actions and measures for drought.

5. Livestock Department

Livestock departments' support is reducing grazing pressure by introduction of improved and high valued breeds replacing the low valued herds. vaccination and collection of livestock statistics are other functions of the department.

6. Environment Climate Change & Coastal Development Department

7. Local Government, Rural Development and Housing Town Planning Department

8. Public Health Engineering Department

9. Health Department

10. Planning and Development Department

P&D department is responsible for overall planning and monitoring for government sector projects and approval of Annual Development Program (ADP).

11. Arid zone research Institute, Umerkot, Agricultural-Research Institutes viz; Tando Jam, Sakrand, Mirpurkhas, Dokri, Drip Irrigation Research Tando Jam and Silviculture Research Station Miani

12. NGOs/ Micro-finance Organizations:

NGOs are playing crucial role in drought management, especially in Thar Desert area.

1. Sindh Rural Support Organization is covering areas including Umerkot, Sanghar and Khairpur.
2. Thardeep Rural Development Program is working in disaster prone areas including Tharparker, Umerkot, Dadu, Jamshoru, and Tandu Allahyar through organizing communities, public-private partnership, food security, nutrition improvement and alleviation of poverty. For poorest of the poor interest free loan is provided. The TRDP has developed 120 disaster risk reduction plans⁷⁹.
3. Sindh Graduate Association is working in arid and semi-arid areas of Sindh.
4. Baanhn Beli is implementing social mobilization, poverty alleviation, and desertification and drought management in districts of Hyderabad, Dadu, Jamshoru and Shaheed Benazirabad.
5. Society for Conservation and Protection of Environment (SCOPE) is working in district Tharparker through social mobilization, combating drought, desertification, water and sanitation, climate change adaptation and mitigation and Biodiversity conservation. It is also coordinating Drynet

⁷⁹ [Thardeep Rural Development Program Report. \(unpublished report\)](#)

forum, a multi-country capacity building network to support UNCCD implementation.

6. Thardeep Micro-Finance Foundation
7. Sindh Agricultural and Forestry Workers Coordinating Organization (SAFWCO) is working in areas including Umerkot and Sanghar.

A12.8. Drought mitigation and preparedness in Sindh

Main on-going ADP & foreign donors funded projects are described below:

Table A12.2. Conserve and develop water resources and raise awareness - Sindh

Action/ Activity	Lead agency	Coordinating agencies	Indicative timeframe	TF ⁸⁰ , Mil. Rs., 1 Jul. 2024	Remarks
1. Nai Gaj Dam Project - Total Cost Rs. 46,980.350 million (GoS Share Rs. 1,899.200 million & GoP Share Rs. 45,081.150 million)	Water resources Division	P&DD Sindh	2024 –26	26,788	On-going

Table A12.3. Sindh (Provincial ADP)

Sindh Projects	Indicative Timeframe	Tentative cost/TF 1.7.24 Mil. Rs.
Lead Agency: Forests & Wildlife Dept.		
Revegetation of Reserve forests of Sindh including infrastructure development for repairing environmental damage and restoring ecosystem service	2024-26	184
Enhancing Tree Cover on Non-State Forest Lands and Strengthening Social Forestry activities in Sindh (SDG # 14 & 15)	2024-27	149
Afforestation & Reforestation of Degraded Forest Ecosystems for Enhancing Carbon Sequestration to Secure Carbon Financing (C:397.135+R:3121.989) (SDG # 13, 14 & 15)	2024-30	3,292
Augmenting Network of Social Forestry Plantation over Non-Forest Lands in Hyderabad and Mirpurkhas Civil Division (Hyderabad, Tando Allahyar, Jamshoro, Matiari, Dadu, Thatta, TM Khan, Badin, Sujawal, Mirpurkhas, Tharparkar, Umerkot)	2024-28	176
Projects with Lead Agency: Agriculture Dept.		
Bio Saline Agriculture Research & Development Phase-II	2024-26	110
Integrated Pest Management of Cotton Crop in Sindh	2024-25	84
Restoration and Promotion of high value Date Palm Crop in Sindh (Un-App)	2025-27	400
Provision of solar submersible pumps on subsidized cost for Agriculture purpose in District Tharparkar	2024-26	156
Installation of solarized Pulp Processing Units for fruits and vegetables in Sindh	2024-27	2,141
Installation / Erection of Modern Cool Chain System on subsidized cost to Farmers for export of Fruits & Vegetables.	2024-27	1,413
Lining of watercourses in Non-Command Areas for Lift pumps/Tube wells Already working in Sindh.	2024-26	519
Additional Lining of Watercourses in Sindh.	2024-26	471
Improvement of new / fresh water courses in Sindh	2024-27	1,800
Provision of subsidy assistance on solar power for high efficiency irrigation system (HEIS)	2024-26	814
Construction of Water Storage Reservoirs operated on solar pumping systems	2024-27	1,250

⁸⁰ Throw forward

Sindh Projects	Indicative Timeframe	Tentative cost/TF 1.7.24 Mil. Rs.
Improving crop yield through Integrated Water Resource Management Model in Sindh	2025-27	976
Transforming the Indus Basin with Climate Resilient Agriculture and Water Management	2024-29	622
Projects with Lead Agency: Irrigation Dept.		
Sindh Resilience Project (Irrigation Component) for Construction of Small Dams including System for Improving Resilience - Phase II (Through Additional Financing) -	2024-27	1,114
Construction of 09 Nos. Tarries namely Saeedo Rind, Mubarak Rind, Kagio Manjhay, Chawar, Parno, Tobo, Chapper Uddin Shah, Khutkhari in Taluka Chachro Tarries in Taluka Chachro in District Tharparkar.	2024-27	345
Construction of Dillan Dam - II and Restoration of Downstream of Dillan Dam -I in Upper Kohistan - I Dadu	2024-27	315
Projects with Lead Agency: Livestock Dept.		
Save Buffalo Calves (R:407.878) Karachi, Badin, Hyderabad, Dadu, Sukkur, Khairpur, Ghotki, Larkano, Kamber at S. Kot, Kashmore at K. Kot, Shikarpur & Jacobabad (SDG #7)	2024-27	257
Fattening of Calves (R:222.110) (Jamshoro, SBA, Dadu, Sukkur, Khairpur, Ghotki, Larkano, Kamber at S. Kot, Kashmore at K. Kot, Shikarpur & Jacobabad (SDG #2)	2024-27	192
Up-Gradation of Veterinary Laboratories in Sindh for Detection and Handling of Corona and other Zoonotic Viruses. (R:300.00, SDG# 2)	2024-27	191
Establishment of Foot & Mouth Disease Free Zones (Phase-I)(R: 99.500)	2024-27	65
Provision of fodder seeds, saplings to progressive farmers for promotion of fodder in Sindh	2024-25	45
Strengthening of Semen Production Unit Tandojam (C: 10.000 + R: 110.000)	2024-27	107

A12.9. Recommendations and implementation actions

Important actions proposed to mitigate drought risk are as follows:

1. Identify most vulnerable drought affected areas, do vulnerability and risk assessment for drought,
2. Take appropriate actions to reduce drought impacts and better response to drought,
3. Focus on Rangeland management to mitigate drought in Sindh through:
 - 3.1. Establishing Seed banks of local and improved grasses and shrubs at divisional/ district levels
 - 3.2. Promoting rangeland reseeding with suitable varieties of grasses and shrubs
 - 3.3. Developing Micro-catchments for water harvesting at potential sites in rangelands to support vegetation
 - 3.4. Constructing Animal watering points, ponds and mini dams at potential sites in rangelands
 - 3.5. Establishing Mechanical sand barrier like semi-buried straw checkboards for sand dune stabilization
 - 3.6. Assessing Rangeland carrying capacity and productivity at periodic intervals and developing local-level grazing management plans in consultation with local communities

- 3.7. Signing Agreements need between Forest/Rangeland departments and local communities for controlled grazing and rangeland improvement
- 3.8. Promoting community-managed controlled grazing practices as per carrying capacity of rangelands
- 3.9. Nurseries of mazri weed to be established to increase the area under mazri
- 3.10. Capacity of staff of government departments working for rangeland improvement to be built through training workshops and exchange visits in and outside the country.
4. Forest trees plantation and nursery raising for the indigenous low delta trees; Enhancing Tree Cover on State Forest Lands; Sarsabz Sindh, Demarcation, Reforestation & Regeneration of Vacated Forest Land; Completion of leftover / remaining targets of Bahman Nature Park Larkano etc)
5. Water resources monitoring and impact assessment (Sindh: Ground Water Investigation and Mapping)
6. Conserve and develop new and alternative water resources and raise awareness (Lining of Distributaries and Minors, Integrated Water Resource Management etc)
7. Quality water supply to meet drinking water needs in drought prone areas (Thar: Shaheed Benazir Bhutto Sweet Water Project)
8. Livestock vaccination for diseases like HS, BQ, FMD, ETV, CCPV and PPR and better management of poultry for drought prone areas
9. Community based drought mitigation programs.
10. Establish Provincial Drought Management Fund to improve Drought Governance support system.
11. Implement/improve Community based drought monitoring and early warning dissemination and response system with the involvement of relevant stakeholders and the local communities
12. Improve regulations for groundwater usage and management in drought prone areas to reduce overdraft and drawdown of water-tables, tube-wells and springs. Even floodwater may be used through its proper management to recharge water sources in the areas where the existing running and tube-wells have their limited discharge flow left.
13. Involve Stakeholders' including famers, the poor, rural residents, marginalized people, women-headed households, youth, line departments and decision makers from planning, implementation to monitoring of proposed actions to get their ownership during implementation of actions and give them responsibility after the implementation.
 - 13.1. In case of drought, adopt coordinated response to avoid duplication of efforts.
 - 13.2. Establish Public private partnership with organizations involved in Thar coal project and private petroleum companies like ENI Pakistan Ltd. to utilize Corporate social responsibility for drought response efforts
14. Improve communication system, outreach of drought and its mitigation measures and emergency

response capacities in drought prone areas. Educate communities on drought response measures, climate change adaptation, safe drinking water, sanitation and other related topics.

- 14.1. Encourage establishment of clean and green clubs in schools for awareness on tree plantation and water management for its saving and increase clean green Pakistan Index.
 - 14.2. Services of telecommunication companies may be utilized for dissemination of information regarding drought.
 - 14.3. Broadcast programs focusing on drought coping techniques on electronic media including radio Pakistan and private FM channels.
 - 14.4. Train youth to get new opportunities like mining of coal etc. and power production,
 - 14.5. Develop and submit concept notes/ PC-1s/ Project documents to the potential donors for funding to mitigate drought.
 - 14.6. Conduct post drought evaluation and disseminate among stakeholders that assists in learning lessons from accomplishments and mistakes.
15. Support vulnerable groups and women to mitigate drought and its impacts.
16. Do research on seeds of drought tolerant varieties of crops and such seeds need to be multiplied in adaptive research farms and on fields of progressive farmers. The NGOs need to improve the linkage between the farmers and the research stations so that the improved seed and technology is available to the poor farmers. To store the improved seed, promote seed banks. (Establishment of Dry Land Farming Research Institute at Mithie)
17. Revive Sindh seed corporation for multiplication and provision of drought tolerant seeds
18. Agriculture Research has introduced below given water saving technologies, which may be included in the plan:
- Alternate wetting and drying method of irrigation application in rice, which saves 15% water and increases 20-25% yield,
 - Aerobic rice cultivation technology, which saves 15-30% water and nursery raising and transplanting expenses,
 - Rice drilling in dry prepared land, saves 15% water and increases 8-10% yield
 - Sowing of wheat and rice in ridges, saves 30-40% water and increases 15-20% yield
- Use of mulching for suppression of weeds and soil moisture conservation
19. Develop and revise crop calendars for different Agro-climatic zones in line with climate change projections.
20. Provide Urea molasses mineral/ vitamin block to the drought hit areas,
21. Demonstrate low-delta crop, shrubs and grass varieties including low delta fruits like ber (Zyziphus), olive, pomegranate, grapes, pistachio, systems including agronomic practices of low-delta cropping like Zero tillage, mulching, encourage systems utilizing indigenous knowledge and advanced water saving crop production, bio-saline agriculture, Bio-gas, and honey bee production, seeds of drought resistant local varieties like Super 1 bajra seed is not available after drought so government and NGOs

should provide such seeds to the farmers,

22. Improve fodder and provide feed supplements to the livestock in drought prone areas,
23. Do research on drought tolerant livestock breeds, train community activists for Animal health and production,
24. Conduct feasibility studies to divert flood water to drought hit areas like Construction of a canal to recharge its groundwater and
25. Diversify sources of income through initiatives including ecotourism.
26. Publicity of national drought preparedness and mitigation plans is required to build public awareness and consensus. Farmers' education regarding drought & its mitigation measures. It requires wide scale publicity through electronic and print media, farmer days and seminars.
27. Increase the coverage of natural gas, promote LPG and energy efficient stoves. Provide subsidy wherever, biogas plants are feasible
28. Increase the coverage of protected areas in drought prone regions
29. Do precision land levelling if the areas are not mountainous and sloppy. Drought effects may be reduced up to some extent by enhancing farm mechanization, options tend to reduce water wastage & enhance water use efficiency (WUE), one such option is the precision land leveling techniques which enhance WUE up to 30%. Agricultural Engineering Dept., Sindh furnished a concept note "Provision of laser land leveling equipment on rental basis to farmers in Sindh".
30. Develop and incorporate disaster related indicators in the planning policy and documents (PC1)
31. Develop and implement Drought Mitigation Plans at provincial and district levels.

A12.10. Suggestion/Recommendation to Combat Drought Situation in Tharparker

Installation of New open well.

Historically underground sweet water in these areas is used for Agriculture purpose at small scale. It can be maximized at large scale by taking Additional efforts like digging/installation of new wells on the farmers' fields.

Installation of solar pumps.

The solar system provides more output, fuel charges are minimized to negligible (O level), more land is irrigated as compare to traditional way of extracting water from the well. The area under cultivation is increasing and becoming healthier yielding, roughly the expenses up to Rs: 15000 per acre can be reduced. The solar pumps may be installed on the well where agriculture is already in practices on sweet underground water.

Establishment of small fruit farms

There is a need to establish small model farm of fruit crops i.e Ber and lemon installation with drip irrigation system, each farm will be of two acres established at growers' own fields. These fruit crops are successfully grown in the soils which are sandy and also salt tolerant. Financial as well as technical support may be provided to the growers for three years till the orchard become stable and mature.

Saline Agriculture

In district Tharparkar agriculture on Saline Water is not in practices. In recent past few months some Demo/ plots are established by some farmers. No practical work has been done regarding utilizing this saline water for agriculture purposes, so demonstration plots on Agro forestry-based method may be established on the growers' own fields where wells are already established and water is ranging between 2000-2500 ppm. Each plot will be of two acres and will be combination of Different fodders/vegetables and other salt tolerated low delta crops which are successfully grown in the soil which are sandy to sandy loam in nature in combination with other local tree plants i.e., Prosopis cineraria (Randi), Tecommella Undulata (Rohera), acacia sengal (Kunbhat), Colligonum Polygonoides (Phog) etc which fulfill the fodder needs and according to the needs of farmers.

Establishment of seed bank.

Frequent droughts in District Tharparkar result in spoiling of seeds of the barani crops. Farmer's community in monsoon season purchases seed from different areas of the country. These varieties are not suitable for the conditions of Tharparkar so it results in low yield of the crops. Farming communities will be benefited with suitable varieties by providing them pure seed. For that purpose, seed bank will be established at taluka level. Seed of high yielding varieties will be made available by either getting from different institutions like Barani Agriculture Research Institute Bahawalpur or other seed providing corporations or will be purchased from local farmers. Seed will be stored in scientific way in seed banks by adopting all management practices.

Establishment of small ponds/water reservoir.

Crops of district Tharparkar are totally depend on rain fall, mostly it happens that after crop cultivation interval of next rain fall become prolong and crops dried up before maturity. Small ponds for water reservoir on suitable places may be established so that same water can be utilized for irrigation purposes.

Introduce high efficiency micro irrigation system (Drip / Trickle). By introducing high efficiency micro irrigation system (Trickle/Drip), we can save 40-60% of irrigation-water for farmers' community to increase their area of cultivation.

A12.11. Suggestion/Recommendation to Combat Drought Situation in Umerkot

1. Historically underground water in these areas is used for Agriculture purpose at small scale. It can be maximized at large scale by taking additional efforts like digging new well or by installation of tube-well.

2. Installation of Solar pumps

The solar pump may be installed on well where agriculture is already in practices.

3. Fruit plant samples like lemon, Ber, date palm and phalsa may be provided free of cost to the farmers already engaged on small scale farming (Wari).

4. Promotion of drought and saline resistant tree plantation such as Moringa and other indigenous plants to reduce malnutrition issues.

5. Grating / Bidding of Soofi /Gola varieties of Ber on Wild Ber on large scale at farmers' fields, where saline water is available ranging in between 2000 to 3500 ppm.

6. R.O. plants may be installed at large level for drinking and kitchen gardening purpose.

A12.12. Conclusion

Desert houses are among the most fertile soils in Sindh Pakistan and has great potential for the promotion of climate smart agriculture (CSA) to combat drought vulnerabilities. The appropriate CSA technologies locally customized and rightly picked up in the farmer fields. With a little fine-tuning, these have potential to change the entire agricultural and poverty landscape of Tharparker and Umerkot districts in Sindh.

Table A12.4. Proposed plan of main Actions for Sindh:

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost, Mil. Rs
1. Climate Smart Agriculture: Enhancing Adaptive Capacity of Crops in Sindh	Agriculture Dept.	2026 – 31	2500
2. Establishment of Horticultural Theme Parks in drought prone districts		2026 - 31	300
3. Promotion of low delta horticulture		2026-29	1000
4. Promotion of solar vegetable/ fruit & crop dryer		2026 – 28	800
5. Indigenous honey bee keeping		2026 – 31	500
6. Engaging Academia in research, cross learning & sharing exercises in agriculture		2026 – 28	250
7. Develop database of crops & climate parameters		2026 – 29	200
8. Introduction of drought resistant fodder varieties		2026 – 29	1000
9. Introduction/adoption of drought resistant varieties of cereal & leguminous crops		2026 – 29	1000
10. Adopting Climate Resilient Measures to Combat Desertification & land degradation		2026 – 29	20000

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost, Mil. Rs
11. Develop/ Maintain database of water related parameters	Irrigation Dept.	2026 –29	200
12. Prepare infrastructure standards in the water sector to withstand & provide adaptation to the impacts of climate change		2026 – 26	100
13. 3,000 Rainwater harvesting structures (rooftop, ponds & mini dams)		2026 –29	360,000
14. On-farm water management		2026 –29	5000
15. Undertake soil & groundwater quality studies		2026 –29	400
16. Conservation of wetlands		2025-30	2000
17. Building climate change resilience in water sector to mitigate & adapt climate change impacts		2026 –30	1500
18. Protection of Forest from Fire in government & private lands	Forest Dept.	2026 - 30	1000
19. Development of sustainable forest landscape to promote biodiversity conservation, mitigation of climate change & ecosystem services		2026 –30	4500
20. Forestry research, rangelands & REDD+ Preparedness		2026 –30	180
21. Promotion of watershed/ social forestry, especially indigenous species & community-based forest nurseries through women involvement		2026 –30	1000
22. NTFP based enterprise development		2026 –30	100
23. Promotion of alternative energy resources like LPG, enhanced energy efficiency & Resource Management for conservation of forests		2026 –30	300
24. Promotion of energy efficient cooking, heating & housing technologies		2026 –30	400
25. Reducing soil & water erosion	Forest Dept.	2026 –30	5000
26. Conservation of threatened & vulnerable flora species through in-situ & ex-situ cultivation		2026 –30	100
27. Rangeland & pasture management, establishment of seed banks for grasses, rangeland productivity assessment, reseeding, establishing micro-catchments, ponds & controlled grazing	Forest Dept.	2026 –30	3500
28. Up-gradation of Forestry Research Division, Sindh		2026 –30	100
29. Development and initiation of implementation of Protected areas magt. plans and development of new PAs	Wildlife Dept.	2025 - 30	1200
30. Development of oasis and botanical gardens in drought prone areas	Agriculture Dept.	2026 –30	1500
31. Capacity building for FD staff in drought mitigation measures	Forest Dept.	2026 –30	1000
32. Establishment/ strengthening of GIS Labs.		2026 –30	200
33. Efficient use of forests waste materials		2026 –30	150

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost, Mil. Rs
34. Introduction of mechanical sand barriers like semi-buried straw checkboards for sand dune stabilization		2026 –30	3000
35. Capacity building of communities in water saving & purification for drinking water	Local Government	2026 –30	5000
36. Scaling up urban & rural sanitation in drought prone areas		2026 –30	400
37. Provision of WASH in schools in drought prone areas		2026 –30	1000
38. Waste to energy projects in drought prone areas		2026 –30	400
39. Improving water supply schemes in drought prone areas		2026 –30	500
40. Urban forestry in drought prone areas		2026 –30	2000
41. Construction of solar powered R.O. plants & RCC Underground Reservoirs for R.O Plant for drought prone areas	Local Government	2026 –30	10,000
42. Rehabilitation/ development of new Filtration Plants for Urban & Rural Water Supply Schemes for drought prone areas		2026 –30	5000
43. Community based early warning system for drought	EPA	2026 –30	1000
44. Enhance capacity for effective climate change-related planning & management at all levels		2026 –30	180
45. Capacity building of DDMA's & other relevant departments & NGOs for DRR	PDMA	2026 –30	300
46. Clean Development Mechanism projects for drought initiatives		2026 –30	100
47. Establishment of Drought Mitigation Fund for Sindh	P&DD	2026 –30	500
48. Research on less water requiring forest trees for drought prone areas	Sindh Forest department s	2026 –30	300
49. Study: drought management with floods in Sindh	Federal Flood Commission	2026-27	50
50. Prepare feasibility of utilizing groundwater aquifers as water storage facility in drought prone areas in Sindh	Sindh water management department	2026-28	400
51. Improving sailaba/ spate irrigation system in Kirthar Mountain range	Irrigation Deptt.	2026-28	100
52. Integrated water resource development and management through rainwater harvesting, biosaline agriculture and aquaculture in Thar desert	Irrigation Dept.	2025-29	111
53. Stone pitching/ apron, earthwork, re-sectioning and rehabilitation of gates of canals in drought prone areas		2025-35	273,274
54. De-silting of canals in drought prone areas			
55. Cement concrete lining of canals in drought prone areas			

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost, Mil. Rs
56. Renovation, reconstruction and improvement of canals in drought prone areas 57. Ratification of regulators and allied guiding systems of canals 58. Construction of supplementary channels along canals 59. Lining and rehabilitation of minors and Distry (distributaries) in canals. 60. Construction of retaining and protection walls along canals in drought prone areas 61. Restoration and rehabilitation of irrigation network in drought prone areas			
Total			720,595

ANNEXURE XIII: PROVINCIAL DROUGHT PLAN - BALOCHISTAN

A13.1. Executive Summary

The area of Balochistan is 43.6% of the total Pakistan's area with 5.3% of the country's total population. Only 5.9% of total provincial area is cultivated. The province is the largest contributor of grapes, almond, apple and pomegranate, peaches, dates and plums to the country. Karezes, springs, streams and rivers are main water sources. But with the increasing drought and tubewells, karezes are drying up rapidly. Forest areas is 1.5%. Juniper forests are found in Ziarat and Zarghoon, Chilgoza forests are found in Suleiman mountains. Main Ecological zones of the province include hyper arid deserts, hot arid lowland plains, hot arid low plains canal irrigated, cool temperate highlands, mid-highlands and coastal sub-tropical zones. Climate is hyper arid in the southern parts (annual 80-150 mm rainfall) to semi-arid in the north-eastern and northern parts (annual 150-350 mm rainfall). There is the Mirani Dam on Dasht River. Groundwater table depth is increasing because of its unsustainable use and drought. Rangelands cover more than 90% area of the province. From year 1951 to 2010, 23 milds to extreme drought events were noted in the province. Years of worst drought in Balochistan include 1952, 1963-64, 1965, 1968, 1970-71, 1983-84, 1987-88, 1999-2002, 2004 and 2006, 2013 – 2015. Drought advisory has been issued for Balochistan for 2021. Unfavorable cultural practices including overgrazing, farmer's lesser awareness of drought mitigation, degraded environment, reduced management of water resource, governance of groundwater and climate change are the main causes of drought.

Impacts of drought include decline in surface and groundwater resources resulting in deteriorated quality, increased extraction cost and failure of tube-wells and dug wells. Yields of apple, grapes, peach plum, apricot, almond and cultivated area of wheat, barley, and vegetables was reduced causing increased rural poverty. Eighty percent livestock died in severely affected districts of Noshkee, Killa Saifullah and Lasbella by droughts of 1997-2004. The drought resulted in drying up of rangelands, degradation of areas covered with vegetation, decrease in the water availability for humans and livestock and about two million animals died. The animals saved became weaker. Market price of animals was low and production cost was high. Communities migrated their animals to productive areas. During drought 1998-2002, income of farmers reduced. Villagers have to sell their assets. Market value of animals was reduced. Meat consumption of communities was reduced causing health issues. Addiction due to psychological problems and increased poverty are considered the main reasons of increased suicide cases up to 43 in 2018 in Tharparker. During 2000 to 2002, national exchequer's loss was up to 25 billion rupees. Prices of food and inflation increased. Women have to walk to more far-away places to collect water. The attendance in schools was reduced. Droughts in 1997 – 2005 resulted in famine causing death of about 1,760,000 heads of livestock and hundreds of people in Balochistan due to malnutrition and associated diseases. Ecological habitats are destroyed resulting in biodiversity loss, increased land degradation, deforestation, desertification and increased conflicts among users of the resource.

The main institutes dealing with drought includes Departments of Planning and Development, Forest and Wildlife, Irrigation and Power, Agriculture and Cooperatives, Balochistan Agricultural Research and Development Centre, UNDP, FAO, IUCN, WWF-P, Balochistan Rural Support Program, Water, Environment and Sanitation Society and Taraqee Foundation. Main legal frameworks related to drought includes

Balochistan Environmental Protection Act, 2012, Forest Act, 1927 and Balochistan Forest Regulation, 1890 and Balochistan Wildlife (Protection, Preservation, Conservation and Management) Act, 2014.

Important actions proposed to mitigate drought risk include improved rangeland management, Karez rehabilitation, water resources monitoring and impact assessment, conserve and develop new water resources and raise awareness, conserve forests and wildlife, reforestation, promote farm forestry and forest crop intercropping, demonstrate the low delta crops and practices to the local community, promote & develop olive, date & pistachio, improve fruit storage (construct cold storage for fruit), promote Veterinary health services, establish Provincial Drought Management Fund, increase coverage of Natural gas to local communities in drought prone areas, provide long-term subsidy to promote LPG and Fuel-efficient stoves and implement community-based drought mitigation programs, increase Forest nurseries' number and their capacity and promote plantation of indigenous less water requiring tree species. There is also need to increase Protected areas, prepare and implement Drought Mitigation plans/ water shortages contingency plans at provincial and district levels and implement the actions proposed in the plans, develop Community based drought early warning dissemination and respond system with the involvement of other relevant stakeholders, improve Regulations for groundwater usage and management in drought prone areas. Floodwater may be used after careful planning to recharge water sources. In the areas where the existing running tube-wells have reduced discharge flow, Physical infrastructure development need to be properly planned so that it does not have negative impacts on karezes and springs, drinking water treatment plants or sand filters may be promoted, wherever needed, to provide better drinking water to the communities.

Involve Stakeholders' including famers and the poor from planning to implementation to monitoring of proposed actions. In case of drought, adopt coordinated response, establish public private partnership, improve communication system, outreach of drought and its mitigation measures and emergency response capacities, educate communities on drought response measures, safe drinking water, sanitation and other related topics, encourage establishment of clean and green clubs in schools for awareness on tree plantation and water management to increase clean green Pakistan index, utilize services of telecommunication companies for information dissemination, broadcast programs focusing on drought coping techniques on electronic media including radio Pakistan and private FM channels. There is also need to develop concept notes/ PC-1s/ Project documents for funding to mitigate drought, conduct post drought evaluation, document best practices and disseminate among stakeholders, consider gender issues while planning and conducting risk assessment and implementation of identified actions, support vulnerable groups and women to mitigate drought and its impacts, do research on seeds of drought tolerant varieties of crops, grasses and shrubs and multiply such seeds, re-investigate crop calendars in line with climate change projections, provide fodder and urea molasses mineral/ vitamin block to the drought hit areas, demonstrate low-delta crop, and agronomic practices, do research on drought tolerant livestock breeds, train community activists for Animal health and production and promote diversification of sources of income through initiatives including ecotourism.

A13.2. Context

Balochistan is the largest province of Pakistan in terms of land area (34.7 million hectares, 43.6 percent of the total Pakistan's area) (Pakistan Economic Survey. Finance Division. Islamabad, 2019-20) and least populated among other provinces (12.335 million in 2017 (Wazir and Goujon, 2019), 5.94 per cent of Pakistan's total population). It comprises of 35 districts and seven divisions. It shares borders with Punjab and KP to the northeast, Sindh to the east and southeast, Arabian Sea to the south, Iran to the west and Afghanistan to the north and northwest. The GDP of Balochistan accounts for 4.5% of national GDP (US\$280) which is due to its weak or absence of physical infrastructure which is major constraint in its development (Economic Survey of Pakistan 2019-20).

Mostly it is arid, desert and mountainous. Only 5.9 per cent of the total area (2.06 million hectares) is cultivated. Balochistan is the largest contributor of grapes (97.6%), almond (93.5%), apple and pomegranate (each 82%), peaches (69%), dates (64%) and plums (49%). There are hundreds of karez in Balochistan which are manmade underground channels or tunnels, after some distance, the water in the tunnel comes out in a well or in the open area that again leads to the tunnel (Zarai Taraqiati Bank Limited), Tubewells, streams, rivers, springs and roadkahi/ spate irrigation are among the other main water sources. The

canal head withdrawals (below rim stations) are 1.94 and 1.00 million acre-feet in Kharif (Apr.-Sept. 2021) and Rabi (Oct 2021 – Mar. 2022) (Pakistan Economic Survey 2021-22). The forests and waterlogged and saline areas are 1.5% and 0.04%, respectively (Government of Pakistan, 2010). Major forests are of Juniper, Chilgoza, wild olive and dry sub-tropical broad leaves forests. Juniper forests are coniferous, found in Ziarat and Zarghoon with approximate area of 999.6 hectares. Chilgoza forests are coniferous, found in Suleiman Mountains with approximate area of 26,000 hectares.

Average annual growth rate from 1998-2017 was 3.37⁸¹. Baluchistan's 59.6% population is poor (MDG report of Balochistan), literacy rate is 54.5 (Labour Force survey 2020-21). The estimated figures of GDP (purchasing power parity) of Balochistan as of 2022 accounts for 3% of national GDP⁸², which is due to its weak physical infrastructure. The economy is mostly based on livestock and agricultural crops. Fishing and mining of coal, copper and other minerals are the other livelihood options. Total livestock population is 28.05 million and total poultry is 5.91 million. Forty per cent of provincial GDP is contributed by livestock⁸³. It is expected that

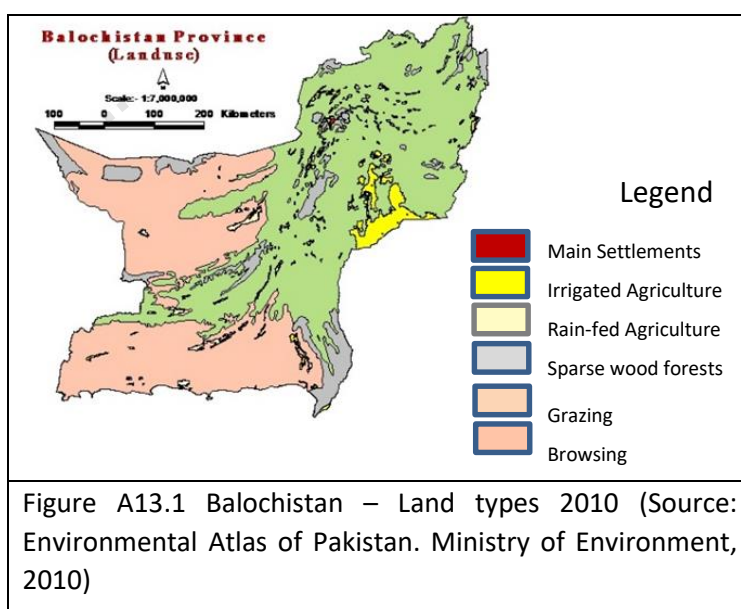


Figure A13.1 Balochistan – Land types 2010 (Source: Environmental Atlas of Pakistan. Ministry of Environment, 2010)

⁸¹ <https://www.pbs.gov.pk/sites/default/files/population/2017/tables/balochistan/Table01p.pdf>

⁸² https://en.wikipedia.org/wiki/List_of_Pakistani_administrative_units_by_gross_state_product

⁸³ <https://tribune.com.pk/story/2116676/balochistan-contributes-40-total-livestock>

increased available resources would help Balochistan to augment their development spending to address infrastructure deficiencies, invest in other sectors including agriculture as well as combat drought impacts.

In the natural climate cycle, drought is the prolonged period of water shortage whether atmospheric or dry weather with precipitation significantly below normal recorded levels, surface or groundwater causing serious hydrological imbalances, adversely impacting land resources' productivity systems⁸⁴. It may last for years, months or declared after as few as mean daily rainfall less than 0.2 mm for at least 29 consecutive days. On May 28, 2017 temperature recorded in Turbat in Balochistan province was 53.7°C that is the hottest temperature ever recorded in Pakistan⁸⁵. The province possesses 770 kms long coastal areas. The ecosystems of the province are deserts, rain fed and cultivated areas and snow-covered mountains (Mangrove for the Future, 2016). The road and communication infrastructure of the province is weak. Balochistan is the second major supplier of natural gas and possess deposits of coal, copper, aluminum, lead, gold, and other minerals. It shares its boundaries with Iran and Afghanistan.

There are 7 physiographic areas in Balochistan which are presented in figure A6.2. Playas are seasonal wetlands or saline basins or inland drainage. Piedmont plains are regions at mountain foothills. Alluvial fans are formed where flowing water interacts with mountains. The mountain ranges include Suleiman (northern Balochistan), Central Makran (up to 3,000 meters), Makran coastal (~1,500-meter, South-west part), Zarghoon (Eastern Quetta, up to 3,578 meters), Kirthar (East-central part), Toba Kakar (~2,166 meters high), Harboi, Siahan and Dilband range.

The rivers in the province include Zhob, Bolan (Having Kachi Dam), Mula (Having Naulong Dam), Nari (Having Nari Dam), Dasht (Having Mirani Dam), Hongol and Hub river (Having Hab Dam). Indus, Balochistan (30,000 km²) and Makran Off-shore basins are in the east, west and south, respectively. Pishin sub-basin's catchment area is 18,133 km². Major water reservoirs include Hanna Lake (Quetta), WaliTangi Dam Lake (Urak valley, east of Quetta), Zangi Nawar Lake (Nushki), Khushdil Khan Bund Lake (Pishin), Mirani Dam Lake (Kech) and Hub Dam Lake⁸⁶.

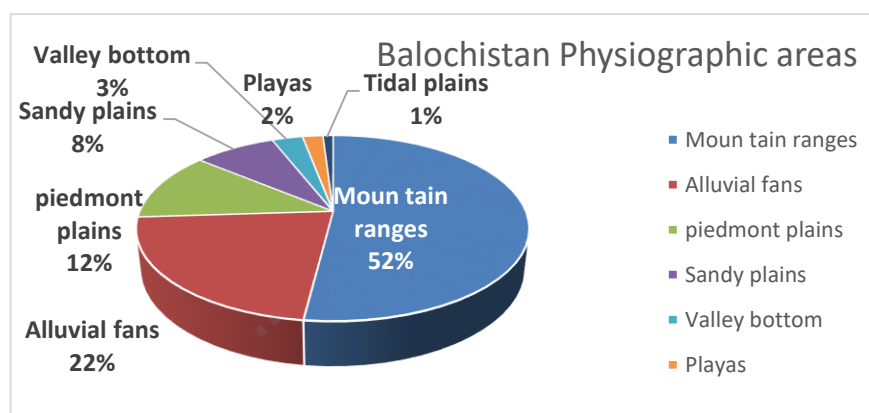


Figure A13.2. Balochistan physiographic area types. Source: Draft Provincial Action Plan to Combat Desertification, Balochistan

A13.3. Arid areas in Balochistan

The climate is hyper arid in the southern parts (annual 80-150 mm rainfall) to semi-arid in the north-eastern and northern parts (annual 150-350 mm rainfall). Precipitation is mostly received in winter. Mountainous/

⁸⁴ https://www.who.int/health-topics/drought#tab=tab_1

⁸⁵ https://en.wikipedia.org/wiki/List_of_extreme_weather_records_in_Pakistan

⁸⁶ <https://www.slideshare.net/HMQaseemAchakzai/baluchistan-geography>

Inter-mountainous portion is eighty per cent and coastal and flood plains are twenty per cent⁸⁷. Groundwater table depth is increasing because of its unsustainable use. During a study drought severity of districts were noted by ranking from 1-5 with 5 as the very high severity with regards to drought. Khuzdar, Kalat, Loralai, Qilla Saifullah, Mastunge, Chaghi and Kharan districts were ranked as 5 with regard to drought vulnerability⁸⁸. Lasbella, Khuzdar, Kalat, Loralai, Qilla Saifullah, Mastunge, Kharan, Pishin, Kohlu, Zhob, Qilla Abdullah, Noshkee, Dera Bugti, Awaran districts covering all agro-climatic zones in Balochistan were affected by a mild to moderate drought (Meteorological and hydrological)⁸⁹.

Six main Ecological zones of the province include hyper arid deserts, hot arid lowland plains, hot arid low plains canal irrigated, cool temperate highlands, mid-highlands and coastal sub-tropical zones (Ahmed et al., 2012). The mountainous Kharan Desert, situated in Balochistan province has about 48,051 km² ⁹⁰ area. Average temperature and precipitation are 23.9°C and 97 mm, respectively. The altitude of the desert is from 250 – 1,000 meters.

⁸⁷ <https://www.undp.org/pakistan/publications/drought-risk-assessment-balochistan-province-pakistan>

⁸⁸ Government of Balochistan. 2008. Provincial Disaster Risk Management Plan-Balochistan. PDMA, Quetta.

⁸⁹ https://pdf.usaid.gov/pdf_docs/PA00Z3HK.pdf

⁹⁰ https://www.iucn.org/sites/default/files/import/downloads/kharan_brochure.pdf

Table A13.1. Land cover distribution in sq. kms (FAO)

District	Orchards	Crop irrigated	Crop Marginal Irrigated Saline	Crop flood plains	Crop rain fed	Forests & natural trees	Natural Vegetation in wet areas	Rangelands	Bare areas	Bare areas with sparse natural vegetation	Wet areas	Built up
Quetta	39.548	62.110	0.00	1.907	322.915	197.315	53.388	267.746	353.711	2,105.526	1.613	165.700
Pishin	133.731	31.556	0.00	56.688	506.342	101.090	61.115	382.726	626.757	4,127.249	7.097	76.605
Qilla Abdullah	81.937	0.116	0.00	33.331	376.159	0.00	147.246	334.392	602.567	3,314.457	5.972	65.924
Chagai	14.816	0.00	106.863	0.034	226.558	46.890	2,613.913	251.480	17,317.792	23,975.770	1.952	83.235
Nushki	0.019	0.00	758.437	1.050	298.232	0.437	87.424	35.574	1,195.499	3,420.223	0.046	33.981
Zhob	9.391	1.719	3.197	12.827	277.725	89.972	241.868	1,549.983	1,643.661	10,033.496	20.896	29.731
Musakhel	0.216	0.732	0.00	0.915	274.835	335.255	108.726	3,110.027	406.473	1,543.503	7.177	3.445
Qilla Saifullah	98.970	0.00	0.00	53.757	604.392	69.684	255.369	777.898	2,332.545	6,457.241	5.571	34.676
Loralai	32.708	0.00	0.00	12.203	802.940	357.158	116.279	999.386	2,138.061	3,602.034	20.766	53.046
Barkhan	9.595	1.710	0.00	0.047	949.297	111.125	36.935	730.928	166.133	1,553.184	2.421	7.337
Sherani	0.106	0.00	0.052	1.328	70.357	97.288	79.890	544.529	247.800	1,679.211	6.399	5.396
Kalat	35.536	0.00	0.00	0.383	1,532.255	417.188	286.773	692.981	1,814.538	9,579.894	3.017	37.511
Mastung	58.296	0.00	0.00	0.115	1,061.350	23.767	73.761	84.512	567.296	2,877.214	0.118	40.444
Kharan	0.420	0.00	185.890	44.675	619.934	17.068	682.343	95.260	4,932.814	8,285.066	0.721	31.477
Khuzdar	2.172	40.862	0.00	143.921	1,597.248	160.879	575.718	2,183.726	2,244.231	22,955.871	61.548	67.967
Washuk	43.670	0.276	240.334	5.089	341.400	59.338	3,091.179	536.227	15,344.778	13,676.260	54.879	21.897
Awaran	2.293	12.287	0.00	17.902	544.680	475.175	1,525.448	1,350.768	2,271.011	18,923.481	294.932	38.995
Lasbela & Hub	68.439	96.210	0.00	364.657	845.430	63.594	534.634	1,257.599	3,750.529	7,480.323	232.799	37.247
Sibi	0.00	154.901	0.00	63.305	590.216	114.194	175.431	510.746	631.041	3,050.429	12.923	18.421
Lehri	0.00	0.00	0.00	0.00	2,407.398	9.469	17.680	130.152	470.738	60.531	3.040	20.388
Ziarat	53.292	0.00	0.00	0.488	149.790	523.861	25.843	813.035	206.804	1,335.603	5.773	11.019
Dera Bugti	1.832	80.882	3.729	0.166	740.655	35.848	226.264	1,841.721	929.075	6,366.776	11.753	25.952
Kohlu	0.937	0.636	0.00	0.133	502.438	228.624	131.111	899.373	433.709	5,679.958	11.186	6.910
Harnai	2.918	0.01	0.00	3.030	83.210	170.085	59.711	697.185	121.099	1,504.893	7.834	4.253
Nasirabad	0.083	1,915.123	7.722	0.00	1,211.241	3.644	15.666	80.332	206.847	63.165	3.766	45.999
Jafarabad	0.686	1,463.481	46.068	0.00	0.00	1.077	0.426	4.986	10.570	0.514	29.267	30.513
Jhal Magsi	0.00	254.933	7.048	0.00	2,212.750	67.689	51.700	203.059	595.700	424.458	20.095	17.846
Kachhi	0.00	107.176	0.00	134.202	1,434.566	23.470	265.083	185.345	762.091	1,529.111	6.473	14.646
Sohbatpur	0.050	671.202	79.030	0.00	0.069	0.057	0.335	5.848	4.790	8.506	26.633	17.352
Gwadar	0.00	0.00	60.578	0.262	432.784	39.722	502.236	403.848	4,758.201	5,772.232	269.050	43.115
Kech	0.161	87.950	0.00	3.891	546.564	62.868	2,024.600	1,001.528	3,123.407	16,227.817	202.619	139.934
Panjgur	0.187	40.042	0.00	1.032	585.501	24.707	909.594	479.434	3,232.217	11,863.993	36.122	55.266

A13.4. Drought prone areas:

The drought situation in the province is rapidly developing into one of the worst natural disasters in Pakistan. Upland Balochistan is the most heavily affected area of the province. Although the affected areas of Balochistan have always been prone to water shortage, rainfall in the last few years has reached low, with minimal or sometimes no rainfall. The abrupt decline in rainfall in most of the upland areas of the province coupled with excessive groundwater lifting with increased number of tubewells have caused increased drying up of surface water resources and decreased water output from springs, tube wells and karezes or no water output from these sources.

Recurring drought is among the major challenges faced by the province. Many areas of the province are experiencing drought as rainfall since 2013 has hardly been a quarter of the usual amount. Dera Bughti, Kohlo, Loralai, Zohb, Qilla Saifullah, Qilla Abdullah, Paishin, Noshki, Kharan, Awaran, Mastung, Kalat, Khuzdar and Lasbella district have been affected by a mild to moderate drought (PDMA Balochistan 2012 & UNDP 2015). Awaran, Chaggi, Kech, Panjgoor, are among the arid areas in the southern Balochistan that mostly receive less than 25 mm rainfall.

Balochistan rangelands cover more than ninety per cent area, out of this grazing-lands cover 65 per cent area. Rangelands are important in provision of fuelwood, forage, water storage facility, medicinal plants, and habitat for wildlife, minerals, energy and recreation.

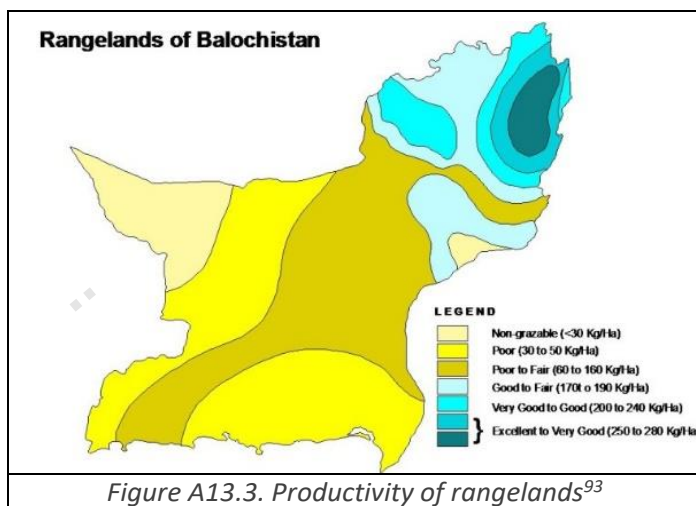
The rangeland landscapes include deserts, piedmonts (Areas at the base of mountains), uplands, mountains, flood and coastal plains. The rangelands are mainly categorized into central, western and eastern Balochistan ranges. Central ranges having a Mediterranean climate with precipitation 100-400 mm annually and altitude 1000->3000 meters, are present in Kalat and Quetta division. Common plant species include *Juniperus macropoda*, *Chrysopogon aucheri*, *Cymbopogon jwarancusa*, *Prunus eburnea*, *Artemisia species*, *Alhagi camelorum*, *Fraxinus xanthoxyloides*, *Pistacia sp.*, *Caragana ambigua*, *Othonnopsis intermedia*, *Seriphidium quettensis*, *Haloxylon griffithii*, *Peganum harmala* and *Othonnopsis intermedia*. Western ranges having precipitation 50-150 mm annually cover Makran division, Kharan, Washuk, Chaghi and Lasbella districts. Common plant species include *Haloxylon griffithii*, *Cousinia alepidea*, *Saccharum ravannae*, *Alhagi camelorum*, *Tamarix sp.*, *Stipa plumose*, *Suaeda fruticosa*, *Zygophyllum atriplicoides*, *Salsola sp.*, *Panicum antidotale*, *A. macrostachyus* and *Aeluropus repens*. Eastern ranges having better precipitation than western ranges cover Zhob, Sherani and Loralai districts. Common plant species include *Tetrapogon villosa*, *Chrysopogon aucheri*, *Cymbopogon jwarancusa*, *Pennisetium orientale*, *Stipa pennata*, *Pancium antidotale*, *Saccharum species*, *Alhagi Camelorum*, *Poa bulbosa*, *Caragana ambigua*, *Ebenus stellatus*, *Prunus eburnea*, *Berberis Balochistanica*, *Pistachia khinjuk*, *Convolvulus species*, *Acacia modesta* and *Olea cuspidate*.

Productivity of rangelands of the province are presented in figure A6.3. Non grazable (<30 kg/ha), poor (30-50 kg/ha) and poor to fair (50-160 kg/ha) rangelands are found in most parts of the province, mostly southern and central parts. Fair to good (170-190 kg/ha), good to very good (200-240 kg/ha) and very good to excellent rangelands are found only in northern parts of the province⁹¹. There is common as well as

⁹¹ <https://forestrypedia.com/rangelands-of-balochistan/>

open rangelands. Common rangelands have customary arrangements of effective and sustainable type of management. Open rangelands are open to all and all around the year for grazing⁹². Areas of common rangelands has decreased in the province. Wind erosion is also noted in silty soils with hyper arid climate in Balochistan.

Grazing systems: Nomads move from lowland to upland in spring and upland to lowland in winter. They have to purchase fodder in winter. International nomads mostly include Pashtuns who migrate from Afghanistan to Pakistan and sometimes also to Central Asian States. National nomads include Baloch/ Murri and Pashtoon nomads. In transhumant grazing, herders have their permanent houses mostly in valleys and have some dryland agriculture and migrate along-with their livestock and families. In Sedentary grazing animals are raised on crop fields and stall feeding (Ahmed et al. 2012).



A13.5. Drought years & drought prone areas

From year 1951 to 2010, 23 milds to extreme drought events were noted in Balochistan. Years of worst drought (PMD, 2019) in Balochistan include 1967–1969, 1971, 1973 to 1975, 1994, 1998 - 2004 and 2006 (PMD, 2019), 2013 – 2023. Almost every year there is drought in most parts of Balochistan. Drought/drought-like conditions have been prevailing from 2013 to 2023 which have impacted livelihood and food security in parts of Balochistan, particularly in western, central and southern districts of Balochistan. The districts affected by severe drought in Balochistan during October 2020 to May 2021 include Chagi, Gawadar, Kech, Panjgur, Kharan and Washuk. The districts impacted by moderate drought include Mastung Nushki, Pishin, Kalat, Quetta and Harnai⁹⁴. The heatwave suppressed the moisture conditions and resulted in the severe drought-like condition in the Chagi district whereas moderate conditions merged over Kharan, Nushki and Washuk districts of Balochistan during January to April 2023⁹⁵.

Abnormally dry conditions (mild drought) prevailed in the central and southern districts of Balochistan from June to August 2023⁹⁶. As per drought vulnerability index and hazard map (Figure 5.2), most of extremely high hazard districts are in Balochistan as it is mostly arid possessing monthly average rainfall very low (two millimeters to twenty-five millimeters)⁹⁷. In northern areas of Balochistan early to late winter droughts

⁹² <https://journals.uair.arizona.edu/rangelands/article/view>

⁹³ <https://forestrypedia.com/rangelands-of-balochistan/>

⁹⁴ <https://reliefweb.int/disaster/dr-2021-000064-pak>

⁹⁵ <https://www.app.com.pk/national/ndmc-issues-drought-alert/>

⁹⁶ <https://ndmc.pmd.gov.pk/new/assets/bulletins/1695714170.pdf>

⁹⁷ <https://www.mdpi.com/2076-3417/10/3/913>

were noted with extreme, severe and moderate drought returning after thirty-five to fifty-five years, sixteen to twenty-one years and about seven years, respectively. In eastern areas, early summer extreme, severe and moderate droughts with return periods of about sixty, twenty and eight years, respectively were noted. In north-east Balochistan, late summer extreme, severe and moderate droughts with sixty-five, twenty-two and eight years return periods were recorded. These were correlated positively with seasonal rainfall variation⁹⁸. Extremely high drought hazard districts include Kech, Panjgoor, Awaran, Chagi, Pishin and Killa Abdullah. High drought hazard districts include Kharan, Washuk, Noshki and Gawadar. Moderate drought hazard districts include Quetta, Mastunge, Lorelei and Killa Saif Ullah⁹⁹.

A13.6. Drought causes in Balochistan

The drought causes (Figure 3.14) include: unfavorable cultural practices including overgrazing, farmer's lesser awareness of drought mitigation, degraded environment, reduced management of water resource, governance of groundwater and climate change. Other causes of drought are as follows:

- Poor quality of drinking water
- Drying of dams
- Low precipitation over an extended period of time
- Overall poor rangeland in most central and southern parts of the province
- Wind erosion in silty soils of the province
- Minimization of gender aspects which has promoted forced women to collect water from far away places and
- Increased disease susceptibility.
- Drought Impacts in Balochistan
- Results of a study¹⁰⁰ are as follows:
- Decline in surface and groundwater resources

National Water Accord's annual surface water allocation for the province is about 5 billion m³, which is insufficient¹⁰¹. Water resources are reduced and ground water tables are declined in Balochistan (Figure A13.4.). Groundwater is excessively pumped for irrigation due to subsidized electricity (Flat rate) in most of the districts of Balochistan, excessive water requiring (High delta) fruits and vegetables like apple and onion are grown, inefficient irrigation methods used, recharge of groundwater is less due to lesser average rainfall causing its annual rate of decline at 2-5 meters¹⁰². Drying of Hub dam and Lake Zanginawar in Lasbella and Noshkee is causing decline in water table, respectively. As a result of

⁹⁸ <https://www.undp.org/pakistan/publications/drought-risk-assessment-balochistan-province-pakistan>

⁹⁹ <https://ffc.gov.pk/wp-content/uploads/2019/06/MonSoon-contingency-plan-2019-balochistan.pdf>

¹⁰⁰ <https://www.undp.org/pakistan/publications/drought-risk-assessment-balochistan-province-pakistan>

¹⁰¹ <http://www.fao.org/3/y3690e/y3690e09.htm>

¹⁰² <https://www.undp.org/pakistan/publications/drought-risk-assessment-balochistan-province-pakistan>

declining water- table, extraction cost is increased and ultimately there is failure of tube-wells and dug wells.

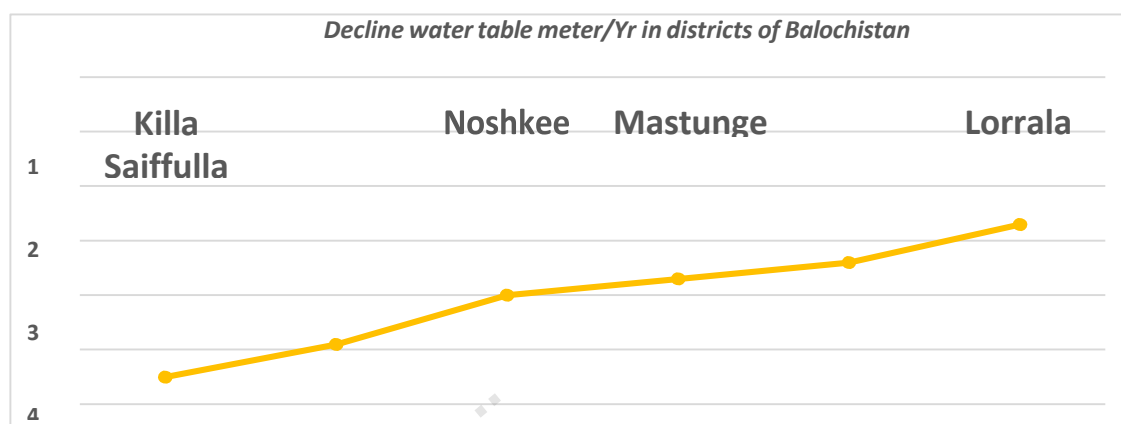


Figure A13.4. Average decline in water-table meters per year

Overall water table decline up to 200 meters in a period of around 30 years in upland Balochistan. Farmers established orchards on tube well irrigation. In areas such as District Pishin (Tora Shah, Manzari, Khanzai, Malikyar and Huraizai) and District Killa Saifullah (Kan Mehtarzai) failure of springs, karezes and wells is common. Cheena Alizai, Shabozai, Lahore and Ponga union councils in district Lorraila water availability for irrigation is completely lacking and only half of the discharge flow was left in karezes and tubewells in the area resulting in loss of livelihood sources. In downstream areas, tubewells are being installed by rich farmers, poor farmers purchase water from tubewell owners or bringing water through tractor mounted water tanks. In 1960s with increasing extraction of groundwater the *kareze* and spring irrigation systems became the source of only about half of the total groundwater. Now a day, more than 90% *karezes* have dried and the natural flow of remaining is also about half than their flow before 1960. Tubewells are also drying in most of the areas of Balochistan. Unavailability of irrigation water results in loss of livelihood.

I. Area and productivity in Agriculture and forests decreased

Due to drought in years 1998 – 2004, rain fed and irrigated crop yields were decreased up to 80%, and 20%, respectively¹⁰³. Animal production was reduced due to shortage of fodder. Due to decrease and erratic rainfall area under cultivation as well as agricultural productivity decreased causing food shortage, hunger and starvation as a result of meteorological drought and it was followed by hydrological and agricultural drought that has long-term impacts on agriculture, forestry, livestock production and water sources, pattern of crop growth changed, death of a large number of livestock, their reduced growth, people have to leave their villages in search of food and water and their assets were reduced. Many people, especially women and children died due to shortage of food and

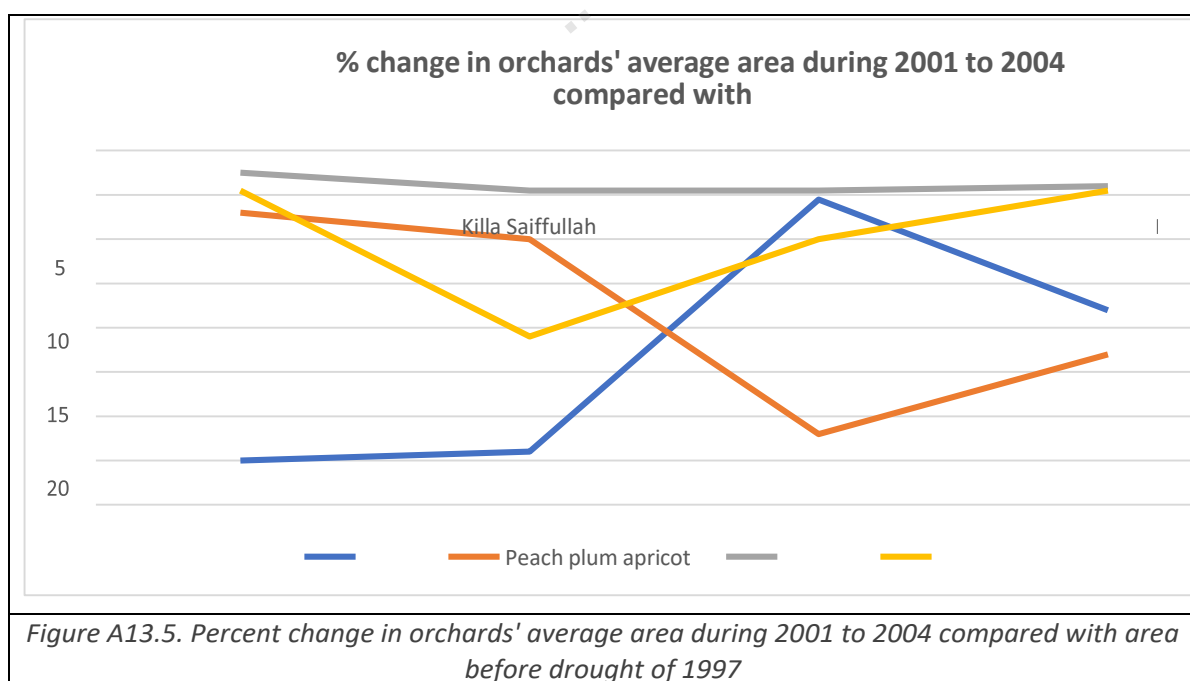
¹⁰³ <https://pcrwr.gov.pk/wp-content/uploads/2021/06/Groundwater-Management-in-Balochistan-Pakistan-2016.pdf>

incidence of diseases. Drought for many years has resulted in decreasing area of juniper forests and permanent migration of human population from many areas in Balochistan.

Reduction in area and productivity in agriculture sector which ultimately becomes a cause of hunger and food shortage and leads to migration.

Ila. Area and yield of Orchards reduced

Due to drought, eight percent orchards were damaged by water stress and even dried up. Fruit yield, size, storability and quality of the remaining orchards was reduced. Areas under apple orchards were reduced up to forty percent while areas under peach, plum and apricot were reduced up to thirty-eight percent. Later on, area under grapes increased as this is low delta and high economic value crop. In apple and grapes, drought caused leaf burning. Water stress resulting from drought caused percent reduction in major fruits' yield (Figure A13.5).



As shown in Figure 13.5, the maximum reduction in apple and grapes yields was reported in Killa Saifullah and Mastunge districts respectively. Pishin district exhibited the maximum reduction in peach plum and apricot yield followed by Killa Saifullah, Mastunge and Loralai. Reduction in the yield of almond were noted (seventeen percent) in Loralai. Chikoo and banana are grown only in Lasbella and its yield was also reduced (six to seven percent).

Ilb. Reduced yield of general crops and vegetables

Cultivated area of wheat, barley, winter and summer vegetables was severely reduced in Pishin, Killa Saifulla, Lasbella and Noshkee, respectively (Figure 3.18). Drought and disruptions in electricity due to load shedding were the causes noted for reduced yield of irrigated field crops like wheat, barley and vegetables (Figure 3.19). The low yield of principal cereal crops is also one of the reasons for increasing rural poverty. Moreover, the declining agricultural production caused by low precipitation,

reliance on rain fed agriculture and unfavorable weather conditions is one of the principal causes of poverty in rural areas.

IIc. Area and yield of rain-fed crops decreased

Due to lack of moisture, the standing crops in the field were damaged and the crops were not harvested. The farmers did not find enough moisture in the field to sow crops from year 2001 to 2005. In some areas farmers find some moisture to prepare the land but at the time of seed sowing enough moisture was not available to grow the crops.

II. *Livestock productivity Decreased*

Noshkee, Killa Saifullah, and Lasbella were severely affected by droughts of 1997-2004; eighty percent of livestock died¹⁰⁴. The drought caused the drying up of rangelands used for livestock grazing, degradation of productive areas, and reduced water availability for humans and livestock. It resulted in the death of about two million animals (Anjum et al., 2012). The animals saved became weaker; their productivity, pregnancy rate, body weight, and immunity to diseases decreased, making them prone to diseases and parasites. The market price of animals was low, and production costs were high due to a shortage of fodder, feed, and water. Communities migrated their animals during drought to productive areas.

III. *Socio-economic impacts*

During the drought 1998-2002, the farmers' income in the drought areas reduced from ten percent to forty percent in Balochistan. To meet livelihood needs, villagers were forced to sell their assets, including land, property, and livestock. The market value of animals was reduced by up to thirty per cent, causing poor people to be caught in a vicious circle of poverty. As the affordability of the communities was reduced, their meat consumption was reduced to even once a week. Cultural occasions, e.g., marriages, were restrained, and simple food was presented in such events during drought¹⁰⁵.

From 2000 to 2002, the national exchequer's loss of twenty-five billion rupees was reported. The government has to incur investment on relief work in twenty-two districts, which were among the main causes of the slowing down of the rate of economic growth. Prices of food and inflation increased. The increase in inflation and food prices has decelerated economic growth.

IV. *Reduced nutritional take-up & health*

The residents of Balochistan eat wheat, vegetables, meat, fruit, and milk yoghurt in normal years. The consumption of meat, fruits, vegetables, and to some extent, milk and yoghurt is reduced during drought situations, and the number of meals per day is reduced to one¹⁰⁶. This reduced nutritional take-up causes health issues. The first major Crimean Congo Hemorrhagic Fever (CCHF) outbreak coincided with the peak of the 1997–2002 droughts in Baluchistan and Sindh in the year 2000¹⁰⁷.

¹⁰⁴ <https://www.pdma.gob.pk/natural-hazards/droughts>

¹⁰⁵ <https://www.undp.org/pakistan/publications/drought-risk-assessment-balochistan-province-pakistan>

¹⁰⁶ <https://reliefweb.int/sites/reliefweb.int/files/resources/Crop%20and%20food%20supply%20assessment%20Baluchistan.pdf>

¹⁰⁷ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4257652/>

V. *Gender*

Women have to collect water for household needs. During drought, they have to walk to more distant places, causing mental stress, physical exertion, and increased disease susceptibility. The deteriorating water quality resulted in diseases including Crimean Congo, hepatitis, tuberculosis, hemorrhagic fever, diarrhea, and cholera. The occurrence of these diseases is higher in women than in men.

VI. *Education*

The attendance in schools is reduced in a drought situation as many families migrate, and the income of remaining families is reduced.

VII. *Food Security*

The great reduction in water availability, food crops, and fodder during droughts in 1997 – 2005 resulted in famine, causing the death of about 2 million livestock (Anjum et al., 2012) and hundreds of people in Balochistan due to malnutrition and associated diseases.

VIII. *Biodiversity & Habitat*

Ecological habitats are destroyed, resulting in biodiversity loss, increased land degradation, deforestation, and desertification.

IX. *Security situation*

Drought results in a decrease in natural resources, and the conflicts among users of the resource increase.

X. *Drought severity in relevant sectors*

The impacts of drought in Balochistan are Crop yields' reduction/food insecurity, Livestock losses, forced sale of assets, forced sale of land, Crime rate increase, Irrigation water reduction, Household water usage reduction and Health reduction due to malnutrition or lack of safe drinking water and diseases spread (Figure 3.20). Other impacts include a shortage of drinking water, malnutrition during drought resulting in Crimean Congo, Hepatitis, Tuberculosis, and hemorrhagic fever.

A13.7. Impacts of the 2018 drought:

Results of the study (PDMA, Balochistan, 2019) conducted for 14 districts of Balochistan (Nushki, Chaghi, Kharan, Washuk, Panjgur, Gwadar, Pishin, Killa Abdullah, Kacchi, Kech, Jhal Magsi, Loralai, Dera Bugti, and Awaran) by UN agencies for 2018 drought are as follows:

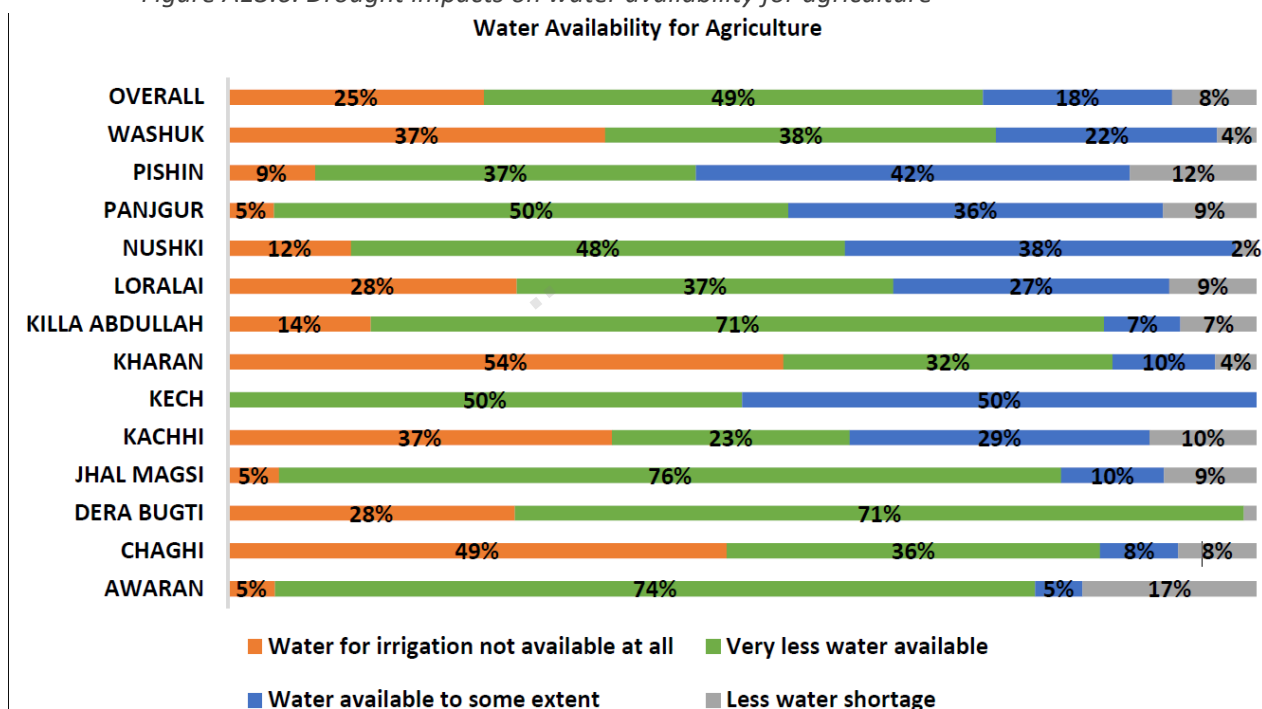
a. Agriculture

Availability of water for agricultural activities:

Overall, 25% of the farming households reported that water for irrigation was not available at all compared to the amount available during the previous year, 49% reported a severe shortage, 18% reported water available to some extent (moderate shortage), whereas 8% reported less shortage of

water. The shortage of water for agriculture was more pronounced in Dera Bugti, Killa Abdullah, Kharan, Chaghi, and Jhal Magsi, where more than 80% of farming households reported either water not at all or very little available compared to the 2016-17 agricultural seasons (Figure A13.6)

Figure A13.6. Drought impacts on water availability for agriculture



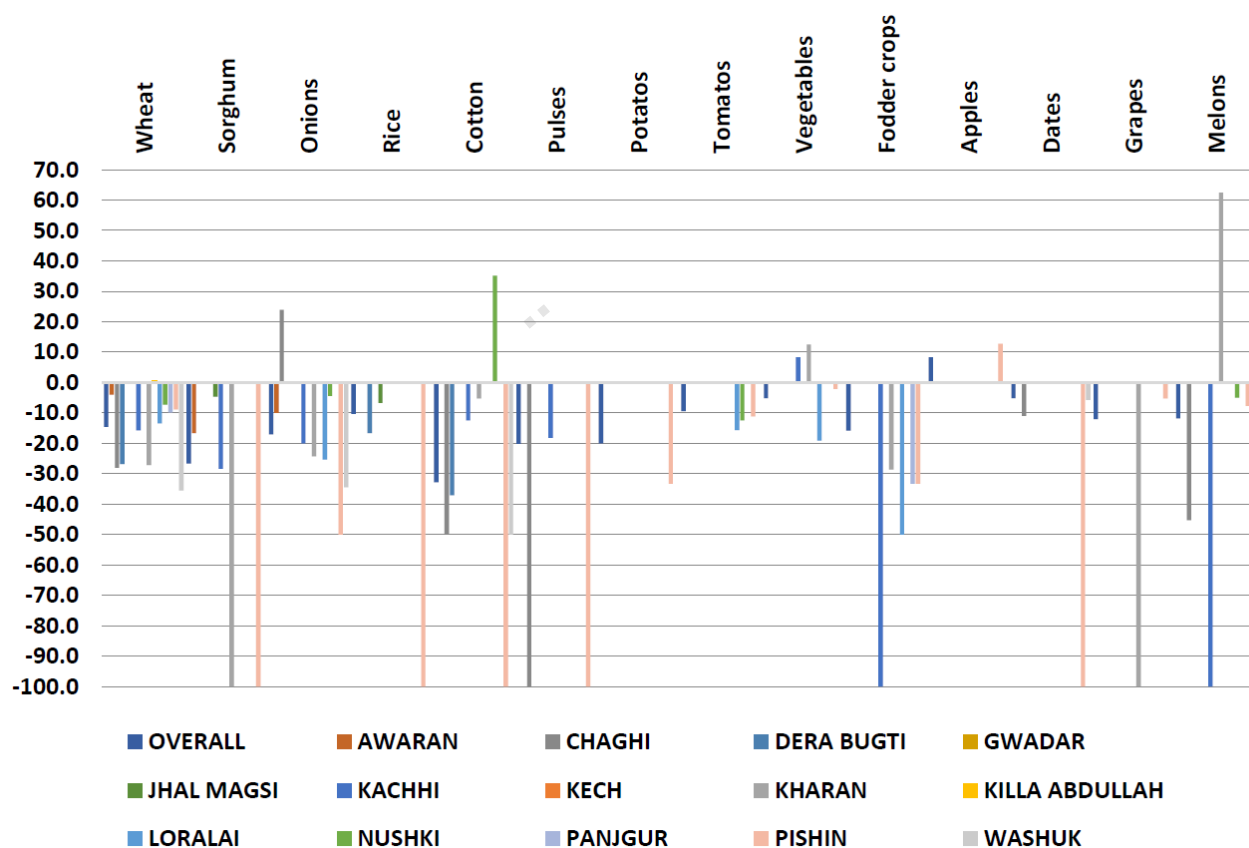
Change in crop cultivation area compared to 2016-17 agricultural seasons:

The drought in Balochistan has adversely impacted the area under cultivation as farmers reported a reduction in the area cultivated compared to the area cultivated in the 2016-17 agricultural season. Farming households in the surveyed areas are mainly engaged in cultivation of wheat, sorghum, onions, rice, cotton, pulses, potatoes, tomatoes, vegetables, fodder crops, maize, mustard, millet crops, apples, dates, grapes, melons, pomegranates, apricots and almonds. Overall, compared to the 2016-17 seasons, cultivation area (measured in acres) for wheat was reduced by 14% in 2017-18, rice by 10%, cotton by 33%, onions by 17%, sorghum by 27%, pulses and potatoes by 20% each, tomatoes by 9%, vegetables by 5%, fodder crops by 16%, dates by 5%, grapes and melons by 12%, whereas cultivation area for apples increased by 8%.

The highest reduction in cultivation area for wheat was in Washuk (by 35%), for sorghum in Kharan and Pishin (100%), for onions in Pishin (50%), for rice in Pishin (100%), for cotton in Pishin (100%), for pulses in Chaghi and Pishin (100%), for tomatoes in Loralai (16%), for vegetables in Loralai (19%), for fodder crops in Kacchi (100%), for dates in Pishin (100%), for grapes in Kharan (100%) and for melons in Kacchi (100%). On the other hand, cultivation area for wheat increased in Killa Abdullah by 0.5%, by 24% in Chaghi, cotton by 35% in Nushki, vegetables by 8% and 13% in Kacchi and Kharan respectively, apples by 8% overall and 13% in Pishin and melons by 63% in Kharan (Figure A13.7).

The reduction in cultivated area of wheat, onions, rice, apples and melons was higher among female headed households, whereas reverse holds true for male headed households for other crops, vegetables and fruits.

Figure A13.7. Percentage Change in Crop Cultivation Area Compared to 2016-17 by District



Reasons for change in crop cultivation/production:

An overwhelming majority (84%) of farming households stated limited availability of water for irrigation as the primary reason for the change in crop cultivation/production. Succeeding common responses include less rain-fall (82%), unavailability of agricultural inputs (28%), lack of manpower, financial constraints and unavailability of seeds (19% each), loss/lack of draught animals (18%), land is not useable anymore, and other reasons (5%), and storms/dust storms (4%).

Agriculture related coping strategies used by farming households during drought:

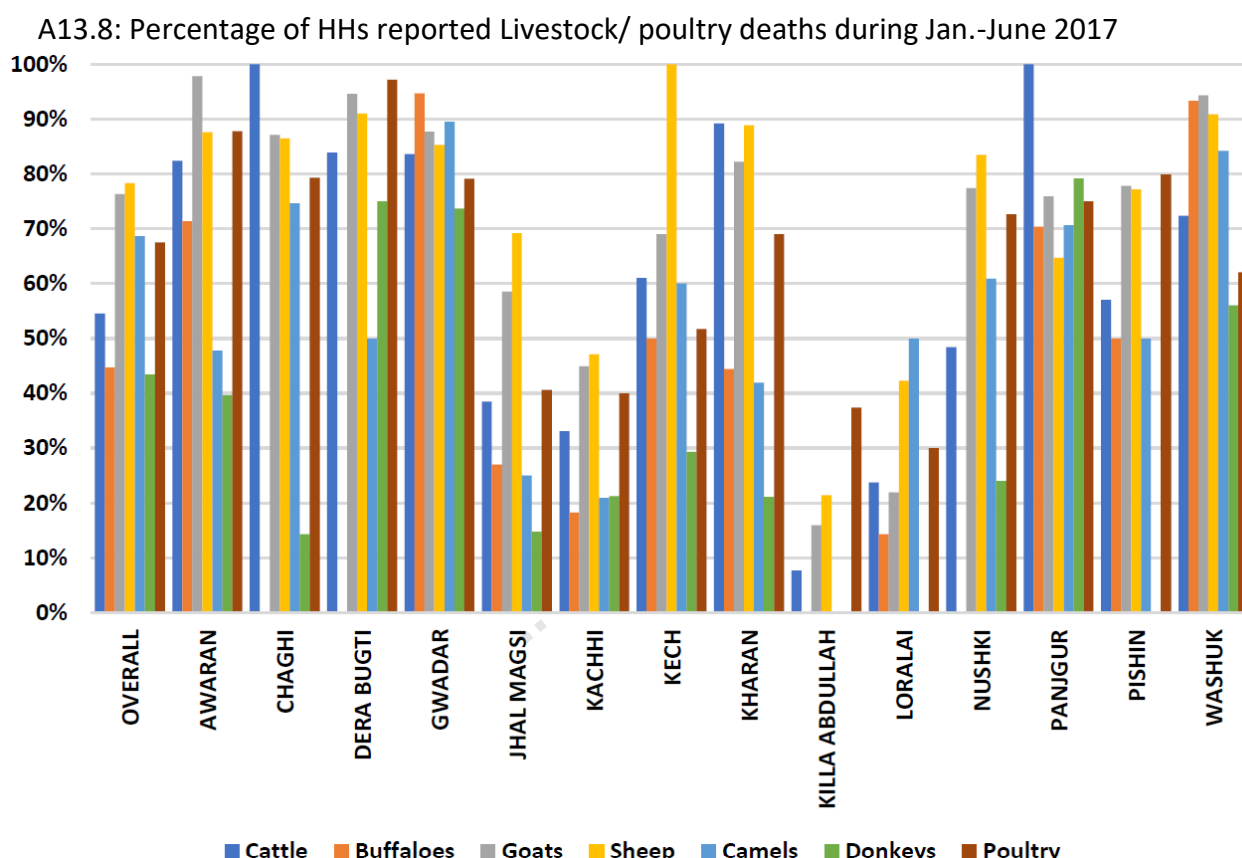
The farming households often engage in different agriculture related coping strategies to cope with drought. Common agriculture related coping strategies include growing drought resistant crops (reported by 66% of farming households), late growing of crops (56%), mixed (intercropping) crop growing (39%), reducing the crop area and using drip irrigation to use limited water efficiently (34% and 17%, respectively), and other preparation (24%) etc.

b. Livestock

Livestock losses:

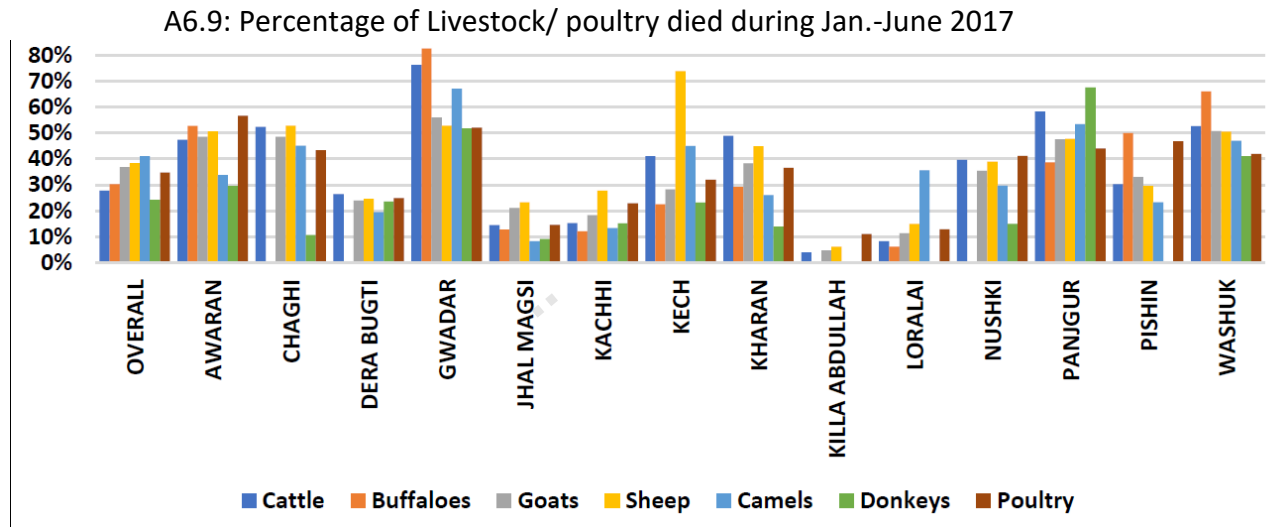
The current episode of drought has adversely affected livestock in the surveyed districts of Balochistan. Of the surveyed households who own livestock, 55% reported deaths of cattle (highest 100% each in Chaghi and Panjgur) during the past six months, 76% reported deaths of goats (highest 98% in Awaran), deaths of sheep by 78% (highest 100% in Kech), deaths of buffaloes by 45% (highest 95% in Gwadar), deaths of camels by 69% (highest 90% in Gwadar), deaths of donkeys by 43% (highest 79% in Panjgur), whereas 68% reported deaths of poultry (highest 97% in Dera Bugti) (Figure A13.8).

Death of cattle, donkeys and poultry was reported by 60%, 52% and 75% households respectively who are dependent on agriculture/livestock-based livelihoods. Death of buffaloes reported by (65%), goats by 80%, and sheep by 86% of the households who are dependent on other sources of livelihood/income, whereas deaths of camels was reported by 79% of households engaged in non-agriculture daily labor.



In terms of percentage of livestock and poultry died during past six months, the surveyed households that owned livestock/poultry six months ago reported, overall, 28% deaths of cattle (highest 76% in Gwadar), 30% of buffaloes (highest 83% in Gwadar), 37% of goats (highest 56% in Gwadar), 38% of sheep (highest 74% in Kech), 41% of camels (highest 67% in Gwadar), 24% of donkeys (highest 68% in Panjgur) and 35% of poultry (highest 57% in Awaran)¹⁵. The deaths/losses of animals are reported

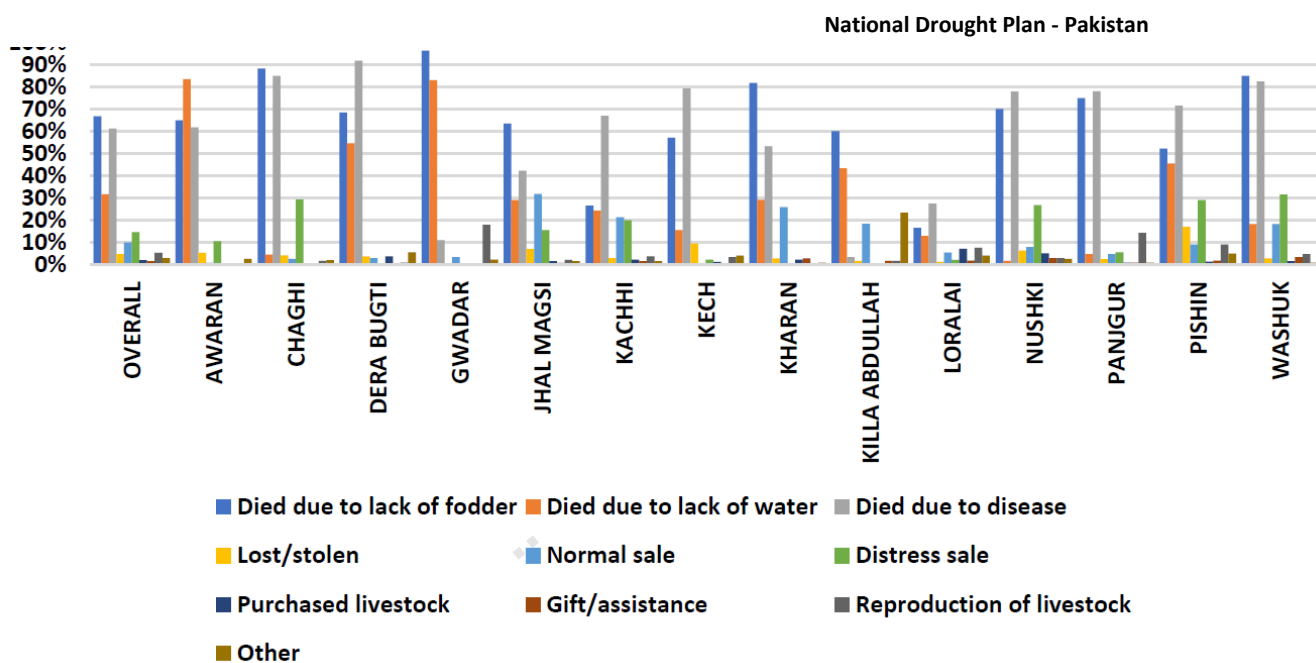
for surveyed households only and these deaths/losses occurred during the past six months preceding the survey. These numbers cannot be generalized to the entire district (Figure A13.9).



Reasons for change in Livestock/Poultry ownership compared to six months ago:

Lack of fodder and drinking water for livestock causes livestock diseases and subsequently death of livestock. Overall, the most common reasons for death of livestock as reported by surveyed households are lack of fodder (67%), livestock diseases (61%), and lack of water (32%). The lack of fodder as a reason for livestock death was reported mostly by surveyed households in Gwadar (96%), lack of water in Awaran and Gwadar (84% and 83%), and livestock diseases in Dera Bugti (92%). Distress sale (15%) is also one of the more prominent reason for decrease in livestock (highest 32% in Washuk) (Figure A13.10)

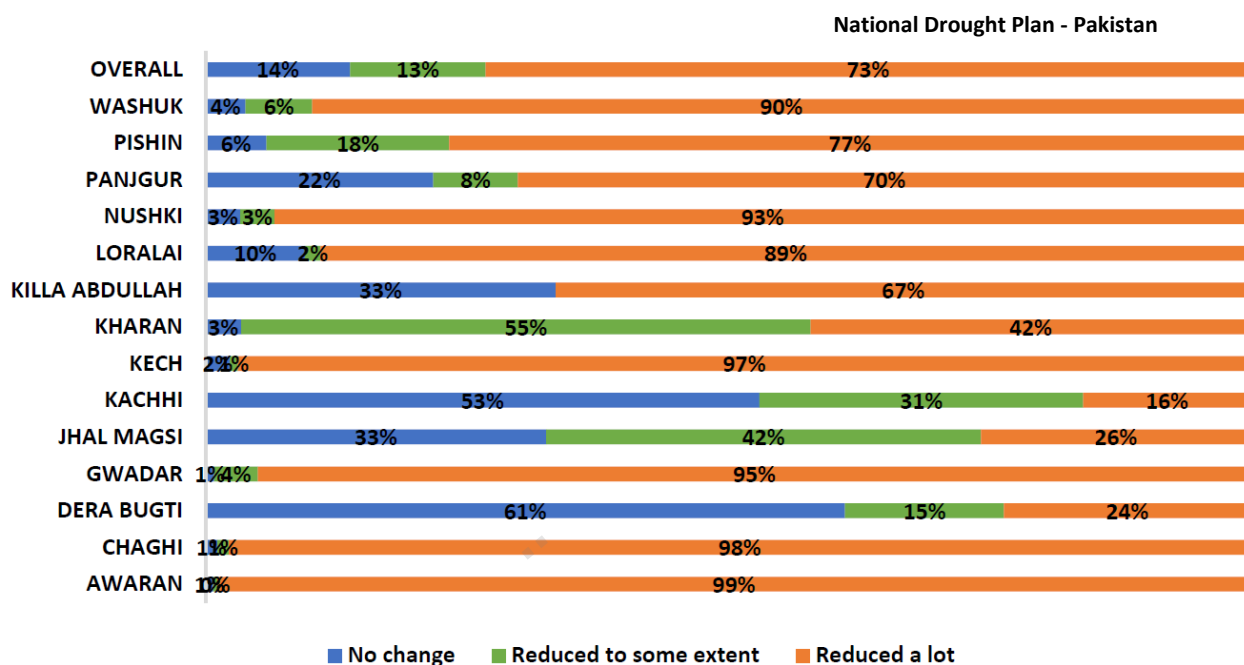
A13.10: Reasons of change in Livestock/ poultry ownership during Jan.-June 2017 compared to July-Dec. 2016



Availability of pastures compared to six months ago:

The current episode of moderate to severe drought has also negatively impacted pastures in the surveyed districts. Almost three-fourths of livestock holders reported pastures have reduced a lot, whereas around 13% each reported either no change or reduction to some extent. Over 90% of livestock holders in Awaran, Chaghi, Gwadar, Kech, Nushki and Washuk reported a high reduction in pastures compared to six months ago (Figure A13.11)

A13.11: Availability/ conditions of pasture during Jan.-June 2017 compared to July-Dec. 2016



Problems faced by livestock owners:

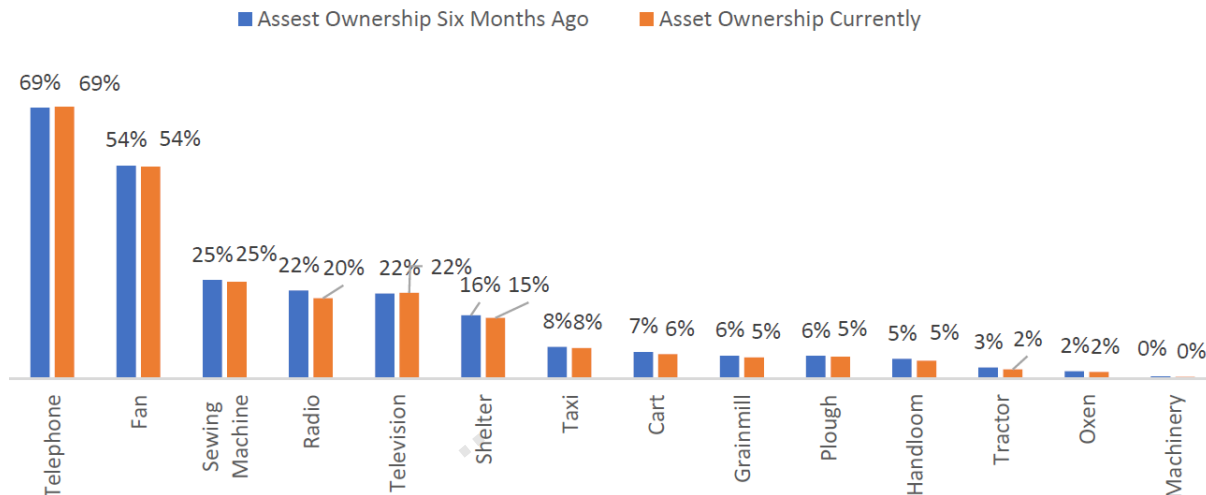
The current episode of drought has had an impact on access to livestock inputs and caused problems to in terms of protection of current herds. An overwhelming majority (95%) of livestock holders reported lack of fodder for animals, 82% reported livestock/poultry diseases, 80% reported lack of drinking water for animals, and 62% reported lack of shelter for animals as significant problems

Current asset ownership comparison with past six months- overall:

Current asset ownership status of the surveyed households was compared with their situation 6 months ago to observe any changes in asset ownership. In particular, the data was collected to check adoption of negative coping strategies, specifically sale of household assets to meet household expenditure needs. As per data collected, the situation at the time of assessment almost remains the same as it was 6 months ago and, neither trends of asset sale to fulfil household needs nor buying new assets was observed. Only marginal (1 -2%) changes were reported, particularly for non-productive assets including radio, cart, and some productive assets such as grain mill, plough, and tractor.

The graph below represents the overall asset ownership status in the communities surveyed. While comparing the productive assets with non-productive, fewer households (2 - 8%) reported to have productive assets like taxi, cart, grain mill, plough, handloom, tractor, oxen etc., while 25% reported having sewing machines. When asked about non-productive assets, maximum ownership was reported for mobile phones (69%), while 54% confirmed owning electric fans, and 22% confirmed ownership of televisions and radios in their houses. Non-ownership of fans with 46% of the households could be due to lack of electricity or non-affordability of an essential item for household comfort (Figure A13.12)

A13.12: Asset ownership during Jan.-June 2017 compared to July-Dec. 2016



A13.8. Main Drought institutes in Balochistan

The main institutes dealing with drought includes:

i. Planning and Development Department:

The P&DD of Government of Balochistan is responsible for planning and monitoring of all the development projects and approval of Provincial PSDP.

Balochistan Forest and Wildlife Department:

Balochistan Forest and Wildlife Department is responsible for taking care all the forestry, rangeland, watershed management, wildlife and soil conservation affairs in the province. The department has been mandated to perform the following functions in the province: conservation & management of forests, rangeland resources, wildlife, protected areas, watersheds/catchments, Soil conservation & desertification control, urban forestry, recreational parks and Social/farm forestry on agricultural lands. Following activities are performed by the department in the province:

- Protection of State Forests & Protected Areas.
- Nursery raising & plant distribution
- Annual Tree Planting Campaigns
- Maintenance of Linear plantations
- Regulation of Forest Produce
- Converting wastelands into productive forests and rangelands
- Farm Forestry in command areas of Kachhi Canal, Mirani & Sabakzai Dams

- Dry Afforestation / sowing using water harvesting and spate irrigation
- Establishment of Forest Recreation Parks in the districts
- Establishment of community protected areas
- Raising roadside plantations

ii. Irrigation and Power Department:

The major responsibilities of the Irrigation Department include: Monitoring / collection, compilation of water quality and hydro-meteorological data, planning, design and Construction of storage and delay action dams, perennial and flood irrigation and drainage schemes, flood protection schemes rehabilitation of damaged irrigation/ drainage facilities, exploiting the water resources through harnessing of flood and ground water flows. These include excavation/lining/cleaning of karezes, sinking of tube-wells and excavation of open surface wells etc. The department is harnessing precious and scarce quantity of water available in small streams, springs, hill-torrents through lining of channels, constructing small weirs, flood diversion structures and small storage and delay action dams.

iii. Agriculture and Cooperatives Department:

Agriculture and Cooperative Department is providing following services:

- i. Agricultural Education and Research except University Education
- ii. Experimental and demonstration farms
- iii. Improvement of agricultural crop production methods.
- iv. Protection against insects and pests and prevention of plant diseases
- v. Agriculture extension services
- vi. Arboriculture operations
- vii. Maintenance of Government gardens including botanical and zoological gardens
- viii. Control over the price and distribution of sugarcane
- ix. Marketing committees & regional markets set up under Agriculture Produce Market Act
- x. Apiaries
- xi. Zoological and Botanical survey

2. Balochistan Agricultural Research and Development Centre:

Under BARDC Quetta, five institutes namely, Horticultural Research Institute Khuzdar, Coastal Agricultural Research Institute Lasbela, Agricultural Research Institute Turbat, Agricultural Research Institute Jafferabad and Agricultural Research Institute Barkhan at Rakhni (new) are

working with the aim to enhance agricultural productivity through efficient management of natural resources (water, land, range lands, livestock, medicinal herbs and fisheries etc.). BARDS is conducting research in Animal and crop sciences, Land and water resources and Rangeland and forestry. The objectives of the institute are as follows:

- Agricultural productivity enhancement through efficient management of natural resources (water, land, range-livestock and medicinal plants)
- Efficient management and utilization of water resources, and improving productivity of Sailaba and khushkaba farming.
- Introduction and dissemination of knowledge and technologies for improving soil fertility through integrated nutrient management including use of bio-fertilizers
- Selection of high-yielding, disease-resistant and drought-tolerant crop varieties for arid & cold environments of Balochistan.
- Identification of promising forage species for different agro-ecological zones of Balochistan.
- Development & promotion of technology packages for cultivation of low delta fruit trees, wheat/barley and medicinal plants in Balochistan.

3. United Nations Agencies:

The main UN agencies working in Balochistan and their drought related initiatives include the following:

A. United Nations Development Programme:

UNDP has contributed generously in the development of Balochistan. Many natural resource management projects were launched and implemented by the UNDP in the province. Detail of some of these follows:

- a. Area Development Programme Balochistan (ADPB)
- b. Sustainable Land Management Project (SLMP)
- c. Habitat and Species Conservation Project
- d. Refugees Affected and Hosting Area (RAHA) Project
- e. Small Grants Programme

B. Food and Agriculture Organization:

The history for supporting natural resource management initiatives in the province by FAO goes way back to 1992-93, when the agency came up with a bunch of projects for implementation in Balochistan. These projects included: Integrated Range-Livestock Development, Watershed

Management, Upland Restoration, Feed Resources and Deciduous Fruit Development Projects. However, in 1997 after merger of these projects into a single program i.e. Area Development Programme Balochistan (ADPB), FAO handed over the implementation task to UNDP, but it re-entered the scene in 2006 with another big project titled “United States Assistance to Agriculture in Balochistan Border Areas. Since 2006, FAO has implemented following projects in the province in the field of natural resource management:

- a. United States Agriculture Assistance for the Bordering Areas of Balochistan
- b. Balochistan Agriculture Partnership (BAP)
- c. Australian Assistance to Agriculture Development in Balochistan Border Areas (FAO, AusABBA and BAP, Project Brief, 2012).

4. Non-Governmental Organizations:

In Balochistan besides the public sector and UN Agencies, NGOs are also working for conservation and management of natural resources in the province. Brief description of activities undertaken by these NGOs follows:

A. International Union for Conservation of Nature (IUCN):

IUCN is working in the province for conservation of natural resources since mid1990s. Following initiatives were undertaken by IUCN in the province:

- a. Preparation of Balochistan Conservation Strategy
- b. Implementation of activities through the Balochistan Strategy for Development
- c. Mainstreaming Biodiversity Conservation into Production System in Juniper Forest Ecosystem of Ziarat

IUCN has also played a key role in declaring the Juniper Forests of Ziarat as Man and Biosphere Reserve (MAB) through UNESCO.

B. World Wide Fund for Nature (WWF):

World Wide Fund (WWF) for Nature is also active in the conservation and management of natural resources. WWF contributions in the Chilghoza forest conservation have been highly appreciated by the stakeholders including resident communities. WWF has also contributed in the management of protected areas through conducting wildlife population census and preparation of plans.

C. Balochistan Rural Support Program (BRSP) is working in 26 districts of Balochistan¹⁰⁸, most of these are drought prone areas focusing on programs including social mobilization, Natural Resource

¹⁰⁸ <http://www.brsp.org.pk/>

management, technology development and Physical infrastructure, nutrition, health, disabilities, livelihood improvement, Hygiene, sanitation and water.

- D. Water, Environment and Sanitation Society** is focusing provision of drinking water, sanitation and hygiene facilities in different areas of Balochistan
- E. NGO Taragee Foundation** is working in eleven districts in Balochistan, two of KP and three of Sindh¹⁰⁹, most of these districts are drought prone areas through implementing social mobilization, disaster mitigation and preparedness, community physical infrastructure, alleviation of poverty, education especially female literacy, capacity building and primary health care. Drought mitigation and preparedness program was focused in Loralai and Ziarat districts of Balochistan.
- F. Tameer-e-Kahalaq Foundation (TKF)** is working in livelihood, education and health sectors in different areas of Balochistan.

Efforts undertaken by these organizations are mostly related to a specific project and location. However, the encouraging aspect on this front is the inclusion of land and water conservation on the priority list of NGOs. It is expected that these organizations in coordination with other stakeholders would further push the agenda of desertification and drought control.

A13.9. Legal Framework in Balochistan

The main instruments of legal framework related to drought includes:

1. Balochistan Environmental Protection Act, 2012,
2. Forest Act, 1927 and Balochistan Forest Regulation, 1890, needs updating to accommodate the recent issues and challenges like REDD+.
3. Balochistan Wildlife (Protection, Preservation, Conservation and Management) Act, 2014

A13.10. Drought mitigation and preparedness in Balochistan

Main projects are described below:

Table A13.2. Projects under Federal PSDP (Balochistan)

Action/ Activity	Lead agency	Coordinating agencies	Indicative timeframe	Total cost/ TF 1.7.23, Mil. Rs
1. Construction of 100 Small Dams In Tehsil Dobandi, Gulistan, Killa Abdullah & Chaman (Provincial Share).	Water resources Division	P&DD Balochistan	2024 – 26	223
2. Construction of Awaran Dam and Development of command Area. Cost		P&DD Balochistan	2024 – 30	6,083

¹⁰⁹ <https://www.iucn.org/our-union/members/iucn-members/taragee-foundation>

Action/ Activity	Lead agency	Coordinating agencies	Indicative timeframe	Total cost/ TF 1.7.23, Mil. Rs
Sharing Basis. (89.97:10.03) (Sb).				
3. Construction of Gish Kaur Dam and Development of command Area. Cost Sharing Basis. (97.84:2.16) (Sb).		P&DD Balochistan	2024 – 30	209
4. Construction of Delay Action Dam at Hurmozain Zehri District Khuzdar		P&DD Balochistan	2024 –24	42
5. Construction of Sunni Gar Dam (Garba) and Development of command Area. Cost Sharing Basis. (93.70:6.30) (Sb).		P&DD Balochistan	2024 – 24	1,443
6. Upscaling of Green Pak Programme (Forestry Component)	MoCCEC	Balochistan Forest Dept.	2024 –30	6,490
7. Upscaling of Green Pak Programme (Wildlife Component)		Balochistan Wildlife Dept.	2019 –30	996

TABLE A13.3. PROJECTS UNDER PROVINCIAL PSDP, BALOCHISTAN:

Balochistan Projects	Indicative Timeframe	Tentative cost/TF 1.7.2024 Mil. Rs.
Lead Agency: Forests & Wildlife Dept.		
1. Strength: of Network of Protection of Areas in Balochistan for Biodiversity Conservation, Education and Scientific Research.	2024-25	131
2. Establishment / Development of Chilgoza Nursery.	2024-25	16
3. Urban Forest Park (Jangal Bagh) at Samungli Road Quetta 5 Acre.	2024-25	36
4. Recreational Park at Spin Karez 100 Acre.	2024-27	170
5. Improvement of Rangelands for Food Security & Livelihoods Improvements Suleiman Range, Balochistan	2024-25	356
6. Strengthening of Fragile Eco- System Trees Prone to Falling due to Erosion in Various State / Protected Forest of Balochistan	2024-27	88
7. Forestry Through Drip Irrigation as Pilot Project at Chiltan, Khazaband and Mariabad, Coastal Belt	2024-27	137
8. Extension of Park Facilities at Mia Ghundi (Phase-II)	2024-25	49
Projects with Lead Agency: Agriculture Dept.		
9. Water Conservation Practices Through the Construction of Water Storage Tanks for Agriculture Purpose (30 Nos) in District Chagai.	2024-25	52
10. Agricultural Prod Through Water Management Scheme in UC Wahvi-I, Wahvi-II, Sharqi Luni, Gharbi Luni, Palos Kalan, Thal Chutiali, Thal Sharqi, Thal Gharbi Duki	2024-25	60

Balochistan Projects	Indicative Timeframe	Tentative cost/TF 1.7.2024 Mil. Rs.
11. Agriculture Productivity Enhancement Through OFWM Component in Killi Kazza Khud A Dadzai District Killa Saifullah	2024-25	25
12. Agriculture Productivity Enhancement Through OFWM in Killi Bakht Muhammad, Babu M. Ghous at Killi Zamistan, Nana Abad, Pishin	2024-25	15
13. Establishment of Onion Frying Plant & Staging Facilities	2024-25	15
14. Construction of Cold Storage In Kalat and Mangocher	2024-25	15
15. Construction of Cold Storage at Surab	2024-25	15
16. Construction of Agriculture Ponds In UC Sarawan, Ulmark, Norozkalat, Miskan-E-Kalat, Joda Kalat, Jamak, Raskoh, Totazai & Tomulk, District Kharan.	2024-25	16
17. Enhancing Agricultural Command Area By Prov and Instalation of Rcc Pipe Line, Construction of Water Storage Tanks Through Agricultural On Farm Water Management Nushki	2024-25	63
18. Agriculture Development Program Through Water Management Resources (OFWM) District Washuk	2024-25	54
19. Construction of Water Storage Tank In All U/Cs In District Ziarat	2024-25	108
20. Construction of Water Course From Gazgi Baint To Gazg City Attaabad For Water Supply & Agricultural Purpose Kalat	2024-25	87
21. Promote & Develop Olive Crop in Balochistan (Agricultural. Dept.)	2024-26	30
22. Construct Cold Storage for Fruit at Killa Saifullah	2024-25	290
23. Rehabilitation of Research Infrastructure.	2015-25	137
24. Construction of Cold Storage at Ameenabad District Chagai.	2019-25	195
25. National Programme for Imp: of Water Courses & Water Storage Tanks Phase-II (Balochistan Component)	2019-28	13,791
26. Development of Marketing Infrastructure Facilities at Sibi, Kharan, Dera Allah Yar Sohbatpur, Kachi, Kalat, Kohlu, Mastung, Hub & Zhob	2024-27	353
27. Sabakzai Dam Command Area Development Project Balochistan Phase-III	2024-25	60
28. Agro markets development including processing, packaging, value addition & cold storage facilities in 20 district of Balochistan	2024-26	4,274
29. Promotion of Olive Plantation in Tehsil Kanraj District Labela.	2024-28	66
30. Poverty Alleviation & Counter of Covid-19 Effects through Agriculture of WM Components for The Farming Community of District Nushki.	2024-25	39
31. Agriculture Development Program Through Water Management Resources (OFWM) Loralai.	2024-29	54
32. Agriculture Development Program Through Water Management Resources (OFWM) 50x50 Numbers of Talab in Various Areas of District Pishin.	2024-25	17
33. Construction of Agriculture Ponds in UC Sarawan, Ulmark, Noroz-Kalat, Miskan-E-Kalat, Joda Kalat, Jamak, Raskoh, Totazai & Tomulk, District Kharan.	2024-25	16

Balochistan Projects	Indicative Timeframe	Tentative cost/TF 1.7.2024 Mil. Rs.
34."1- Construction of Water storage tank 60x60x4.5, 50x50x4.5 Pro & Instalation of PVC Pipe 3"" Diameters, 4"" Diameters B-Class, Local Bore Along with Solar System at Pb-38.	2024-25	30
35.Instalation of PVC Pipe for Agriculture Purpose in Tehsil Killa Abdullah.	2024-25	30
36.Construction of Shenzani Storage Dam District Gwadar	2019-24	147
37.Construction of Check Dams and Other Retention Structures in Balochistan.	2019-25	2007
38.Construction of Bolan Dam.	2019-24	1,905
39.Construction of Katki / Khaisar Delay Action Dam in Johan Area	2024-25	10

	Balochistan Projects	Indicative Timeframe	Tentative cost/TF 1.7.2024 Mil. Rs.
40.	Construction of Tang Dam (Tang River) (Sb).	2024-25	6,478
41.	Construction of 04 No. Delay Action Dams in U/C Raskoh District Kharan.	2024-25	119
42.	Construction of Sara Khula Dam District Quetta.	2024-25	2,982
43.	Construction of Delay Action Dam Shorma Kaur Nodiz District Kech.	2024-25	175
44.	Construction of Zakhori Storage Dam Raesh	2024-25	48
45.	Restoration of Bolan Weir Irrigation Scheme of Bolan River District Kachhi.	2024-25	276
46.	Construction of Sia Pusht Small / Check Dam Ghafoorabad.	2024-25	33
47.	Construction of Jazdar Kaur Delay Action Dam	2024-25	48
48.	Construction of Awaran Dam and Development of Command Area. Cost Sharing Basis. (89.97:10.03) (Sb).	2024-26	6,082
49.	Construction of Panjgur Dam and Development of Command Area. Cost Sharing Basis. (90.05:9.95) (Sb).	2024-26	5,673
50.	Construction of Shehzanik Dam and Development of Command Area. Cost Sharing Basis. (84.85:15.15) (Sb).	2024-26	353
51.	Construction of Gish Kaur Dam and Development of Command Area. Cost Sharing Basis. (97.84:2.16) (Sb).	2024-26	205
52.	Construction of Sunni Gar Dam (Garba) and Development of Command Area. Cost Sharing Basis. (93.70:6.30) (Sb).	2024-26	1,442
53.	Construction of Delay Action Dam at Hurmozain Zehri District Khuzdar	2024-26	42
54.	Construction of Gaur Pad / Singindas Delay Action Dam in District Kalat	2024-25	50
55.	Construction of Katrach Dam in Lohi	2024-25	29

56.	Peerkas Storage Dam	2024-25	136
57.	Construction of Delay Action Dam Soatkal Turbat, District Kech	2024-25	20
58.	Construction of Sakery Wali Check Dam Sooman Area, Dungee Lahree Dam Mohma Samad Khan Area and De-Silting of Nahar Kot Dam Barkhan	2024-26	62
59.	Construction Check Dams Hazarganji, Quetta	2024-25	28
60.	Raising of Dam Body Restoration of Spill Way Gokar Delay Action Dam Zavar Meran District Musakhail	2024-25	27
61.	Construction of Mara Tangi Dam District Loralai (Provincial Share 492.476).	2024-27	492
62.	Construction of Gargol Dam Area Muhammad Samad Khan, Check Dam Jokhyon Area Choor Kot and Chaddry Walai Dam Halyani Area Takhra Barkhan	2024-25	144
63.	Construction of Kala Ghat Check Dam Sooman Area, Bibber Tak Dam, Sher Sherani Sooman Dam & Ghurthy Wala Gambrak Dam, Barkhan	2024-25	204
64.	Construction of Delay Action Dam Darwazi Takari Area Musakhel	2024-25	20
65.	Construction of Piun Jhal Delay Action Dam Shoran Area Kachhi.	2024-25	43
66.	Construction of Thathani Githan Delay Action Dam Nag Zamuran in Kech	2024-25	29
67.	Construction of Check Dam Sirkazey Zamuran Kech	2024-25	15
68.	Construction of Babka Gravity Dam, Zarghoon Ghar Area Harnai	2024-25	134
69.	Construction of Gendari -li Storage Dam/Delay Action Dam Noshki	2024-25	68
70.	Construction of Earthen Delay Action Dam in Killi Narezai Zhare Lakai Area of Zhob	2024-25	29
71.	Construction of Nag Kaur Delay Action Dam Nag Zamuran in Kech	2024-25	65
72.	Construction of Dam for Killi Tanga Duff Andarpar U/C Andarpar Musakhail	2024-25	50
73.	Zarhghaiz Dam District Killa Saifullah	2024-25	90
74.	Construction of Manday Tak Wakaam / Rabaat Dam District Duki	2024-25	243
75.	Pehee Jahal Gravity Dam Nemargh	2024-25	60
76.	Construction of Narriro Storage Dam Wahear Area Tehsil Wadh Khuzdar	2024-25	75
77.	Construction of Kurdan Stroage Dam in Sarooni Area Khuzdar	2024-25	115

78.	Construction of Mona Khal Small Stroage Dam in Wahear Area Tehsil Wadh Khuzdar	2024-25	48
79.	Construction of Pulinaki Dam at Ormara Gwadar	2024-25	70
80.	Construction of 1 Nos of Dams Tehsil Ormara Gwadar	2024-25	172
81.	Small Dams / Water Shed Management Around Quetta	2024-25	256
82.	Development Schemes of District, Qilla Saifullah (Ext: & Improvement of Karezes in District. Qilla Saifullah).	2012-25	134
83.	Balochistan Integrated Water Resource Management Project (BIWRMP).	2016-25	2,824
84.	Balochistan Water Resources Development Project (BWRDP).	2019-25	31,293
85.	Construction of Flood Protection Bund of Left and Right Side of Kech Kaur Phase-iii	2019-24	16
86.	Digging of Wells and Installation of Water Monitoring Instruments On 18 Basins of Balochistan	2024-25	265
87.	Construction of Flood Protection Band of Left Side of Kech Khaur (Phase IV)	2024-25	26
88.	Rehabilitation and De-Silting of Main Pat feeder and Kirther Canals	2024-25	218
89.	Construction of Flood Canal Meero Wah Shoran, District Kachhi.	2024-25	96
90.	Construction of Flood Protection Band in Ucs Padag, Yakmach, Chagai & Aminabad District Chagai	2024-25	21
91.	Construction of Protection Bund Left & Right Side of Nodiz River District Kech	2024-25	29
92.	Construction of Flood Protection Works Along Right Bank of Keel Kaur at Village Karki District Kech	2024-25	24
93.	Rehabilitation of Gazg Perennial Schemes and Hydro Electric Power Generation System of Sub Tehsil Gazg	2024-25	37
94.	Lining of Flood Channel Saraghurgi Near IB Office Nawakilli Quetta	2024-25	21
95.	Construction of Flood Protection Bund Jalalabad Mand District Kech	2024-25	36
96.	Construction of Flood Protection Bunds in Aminabad & Cheather Area District Chagai	2024-25	34
97.	Construction of Flood Protection Bund Kech Kaur at Gokdan District Kech	2024-25	32
98.	Construction of Water Ponds Channels and Flood Protection Bund, District Sibi	2024-25	38
99.	Bed Clearance of Distributaries, Minors and Construction of Vrbs on Khirther Canal System District Jaffarabad	2024-25	47
100.	Construction of 3 Nos of Mini Dam in District Gwadar	2024-25	94

101	Construction of 2 Nos Offshore / Coastal Water Reservoirs for Ground Water Recharge, Agriculture and Drinking Purpose in District Gawadar	2024-25	15
102	Construction of Flood Drain Labour Colony Near Molakhailabad, Mehmod Barech, Umar Airport Sheikh Manda, Sheikhmanda, & Protection of Wal Zadran Colony	2024-25	19
103	Shore Protection and Wave Break for Protection of Goth Ramzan Faqeer and Goth M. Ayoub Khaskheli at Dam Bandar Tehsil So	2024-25	20
104	Lining of Minor at Rd 60 L/S Marshala Minor Bari Shakh Naseerabad	2024-25	13
105	Bed Clearance of Minor No 31 & 65 Jhal Magsi	2024-25	32
106	Rehabilitation of Gangha Channel Shoran Tehsil Sunni Kachhi	2024-25	20
107	Construction of Water Channel Tuniya to Lehri, Tehsil Shoran Kachhi	2024-25	306
108	Construction of Delay Action Dam in Ali Khail Qilla Saifullah	2024-25	20
109	Construction of Flood Protection / Diversion Bund at Nizar Abad Tetyani Tump Kech	2024-25	35
110	Construction of Flood Protection Bund at Waja Murad Bazar Tump.	2024-25	35
111	Construction of Flood Protection Bund at Haji Taj Bazar Hoth Abad & Srinkin Tump	2024-25	31
112	Construction of 100 Karezats in District Pangjur	2024-25	65
113	Construction of Flood Protection Bund at Gish Kaur Reko Ronghan, District Kech	2024-25	39
114	Construction of Flood Protection Bund at Gish Kaur Kor e Posht Buleda District Kech	2024-25	15
115	Construction of Flood Protection Band Kech Kaur, Chad E Kaur Allah Bakht & Ext: Maskeen Kaur Jusak Turbat, District Kech	2024-25	116
116	Protection of Wall Zmdan Bakhtyar, Walik Pirandar, Durski, Dak Nondara, Murad Jan Daro Kcha, Sherago Master Hussain Shandi, M Ashraf Biznjo, Jan M Zelg Jaho	2024-25	71
117	Construction of Protection of Wall Nako Dad Mohd Jhal Jhao, Ashfaq Allah Dad Kambaro, Abdul Samad Azoo, Ellahe Bakhsh Nadago and Adjoining Areas Awaran	2024-25	35
118	Construction of Protection of Wall Buzdad Karki, Nako Ali Jan Mash, Haji M Baran Kumbi, Qadir Bux Peran, Ahmad Jan Mirwani, Naibat, Khoromusht Arika, Wali Jan Murad Koch	2024-25	21
119	Construction of Flood Protection Bund Left Side of Dasht River from Breedag-E-Kaur to Meerani Dam	2024-25	29

120	Lining of Minor at Rd,70+00l/S Marshala Water Course of Bari Shakh Tehsil Tamboo District Nasirabad	2024-25	12
121	Lining of Minor and Water Courses at Village B.K. Buledi, Ajab Buledi, A.K. Buledi, R.K. Buledi, Bari Shakh, Tehsil Tamboo	2024-25	145
122	Construction of Flood Protection Wall Left, Right Apshan Kaur Ilyas Jama Masjid Mohalla Kashap, Kech	2024-25	35
123	Construction of Flood Protection Wall Left & Right Side at Kashap Village District Kech	2024-25	37
124	Construction of Flood Protection Bund Dalser Bazar Mand Sub-division Tump Kech	2024-25	29
125	Construction of Flood Protection Bund Delay Kaur Nasir Abad Kech	2024-25	56
126	Construction of Flood Protection Work Master Rafiq, Gichki Bazar & High School Bazar Kech	2024-25	35
127	Construction of P.P.C Wall Haji Muhammad Kareem Bazar Kohpushat Mond District Kech	2024-25	38
128	Construction of Flood Protection Bund Bast Balicha Tehsil Tump	2024-25	39
129	Construction of Various Detention Bands in Different Areas of District Gwadar	2024-25	46
130	Construction of Miner for Mozanoro and Mehrabwah undron pet feeder Canal Naseerabad	2024-25	50
131	Flood Protection Bund for Various Killi Mirwani Drakhla, Khalil Badari, Laiso Garuk, Jamel Hazar Ganji Nal & Sndal Karaiz Hazar Ganji Nall Wadh	2024-25	30
132	Construction/Cleaning of Different Karezat at Pull Abad Kect Turbat	2024-25	111
133	Protection Bund Rehabilitation at Tuna Wah Tehsil Sunni.	2024-25	110
134	Revival of Balochistan Water Resources Programme (Eu).	2024-28	6,449
135	Construction of Flood Protection Scheme for Lands of Chooar Kot Area of Dhoulah River and Rind Gol Kujja Area Barkhan	2024-25	40
136	Construction of Flood Protection Wall in Different Unions Sherani	2024-25	48
137	Construction / Rehabilitation of Water Channels at Killi Wahvi, District Duki	2024-25	20
138	Lining of Flood Channel Siah Aab Shoran Tehsil Sunni Kachhi	2024-25	20
139	Construction of Flood Protection Band on Bolan River Kachhi.	2024-25	20
140	Construction of Flood Protection Band Kech Kaur Band Ginnah Turbat, District Kech	2024-25	105
141	Construction of Flood Protection Band Kech Kaur Right Side and Left Side Turbat District Kech	2024-25	105

142	Construction of Flood Protection Bund at Madag E Kalat/ Madag E Kaur Dandar District Kech	2024-25	10.000
143	Construction of Flood Protection Bund Ambani Pull Sami at Kech Kaur Kech	2024-25	14
144	Construction of Flood Protection Bund Killi Hakeem Abdul Majeed Tahsil Gazg Kalat.	2024-25	38
145	Construction of 5 Detention Bund / Small Water Reservoirs for Groud Water Recharge, Agriculture and Drinking Purpose in District Gwadar	2024-25	110
146	Lining of Qaiser Wah Phase-Ii Jaffarabad	2024-25	20
147	Re-Modelling of Safi Kot / Khatol Irrigation Scheme Zhob	2024-26	504
148	Construction of Flood Protection Wall at Killi Khaizai Goti Shalla Quetta	2024-25	17
149	Construction of Flood Protection Bund Cheery Shayhaq A Joo Bullo Mand, Kech	2024-25	29
150	Construction of Flood Protection Bund Sari Shayhaq A Joo Bullo Mand, Kech	2024-25	28
151	Ext of Flood Protection Bund for Dil Jam E Kadh at Kech Kaur Near Jusak Kech	2024-25	16
152	Lining of Panjuk Channel Phase-III Tehsil Gandawah District Jhal Magsi	2024-25	70
153	Construction of 3 Nos of Detention Bands in Gwadar	2024-25	20

Milestones achieved:

Some milestones achieved during 2022 are as follows¹¹⁰:

- 55,000 Cultivable Command Area (CCA) of Kachhi Canal (Phase-I) developed
- Initiation of about 30 new schemes of small dams/recharge/check having cost about Rs 28.60 billion with an allocation of Rs 2.74 billion
- Under Southern Balochistan Package, approval of 17 water sector projects including Sunni Gar, Panjgur, Gish Kaur, Awaran & Shehznek dams and one umbrella PC-II covering 10 feasibility studies has been accorded.
- Construction of Naulong, Garuk, Basool, Batozai, Mangi, Mara Tangi Dams and 100 small dams (Package-II, III and IV).
- Plantation of 22 million forest plants (2019-2022)

Reversing Deforestation and Forest Degradation in High Chilgoza Pine Forests Pakistan - Balochistan Progress

¹¹⁰ Pakistan Economic Survey 2021-22

Some of the major achievements of the project over the last two years are given below:

- 8,443 households (includes 6,679 men and 1,764 women) have directly benefited from the project out of the total 25,000 households targeted in the project.
- Assisted Natural Regeneration on 2153 ha in 14 valleys through 48 enclosures (4 million seedlings) achieved out of the 3,600 ha targeted in the project.
- Four Chilgoza Processing units provided to different communities.
- Total of 600 sets of Chilgoza cone collection and storage tools procured against the target of 100 sets.
- Gasifiers and 2,100 fuel efficient stoves are distributed.
- Different communities have planted fruit and forest seedlings on 653 ha (653,000 plants).
- Management plans for Chilgoza forests over 26,000 ha have been prepared.

Declaration of Marine Protected Areas

- Astola Island was declared as first marine protected area of the Pakistan. In this context, consultative process continued on management planning of Astola Island with the involvement of all stakeholders. Moreover, active consultation is in process with other Ministries like Defense, Maritime Affairs and the Provincial Governments to increase Marine Protected Areas in the country.

A13.11. Recommendations and implementation actions

Important actions proposed to mitigate drought risk are as follows:

1. Constitute Donors Coordination Group for Natural Disasters for Balochistan and convene biannual meetings,
2. Assess rangeland carrying capacity at periodic intervals, develop local level grazing management plans in consultation with local communities and adopt community managed controlled grazing practices as per carrying capacity, rangeland reseeding with suitable varieties of grasses and shrubs, establish micro-catchments, animal watering points, ponds and mini dams
3. Establish seed banks of local and improved grasses and shrubs at divisional/ district levels
4. Establish nurseries of mazri weed in Kalat and Makran division,
5. Stabilize sand-dunes by establishing mechanical sand barriers like semi-buried straw checkboards,
6. Sustainable Use of Mazri Palm & Non-Timber Forest Products with the involvement of Local Communities and Private Sector.
7. Promote Farm forestry and forest crop intercropping
8. Conserve forests and wildlife, forest trees plantation,

9. Reforestation with indigenous and drought resistant varieties,
10. Build capacity of relevant government departments' staff through training workshops and exchange visits in and outside the country. Organize joint training programs to build human capacity in improved resilience towards drought. Enhance capacity of relevant institutions for medium and long drought forecasting.
11. Developing mechanisms for context-specific and need-based forecasting, include such information in local level languages for better understanding. Strengthen observational network for drought monitoring to bridge the gap between the existing and desired meteorological and hydrological monitoring network. Improve methodologies and vulnerability assessment at the Local and regional level
12. Devise a Provincial drought policy focused on disaster reduction.
13. Establish Groundwater Development and Management Regulatory Authority
14. Planning and Development department may prepare two years' work plan for drought mitigation with the involvement of stakeholders including farmers and poor communities of the affected areas,
15. Include following actions as a priority for drought preparedness and mitigation:
 - 15.1. Schemes of Karez rehabilitation to be implemented on regular basis in all potential areas (Construct Channels in Murda Karez Area Tehsil Chaman etc.)
 - 15.2. Water resources (surface and groundwater) monitoring
 - 15.3. Groundwater management through artificial recharge
 - 15.4. Construction of leaky structures
 - 15.5. Check structures/ Bunds
 - 15.6. Inverted wells
 - 15.7. Other measures for recharge-Valley dikes, ditches, furrows, terraces, loose stone walls, surface spreading of rainfall runoff
 - 15.8. Integrated water resource management like lining of watercourses, Plain Cement Concrete (PCC) lining of channels, installation of Polyvinyl chloride (PVC), Reinforced Cement Concrete (RCC) pipelines with focus on reducing conveyance losses
 - 15.9. Construction of rainwater harvesting structures such as ponds, mini dams, small dams, delay action dams, macro and micro catchments for crop production/ forest plantation and to recharge underground water (Tubewell, karezes, springs)
 - 15.10. Use of Dams for water storage and command area development
 - 15.11. Construction of leaky structures
 - 15.12. Promotion of sailaba and spate irrigation system
 - 15.13. Construction of water storage tanks

- 15.14. Conserve and develop new water resources and raise awareness
 - 15.15. Demonstrate the low delta crops, practices and low delta high value fruit trees to the local community. (Promote & Develop olive, date, pistachio, grapes, pomegranate, almond, fig & grewia)
 - 15.16. Improve fruit storage (Construct Cold Storage for Fruit at Killa Saifullah and Kalat)
 - 15.17. Promote Veterinary health services
 - 15.18. Establish Provincial Drought Management Fund to improve Drought Governance support system.
 - 15.19. Increase coverage of Natural gas to local communities in drought prone areas to protect cutting of trees.
 - 15.20. Provide long-term subsidy to promote LPG and Fuel-efficient stoves.
 - 15.21. Implement Community based drought mitigation programs.
 - 15.22. Appropriate layout of the farm.
 - 15.23. Raised bed planting system
 - 15.24. Efficient and balanced use of fertilizers, with focus on organic fertilizers
 - 15.25. Formulate irrigation scheduling
 - 15.26. Expand Forest nurseries' number and their capacity
 - 15.27. Promote production of indigenous less water requiring tree species
16. Watershed management
- 16.1. Promotion of vegetation to promote the vegetative cover to minimize the runoff of rainwater
 - 16.2. Facilitation of infiltration through vegetative cover and rainwater harvesting structures
 - 16.3. Construction of rainwater harvesting structures including low-cost loose stone structures in watershed areas
 - 16.4. Plugging of gullies, water ways and promotion of vegetation
17. Increase protected areas including national parks to restore soil and water conservation.
18. Prepare and implement Drought Mitigation Plans/ water shortages contingency plans at provincial and district levels.
19. Develop Community based drought monitoring, early warning dissemination and respond system with the involvement of other relevant stakeholders. Year-wise communications need to be developed for an alert of drought.
20. Improve Regulations for groundwater usage and management in drought prone areas to reduce overdraft and drawdown of water-tables, tube-wells, Karezes and springs.

21. Floodwater may be used after careful planning to recharge water sources. In the areas where the existing running Karezes and tube-wells have reduced discharge flow,
22. Physical infrastructure development to be properly planned so that it does not have negative impacts on karezes and springs,
23. Promote Drinking water treatment plants or sand filters, wherever needed, to provide better drinking water to the communities
24. Involve Stakeholders’ including famers and the poor from planning to implementation to monitoring of proposed actions to get their ownership during implementation of actions and giving them responsibility after the implementation.
 - 24.1. In case of drought, coordinated response to be adopted to avoid duplication of efforts;
 - 24.2. Establish Public private partnership to utilize Corporate social responsibility for drought response efforts;
 - 24.3. Development linkages with the Federal Government’s Ministry of Climate Change and Environmental Coordination to share data of climate change resilience and options for its improvement.
25. Improve Communication system, outreach of drought and its mitigation measures and emergency response capacities in drought prone areas for capacity building and mentoring. Communities to be educated on drought response measures, safe drinking water, sanitation and other related topics.
 - 25.1. Encourage establishment of clean and green clubs in schools for awareness on tree plantation and water management to increase clean green Pakistan Index.
 - 25.2. Utilize services of telecommunication companies for dissemination of drought information,
 - 25.3. Broadcast Programs on drought coping techniques on electronic media including radio Pakistan and private FM channels.
 - 25.4. Develop and submit concept notes/ PC-1s/ Project documents to the potential national and international donors for funding to mitigate drought.
 - 25.5. Conduct Post drought evaluation, documented and disseminated among stakeholders that assists in learning lessons from accomplishments and mistakes.
26. Gender issues to be considered when planning and conducting the main steps of risk assessment and implementation of identified actions. Support vulnerable groups and women to mitigate drought and its impacts.
27. Re-investigate Crop calendars for different Agro-climatic zones in line with climate change projections.
28. Provide Fodder, livestock feed, Urea molasses mineral/ vitamin blocks and incumbents that may resist against drought to the drought hit areas,
29. Demonstrate low-delta crops (Sorghum, cowpea, groundnut etc.), shrubs (Ber, lavender, juniper

etc), grass varieties (Barmuda, zoysia, Buffalo etc.) and low delta fruits like ber (Zyziphus), olive, pomegranate, grapes, pistachio, grewia and figs.

30. Demonstrate agronomic practices of low-delta cropping like Zero tillage, mulching and developing calendars of such crops for different agro-ecological zones, encourage advanced water saving crop production, bio-saline agriculture and provide seeds of drought resistant local varieties to the farmers,
31. Introduce and promote low-cost high efficiency irrigation system like drip, sprinkler and bubbler irrigation system with solar system for consistent electric supply,
32. Introduce and promote medium efficiency irrigation system like precision land levelling, furrow irrigation and raised bed cultivation
33. Demonstrate improved fodder and provide livestock feed supplements to communities,
34. Train Community activists for Animal health and production,
35. Promote diversification of sources of income through initiatives including ecotourism.
36. Plan and develop physical infrastructure so that karezes and springs donot have any negative impact,
37. Provide food and cash assistance support from government and NGOs to drought affected farmers and other members of the communities,
38. Support mechanism for the farmers to ensure the Development of food security.
39. Develop/improve water contingency plans for prevailing drought prone districts,
40. Develop and incorporate disaster related indicators in the planning policy and documents (PC1)

Research

41. Agriculture of drought prone areas/districts should be declared as affected and research may be focused on drought mitigation technologies in these areas for systematic handling
42. Research and development is imperative for drought mitigation. Research need to be concentrated on its human resources and financial aspects.
43. Research need to be focused on:
 - 43.1. Low water requiring crops and water management even at application level
 - 43.2. Development and evolvement of new varieties of different crops to withstand drought and climate change
 - 43.3. Biotechnology, bioengineering and tissue culture applications to develop and evolve drought resistant varieties of crops
 - 43.4. Introduction of drought tolerant and disease resistant varieties of crops, grasses and shrubs according to drought area

44. Multiply seeds of drought tolerant and disease resistant varieties of crops, grasses and shrubs in adaptive research farms and on fields of progressive farmers.
45. Do research on drought tolerant livestock breeds,
46. Implement effective and collaborative implementation of drought relief programs

A13.12. Proposed main projects/ Action plans - Balochistan

Table A13.4. Proposed main projects/ Action plan - Balochistan

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost, Mil. Rs
1. Conduct feasibility studies and construction of 10,000 mini/ small dams	Irrigation Dept.	2026 –34	1,250,000
2. Kachhi Canal (Phase-I remaining part, II & III)		2026 –34	80,000
3. Solar water pumping		2026 –30	5000
4. Construction of infrastructures for storage of water (storage dams, small dams, mini dams, delay action dams) off-farm activity	Agriculture Deptt.	2025-31	20,000
5. Rainwater harvesting (ponds & mini dams)		2026 –30	10,000.00
6. Install drip/mini-bubbler irrigation systems for low delta fruit trees (apricot, pomegranate, pistachio, olive, grapes)		2026 –30	800.00
7. Promote rain-fed agriculture through rainwater harvesting & soil moisture conservation		2026 –30	1,000.00
8. Introduce low delta & high yielding fruit trees, grapes, apricot, pomegranate, pistachio & olive		2026 –30	1,000.00
9. Climate Smart Agriculture: Enhance Adaptive Capacity		2026 –30	2,500.00
10. Establish Horticultural Parks in drought prone districts		2026 –30	3,000.00
11. Promote solar vegetable/ fruit & crop dryer		2026 –30	800.00
12. Indigenous honey bee keeping		2026 –30	1,000.00
13. Engage Academia in research in agriculture		2026 –30	250.00
14. Develop database of crops & climate parameters		2026 –30	200.00
15. Introduce drought resistant fodder varieties		2026 –30	1000
16. Introduce drought resistant cereal & leguminous crops' varieties		2026 –30	1000
17. Construction of water storage tanks		2026 –30	40,000
18. Lining of water courses		2026 –30	5000
19. Laying of RCC pipelines		2026 –30	4500
20. Installation of PVC pipeline		2026 –30	4000
21. Rainwater harvesting structures		2026 –30	7000
22. Promotion of Protected agriculture		2026 –30	3000
23. Precision land levelling (PLL)		2026 –30	4000
24. Installation of high efficiency irrigation system		2026 –30	8000
25. Promotion of low delta crops (olive, pistachio, grapes, pomegranate, almond & cotton)		2026 –30	6000
26. Rehabilitation of karez (kanats)/ springs		2026 –30	7000
27. Installation of solar operated irrigation system linked with HEIS		2026 –30	10,000
28. On Farm Rainwater storage ponds/ reservoirs		2025-31	30,000
29. Construction of leaky structures		2025-31	1,000

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost, Mil. Rs
30.Construction of flood dispersal structures for spate irrigation system		2025-31	2,500
31.Develop/ Maintain database of water related parameters		2026 –30	1000.00
32.Prepare infrastructure standards in water sector to withstand & provide adaptation to climate change impacts		2026 –30	500.00
33.On-farm water management including Water conveyance system (Piping)		2026 –30	5000.00
34.Undertake soil & groundwater quality studies		2026 –30	400.00
35. Conservation of wetlands		2026 –30	2000.00
36. Building climate change resilience in water sector to mitigate & adapt climate change impacts		2026 –30	1500.00
37. Introduce Low-cost Hose-Fed Irrigation System (HFIS) & Geo Membrane-based Water Reservoir		2026 –30	1000.00
38.Construction of rainwater harvesting reservoirs and structures in Balochistan		2026 –30	5000
39.Integrated water resource management in the highly depleted divisions of Balochistan		2026 –30	4000
40.Improvement for Workshop Facilities at Quetta, Khuzdar & Turbat to provide Adequate Repair & Maintenance Services to the Bulldozers for constructing water harvesting structures		2026 –30	100.00
41.Land & Water Resources Development Project for Poverty Reduction in Balochistan (Procurement of Bulldozers)		2026 –30	1000.00
42.Development of Agriculture on mountainous areas of Balochistan		2026 –30	1000.00
43.Provision of logistic support (transporter, fuel tanker & single cab pickup) for bulldozers		2026 –30	200
44.Provision of laser levelling machines for land levelling and command area development (SB)		2026 –30	4000.000
45.Provision of bulldozer hours for agricultural land and water resource development		2025- 31	600
46.Provision of farm machinery/ implements to the needy farmers of Balochistan on 50% cost sharing		2026 –30	400
47.Strengthening of Tractor Operator Training Institute at Kirani		2026 –30	400
48.Improving nutrition and food security through kitchen gardening, advocacy, awareness & capacity building under “Gwadar-Labela Livelihoods Support Project Phase-II (GLLSP-II)	Fisheries Dept.	2026 –30	800
49.Protected Horticulture (low-delta Vegetable, floriculture & fruits)	Agriculture Dept.	2026 –30	150
50.Develop grazing magt. Plans, reseeding, establish micro-catchments, ponds & controlled grazing.		2026 –30	350

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost, Mil. Rs
51. Establish seed banks for grasses/shrubs at divisional/district levels	Forest Dept.	2026 –30	100
52. Develop Mazri nurseries in Makran & Kalat divisions		2026 –30	100
53. Sustainable Use of Mazri Palm & NTFPs through Communities and Private Sector, Makran & Kalat divisions		2026 –30	150
54. Introduce semi-buried straw checkboards for sand dune stabilization in Dasht. Turbat, Chagi and Kharan		2026 –30	3000
55. Promote Agro-Forestry in Mirani Dam Command Area, Kech		2026 –30	100
56. Promote dry afforestation, rainwater harvesting & low delta cropping through Communities		2026 –30	200
57. Water & Soil Conservation (Contour trenches, spurs & eye brows) for forest plantations		2026 –30	150
58. Protect Forests from Fire in government & private lands		2026 –30	150
59. Conserve juniper forests		2026 –30	1000
60. Promote watershed/ social forestry, indigenous species & community based nurseries through women		2026 –30	1000
61. NTFP based enterprise development		2026 –30	1000
62. Promote LPG & energy efficiency for forest conservation		2026 –30	200
63. Reducing soil & water erosion		2026 –30	500
64. REDD+ Preparedness		2026 –30	180
65. Develop forests at landscape level to promote biodiversity conservation, climate change mitigation & ecosystem services		2026 –30	450
66. Up-gradation of Forestry Research Division, Balochistan	Forest Dept.	2026 –30	100
67. Develop oasis/botanical gardens in drought prone areas		2026 –30	150
68. Capacity building of FD staff		2026 –30	100
69. Efficient use of forests waste materials		2026 –30	150
70. Establishment of GIS Lab.		2026 –30	80
71. Conserve threatened & vulnerable flora species through in-situ & ex-situ cultivation		2026 –30	100
72. Develop & implement protected areas (PAs) magt. Plans and develop new PAs		2026 –30	120
73. Promotion of energy efficient cooking, heating & housing technologies	P&DD	2026 –30	100
74. Community based drought mitigation program	P&DD	2026 –30	1,000
75. Updation of Balochistan Drought mitigation / water shortages contingency plans	PDMA	2026 –30	10
76. Establishment of Drought Mitigation Fund for Balochistan	P&DD	2026 –30	500
77. Develop Community based drought early warning dissemination and respond system	P&DD	2026 –30	100

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost, Mil. Rs
78.Improve Regulations for groundwater usage and management in drought prone areas	Irrigation Dept.	2026 –30	120
79. Establishment of Hydromet Department for Balochistan	PMD, Islamabad	2026 –30	200
80.Floodwater to be used to recharge water sources	Irrigation Dept.	2026 –30	500
81.Promotion of Drinking water treatment plants and sand filters for water purification	LG Dept.	2026 –30	300
82. Conduct livestock vaccination drives for communities	Livestock Dept.	2026 –30	500
83. Train Community activists for Animal health and production		2026 –30	1,000
84. Provide livestock feed supplements to communities		2026 –30	100
85.5. Do research on drought tolerant livestock breeds		2026 –30	500
86.Capacity building of DDMA's & other relevant departments & NGOs for DRR	PDMA	2026 –30	300
87.Implement drought specific activities		2026 –30	300
88. Capacity building of communities in water saving & purification for drinking water	LG & PHE	2026 –30	50.00
89. Scaling up urban & rural sanitation in drought prone areas		2026 –30	400.00
90. Provision of WASH in schools in drought prone areas		2026 –30	160.00
91. Waste to energy projects in drought prone areas		2026 –30	400.00
92. Improving water supply schemes in drought prone areas		2026 –30	500.00
93. Urban forestry in drought prone areas	LG & PHE	2026 –30	200.00
94. Construction of 100 solar powered R.O. plants & RCC Underground Reservoirs for R.O Plant for drought prone areas		2026 –30	1,000.00
95. Rehabilitation/ development of 100 new Filtration Plants for Urban & Rural Water Supply Schemes for drought prone areas		2026 –30	500.00
96.Enhance capacity for effective climate change-related planning & management at all levels		2026 –30	150.000
97.Community-based drought control program-Balochistan	RSPs, Taraqi Foundation & PMD	2025 - 30	300
98. Renovation, reconstruction and improvement of canals in drought prone areas	Irrigation Dep.	2025-35	300,000
99. Stone pitching/ apron, earthwork, re-sectioning and rehabilitation of gates of canals in drought prone areas			
100. De-silting of canals in drought prone areas			
101. Cement concrete lining of canals in drought prone areas			
102. Ratification of regulators and allied guiding systems of			

National Drought Plan - Pakistan

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost, Mil. Rs
canals 103. Construction of supplementary channels along canals 104. Lining and rehabilitation of minors and Distry (distributaries) in canals. 105. Construction of retaining and protection walls along canals in drought prone areas 106. Restoration and rehabilitation of irrigation network in drought prone areas			
Total			1,857,220

ANNEXURE XIV: PROVINCIAL DROUGHT PLAN - PUNJAB

A14.1. Executive Summary

Punjab occupies 20.630 million hectares, about 72% area is cultivated. Total compact forest area was 741,025 hectares (in 2014-15). Main rangelands include Pothwar Scrub, Thal desert, D.G. Khan and Cholistan desert rangelands covering 1.68 million hectares, 2.5 million hectares, 1.5 million hectares and 2.6 million hectares, respectively. The rangelands under the administrative control of Forest Department are 3 million hectares. There are ten National parks in the province. Cholistan, Thal and Dera Ghazi Khan are the main arid/ hyper-arid areas most vulnerable to drought. Greater Thal Canal water was provided to approximately 8.5 square kms. To bring major part of the Thal Desert under agriculture. Some part of Thar Desert is situated in south-eastern Punjab. Pothwar Plateau are mostly rain-fed areas, with average rainfall mostly 380-500 mm yearly. Main organizations to mitigate drought include Provincial Disaster Management Authority, Departments of Forest, Agriculture, Irrigation, Defunct Thal Development Authority, Cholistan Development Authority, Agency of Barani Area Development, Dera Ghazi Khan Development Authority, Cholistan Institute of Desert Studies, Islamia University Bahawalpur, Punjab Forestry Research Institute, Faisalabad and Arid Zone Research Institute (AZRI), Bahawalpur, AZRI, Bhakkar, Barani Agriculture Research Institute, Chakwal, Soil and Water Conservation Research Institute, Chakwal and Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi and University of Agriculture, Faisalabad.

Relevant policies include the Draft Punjab Forest Policy 2016 emphasizing on avoiding commercial exploitation of forest resource on state forestland. It prefers increasing and conserving such resources as biological reserve and ecological assets for providing eco-system services. The forest resources on farmlands continue to be utilized for meeting the local requirements. The policy has been made flexible to cater for the needs and consequences of emerging issues such as Climate Change, international obligations and other cross sectoral requirements. A major amendment was made in the Forest Act 1927 by increasing punishments for different forest offences to control rate of deforestation. Furthermore, provision was included for change in use of forest land for any purpose other than forestry. If use of forestland is inevitable for any project of national significance than safeguards have been provided to allocate equivalent additional land for afforestation. The Act has been further amended to support Public Private Partnership through creation of Forest Company to afforest on notified assigned forest land or wasteland.

Worst droughts in Punjab were noticed during 1899, 1920 and 1935, 1969, 1987-88 and 2000-01. Main causes of drought include population growth, Deforestation and Land degradation, overgrazing, Climate change, increased anthropogenic activities, and inappropriate use of land without considering land capability classification, Soil Problems, mostly causing increased vulnerability to drought including wind erosion. A major drought affected 7,286 villages in 1999-2002. Rahim Yar Khan, Bahawalnagar, Rajanpur, Bahawalpur, Dera Ghazi Khan, Multan, Bhakkar, Khushab, Layyah, Chakwal, Jhelum, Rawalpindi, Attock, Mianwali, Narowal and Muzafargarh are drought vulnerable districts (PMD). During drought in 1999-2002, agricultural crops, livestock and fruit orchards were severely affected resulting in losses to economic assets, environment damage and deterioration of health conditions of people in drought affected districts.

Droughts during year 1998 – 2002 reduced the economy of Punjab province by 21 per cent. The dry spells of 2009-2010 severely affected the province, badly affecting the crop production. About 10% reduction in the productivity losses in livestock were observed. Livestock was moved to irrigated areas for water and feed, mostly in Cholistan, Punjab. During droughts in 2001, Cholistan, Potowar and Mianwali were the worst affected in Punjab. The water flows in the canals were reduced and there was no water at some points of the canals at the tail end. Groundwater resources were also severely affected.

Important actions proposed to mitigate drought risk include Water resources monitoring, conserve and develop new water resources, water supply for access rights to meet domestic needs, forest trees plantation, livestock vaccination, research on drought, community based drought mitigation programs, establish Provincial Drought Management Fund, system to forecast, early warning dissemination and respond drought, Do gap analysis of existing relevant policies, plans and legislative framework to mainstream/ align drought early warning and mitigation in these documents, demonstrate the low delta crops and practices. Floodwater may be used to recharge water sources. Stakeholders may be involved from planning to implementation to monitor the proposed actions, in case of drought, coordinated response may be adopted, Public private partnership established and Decision Support System developed for drought mitigation.

The other initiatives include development of community-based early warning, evacuation system, updating Vulnerability and risks for drought annually, Improvement of Communication system, outreach of drought, its mitigation measures and emergency response capacities in drought prone areas, educating communities on drought response measures, establishment of clean and green clubs in schools for awareness and increasing clean green Pakistan Index, utilizing services of telecommunication companies for information dissemination regarding drought, broadcasting programs focusing on drought coping techniques on electronic and social media, development and submission of concept notes, project documents to the potential donors for funding to mitigate drought, conducting post drought evaluation, documentation of successful practices and dissemination among stakeholders, considering gender issues when planning and implementing drought mitigation and response actions. Assisting Vulnerable groups and women to tackle drought and its impacts, doing research on seeds of drought tolerant crop varieties. The NGOs need to improve the linkage between the farmers and the research stations. Other initiatives include promotion of seed banks, re-investigating crop calendars in line with climate change projections, providing Fodder and Urea molasses mineral/ vitamin block to the drought hit areas, demonstrating low-delta crops and agronomic practices and develop crop calendars, encouraging systems utilizing indigenous knowledge and demonstrating honey bee production, providing drought resistant local varieties' seed to the farmers, improving rangeland management, improved fodder, focus on feed supplements and doing research on drought tolerant livestock breeds, promoting Veterinary health services, training community activists for Animal health and production, conducting Feasibility studies to divert flood water to drought hit areas to recharge groundwater and demonstrate diversification of sources of income through initiatives including ecotourism. There is a need to develop and implement Drought Mitigation Plans at provincial and district levels.

A14.2. Context

The Punjab occupies an area of 20.630 million hectares¹¹¹, out of this about 72% area is cultivated as most of the land is productive¹¹². The province contributed about 54% to the national GDP in 2017-18 and number of employed people is about 37 million¹¹³. Out of the reported area of 17,680 million hectares, cultivated area, forest area, culturable waste and area not available for cultivation are 12,667 million hectares, 489 million hectares, 169 million hectares and 2,855 million hectares, respectively during year 2013-14. Out of the cropped area of Punjab and Islamabad of 16,585 during 2014-15, the area under wheat, cotton, rice, fodder, gram, sugarcane, autumn maize, bajra, jowar, mustard and rape, potato and other crop area is 42.1%, 14.0%, 11.3%, 10.6%, 5.2%, 4.3%, 4.1%, 2.5%, 1.0%, 0.9%, 0.8% and 3.3%, respectively.

Total compact forest area in 2014-15 was 741,025 hectares. Moreover, among the protected forests, total linear plantations are 47,541 hectares, while total compact protected forest area under provincial government and forest area transferred to districts include 211,458 and 8,198 hectares, respectively. Furthermore, among the reserved forests area under provincial government and forest area transferred to districts include 319,675 and 3,114 hectares, respectively. The unclassified forests, Section 38 Forests/resumed lands, Guzara forests, Choas Act and Miscellaneous forests include 112,696, 16,015, 68,237, 80 and 1,553 hectares, respectively. Numbers of buffaloes, cattle, goat, sheep, donkeys, camel, horses and mules were 16,019; 13,145; 17,057; 4,751; 1,997; 224; 101 and 73, respectively.

The main rangelands in Punjab include Pothwar Scrub rangelands, Thal desert rangelands, D.G. Khan rangelands and Cholistan desert rangelands covering area of 1.68 million hectares, 2.5 million hectares, 1.5 million hectares and 2.6 million hectares, respectively. The rangelands under the administrative control of Punjab Forest Department are 3 million hectares that are thirty-six percent of total rangeland area of Punjab¹¹⁴.

The ten National parks in Punjab include Chinji NP (Area 6,095 hectares), Kala Chitta NP (Area 36,965 hectares), Lal Suhanra NP (Area 87,426 hectares), Murree Kahuta Kotli Sattian NP (Area 57,581 hectares), Salt range NP (Area 13,700 hectares), Tilla Jogian (Area 8,840 hectares), Margalla Hills NP (17,386 hectares)¹¹⁵, Kallar Kahar Salt Range NP (Area 13,700 hectares), Kheri Murat NP (Area 8,740 hectares) and Pibi Rasool NP (Area 38,874 hectares)¹¹⁶. District-wise land cover distribution is presented in the table below¹¹⁷.

A14.3. Arid and drought prone areas in Punjab

Cholistan, Thal and Dera Ghazi Khan are the main arid/ hyper-arid areas most vulnerable to drought. Cholistan Desert is spread over 26,300 square km¹¹⁸ with average yearly rainfall of about 127 millimeter causing sparse vegetation¹¹⁹ and containing Hakra River which is dry during most parts of the

¹¹¹ <https://pakissan.com/english/agri.overview/punjabforest.shtml>

¹¹² <https://portals.iucn.org/library/sites/library/files/documents/WCS-PK-009.pdf>

¹¹³ <https://pnd.punjab.gov.pk/system/files/wpab202021%28whitePaper%29.pdf>

¹¹⁴ <http://maazm.blogspot.com/2015/04/rangelands-of-punjab.html>

¹¹⁵ https://en.wikipedia.org/wiki/List_of_national_parks_of_Pakistan

¹¹⁶ <https://profit.pakistantoday.com.pk/2020/12/04/cm-buzdar-okays-three-new-parks-to-combat-air-pollution-in-punjab/>

¹¹⁷ <http://www.fao.org/3/be839e/be839e.pdf>

¹¹⁸ https://en.wikipedia.org/wiki/Cholistan_Desert#:~:text=11%20External%20links-,Geography,the%20edge%20of%20the%20desert.

¹¹⁹ <https://defence.pk/pdf/threads/deserts-of-pakistan.272202/page-5>

year. Thal Desert covers 20,900 square km¹²⁰. Canal water was provided to approximately 8.5 square kilometers of land from Chashma Barrage to bring major part of the Thal Desert under agriculture¹²¹. Greater Thal canal whose construction was completed in 1957-58, boosted agricultural outputs and the economy of Pakistan and improved physical environment.

Some part of Thar Desert is situated in south-eastern Punjab¹²². Pothowar Plateau in northeastern Pakistan, form the northern part of Punjab. These are mostly rain-fed areas, with average rainfall between three hundred and eighty millimeters to more than five hundred millimeters yearly with lesser rainfall and arid type climate in south-west areas. Soils are mostly silt loam, silty and clay loam¹²³. The Barani (Rain fed) tract comprises whole of the Attock, Rawalpindi, Jhelum and Chakwal districts and parts of Sialkot, Narowal, Gujrat, Khushab, Mianwali, Jhang, Bhakkar, Layyah, D.G. Khan and Rajanpur districts.

¹²⁰ <https://www.graana.com/blog/deserts-of-pakistan/>

¹²¹ <https://www.grrjournal.com/fulltext/agricultural-development-under-thal-development-authority-194969>

¹²² https://en.wikipedia.org/wiki/List_of_deserts_of_Pakistan#:~:text=It%20is%20the%20world's%2017th,Gujarat%2C%20Punjab%2C%20and%20Haryana.

¹²³ <https://www.soils4teachers.org/physical-properties/>

Table A14.1. Land cover distribution in sq. kms (FAO)

District	Orchards	Crop irrigated	Crop Marginal Irrigated Saline	Crop flood plains	Crop rain fed	Forests & trees	Vegetation in wet areas	Rangelands	Bare areas	Bare areas with sparse vegetation	Wet areas	Built up
Attock	3.33	0	0	8.19	4,112.83	265.67	175.74	2,007.88	2.40	0.51	73.51	131.62
Bahawalnagar	6.38	5,720.10	88.22	145.04	327.33	4.74	118.42	12.83	38.81	1,874.43	96.59	240.39
Bahawalpur	4.91	5,120.94	6.94	39.13	0.36	104.93	54.91	169.55	24.85	18,146.30	40.66	214.74
Bhakkar	12.32	3,144.30	1.72	101.98	0.07	41.13	64.28	12.05	1.38	4,483.61	107.71	189.83
Chakwal	0.03	0	0	0.40	3,815.97	502.59	47.76	2,005.61	1.93	0	43.20	138.36
Chiniot	39.80	2,187.52	7.26	150.64	0	1.94	104.97	11.47	3.61	0	72.60	79.45
D.G. Khan	5.70	2,680.05	39.59	382.43	1,812.28	55.13	531.34	4,341.82	23.99	1,685.11	224.47	164.89
Faisalabad	30.14	5,023.01	119.88	20.60	0	11.43	12.73	31.09	0.21	0	154.51	454.01
Gujranwala	0.15	3,225.17	5.64	35.14	0	12.18	47.52	0.53	2.04	0	62.75	246.35
Gujrat	0.83	2,134.21	0.09	58.31	283.65	16.29	150.19	294.68	12.54	0.80	71.09	188.09
Hafizabad	0.23	2,105.40	35.30	29.55	0	5.20	50.56	0.36	1.93	0	65.54	66.29
Jhang	15.42	4,235.85	41.69	285.15	0	61.95	188.77	49.90	2.32	1,014.69	153.68	132.72
Jhelum	0.19	188.92	37.09	83.78	1,386.69	169.40	108.17	1,317.20	3.97	1.79	224.88	104.64
Kasur	19.49	3,463.89	20.02	70.70	0	92.97	48.74	23.96	1.29	0	77.79	191.01
Khanewal	155.41	3,644.06	25.05	91.49	0	56.25	28.64	44.55	3.40	0	79.15	162.40
Khushab	8.75	1,440.96	28.06	83.56	722.89	685.44	39.63	429.67	36.67	2,725.68	149.68	205.24
Lahore	4.02	1,048.33	28.16	4.70	0	3.35	7.49	8.50	1.36	0	23.79	621.06
Layyah	59.18	2,980.43	0	398.01	0.01	111.04	145.28	21.35	0.31	2,312.78	117.70	124.93
Lodhran	10.30	2,711.75	23.22	13.54	0	6.21	18.06	2.26	2.26	18.84	21.31	87.39
Mandi Bahauddin	102.77	2,231.91	1.58	61.52	0.14	41.19	68.60	8.62	2.36	0	72.55	96.48
Mianwali	5.66	2,089.60	0	300.46	770.12	124.55	308.75	1,397.27	24.94	382.05	242.96	184.53
Multan	347.56	2,787.35	20.31	108.06	0	0.04	51.20	1.33	0.26	36.29	56.49	263.39
Muzaffargarh	272.18	4,695.95	57.13	865.53	0.62	4.86	535.54	55.43	1.58	1,189.11	439.33	149.54
Nankana Sahib	16.02	1,451.16	48.84	43.20	0	3.70	14.64	0.78	0.46	0	29.34	54.05
Narowal	0.25	1,947.47	4.76	212.69	0	13.74	39.26	30.54	7.23	0	19.20	85.54
Okara	11.66	3,935.00	47.50	82.52	0	30.00	57.86	4.77	0.49	0	58.95	192.50
Pakpattan	5.37	2,514.54	7.11	27.37	0	6.35	20.86	6.56	3.33	0	10.91	111.13
Rahim Yar Khan	160.63	5,891.23	116.33	508.02	0	50.67	120.54	28.01	30.46	5,287.23	156.29	272.63
Rajanpur	9.66	2,694.63	27.12	863.77	1,328.70	8.82	179.79	6,885.02	39.69	21.67	216.54	64.76
Rawalpindi	0.54	0	0	0.01	2,719.17	618.30	10.20	1,574.04	0	0	39.26	366.30
Sahiwal	52.78	2,821.72	26.54	29.79	0	50.35	28.53	2.72	0.10	0	25.13	166.87
Sargodha	1,114.84	4,028.19	70.27	89.22	0	6.45	69.14	21.96	8.25	0	166.74	278.00
Sheikhpura	42.81	3,794.56	94.60	27.81	0	14.95	27.73	3.00	5.18	0	83.64	259.45
Sialkot	3.35	2,665.78	0.63	35.04	0	28.52	36.40	3.21	3.23	0	21.70	234.87
Toba Tek Singh	69.94	2,764.79	12.78	26.58	0	53.15	24.30	104.53	0.76	0	46.91	172.41
Vehari	30.82	4,079.57	12.80	18.27	0	0.01	28.66	9.36	10.76	1.04	19.26	174.11

A14.4. Institutions Related to Drought:

The main Provincial Government institutions to combat drought include:

Government Department:

The main government departments to mitigate drought include:

1. Provincial Disaster Management Authority, Punjab

The Provincial Disaster Management Authority is responsible for studying vulnerability, dealing with early warning and post disaster issues, coordinating response and relief in case of drought and floods, drought prevention and mitigation, formulation of disaster management policy for Punjab, coordination and monitoring of the relevant policies and plans.

2. Forest Department

The Forest Department is responsible for conserving and developing natural resources especially forest and rangelands, overcoming the problem of deforestation and rangeland degradation which ultimately assist in drought mitigation. Other functions of the department include:

- to prepare and implement forestry sector policies, programs, laws and rules
- raise forest plantations and nurseries
- sustainably manage forests to produce firewood, timber, non-timber products and services
- demarcate and protect forest lands from encroachments
- awareness raising, training and research in forests, plantations and rangeland management

The major productive forests in the province are Riverine and Irrigated Plantation. Other forest types include scrub and coniferous. Tree species with lesser water requirement are being planted to conserve water. Due to lesser inundation of water in the riverine forests, the water table has lowered. As a result, the traditional practice of digging shallow wells for irrigation water is being replaced with deeper boring and pumping of water through pump engines that is increasing the cost of production and increasing the groundwater table ultimately leading to drought like situation.

3. Agriculture Department

The Agriculture Department is responsible for sustainably increasing crop productivity through promoting low delta crops, improved agronomic practices, efficient use of available resources, and limiting losses due to insects, pests, salinity and alkalinity that ultimately assists in mitigation of land degradation and drought.

The Department has following attached Departments: Extension & Adaptive Research wing conducts research on emerging challenges faced to agriculture sector in various disciplines and provides on farm demonstration and dissemination of information and new technology at the door step of the farmers.

Agriculture Field wing supports in farm mechanization, land and water resource development. Pest Warning and Quality Control of pesticides is responsible to monitoring of pest development, pest scouting, quality control of pesticides and guidance in protecting plants from pests. On-Farm Water Management wing introduces efficient water application techniques and land leveling to avoid water losses. Ayub Agricultural Research Institute is developing new crop varieties and technologies for food security and natural resources conservation.

Soil Survey of Punjab keeps database of Pakistan's land resources and assists in mapping of land and land use planning.

4. Irrigation Department

The Irrigation Department takes measures to overcome water scarcity through programs and projects relating to efficient use of water for reliable, equitable and adequate irrigation, groundwater, flood management & mitigation and development of small dams.

A. Tapping water from flood events or hill torrents:

Punjab Irrigation Department is undertaking activities of tapping water from flood and hill torrents by constructing small dams. There is a potential of 1.88 MAF of water storage in Potohar region. Out of which only 0.26 MAF has already been tapped by construction of 57 small dams. 11 Small Dams projects are under construction in Potohar region which will add 0.21 MAF water storage potential. The balance water storage potential in Potohar is 1.41 MAF which remains to be trapped. 37 sites for small dams have been identified in districts Rawalpindi, Jhelum, Chakwal and Attock which will be taken up in future.

Similarly, there is a potential of small dams on hill torrents of DG Khan. The water storage potential of Koh-e-Suleiman hill torrents in Punjab is also being tapped. Consultants have been hired for feasibility study and detail design of (5) major hill torrents i.e. Sanghar, Chacher, Sorra, Vehowa and Vidore in Rajanpur and D.G Khan Districts. Sorra dam, DG Khan (51,000 acre feet) is at tendering stage. PC-I of Chacher and Vidore prepared and design data is being updated. Project at Vehowa Dam & Sanghar is at pre-feasibility stage. Ministry of Water Resources may provide the assistance to Government of Punjab for provision of funding Rs. 25 billion for construction of small dams on Sanghar & Chacher hill torrents.

B. Decrease the conveyance losses in canals:

- Selective Lining of Irrigation Channels Phase-III with length of 450 miles is going to be completed on 06-2022 under ADP scheme.
- Improvement of Irrigation water supply at tail reaches of Irrigation channels will be completed on 06-2024 with length of 680 miles under ADP scheme.
- 1050 miles lining has been done under ongoing PSDP lining project.

C. Mitigate drought risks in vulnerable districts of Punjab:

- Construction of 2 No. new canals & systems are in progress. 15 % work on Jalalpur Canal Project has been completed and it will be completed on 06-2025. Greater Thal Canal Phase-II (Choubara Branch) Project is starting soon.

- Work on remodeling and rehabilitation of SMB Link and Mailsi Syphon and rehabilitation of Eastern Sadiqia Canal have almost been completed.

D. Drought mitigation measures in Greater Cholistan:

The proposed works to be undertaken are as follows:

- 1) Rehabilitation & Upgrading of Abbasia Link Canal RD 0+000 to RD 228+000
 - 2) Construction of Irrigation System for Greater Cholistan
 - 3) Command Area Development
 - 4) Construction of Reservoirs
 - 5) Construction of Water Supply Lines
 - 6) Rangeland Management / Tree Plantation and Rainwater Harvesting
- 4.65 million acres of Cholistan Desert in Districts of Bahawalpur, Bahawalnagar and Rahimyar Khan will be irrigated.

E. Rehabilitation and Upgrading Thal Branch Canal and Distribution System:

The proposed works to be undertaken are as follows:

- 1) Rehabilitation of Thal Main Line Lower

2) Rehabilitation of Mohajir Branch, Dullewala Branch, Bakhat Branch, Munda Branch and Indus Branch

With the rehabilitation and upgrading of the MLL and branches of Thal Canal, it is envisaged that water conveyance losses would be minimized and irrigation efficiencies of the system would be improved resulting in improved water availability at the water course head. The water thus saved under 'with project' conditions would be used for gaining increased cropping area, cropping intensities and ultimately resulting in increase of crop production.

Two million acres of canal command area in districts of Mianwali, Khushab, Bhakkar, Layyah and Muzaffargarh will be irrigated.

F. Drought mitigation measures in District Rajanpur and D. G. Khan:

A total of 53 No. ponds will be provided in District D.G. Khan and Rajanpur. Rural abadies will be saved from Hill torrent flashy floods and this flood water will be used for agriculture establishing stable farming practices in the areas of districts of D.G. Khan and Rajanpur.

Agencies/Authorities:

Few specialized institutions supporting drought mitigation include:

a. Defunct Thal Development Authority:

Thal Development Authority continued till 1969. Its mandate was to colonize the administrative districts of Thal Desert i.e. Khushab, Mianwali, Bhakkar, Layyah and Muzaffargarh. An extensive canal network was developed from Chashma Barrage to bring major part of the Thal Desert under agriculture. The Authority levelled 631,000 acres and constructed water courses of about 63,900 miles.

b. Cholistan Development Authority:

Cholistan Development Authority focused on creation/desiltation of tobas, provision/improvement of drought resistant breeds, sale mechanism of livestock, etc. Improvement of access roads to local markets and provision of water supply through pipelines is also under process. Local population is also being supported through increase sale of local handicrafts and by encouraging tourism.

c. Agency of Barani Area Development:

Agency of Barani Area Development, a subsidiary body of Planning & Development Department, Punjab, is responsible for the socio-economic development of Punjab Barani Tract including land management, water resource development and human formulation. To date, it has established 685 mini dams in 8 barani districts of Punjab.

d. Dera Ghazi Khan Development Authority:

Dera Ghazi Khan Development Authority was created to support development of tribal areas of Dera Ghazi Khan Civil Division. The major focus is on infrastructure development and livestock improvement. Besides that, skill development of local population is also under consideration.

Academic and Research Institutes:

The major institutions specifically meeting the academic and research needs of arid and semi-arid areas in the province are given as under:

a. Cholistan Institute of Desert Studies (HIDS), Islamia University Bahawalpur

The Institute has been established under the management of Islamia University. The major function of the Institute includes selection and propagation of salt tolerant and drought resistance shrubs, trees and grasses, studies on desert plants with emphasis on their morphogenic and ethno

botanical characters and medicinal value and studies on nomadic lifestyle and socio – economic aspects of the desert dwellers.

b. Punjab Forestry Research Institute, Faisalabad

The Institute is being managed by the Punjab Forest Department with an overall objective to meet the research and training needs of the Department. The research activities include propagation of endangered flora, afforestation techniques, introduction of plant with low water requirement and suitable for arid, waterlogged and saline conditions and Agro-forestry projects.

c. Arid Zone Research Institute (AZRI), Bahawalpur

The main objectives of the institute include:

1. To evaluate present constraints to agricultural productivity in the desert where the potential for irrigation is either undeveloped or does not exist;
2. To establish a regional capability to tackle the problems of arid areas and develop suitable techniques for the best land use in the Cholistan desert.
3. To assess the social and economic acceptability of proposed technological innovations and develop suitable methods for the rapid and effective dissemination of new agricultural information; and
4. To ensure self-sustainability of biological systems and environmental protection of fragile arid ecosystems of the Cholistan desert.

d. Arid Zone Research Institute (AZRI), Bhakkar

The institute mainly focuses on development of drought and frost resistant crop varieties, insect pest resistance, sowing time and weed control in Thal Desert of Punjab.

e. Barani Agriculture Research Institute (BARI), Chakwal

The BARI, Chakwal's mandate was to tackle the agricultural problems of Barani areas.

f. Soil and Water Conservation Research Institute, Chakwal

Soil and Water Conservation Research Institute, Chakwal mainly focusses on the following objectives:

- i. To develop appropriate soil & water conservation *low-cost technology* for different ecological zones including rehabilitation of gullied lands and water harvesting.
- ii. To standardize soil & crop management practices to arrest soil & water losses and raise the productivity.
- iii. To develop a system to monitor surface runoff and soil losses under different land use, soil types and rainfall patterns.

g. Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi

The mandate of the University is to produce high-quality agricultural scientists and to form an organized scientific infrastructure for teaching and research for the development of dryland regions of the country.

h. University of Agriculture, Faisalabad

The university is premier site for learning and research on all disciplines of agriculture.

A14.5. Policies, Acts and Regulatory Frameworks:

Specific policies, acts and regulatory framework do not exist to implement UNCCD or Climate Change in the province. However, provisions are provided for combating the causes leading to the drought in various policies, acts and regulatory frameworks as under:

- Punjab Forest Policy:

The Punjab Forest Policy was approved by the Provincial Cabinet in 1999. The major perspectives of the policy statement are given as under:

- i. Tree and vegetation cover shall be increased on farmlands, marginal and sub-marginal lands to make up the deficiency of forest resources in the province.
- ii. A proper land use planning Programme based on land capability classification, shall be formulated.
- iii. Rights of local population shall be rationalized on the basis of carrying capacity of the public forests for sustained and perpetual benefit to the right-holders.
- iv. Land and irrigation water shall be utilized to their maximum productive potential through on-farm water management, appropriate agroforestry practices and Joint Forest Management (JFM) of the land resource in the public sector irrigated plantations.
- v. The resource use shall be regulated according to their capability and carrying capacity.
- vi. Suitable incentives (inputs or market oriented) shall be provided to encourage large scale afforestation on farms through appropriate Agroforestry (AF) systems.
- vii. Mass awareness and public education in respect of forests, environment, wildlife, biodiversity, watershed values, other intangible benefits and need for effective protection of these resources, through electronic media and farm level research shall be undertaken.
- viii. Environmental and global perspectives of forestry shall be achieved through:
 - a. Solid steps shall be taken to maintain pollution free livable environment and stand firmly by the international commitments / conventions.
 - b. Suitable measures shall be taken to conserve natural ecosystems in various agro-ecological zones of the province through establishment of Protected Areas scientific management plans.
- ix. The Government of the Punjab shall stand by all international commitments and seek international collaboration in funding the management and conservation of natural resources in the global perspective.
- x. Preservation of original flora and fauna by developing ecosystem reserves in various agro-ecological zones of the province and by imposing complete ban on change of land use of the forestlands. In case it is inevitable to transfer any forest area, at least an equal area shall be transferred to forestry sector in lieu of the land so transferred.

The revision of Punjab Forest Policy of 1999 was necessitated owing to recent changes in the policy perspectives at provincial, national and global level. In a major policy shift The Draft Punjab Forest Policy 2016 emphasizes on avoiding commercial exploitation of forest resource on state forestland. It prefers increasing and conserving such resources as biological reserve and ecological assets for providing eco-system services. The forest resources on farmlands continue to be utilized for meeting the local requirements. The policy has been made flexible to cater for the needs and consequences of emerging issues such as Climate Change, international obligations and other cross sectoral requirements.

- Punjab Water Policy 2018:

Government of the Punjab in line with National Water Policy 2018 approved the Punjab Water Policy, 2018. The objective of Punjab's Water Policy is to "provide clear policy directions to the Government

of Punjab on the sustainable management and development of water resources". Section 5 of Punjab Water Policy discusses the drought management with measures to be adopted for drought prone areas.

- **Punjab Water Act:**

In line with section 9 of Punjab Water Policy (water Governance), Punjab Water Act has been enacted and notified in the Punjab Gazette on December 13, 2019 to ensure protection of water resources of the Punjab. It is a comprehensive framework for the management and regulation of water resources in the province.

Punjab Water Resources Commission and Punjab Water Services Regulatory Authority:

For the implementation of Punjab Water Act, Punjab Water Resources Commission headed by Chief Minister Punjab and Punjab Water Services Regulatory Authority (PWSRA) headed by Chief Secretary Punjab has been notified on 11-05-2020 and these organizations are working. The Commission is responsible for conserving, redistributing or otherwise augmenting water resources, allocating water resources for domestic, agricultural, ecological, industrial or other purposes in different areas of Punjab and of securing the proper use of water resources in Punjab. The Authority will ensure that water & sewerage undertakers discharge duties and perform function as per Act.

- **Forest Act of Punjab:**

A major amendment was made in the Forest Act 1927 by increasing punishments for different forest offences to control rate of deforestation. Furthermore, provision was included for change in use of forest land for any purpose other than forestry. If use of forestland is inevitable for any project of national significance than safeguards have been provided to allocate equivalent additional land for afforestation. The Act has been further amended to support Public Private Partnership through creation of Forest Company to afforest on notified assigned forest land or wasteland.

- **Punjab Growth Strategy 2023**

The strategy for "sustainable economic growth and attaining regional equalization" highlights the key performance drivers of the province; takes stock of the current situation and the constraints faced both at the national and provincial levels; and presents a clear set of strategic priorities and plans to generate economic growth that is both inclusive and sustainable.

Guidelines in the Strategy related to Agriculture

It describes that the main crops in Punjab including wheat, cotton, rice, sugarcane and maize account for 50 percent of the cultivated land. Livestock and dairy consist of 56.7 percent of the total agriculture sector value added. The cattle and buffalo population is in excess of 80 million, whereas there are over 100 million sheep and goats in the province. About 80 percent of national exports originate from the agriculture sector and Punjab enjoys 60 percent share in the national exports. Water is a key determinant of value added in the agriculture sector. However, the productivity of water used in the agriculture sector has declined over the last three decades. It will take time and significant investments to increase supply of water through physical means. The farmers of the province will have to use the available water more productively 'more crop per drop' will have to be

the strategy going forward. Moreover, the climate change has also resulted in an enhanced need for addressing the cropping patterns in the province. The current agro-climatic zones of Punjab are:

Table A14.2. Punjab Agro-climatic zones

Agro-climatic Zones	Districts
Rice/Wheat Punjab	Sialkot, Gujrat, Gujranwala, Sheikhpura, Lahore, Kasur, Narowal, Mandi Bahauddin, Hafizabad
Mixed Punjab	Sargodha, Khushab, Jhang, Faisalabad, Toba Tek Singh, Okara
Cotton/Wheat Punjab	Sahiwal, Bahawalnagar, Bahawalpur, R. Y. Khan, Multan, Vehari, Lodhran, Khanewal, Pakpattan
Low Intensity Punjab	DG Khan, Rajanpur, Muzaffargarh, Layyah, Mianwali, Bhakkar
Barani Punjab	Attock, Jhelum, Rawalpindi, Islamabad, Chakwal

Source: Agriculture Department, Government of Punjab

These agro-climatic areas need to be redefined due to rainfall volatility, increased drought and rising temperatures due to climate changes seriously impacting crop yields. The Punjab Growth Strategy 2023 targets to reach a growth rate of 5.5 percent in the agriculture sector by 2023 and create 1.26 million jobs in the sector. The government will bring structural reforms, modernize farm management and increase availability of water and fertilizer to increase total factor productivity by 3 times. The government will make Punjab disease-free for livestock. The government will eliminate the use of adulterated milk from the market. Increase the average animal productivity in Punjab by 25 percent by 2023. Enhance the household income of small livestock holders by 10 percent per annum.

In order to attain the targets, set above, the government will take the following strategic interventions. It will ensure efficient usage of water, invest in irrigation, reduce price volatility of inputs, especially fertilizers, and develop mechanism to ensure farm upgradation solutions at small farm holdings. It will work on the pricing policy of water for agriculture to reap resources that will be invested in ensuring sustainability. The government will substantially increase public and private investment in the agriculture sector. The private sector investment will be supported by enhancing the Agricultural-credit to the farmers. The investments will be focused on upgrading facilities, especially improving the efficiency of the irrigation system. The government will take measures to improve cost recovery for the provision of public services such as improving the cost recovery of canal maintenance. The government will work towards driving value by strengthening commercial agriculture and by providing greater incentives for production of high value-added items. The wholesale markets in Punjab are governed by the Agriculture Produce Markets Act of 1939. The government will review and revise the Act and also further enhance the quality and economic viability of whole-sale markets. The government has invested significantly in farm-to-market roads. However, it will use spatial mapping to identify further connecting roads that are required to integrate these markets with farms.

The government will double the investment in agriculture research and development to 0.4 percent of the GPP. The agriculture research will be made more in line with the demands of the farmers. The Punjab Agriculture Research Board (PARB) will be strengthened to provide significant coordination of research work by the government and other private institutes. The government is focusing on enhancing the use of ICT. To extend the efficiency of the extension services, the government will focus on developing its human resource and will implement speedily the projects such as 'Extension Services 2.0' and 'Agricultural-SMART', which

will enable ICT-based interaction and information transfer to the farmers. The government will support the growth challenges of small commercial farmers, especially women and youth, particularly in areas such as High-value agriculture (HVA) farming and cottage level processing. The government will address disparities in productivity and prices along the agro-climatic zones and empower the Small Commercial Farmers (SCFs) and women to induce agriculture productivity growth and poverty reduction. Steps will be taken to ensure female education and awareness through female extension agents who can provide educational opportunities to the rural women. The government will revamp its cropping patterns, Agricultural-cropping zones will be moved towards more value added and high yielding crops given Punjab's climate change, water availability and soil suitability. The government will bring the focus on diversifying horticulture.

Substandard sanitation coupled with scant market infrastructure accounts for 30 - 40 percent post-harvest losses. Furthermore, it is the middleman who benefits the most in the long supply chain by grabbing 60 - 70 percent of the value of the produce at the expense of growers. The development of agriculture products' value chain is crucial for agriculture sector's sustainable growth. Well-functioning agriculture value chain ensures a fair price to farmers and adds value to production for local and export markets, develop market infrastructure; promote research, improvement in management techniques and shelf life of the produce; and facilitate the connection between producers and final consumers. Market committees, private sector investment, ad-valorem fee, farmer credit, enhanced competition among brokers, direct farming and storing facilities are the key areas of the proposed market reforms by the Punjab government.

In terms of the development of agriculture value chains, the government will focus on enhancing the connectivity of farms to the markets by developing the required infrastructure to shift the central markets to a modern, private sector and profit-oriented infrastructure. It will design systems to monitor the quality of daily price and quantity reports, increase the efficiency of traditional assemblers and wholesalers, improve the credit services to the farmers, and connect farms and markets cohesively by employing ICT based reforms. The Food Outlook program will be further developed to provide information to the farmers. The Agriculture Department is moving towards strategic crop cultivation and SMEs for technology and value addition. It has recently started a horticulture value chain development program with component of matching grants for SME processors. Several other programmes are also being planned to assist processing sector SMEs in technology transfer, capacity development and provision of technical and marketing support. Value added sectors, including pack houses, diced frozen fruits and vegetables; jams, pickles and other preserves; edible and essential oil extraction; drying and dehydration; and pulp and concentrate extraction units, will be supported to increase demand for farm produce and enable export of horticulture. The government will invest in research for the development of weather resistant varieties of seeds and crops. In this regard, the Climate Smart Agriculture (CSA) techniques will be further developed and implemented. The main thrust of the policy to tackle climate change will be to establish an Institute for Climate Smart Agriculture (ICSA). Adaption and building resilience in events of extreme weather, reducing the effects of underlying cross-cutting issues, mitigation of emissions of greenhouse gases (GHG) and the formation of an enabling policy along with the suitable institutional and legal framework for implementation of CSA are the four broad areas of focus for the CSA. Water resource conservation and precise irrigation techniques will be encouraged as part of on-farm water management along with the expansion of small-scale water storage capacity and rainwater harvesting at the farm level. Moreover, the quality of soil needs will be kept under

check by focusing on improving application of fertilizer and by developing an evidence-based analytical structure to help the farmers.

The Strengthening Markets for Agriculture and Rural Transformation (SMART) program aims to make the sector resilient to climate change. To protect the small farmers from yield losses due to natural calamities, the Crop Yield Insurance Index (CYII) stands as a safety net scheme that connects the insurance with the average yield at the tehsil level. The government will consider effective use of e-voucher subsidy, in which the vouchers are placed in packets of certified seeds and bags of fertilizers, etc. This will aid the farmers, as it allows a direct transfer of cash to the mobile banking account of farmer within 6 seconds of him sending the scratch code to a digitalised system. The Kissan Cards will serve as a useful tool in the implementation of e-voucher subsidy, as the subsidy money transferred in the digital bank is linked with Kissan Cards, which operate like an ATM or debit card at the point of purchase. Punjab has advantage of using pork-free feed for poultry production and use of hand slaughtering rather than stunning for meat processing. Going forward, Hilal marketing is going to be an important area for earning foreign exchange and ameliorating the conditions of breeder. The government will develop strategies to promote livestock exports, as outlined in the Punjab Livestock Policy 2016, focus on capacity building of livestock production and processing industry to generate requisite quantity of exportable surplus, introduce premium price for the value gain in the process of Livestock Development. Focus on development of ostrich, camel and equine meat and hides for exports, development of human resource capacity building in the International Trade Protocols in the context of WTO regime and phytosanitary and sanitary products. The requisite exposure will be obtained as a result of special training and education regarding trade of livestock products, use ICT based innovative interventions to ensure 100 percent animal vaccination coverage for a disease-free Punjab. Punjab will ensure zero adulteration in milk.

The Punjab Spatial Strategy has identified the following strategies: Punjab's spatial landscape is divided into 25 cropping zones. Using spatial counts, 5 high value cropping zones have been identified. These zones will be focused, use spatial planning to increase the area of production of high value export-oriented crops, information, research and export centers that provide updated information on demand, prices, trends and quality standards in the international market, will be set up in 9 divisional headquarters. Spatial transformation proposed in Spatial Strategy is provided below¹²⁴.

Table A14.3. Proposed Agricultural Transformation Plan for Punjab

Proposed Zone (Based on Crops)	Districts in Zone	Total Cultivated Area of Districts (hectares)	% age Area under these Crops	Proposed Area by 2023 (%)
Olive and Grapes valley, Pulses and Groundnut	Rawalpindi, Attock, Chakwal and Jhelum	994,000	9	15
Citrus and Vegetable Zone	Sargodha, MB Din and Khushab	1,194,000	9	15

¹²⁴ Punjab Growth Strategy 2023

National Drought Plan - Pakistan

Vegetable, Guava and Rice Zone	Gujranwala, Gujrat, Hafizabad, Narowal, Sialkot, Lahore, Kasur, Nankana Sahib and Sheikhupura	2,157,000	52	60
Maize, Potato, Guava, Fodder and Vegetable Zone	Sahiwal, Okara, Pakpattan, Faisalabad, Chiniot, Jhang, Toba Tek Singh	2,276,000	32	38
Mango, Date and Vegetable Zone	Multan, Khanewal & Muzaffargarh	1,087,000	7	14
Cotton, Banana and Oilseed crops zone	Bahawalpur, Bahawalnagar, Rahim Yar Khan, Rajanpur, Lodhran and Vehari	2,754,000	46	55
Pulses, Barley and Date zone	DG Khan, Layyah, Bhakkar and Mianwali	2,097,000	29	35

Guidelines in the Strategy related to Irrigation

The Irrigation Department is working on Punjab Master Plan related to water. The plan highlights the need for adoption of Integrated Water Resource Management (IWRM). It clearly mentions the short, medium and long-term steps that are needed to increase availability of water through building of small dams, improving flood control measures through repair of barrages, improving financial sustainability through increase in abiana and agriculture income tax rates, etc. This Strategy will provide the direction needed to solve the problems of the water sector in Punjab.

The irrigation conveyance network is serving 21 million acres (8.4 million hectare) of cultivable command area with cropping intensities generally exceeding 120 percent. The share of Punjab in the Water Accord is 55.94 million-acre feet (MAF). This includes 18.87 MAF for Rabi and 37.07 MAF for Kharif. However, in Punjab, there has been a yearly shortage of water during the past five years (2013-2018) (Table A14.4).

Table A14.4. Seasonal Water Shortage

Year	Rabi, MAF	Rabi (%)	Kharif, MAF	Kharif (%)	Total (MAF)	Yearly (%)
2015-16	16.87	-15	32.53	-6	49.4	-9
2016-17	15.93	-20	35.51	2	51.44	-6
2017-18	12.76	-36	29.19	-16	41.95	-23
Average	16.02	-19	33.242	-4	49.26	-10

Source: Irrigation Department, Government of Punjab

The storage capacity of major dams is depleting at an alarming rate, and no new storage facilities have been initiated or completed during the last 40 years. The current situation of water storage is given in Table A14.5.

Table A14.5. Capacity of Dams

Reservoir	Designed capacity (MAF)	Existing capacity (MAF)	Capacity lost (percent)
Tarbela Dam	9.68	6.05	38

Mangla Dam	5.34	4.49	16
Chashma Barrage	0.72	0.23	68

Source: Ministry of Water Resources, Government of Pakistan

The Punjab Irrigation Department has successfully launched various projects for canal rehabilitation, canal lining, rehabilitation of barrages, construction of small dams and flood protection works during the last five years in order to efficiently utilize and protect precious water resources.

Issues and Challenges Faced by Irrigation Sector

The issues and challenges include the Falkenmark water stress index with a threshold value of 1,000 m³/capita/year hangs over Pakistan. For Punjab, it is below threshold at 770 m³/capita/year, with total water availability (surface water plus groundwater) of 75 MAF. The estimated maintenance cost of Punjab's irrigation infrastructure is \$800 million per year. The water charges at Rs 135 per acre annually, and even at 100 percent recovery rate, are only \$120 million per year, which are insufficient and results in deferred maintenance. Different climate change scenarios show that Pakistan is a high-risk country. The increased variability and erratic rainfall is likely to increase flood and drought conditions which may affect our supply and demand management system.

The main reasons for low crop yields in the country include inefficiently irrigated agriculture, which includes tenant-based farming (as against corporate farming), unreliable supply of canal water, especially for tail-end farmers, inefficient irrigation application, lack of adoption of modern irrigation technologies and practices, etc. Over groundwater exploitation. 1.2 million Private Wells in Punjab, pumping in excess of balanced recharge of 43 MAF. The deposition of excessive salts in underground water, use of fertilizers and pesticides, improper sewage disposal and negligible treatment of industrial effluents are causing land and water degradation in the country.

Flooding: Despite heavy investments in flood protection structures, flood damages continue to rise. The 2010 flood caused damages worth US\$10 billion in the country. The estimates for 2022 floods are more than this. For Punjab the 2022 flood caused damages are estimated at more than US\$0.4 billion with an additional about US\$0.8 billion reconstruction cost. The uncontrolled development in the floodplains due to increasing demographic pressure is the principal cause of rising flood damages even when flood peaks have not exceeded their historic highs. Early Flood Warning Systems and the enactment of the River Act to regulate activities in floodplain is essential. A transition in water governance is required through institutional reforms, capacity building and Integrated Water Resources Management (IWRM). Punjab currently lacks an integrated database for water and environment, water balance and real-time simulation models, the use of which could tremendously help in resolving water allocation and equity issues.

The Growth Strategy proposes increasing water availability through construction of large dams at the federal level and small and medium dams in Punjab. Steps will be taken for beneficial use of floodwaters and reuse of wastewater. This will result in adequate, equitable and reliable irrigation supplies to mitigate water stress and enhance productivity of irrigated agriculture. Financial sustainability will be improved through adequate and regular maintenance of water infrastructure, and proper water pricing through revision of Abiana rates. The government will initiate Integrated

Water Resources Management through IWRM Framework, institutional reforms and promote sustainable management of water resource (surface water and groundwater) and drainage network. Knowledge database and water informatics will be developed through basin/sub-basin wide development of GIS databases for water and environment, water balance and simulation models, hydro-meteorological network, real-time data acquisition and operational models. The Irrigation Department will conduct following actions and activities to achieve its objectives:

- Rehabilitation & Lining of Canals

Thirty-nine canal rehabilitation and 20 canal lining schemes will be completed. 1,528 miles of canal network will be rehabilitated and 1,662 miles of canal network will be lined.

- Construction of New Canals and Rehabilitation of Barrages

Four new canals will be constructed. 563 miles of new canals will be constructed. Jalalpur Canal Project costing Rs 32,721 million will be completed with new canal length of 156 miles, bringing 160,000 acres under Culturable Command Area (CCA). Greater Thal Canal Phase-II costing Rs 6,261 million will be completed with new canal length of 278 miles, bringing 294,110 acres under CCA. Permanent Headworks and rehabilitated system for Kas Umar Khan Canal costing Rs 9,998 million will be completed with new canal length of 30 miles and bringing assured irrigation supply to 112,000 acres. Greater Cholistan Project costing Rs 14,966 million will be completed with new canal length of 98 miles, bringing 153,612 acres under CCA. Suleimanki, Trimmu, Panjnad and Islam Barrages will be rehabilitated.

- Drainage, Flood-works and Small Dams

One drainage scheme will be completed. 486 miles of drains will be rehabilitated. Rs 11,858 million required during the next five years. 39 canal rehabilitation schemes will be completed. 1,528 miles of canal network will be rehabilitated. 20 small dams will be completed. These dams include Ghabir, Papin, Dadocah & Cherah Dams, 440,944 acre-feet of water storage will be the capacity added.

A14.6. Drought years and main causes of Drought in Punjab

Worst droughts in Punjab¹²⁵ were noticed during 1899, 1920 and 1935, 1969, 1987-88 and 2000-01. Abnormally dry conditions (mild drought) prevailed in the Cholistan region (Bahawalpur, Bhawalnagar and Rahim Yar Khan) in Punjab. Low rainfall and high temperature emerged the water stress conditions which have started to impact the vegetation over these areas¹²⁶.

Main causes of drought are as follows:

1. Population growth

Due to increase in population, the consumption of household firewood and water is increasing at a high rate.

2. Deforestation and Land degradation

¹²⁵ <https://reliefweb.int/report/pakistan/drought-mitigation-pakistan-current-status-and-options-future-strategies>

¹²⁶ <https://reliefweb.int/report/pakistan/drought-bulletin-pakistan-august-2023>

Almost 50% of the total land area of Punjab is susceptible to land degradation and desertification (Punjab Development Statistics, 2015). The forest area in Punjab is 0.67 million hectares¹²⁷ which is about 3.2% of the area of the province. About 86.8% area is arid or semi-arid¹²⁸. Conversion of forest land to non-forestry purposes causes increase in soil erosion, land degradation and ultimately drought. Land degradation and soil erosion lead to weakening of the resilience of ecosystem and livelihood of the population when confronted with drought.

3. Overgrazing

Rangelands are found on about forty per cent area of Punjab¹²⁹. Pasture/ rangeland productivity and services and functions of ecosystem is reduced causing soil compaction, wind and water erosion and natural resilience to climate variability as a result of overgrazing. In the areas of degraded rangelands, in addition to decreased feed and fodder availability for the livestock, water penetration into the soil to support groundwater recharge is reduced causing drought like situations in the area.

4. Climate change

Due to climate change impacts, frequency and severity of floods and drought, especially hydrological drought is expected to be enhanced due to precipitation regime's high variability. Extreme events are expected to be increased due to changes in thermal regime and precipitation patterns causing increased glacier melting and later on reduced river flows and intensification in scarcity of water.

5. Increased anthropogenic activities

Majority of deserts in Punjab resulted from vegetation deterioration, bad management and overgrazing¹³⁰. Anthropogenic activities like removal of natural vegetation cover, excessive cultivation of marginal lands, excessive pumping and inappropriate use of groundwater increase the use of water in access to renewable water supply and emission of greenhouse gases that lead to more erratic rains and increased temperature supporting drought phenomenon. Excessive pumping of groundwater also results in depletion of groundwater resources.

6. Inappropriate use of land without considering land capability classification

The Land Capability Classification describe soil productivity and capabilities for planning either grasslands, forest or croplands on an area.

7. Soil Problems, mostly causing increased vulnerability to drought

Wind erosion is among the main causes of drought.

A14.7. Drought Impacts in Punjab

A major drought affected 7,286 villages in 1999-2002. Droughts in year 2001, 2002, 2003 and 2004 affected 3449, 3493, 31 and 313 villages, respectively. The rainfall of Punjab during year 2000 was 13.2 per cent and

¹²⁷ Punjab Forest Department, 2013. Forest area, Legal classification & forest type.

¹²⁸ <https://portals.iucn.org/library/sites/library/files/documents/WCS-PK-009.pdf>

¹²⁹ <http://maazm.blogspot.com/2015/04/rangelands-of-punjab.html>

¹³⁰ <http://maazm.blogspot.com/2015/04/rangelands-of-punjab.html>

26.2 per cent less than in 1999 and 1998, respectively. The drought vulnerable districts are presented in Figure A14.1.

Rahim Yar Khan, Bahawalnagar, Rajanpur, Bahawalpur, Dera Ghazi Khan, Multan, Bhakkar, Khushab, Layyah, Chakwal, Jhelum, Rawalpindi, Attock, Mianwali, Narowal and Muzafargarh are drought vulnerable districts (PMD)¹³¹. The main impacts of drought are as follows:

I. Losses to Agriculture, Economic, environment & human health

During drought in 1999-2002, agricultural crops, livestock and fruit orchards were severely affected resulting in losses to economic assets, environment damage and deterioration of health conditions of people in drought affected districts. Droughts during year 1998 – 2002 reduced the economy of Punjab province by 21 per cent¹³². The dry spells of 2009-2010 severely affected the province of Punjab, badly affecting the crop production¹³³. The results of analysis of drought during 2009-2010 revealed that 97% of the vegetated area of Rawalpindi was impaired making it the most drought affected district. On the contrary, district Dera Ghazi Khan turned out to be the most resilient district with approximately 54% of its vegetation affected by this drought.

The average yield of wheat in the province from July 1998- June 2002 was 26.41 mounds per acre, while it increased to 28.0 mounds per acre during July 2002 – June 2006. The yield during 2006-07 was 30.09 mounds per acre¹³⁴.

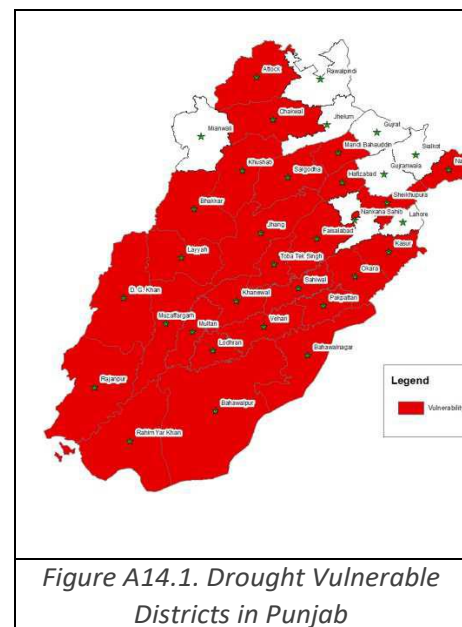


Figure A14.1. Drought Vulnerable Districts in Punjab

In addition to reduced acreage and production of barani crops, production of irrigated crops was also reduced which affected the overall crop production of the country, as against the target of 20 million tons of wheat during the year 2001-02, the production was about 18.44 million tones. The normal yearly requirement of wheat in the country was 21 million tones. Production of other crops has also been impacted negatively e.g., cotton 10.07 million bales as against the previous year's production of 10.68 million bales. Rice 3.891 million tones as against the target of 4.025 million tones. Vegetable production had also some shortfalls, e.g., onion 1.405 million tones as against a target of 1.542 million tones.

During 2021, According to official sources, 60 to 90 percent of the wheat crop in the arid areas has been destroyed by the lack of rains while in the irrigated areas this loss is reported at 10 to 15 percent. In arid areas 7.4 million acres of land was affected while in irrigated areas, 700,000 acres of land was affected. According to the Government of Punjab, the wheat crop in 2,632 villages was damaged and the livestock sector is estimated to have suffered a loss of nearly Rs. 5.5 billion. In Punjab, ten districts

¹³¹ Provincial Disaster Mgt. Authority, Punjab. 2008. Disaster Risk Mgt. Plan, Punjab. Nov. 2008.

¹³² Provincial DRM Plan Punjab

¹³³ <https://cscr.pk/explore/themes/energy-environment/lessons-pakistan-droughts-past/>

¹³⁴ <https://crs-agripunjab.punjab.gov.pk/system/files/Wheat%20Historical%20Data.pdf#overlay-context=node/165>

are arid and they are the most affected by the drought. Among them are Dera Ghazi Khan, Rajanpur, Lodhran, Chakwal, Rawalpindi, Jehlum, Attock, Mianwali, and Gujrat¹³⁵.

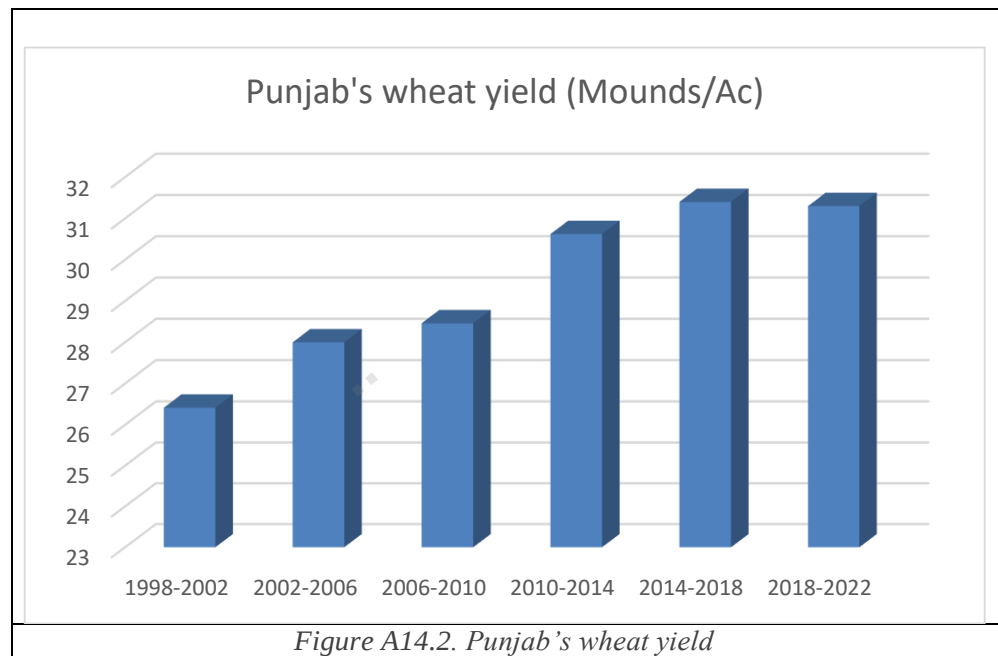


Figure A14.2. Punjab's wheat yield

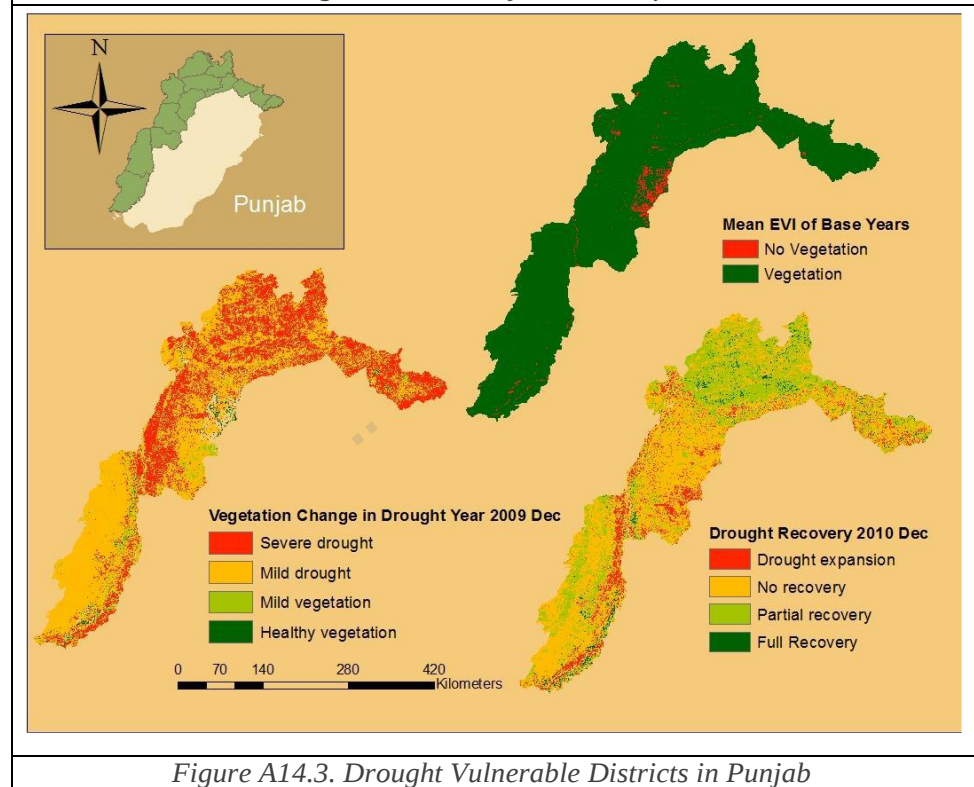


Figure A14.3. Drought Vulnerable Districts in Punjab

¹³⁵ <https://reliefweb.int/report/pakistan/drought-pakistan-update-no-12>

II. Livestock & drought

About ten per cent reduction in the productivity losses in livestock were observed in the regions severely affected by drought. Livestock was moved to irrigate areas for water and feed, mostly in Cholistan¹³⁶, Punjab.

III. Losses to ground and surface water sources

During droughts in 2001, Cholistan, Potowar and Mianwali were the worst affected in Punjab. The water flows in the canals were reduced and there was no water at some points of the canals at the tail end. Groundwater resources were also severely affected.

A14.8. Heatwave Cholistan 2022

The Cholistan¹³⁷ comprises three districts Bahawalnagar, Bahawalpur, and Rahim Yar Khan. The total area of Cholistan is 6,655,360 acres. The largest area of Cholistan is present in Bahawalpur which is 4,028,217 acres. The length of Cholistan is 480 km and the width ranges from 32 to 192 km. The human population of Cholistan is 155,000 whereas the livestock population is 1,318,000 Paridhi et al. (2018). The livestock is mostly consisting of camels, sheep, goats and Cholistani Cattle.

The Cholistan region falls in a hyper/extremely arid climate. According to the PMD climate normal of Pakistan, the monsoon season brings the majority of the rainfall over the Cholistan region. July is the wettest and November is the driest month in the region. The highest amount of rainfall is observed in July (48.4mm). The average maximum temperature ranges in Cholistan is from 20.0°C to 42.2°C with June being the hottest. The historical data (1981-2020) shows that the Khanpur (Rahim Yar Khan) station received the extreme highest (50.8°C) in June and the lowest (-4.3°C) in January respectively.

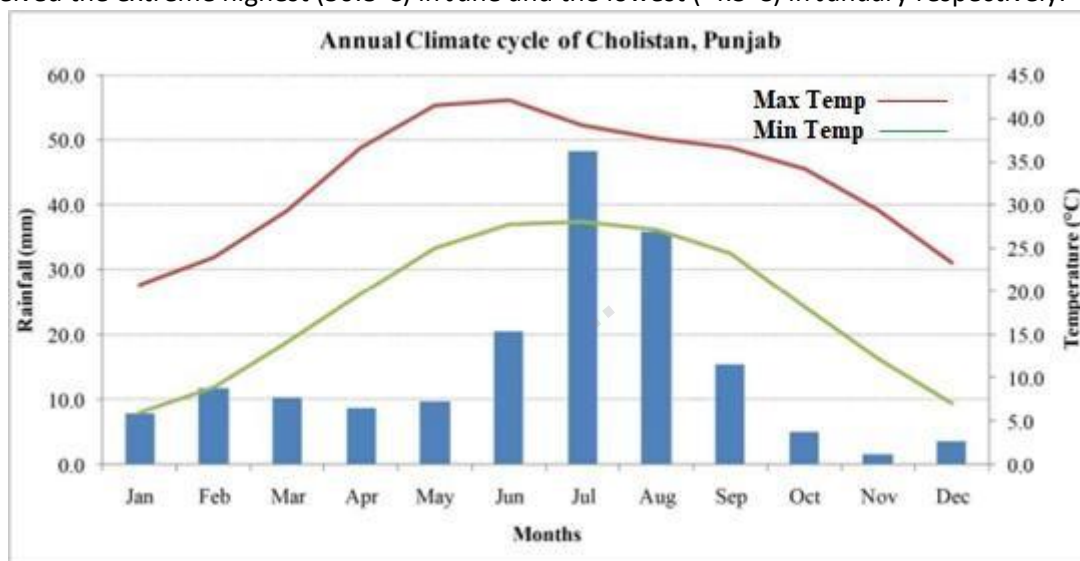


Figure A14.3. Annual Climate Cycle of Cholistan, Punjab

¹³⁶ <https://reliefweb.int/report/pakistan/drought-pakistan-update-no-14>

¹³⁷ <https://reliefweb.int/report/pakistan/pakistan-meteorological-department-technical-report-catastrophe-due-heatwave-instead-drought-cholistan-punjab-14-may-2022>

The annual total rainfall of Cholistan is 179.3mm with a maximum (247.3mm) at Bahawalnagar. The monsoon system brings rainfall during the summer season (June to September) which makes up 67% of the annual rainfall whereas in the winter season (December to March) rainfall contributes 19% of its share (Fig A7.4.). These results provide a clear indication that this region highly depends upon summer monsoon rainfall and the failure of monsoon rainfall may cause drought in the Cholistan region.

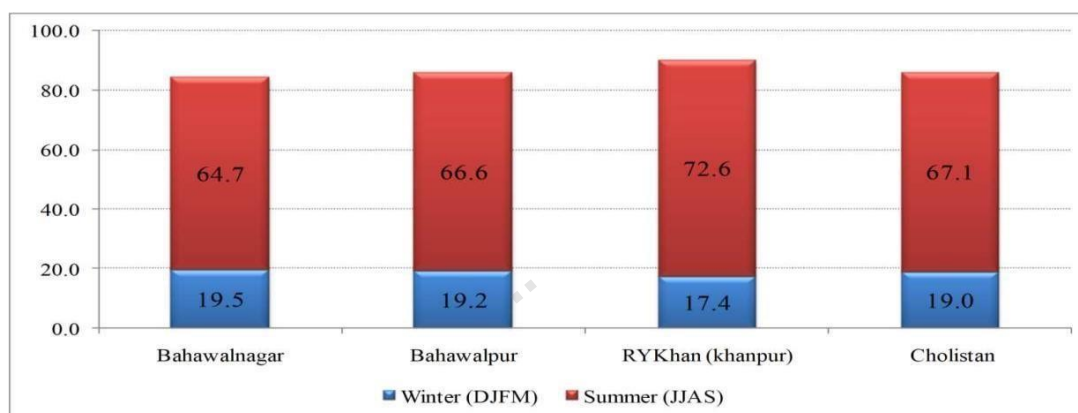


Figure 14.4. The seasonal rainfall contribution in the Cholistan region, Punjab

I. Drought situation in Cholistan

The climatology of Cholistan shows that it receives a low amount of rainfall in winter. However, this region received a good amount of rainfall (well above normal) during January 2022 in all the tehsils of the Cholistan region (Table A14.6). The month of February and April remained almost dry however, the intermittent rainfall that occurred during January, March and May helped to lessen the moisture stress and provide resistance to emerging drought-like conditions in the region.

Table A14.6. Monthly rainfall in the Cholistan region from January to 13th May 2022. (TR means rainfall less than 0.1mm)

Monthly Rainfall (mm) from January to 13th May 2022 in the Cholistan region							
District	Tehsil	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Total
Bahawalpur	Bahawalpur	19.2	1.0	7.0	0.0	0.0	27.2
	Ahmedpur east	11.0	0.0	0.0	0.0	0.0	11.0
	Hasil pur	20.0	0.0	1.0	0.0	3.0	24.0
	Yazman	17.0	0.0	3.0	0.0	4.0	24.0
	Khair pur t.wali	24.5	0.0	2.0	0.0	5.0	31.5
Bahawalnagar	Bahawalnagar	42.0	0.0	4.0	0.0	8.0	54.0
	Chishtian	32.0	0.0	0.0	0.0	16.0	48.0
	Haroon abad	42.0	0.0	2.0	0.0	3.0	47.0
	Fortabbas	25.0	0.0	0.0	0.0	2.0	27.0
	Minchinabad	42.0	0.0	9.0	0.0	8.0	59.0
	R.Y.Khan	9.0	0.0	0.0	0.0	TR	9.0

R.Y.Khan	Sadiq abad	27.0	0.0	0.0	0.0	TR	27.0
	Liaqatpur	11.0	0.0	3.0	0.0	4.0	18.0
	Khanpur	16.0	0.0	0.0	0.0	8.0	24.0

The drought situation in the Cholistan region was accessed by using satellite-based indices. NDVI shows normal conditions in the Cholistan region except on some of the eastern sides where there is no vegetation due to sandy desert whereas land surface temperature (LST)

Was exceptionally high ($> 55^{\circ}\text{C}$) which affected the moisture conditions and causes the dryness in the vegetation. The LST increased due to an increase in daytime temperature which ultimately caused heat stress in the region. Keeping in view the climatology and the results of recent data depicts that there is a probability of drought emergence in the eastern side of the Cholistan region in the coming days.

II. Heatwave situation in Cholistan during 2000 to 2022

From October 2020 to May 2021, the lower precipitation rate has created drought like conditions in southern part of the Pakistan. The limited downpour in the following month couldn't normalized the drought conditions completely. The year 2022 started with limited spell of downpour i.e., -21.6%. The situation again become critical when extreme heatwaves hit the southern Pakistan from mid- march 2022 onwards, and drought-like situation emerged in high-temperature regions of the country.

The daily temperature remains low during winter and it gradually increases during transition months i.e., March and April. However, a sharp increase in daily temperature was observed in Cholistan region. The first high-intensity major heatwave with duration of 41 days was observed from 11th March to 19th April 2022 in which daily maximum temperature remained consistently above 5°C to 11.5°C than normal over all the districts of Cholistan. Another heatwave of relatively low intensity was observed from 27th April to 2nd May with a duration of 6 days where the daily maximum temperature was above 3.8 to 6.8°C than normal (Fig A14.5).

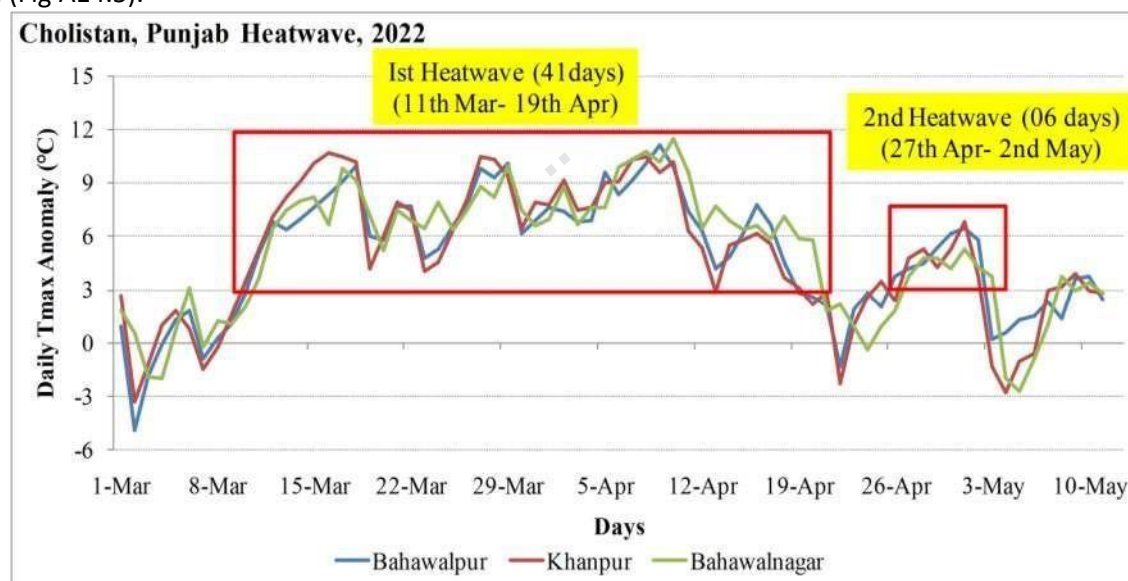


Figure A14.5. Heatwave episodes experienced in the Cholistan region, Punjab

Diurnal variation in body temperature, range from about 37.5 °C from 10 a.m. to 6 p.m., and falling to about 36.4 °C from 2 a.m. to 6 a.m. Diurnal Variation of Temperature (DVT) on human health is significantly associated with mortality and morbidity, particularly for cardiovascular and respiratory diseases. All animals have a thermal comfort zone, which is a range of ambient environmental temperatures that are beneficial to physiological functions (FAO, 1986). During the day,

Livestock keeps a body temperature within a range of ± 0.5 °C (Henry et al., 2012). When temperature increases more than the upper critical temperature of the range (varies by species type), the animals begin to suffer heat stress (FAO, 1986). Warm and humid conditions that cause heat stress can affect livestock mortality. Howden et al. (2008) reported that increases in temperature between 1 and 5 °C might induce high mortality in grazing cattle. The daily diurnal temperature variation recorded in Cholistan was 14.9°C to 22.7°C during the heatwave period (Fig A14.6).

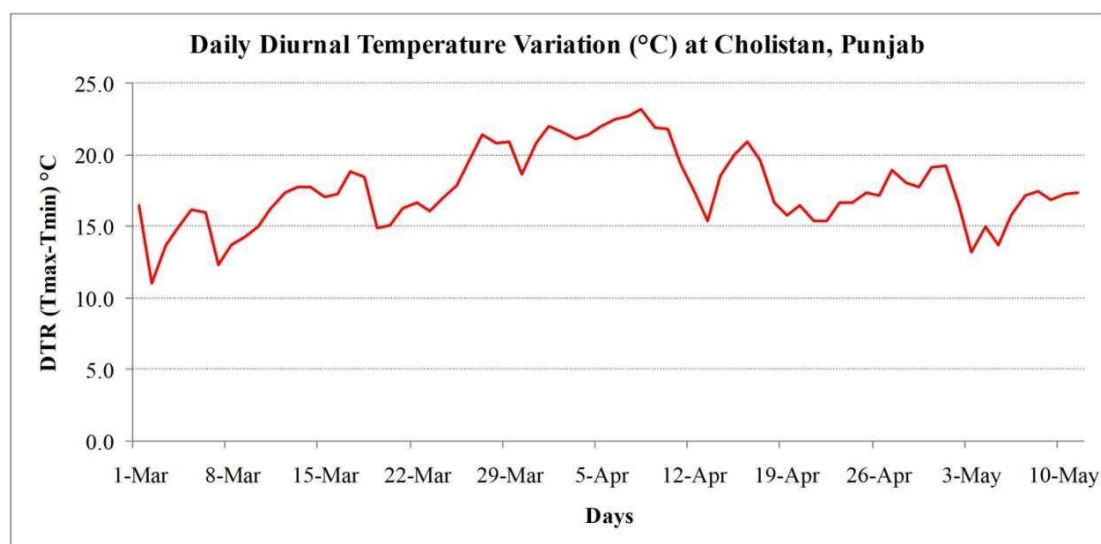


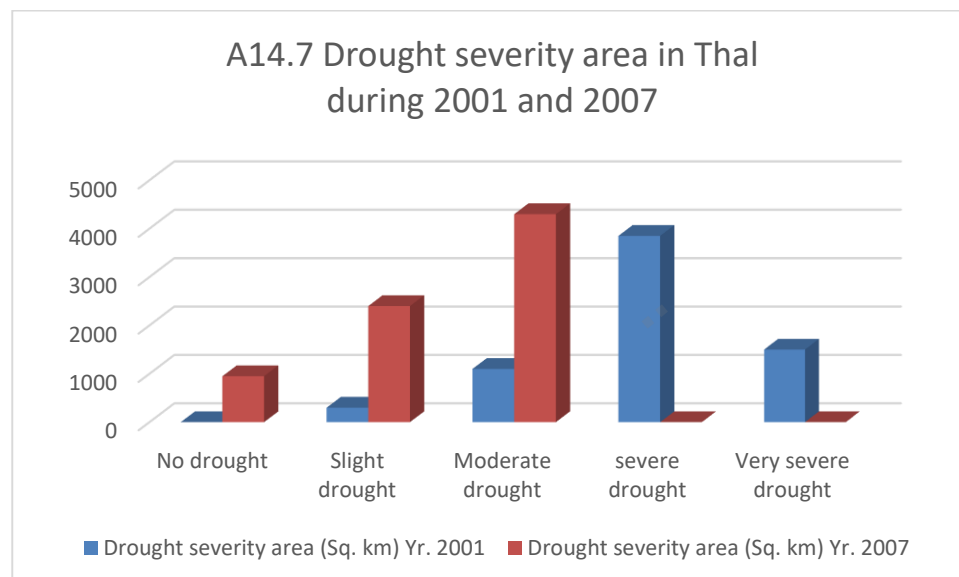
Figure A14.6. Daily diurnal temperature variations in the Cholistan, Punjab

III. Impacts of heatwave in Cholistan

Based on the above results, it is concluded that severe heatwave impacted the vegetation, water resources and most importantly the livestock in the Cholistan region instead of drought. The severe heatwaves trigger the evapotranspiration by 1.5mm/day to 3.5mm/day which impacted the soil moisture, water table/resources and vegetation in the region. The high temperature caused heat stress which affected livestock mortality. Furthermore, high variation in the daily diurnal temperature (≥ 5 °C) increased the probability of high mortality in grazing cattle. Finally, this heatwave has also enhanced the probability of the drought emergence in the Cholistan region.

IV. Drought in Thal

Thal Doab, which is situated between rivers Indus, Jhelum and Chenab, bears extremely dry weather conditions with very low rainfall. Gram is the most important Rabi crop sown in this region. During drought period (1998-2003), the production of this crop is affected badly due to low rainfall¹³⁸.



Standardized Precipitation Index was calculated for six months i.e. October to March as rainfall during these months affect the Rabi vegetation. During 2001, the low SPI values had large spatial extension from southeast to western parts of the study area. During 2007, the low SPI values were observed in the mid-southern part of the study area. The meteorological drought situation in 2001 was very severe. During 2007, drought condition prevailed from moderate drought to virtually no drought. During 2001, most part of the study area from southeast to southwest was suffered from very severe to severe agricultural drought. During 2007, most part was moderate to slight drought.

Women empowerment

South Punjab has high yields of cotton that supports a large number of female work- force. Most of these females work in the informal sector and depend for their livelihood on cotton farming and home livestock. Therefore, improving productivity and growth in the sector is critical for social and economic empowerment of women. This makes the strategy of the government strongly pitched in favour of gender empowerment.

¹³⁸ [https://www.psipw.org/attachments/article/273/IJWRAE_1\(2\)92-101.pdf](https://www.psipw.org/attachments/article/273/IJWRAE_1(2)92-101.pdf)

A14.9. Proposed/ On-going projects

Table A14.7. Main Project under Federal PSDP

Action/ Activity	Lead agency	Coordinating agencies	Indicative timeframe	Remarks
1. Upscaling of Green Pakistan Program (Revised)	MoCCEC	Provincial Forest and Wildlife Dept.	2024-28	- Target of tree plantation in drought prone areas ¹³⁹ of: Punjab: 0.3 Billion

Table A14.8. Main Projects under Provincial ADP

Action/ Activity	Lead agency	Indicative timeframe	TF 1.7.24, Mil. Rs
2. Program for Quality Seed Production and Dissemination (2021-22 to 2025-26)	Agriculture Dept.	2024-26	694
3. Punjab Resilient and Inclusive Agriculture Transformation (PRIAT)		2024-26	32,449
4. National Program for Enhancing Command Area in Barani Areas of Pakistan, Punjab		2024-26	719
5. Transforming the Indus Basin with Climate Resilient Agriculture and Climate-Smart Water Management (FAO Assisted) Dera Ghazi Khan, Khanewal, Lodhran, Multan, Muzaffargarh		2024-27	987
6. Promotion of Gram Cultivation through Climate Smart Technologies in Thal Areas of the Punjab Un-Approved /Jhang, Mianwali, Muzaffargarh		2024-27	997
7. National program for improvement of watercourses in Pakistan Phase-II Punjab		2024-29	6,203
8. Import Substitution and Export Enhancement through Promotion of Sesame, Soybean and Canola		2025-27	1,000
9. Chief Minister's Punjab Green Tractor Program		2025-27	30,000
10. Tree planting along ROW Ghazi Barotha Hydro Project, Attock	Forest Deptt.	2024-25	33
11. Establishment of Dargai Gill Forest Park Sheikhupura		2024-25	193
12. Strengthening of Protection Regime in Changa Manga irrigated Plantation Kasur		2024-25	118
13. Substitution of Solar Pumps in Depalpur Plantation Okara		2024-25	58,899
14. Livelihood Improvement & Green Job Creation Through Ecosystem Restoration in Punjab		2024-27	2,000
15. Chief Minister's "Plant for Pakistan" Initiative		2024-27	27,700

¹³⁹ Such areas include Rahim Yar Khan, Bahawalnagar, Rajanpur, Bahawalpur, Dera Ghazi Khan, Multan, Bhakkar, Khushab, Layyah, Chakwal, Jhelum, Rawalpindi, Attock, Mianwali, Narowal and Muzafargarh etc.

Action/ Activity	Lead agency	Indicative timeframe	TF 1.7.24, Mil. Rs
16. Establishment of Eco Tourism Facility at Lal Suhanra National Park as per International best practices (Conservation of Desert Ecosystem) Bahawalpur		2024-27	2,000
17. CM Initiative for Agro Forestry for Forest Waste Land		2024-27	1,000
18. Project Readiness Financing Facility for Punjab Water Resources Management	Irrigation Dept.	2024-26	575
19. Construction of Mohata Dam Rawalpindi		2024-26	380
20. Construction of Dadhocha Dam Rawalpindi		2024-28	3,907
21. Construction of Mohra Shera Dam in District Rawalpindi		2024-26	330
22. Construction of Mujahid Dam District Rawalpindi		2024-28	2,713
23. Construction of Small Dams in District Attock Phase II Shahbazpur, Tajabara and Sadrial Dams (Revised) Attock		2024-28	711
24. Construction of Dhrabi and Minwal Dam (Revised) Chakwal		2024-29	527
25. Construction of Small Dams in District Chakwal Phase II (Dhok Hum, Mundi Dam, Dhok Jhang and Uthwal /Lakhwal Dam (Revised)		2024-27	525
26. Construction of Tamman Dam Chakwal		2024-27	2,432
27. Raising of Dhok Qutabdin Dam		2024-27	398
28. Construction of Sorra Dam Dera Ghazi Khan		2024-28	7,384
29. Land acquisition of Sorra Dam Project, DG Khan		2024-26	163
30. Rehabilitation & Upgradation of Irrigation System of Small Dams in Potohar		2024-26	800
31. Recharge of Aquifer for Groundwater Management in Punjab		2015-24	397
32. Improving Water Management and Irrigation Systems in Punjab (IWMISP)		2024-30	32,775
33. Construction of Cholistan Canal and its System			218,000
34. Provision of Mobile Veterinary Services at Door Step of Livestock Farmers in Cholistan Un-Approved / Bahawalpur	Livestock Dept.	2024-25	190
35. Strengthening of Livestock Experiment Stations Allahdad, Jahangirabad, Jugait Peer, Haroonabad and Chak Katora / Bahawalnagar, Bahawalpur, Khanewal		2024-25	54
36. Provision of Effective Veterinary Services through Rehabilitation and Revamping of Veterinary Facilities in Bahawalpur Division / Bahawalnagar, Bahawalpur, Rahim Yar Khan		2024-25	21
37. Provision of Effective Veterinary Services through Rehabilitation and Revamping of Veterinary Facilities in Sargodha Division /Bakkar, Khushab, Mianwali, Sargodha		2024-26	130
38. Provision of Effective Veterinary Services through Rehabilitation and Revamping of Veterinary Facilities in DG Khan Division		2024-26	70

Action/ Activity	Lead agency	Indicative timeframe	TF 1.7.24, Mil. Rs
40. Provision of Effective Veterinary Services through Rehabilitation and Revamping of Veterinary Facilities in Rawalpindi Division	Livestock Dept.	2024-26	90
41. Provision of Effective Veterinary Services through Rehabilitation and Revamping of Veterinary Facilities in Lahore Division		2024-26	230
42. Strengthening of Veterinary Services in Districts Rahim Yar Khan and Khanewal		2024-25	88
43. Breed Improvement of Small Ruminants through Provision of Rams and Bucks		2025-27	500
44. CM Punjab: Foot & Mouth Disease Eradication Program		2025-28	7,500
45. CM Punjab: Livestock Card		2025-28	2,000
46. Livestock Asset Transfer to Rural women in South Punjab		2025-28	2,000
47. Southern Punjab Poverty Alleviation Project (SPPAP)-IFAD Assisted Bahawalnagar, Bahawalpur, Bhakkar, Dera Ghazi Khan, Khushab, Layyah, Mianwali, Muzaffargarh, Rahim Yar Khan, Rajanpur	P&DD	2024-29	7,010
48. Koh-E-Suleman Improvement Project (KSIP) Dera Ghazi Khan, Rajanpur		2024-29	3,312
49. Water Resource Development in Expanded Areas of ABAD Dera Ghazi Khan, Mianwali, Rajanpur		2024-25	44
50. Integrated Farms Development in Punjab Barani Tract by ABAD Un-Approved / Attock, Bhakkar, Chakwal, Jhelum, Khushab, Layyah, Rawalpindi		2024-27	511
51. Lying of Water Supply pipe line from Rasool Sar to Renal Toba		2024-25	10
52. Rehabilitation of Water Supply pipe line from Khutri Dahar to Tufana Tehsil Yazman District Bahawalpur. Un-Approved		2024-25	17
53. Rehabilitation of Water Supply pipe line from Kud Wala to Banna Post Tehsil Yazman District Bahawalpur		2024-25	55
54. Rehabilitation of Water Supply pipe line from 111/DNB to Nawan Kot & Gurara Tehsil Yazman District Bahawalpur		2024-25	79
55. Rehabilitation of Water Supply pipe line from 108/DB to Bijnot / Khalri Tehsil Yazman District Bahawalpur		2024-26	97
56. Rehabilitation of Water Supply pipe line from Mirgarh to Choori Tehsil Fortabbasd District Bahawalnagar.		2024-26	75
57. Procurement of Water Bouzers for Cholistan to combat Drought like Condition / Bahawalnagar, Bahawalpur, Rahim Yar Khan		2024-26	185
58. Construction of Small Dams in Potohar Region		2024-26	500

A14.10. Recommendations and implementation actions

Important actions proposed to mitigate drought risk are as follows:

1. Following actions need to be included as a priority in drought preparedness and mitigation:

- 1.1. Water resources monitoring and impact assessment
- 1.2. Conserve and develop new water resources and raise awareness
- 1.3. Water supply for access rights to meet domestic needs in drought prone areas
- 1.4. Forest trees plantation and wildlife conservation
- 1.5. Increasing command area of water resources
- 1.6. Livestock vaccination for diseases like HS, BQ, FMD, ETV and PPR and better management for drought prone areas
- 1.7. Research on drought
- 1.8. Community based drought mitigation programs.
- 1.9. Establish Provincial Drought Management Fund to improve Drought Governance support system.
2. System to forecast, early warning dissemination and respond different types of drought in Pakistan needs to be improved with the involvement of relevant stakeholders and the local communities
3. Do gap analysis of existing relevant policies, plans and legislative framework to mainstream/ align drought early warning and mitigation in these documents. Relevant provincial policies need to emphasize to ensure appropriate financial allocations for developing new low delta crop varieties for various agro-climatic zones in relation to climate change projections.
4. Improve regulations for groundwater usage and management in drought prone areas to reduce overdraft and drawdown of water-tables, tube-wells and springs.
5. Floodwater may be used through its proper management to recharge water sources. The government and development organizations may demonstrate the low delta crops, practices and fruit trees to the local community.
6. Work out causes of drought after reviewing historical occurrence.
7. Involve Stakeholders' including famers, the poor, rural residents, marginalized people, women-headed households, youth, line departments and decision makers from planning to implementation to monitoring of proposed actions to get their ownership during implementation of actions and giving them responsibility after the implementation.
 - 7.1. In case of drought, adopt coordinated response to avoid duplication of efforts.
 - 7.2. Establish Public private partnership to utilize Corporate social responsibility for drought response efforts
8. Develop Decision Support System to coordinate relevant stakeholders for timely drought mitigation,
9. Update Vulnerability and risks for drought annually.
10. Improve education, communication system, outreach of drought and its mitigation measures and emergency response capacities in drought prone areas. Educate communities on drought response measures, climate change adaptation, safe drinking water, sanitation and other related topics.

- 10.1. Increase female education and awareness through female extension agents who can provide educational opportunities to the rural women
- 10.2. Encourage establishment of clean and green clubs in schools for awareness on tree plantation and water management for its saving and increase clean green Pakistan Index.
- 10.3. Utilize services of telecommunication companies for dissemination of information regarding drought.
- 10.4. Broadcast Programs focusing on drought coping techniques on electronic media including radio Pakistan and private FM channels.
- 10.5. Develop and submit concept notes/ PC-1s/ Project documents to the potential donors for funding to mitigate drought.
- 10.6. Conduct Post drought evaluation, document and disseminate among stakeholders to assist in learning lessons from accomplishments and mistakes.
11. Consider gender issues when planning and conducting the main steps of risk assessment and implementation of identified actions. Assist vulnerable groups and women to tackle drought and its impacts.
12. Do research on seeds of drought tolerant varieties of crops and multiply such seeds in adaptive research farms and on fields of progressive farmers. The NGOs need to improve the linkage between the farmers and the research stations so that the improved seed and technology is available to the poor farmers. Promote seed banks.
13. Re-investigate Agro-climatic zones and crop calendars need in line with climate change projections.
14. Provide Fodder and Urea molasses mineral/ vitamin block to the drought hit areas,
15. Demonstrate low-delta crop, shrubs and grass varieties including low delta fruits like ber (Zyziphus), olive, pomegranate, grapes, pistachio, systems including agronomic practices of low-delta cropping like Zero tillage, mulching and developing calendars of such crops for different agro-ecological zones, encourage systems utilizing indigenous knowledge and advanced water saving crop production, bio-saline agriculture, Bio-gas, and honey bee production, Provide seeds of drought resistant local varieties like Super 1 bajra seed to the farmers,
16. Manage Rangelands to mitigate drought in Punjab by:
 - 16.1. Establishing Seed banks of local and improved grasses and shrubs at divisional/ district levels and rangeland reseeding with suitable varieties of grasses and shrubs to be promoted
 - 16.2. Developing Micro-catchments for water harvesting
 - 16.3. Promoting Animal watering points, ponds and mini dams at potential sites in rangelands
 - 16.4. Introducing Mechanical sand barrier techniques like semi-buried straw checkboards for sand dune stabilization
 - 16.5. Assessing Rangeland productivity at periodic intervals and developing local level grazing management plans in consultation with local communities

- 16.6. Promoting community managed controlled grazing practices as per carrying capacity of rangelands
- 16.7. Building Capacity of staff of government departments working for rangeland improvement through training workshops and exchange visits in and outside the country.
17. Establish an Institute for Climate Smart Agriculture (ICSA)
18. Agreements need to be signed between Forest/Rangeland departments and local communities for controlled grazing and rangeland improvement,
19. Improve fodder, focus on feed supplements and research on drought tolerant livestock breeds,
20. Promote Veterinary health services, train community activists for Animal health and production,
21. Conduct Feasibility studies to divert flood water to drought hit areas like Construction of a canal to recharge its groundwater and
22. Demonstrate diversification of sources of income through initiatives including ecotourism.
23. Engage young researchers for community education as well as sustainable solutions at local level.
24. Develop and incorporate disaster related indicators in the planning policy and documents (PC1)
25. Develop and implement Drought Mitigation Plans at provincial and district levels.

Table A14.9. Proposed main projects/ Action plan for Punjab:

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost, Mil.Rs
Constructing 2000 ponds, mini dams to use floodwater to recharge water sources	Irrigation Dept.	2026 - 30	240,000
1. Capacity building for Agriculture including OFWM Department staff in drought mitigation measures after capacity needs assessment	Agriculture Dept.	2026 - 30	700
2. Sustainable Use of Non-Timber Forest Products with the involvement of Local Communities and Private Sector	Forest Dept.	2026 - 30	1500
3 Promotion of Agro-Forestry in Mini Dam Command Area		2026 - 30	10000
4. Introduction of Sustainable Land Use Practices including dry afforestation, rainwater harvesting & low delta cropping with the Involvement of Local Communities		2026 - 30	20000
5. Water & Soil Conservation structures (Contour trenches, spurs & eye brows) for water conservation in forest plantation		2026 - 30	1500
6. Protection of Forest from Fire in government & private lands		2026 - 30	1500
7. Development of sustainable forest landscape to promote biodiversity conservation, mitigation of climate change & ecosystem services		2026 - 30	45000
8. Forestry research, rangelands & REDD+ Preparedness		2026 - 30	180
9. Promotion of watershed/ social forestry, especially indigenous species & community-based forest nurseries through women involvement		2026 - 30	1000
10. NTFP based enterprise development		2026 - 30	1000
11. Promotion of alternative energy resources like LPG, enhanced energy efficiency & Resource Management for conservation of forests		2026 - 30	2000

National Drought Plan - Pakistan

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost, Mil.Rs
12. Promotion of energy efficient cooking, heating & housing technologies		2026 - 30	100
13. Reducing soil & water erosion	Agriculture Dept.	2026 - 30	5000
14. Conservation of threatened & vulnerable flora species through in-situ & ex-situ cultivation		2026 - 30	1000
15. Rangeland & pasture management, establishment of seed banks for grasses, rangeland productivity assessment, reseeding, establishing micro-catchments, ponds & controlled grazing	Forest Dept.	2026 - 30	3500
16. Up-gradation of Forestry Research Division, Punjab		2026 - 30	100
17. Development and initiation of implementation of Protected areas magt. plans and development of new PAs	Wildlife Dept.	2026 - 30	1200
18. Development of oasis and botanical gardens in drought prone areas	Agriculture Dept.	2026 - 30	1500
19. Capacity building for FD staff in drought mitigation measures	Forest Dept.	2026 - 30	1000
20. Establishment/ strengthening of GIS Labs.		2026 - 30	200
21. Efficient use of forests waste materials		2026 - 30	1500
22. Introduction of mechanical sand barriers like semi-buried straw checkboards for sand dune stabilization		2026 - 30	3000
23. Transfer, testing and introduction of technology for drought mitigation.	P&DD	2026 - 30	10,000
24. Punjab Drought mitigation / water shortages contingency plans	PDMA	2026 - 30	100
25. Establishment of Drought Mitigation Fund for Punjab	P&DD	2026 - 30	500
26. Develop Community based drought early warning dissemination and respond system	P&DD	2026 - 30	1000
27. Develop/construct wells in Cholistan	P&DD	2026 - 30	1000
28. Propagate / Conserve Mareecha camel, Jattal goat and Khadali sheep at drought emergency relief & rehabilitation centers in Cholistan	P&DD	2026 - 30	100
29. Improve Regulations for groundwater usage and management in drought prone areas	Irrigation Dept.	2026 - 30	500
30. Establish Hydromet Department for Punjab	PMD	2026 - 30	200
31. Promotion of Drinking water treatment plants and sand filters for water purification	LG Dept.	2026 - 30	3000
32. Lining & rehabilitation of minors & Distry (distributaries) in canals. 33. De-silting of canals in drought prone areas 34. Restoration and rehabilitation of irrigation network in drought prone areas Stone pitching/ apron, earthwork, re-sectioning and rehabilitation of gates of canals in drought prone areas 35. Cement concrete lining of canals in drought prone areas 36. Renovation, reconstruction and improvement of canals in drought prone areas 37. Ratification of regulators and allied guiding systems of canals 38. Construction of supplementary channels along canals 39. Construction of retaining and protection walls along canals in drought prone areas 40. Restoration and rehabilitation of irrigation network in drought prone areas	Irrigation Dept.	2026 - 35	500,000
Total			858,880

ANNEXURE XV: PROVINCIAL DROUGHT PLAN – KHYBER PAKHTUNKHWA

A15.1. Executive Summary

Khyber Pakhtunkhwa is the third-largest province of Pakistan in terms of population and geographically the smallest with about 22% cultivated area and 25% area under forests. Previously Federally Administered Tribal Areas (FATA) along North West of Pakistan possessing 2.7 million hectares have also become part of KP since 2018. Rangelands, exposed rocks area and agricultural land and open ground or current fallow are about 28%, 25%, 8% and 9% of the province, respectively. The rest is mountainous areas. Waterlogged and saline land, built up area and water bodies. Estimated livestock population was 16.58 million (in 2013-14). There are seven National Parks in KP. The FATA consists of seven tribal districts (Agencies) and six frontier regions. The literacy rate of FATA is only 22%. The unemployment rates among 15-64 years' age are 7.1%. Chitral, Dera Ismail Khan, Laki Marwat, Karak, Bannu, Dir and Kohat and agencies of previously FATA are either arid or semi-arid with moderate rainfall, hot summers and fair less severe winters.

Even a light drought causes much impacts on the food security and the province had to import necessary food items. Southern parts of KP possess extremely arid to arid sandy plains and rangelands with temperature in summer even increases above 50°C. Non-palatable weed species in the rangeland is more than 40% and vegetation cover is about 27% of its potential. Extreme drought was recorded in Chitral and Dir in 1971, in Cherate during 1984 and in Dir, Drosh, Chitral and Kakul in 2001. Mild to extreme drought events were noted in KP during 1902, 1951-1952, 1970-71, 1987-88, 1999-2001. The NWFP, now KP Forest Policy focusing on integrated resource management, stakeholder participation and Decentralized management was approved by the Provincial Cabinet in 1999. The Forest related Acts of KP include NWFP Forestry Commission Act 1999 and NWFP Forest Ordinance 2002.

The Provincial Government is overcoming the issue of drought through various Departments and agencies. The main government departments directly involved in combating drought include Provincial Disaster Management Authority, Forestry, Agriculture, Irrigation and Local Government and Community Development. The dry spells of 2009-2010 severely affected the province of KP, badly affecting the crop production¹⁴⁰. During 1998-2003, extreme drought particularly in Kakul, Dir and Balakot. Caused groundwater depletion, crop failure and even starvation.

Important actions proposed to mitigate drought risk include integrated rangeland management, provision of Fodder and Urea molasses mineral/ vitamin block to the drought hit areas, demonstration of low-delta crop and practices, take preventive measures for animal diseases, introducing livestock feed supplements, training community activists for Animal health and production, doing research on drought tolerant livestock breeds, introducing drought resistant multi-cut varieties of fodder, plant indigenous Forest trees, conserving and developing new water resources, assessing the vulnerability of water stressed and potential drought areas, community-based drought mitigation programs, increasing command area of water resources, livestock vaccination, establishing Provincial Drought Management Fund, developing Land use plan at province level, mainstreaming/ aligning drought early warning and mitigation in relevant legislative framework and development of regulations for groundwater usage and management.

¹⁴⁰ <https://cscr.pk/explore/themes/energy-environment/lessons-pakistan-droughts-past/>

Stakeholders may be involved from planning to implementation to monitoring of proposed actions. In case of drought, coordinated response may be adopted. Improve Communication system, outreach of drought and its mitigation measures and emergency response capacities in drought prone areas, educating Communities on drought response measures, encouraging establishment of clean and green clubs in schools to increase clean green Pakistan Index, utilizing services of telecommunication companies for information dissemination regarding drought, broadcasting programs focusing on drought coping techniques on electronic and social media, development of concept notes, project documents and its submission to potential donors, conducting post drought evaluation, documentation of best practices and its dissemination among stakeholders are also needed.

Other initiatives include assisting vulnerable groups and women to tackle drought and its impacts, doing research on seeds of drought tolerant varieties of crops and multiply such seeds in adaptive research farms and on fields of progressive farmers, encouraging systems utilizing indigenous knowledge for water saving crop production, bio-saline agriculture and honey bee production, provision of LPG and fuel-efficient stoves at subsidized rates and increasing natural gas network in the drought prone areas, diversifying sources of income in drought prone areas through initiatives including ecotourism, development and implementation of Drought Mitigation Plans at provincial and district levels.. To store the improved seed, seed banks may be promoted and revise Crop calendars in line with climate change projections may be developed.

A15.2. Context

Khyber Pakhtunkhwa is the third-largest province of Pakistan in terms of both population and economy, though it is geographically the smallest of the four provinces. The KP occupies an area of 10.17 million hectares¹⁴¹, out of this about 22% area is cultivated¹⁴². Previously Federally Administered Tribal Areas (FATA) along North West of Pakistan possessing area of 2.7 million hectares have also become part of KP since 2018. The population of KP is 34.5 million¹⁴³ including previous FATA¹⁴⁴ in 2017.

The terrain of the province contains mountainous, sub-mountainous and placid plains between hills and arid areas in southern parts of the province and many newly merged areas of FATA. The Hindukush range contains northern parts of Hindukush and Hindu Raj and between these ranges there is Kunar River. Tirch Mir 25,230 feet is the highest peak of the province. Kandai, Swat and Panjkora river basins are also in the province. Himalaya is in the eastern part. Valleys along Kabul River are fertile which are less than ten percent of the total area of the province. Indus River is towards eastern borders and some southern areas. In the south there are Gomal, Tochi and Kuram rivers and Rod kahi system of cultivation. Other rivers include Khiali, Kurram, Siran, Jindi, Kaitu, Haro and Chitral River¹⁴⁵.

The KP has about 25 percent area under forests,¹⁴⁶ forty percent of Pakistan's forests are found in KP¹⁴⁷, it is dominated by conifers forests and Scrub forests. Rangelands, exposed rocks area and agricultural land and Open ground or current fallow are about 28%, 25%, 8% and 9% of the province, respectively. The rest is

¹⁴¹ It includes previous KP & FATA

¹⁴² Khyber Pakhtunkhwa in figures. 2015. <http://kp.gov.pk/uploads/2016/04/2015.PDF>

¹⁴³ Bureau of Statistics. 2017. Development Statistics of Khyber Pakhtunkhwa 2017

¹⁴⁴ https://en.wikipedia.org/wiki/Federally_Administered_Tribal_Areas

¹⁴⁵ <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0249718>

¹⁴⁶ <https://fp.brecorder.com/2019/07/20190707495197/>

¹⁴⁷ KP Climate Change Policy

mountainous areas. Waterlogged and saline land, built up area and water bodies¹⁴⁸. Twenty percent of the provincial GDP and forty-four percent of the labor force is contributed by Agriculture. Livestock's contribution to the Agriculture is fifty percent. The estimated livestock population in 2013-14 in the KP was 16.58 million¹⁴⁹.

National Parks

There are seven National Parks: Ayubia NP is in Abbotabad, Saiful Muluk and Lulusar-Dudipatsar NPs are in Mansehra district. The other three NPs Chitral Gol (Area 7,750 hectares), Broghil (134,744 hectares) and Sheikh Badin NPs (15,540 hectares) are in Chitral and Dera Ismail Khan that are drought prone areas¹⁵⁰.

FATA

The FATA consists of seven tribal districts (Agencies) and six frontier regions. The districts are Bajaur, North and South Waziristan, Mohmand, Khyber, Orakzai and Kurram. Frontier regions include FR Peshawar, Kohat, Bannu, Lakki Marwat, Tank and FR D. I. Khan. The region has reserves of marble, coal, copper and limestone. The literacy rate of FATA is only twenty-two percent comprising of thirty-six percent and 7.5 percent literacy rate of men and women, respectively¹⁵¹. The unemployment rates among 15 to 64 years and among youth are 7.1 percent and 11.8 percent, respectively. The cultivated area in 2015 is 265,000 hectares¹⁵².

¹⁴⁸ Ministry of Climate Change. 2009. Land Use Atlas of Pakistan.

¹⁴⁹ http://kp.gov.pk/uploads/2018/05/Crops_Statistics_2013-14_KP1.pdf

¹⁵⁰ https://en.wikipedia.org/wiki/Khyber_Pakhtunkhwa#Chitral_District

¹⁵¹ https://en.wikipedia.org/wiki/Federally_Administered_Tribal_Areas

¹⁵² http://www.c-gpa.org/images/publications/Analysis_AD_P_FATA_2012-13to2015-2016.pdf

Table A15.1. Land cover distribution in sq. kms (FAO)

District	Orchards	Crop irrigated	Crop Marginal Irrigated Saline	Crop flood plains	Crop rain fed	Forests & natural trees	Natural Vegetation in wet areas	Rangelands	Bare areas	Bare areas with sparse natural vegetation	Wet areas	Built up	Snow & glaciers
Abbottabad	0.0	0.0	0.0	15.09	366.64	385.80	12.42	741.37	0.03	199.37	14.72	71.28	00.0
Bannu	6.27	657.39	2.63	1.14	130.44	6.14	87.97	62.49	149.92	28.50	10.72	68.57	00.0
Battagram	00.0	00.0	00.0	5.65	303.70	391.13	17.35	663.55	0.13	53.93	6.83	8.73	40.17
Buner	0.19	9.81	00.0	1.97	627.43	252.72	3.40	697.10	00.0	93.16	2.09	21.29	00.0
Charsadda	36.44	754.71	0.50	7.92	7.41	1.67	25.85	8.02	7.26	31.14	13.67	101.98	0.07
Chitral	0.10	0.78	00.0	156.04	209.17	656.99	129.95	3,458.07	16.75	4,617.91	54.50	10.21	5,552.75
D. I. Khan	7.59	2,053.63	32.90	208.98	3,246.36	54.64	252.74	356.24	327.11	471.80	148.47	161.97	00.0
Hangu	00.0	2.62	00.0	10.76	399.81	175.56	10.60	357.87	2.84	365.13	1.22	39.67	00.0
Haripur	10.38	17.28	00.0	32.15	585.74	164.79	46.20	636.95	4.08	120.48	110.36	72.96	00.0
Karak	1.01	34.99	00.0	00.0	895.40	248.38	61.38	525.74	29.58	822.22	2.07	42.66	00.0
Kohat	9.89	241.11	1.56	20.23	683.07	358.36	22.24	658.69	35.62	855.40	19.55	74.84	00.0
Kohistan	00.0	00.0	00.0	14.71	99.25	2,216.53	54.98	2,273.71	0.35	1,345.38	57.53	3.20	1,567.51
Lakki Marwat	39.14	892.11	36.76	9.94	1,163.66	15.20	129.44	39.53	228.18	522.56	24.50	77.70	00.0
Lower Dir	2.03	28.31	00.0	104.39	526.23	301.21	24.56	333.51	00.0	304.03	10.73	58.62	00.0
Malakand	15.39	184.35	00.0	36.27	109.54	93.18	12.44	255.76	1.04	193.50	5.44	38.01	00.0
Mansehra	00.0	00.0	00.0	55.91	766.96	741.96	20.36	1,868.93	00.0	277.08	29.50	69.64	324.79
Mardan	19.36	932.65	4.37	0.04	196	6.63	9.22	220.67	1.65	100.67	8.27	134.09	0.06
Nowshera	31.46	402.30	9.66	17.88	286.91	207.41	30.36	436.45	50.73	161.59	20.83	168.93	00.0
Peshawar	8.80	691.85	0.13	3.76	85.51	6.06	20.22	34.64	18.59	43.94	9.98	259.60	00.0
Shangla	00.0	00.0	00.0	21.57	394.98	466.26	17.20	451.05	00.0	41.01	8.91	8.38	11.22
Swabi	2.38	705.61	3.99	27.16	241.30	26.18	79.38	268.19	8.22	40.68	55.56	86.38	00.0
Swat	49.64	5.99	00.0	170.78	758.34	1,171.22	62.26	1,429.09	00.0	1,015.03	38.45	77.31	613.84
Tank	0.23	181.36	21.23	00.0	772.41	10.72	71.25	66.44	266.06	226.75	27.66	32.87	00.0
Tor Ghar	00.0	00.0	00.0	6.66	68.26	122.74	12.02	211.46	0.06	20.80	11.78	1.90	0.02
Upper Dir	00.0	00.0	00.0	32.29	361.04	1,178.48	27.09	1,432.39	0.74	401.94	14.42	12.84	147.51
Bajaur Agency	0.00	0.00	0.00	102.08	442.60	151.18	16.84	213.15	31.93	0.67	381.15	4.63	0.00
Khyber Agency	6.81	55.91	0.00	2.89	232.97	634	22.95	837.75	85.09	39.30	704.27	6.03	6.71
Kurram Agency	1.52	92.29	0.00	44.40	277.75	951.81	76.77	931.52	43.60	72.79	850.24	5.18	31.50
Mohmand Agency	0.22	23.45	0.00	1.99	649.37	131.62	7.36	689.79	23.56	0.27	741.43	3.89	0.00
North Waziristan Agency	3.28	2.15	0.00	122.58	78.70	1,579.40	113.41	689.89	70.15	282.72	2,010.30	8.52	0.00
Orakzai Agency	0.00	0.48	0.00	21.88	263.51	585.86	12.73	395.80	16.93	0.15	181.24	0.00	0.00
South Waziristan Agency	50.89	57.44	17.04	13.20	136.01	1,811.67	168.04	550.77	38.64	494.04	3,105.60	9.07	0.00
FR Bannu	0.00	1.62	0.00	3.99	19.68	35.88	18.39	55.92	2.23	39.62	618.68	10.79	0.00
FR D.I.Khan	0.20	0.01	0.00	17.86	9.19	491.84	48.35	407.98	15.12	82.85	832.50	0.34	0.00
FR Kohat	0.00	10.67	0.00	0.00	42.28	111.96	2.20	159.88	9.07	14.36	102.69	0.00	0.00

National Drought Plan - Pakistan

FR Lakki Marwat	0.00	0.01	0.00	0.00	6.25	18.65	6.73	47.86	0.70	14.18	93.49	0.00	0.00
FR Peshawar	2.05	3.73	0.00	0.00	41.79	92.53	0.12	105.42	4.06	0.43	8.48	0.00	0.00
FR Tank	0.00	1.16	0.00	0.00	34.58	221.32	40.83	170.65	4.70	54.55	570.96	0.00	0.00

A15.3. Arid and semi-arid areas and drought years in KP

Chitral, Dera Ismail Khan, Laki Marwat, Karak, Bannu, Dir and Kohat and agencies of previously FATA are either arid or semi-arid¹⁵³ with moderate rainfall, hot summers and fair less severe winters. Chitral is the highest district so lowest temperatures in winter, have low vegetation cover and many glaciers. Dera Ismail Khan is the southernmost district have milder winters and have much agricultural lands and rangelands used for livestock grazing. In addition to these districts, Peshawar, Charsadda, Khyber, Lower Kurram, Mohmand, Hangu, Tank, Orakzai, south and north Waziristan receive less than 600 mm rainfall, the area is about half of the province¹⁵⁴.

KP is divided into four **agro-ecological zones** based on climate, rainfall, temperature, altitude and topography: (i) Higher northern mountains (Chitral, Swat, Shangla, Buner, lower and upper Dir), (ii) Sub humid eastern mountains and wet mountains (Batgram, Mansehra, abottabad, Haripur etc.), (iii) Central Valley Plain (Hangu, Kohat, Swabi, Nowshera, Peshawar, Mardan and Charsadda) and (iv) Suleiman Piedmont plain (Dera Ismail Khan, Lakki Marwat, Karak, Tank and Bannu). We have used the conventional system of agro-ecological zones as applied to the province in the available literature. However, recently, a new system based on bio-climatic zoning has been proposed for Pakistan which is more pertinent to monitoring and catering to the impacts of climate change (Nasir et al., 2015). Cultivable area of Suleiman piedmont and Central Valley plain is 1.115 million hectares; the other two zones have 0.626 million hectares. Even a light drought causes much impacts on the food security and the province had to import necessary food items. These two zones have drier winters, high temperature and lesser rainfall in summers. Climate change impacts may increase temperature, erratic rainfall events, increase crop production so increases incidences of all types of drought (KP Climate Change Policy, EPA, Government of KP).

Southern parts of KP possess extremely arid to arid sandy plains and rangelands with temperature in summer even increases above 50°C. Non-palatable weed species in the rangeland is more than forty percent and vegetation cover is about twenty-seven percent of its potential. Extreme drought was recorded in Chitral and Dir in 1971, in Cherate during 1984 and in Dir, Drosh, Chitral and Kakul in 2001¹⁵⁵. Mild to extreme drought events were noted in KP during 1902, 1951-1952, 1970-71, 1987-88, 1999-2001¹⁵⁶.

¹⁵³ Sector assessment (summary): agriculture, natural resources and rural development. FATA Water Resources Development Project (RRP PAK 47021), <https://www.adb.org/sites/default/files/linked-documents/47021-002-ssa.pdf>

¹⁵⁴ <https://www.pdma.gov.pk/sub/uploads/Monsoon%20Contingency%20Plan%202019.pdf>

¹⁵⁵ https://www.researchgate.net/publication/322685499_Spatial_and_temporal_variation_of_rainfall_and_drought_in_Khyber_Pakhtunkhwa_Province_of_Pakistan_during_1971-2015

¹⁵⁶ https://www.adb.org/sites/default/files/project-documents/52304/52304-001-tacr-en_1.pdf

A15.4. Policies, Acts and Regulatory Frameworks:

Specific policies, acts and regulatory framework do not exist to implement UNCCD or Climate Change in the province. However, provision is provided for combating the causes leading to the drought in various policies, acts and regulatory frameworks as under:

A15.5. NWFP Forest Policy 1999:

The NWFP, now KP Forest Policy was approved by the Provincial Cabinet in 1999. The major guiding principles of the policy are given as under:

- i. Integrated resource management whereby vegetation and other resource types and different land-use types (forests, rangelands, watersheds, biodiversity areas etc.) will be managed in an integrated way as part of overall ecological system.
- ii. Stakeholders including local communities' participation in planning, implementation, M&E of NRM activities
- iii. Decentralized management
- iv. Private sector involvement
- v. Equity between powers, responsibility and tasks of Forest Department and local community
- vi. Awareness raising and capacity building for NRM
- vii. Cross-sectoral linkages' promotion

A15.6. KP Climate Change Policy and Action Plan 2022:

The policy focuses on focuses on reducing vulnerability of natural and human systems as well as lessening greenhouse gas emissions through technological or nature-based solutions. It describes that Droughts in the southern parts of KP are more common as compared to the North. Dera Ismail Khan is the area which will be most prone to droughts. Deserts in Southern parts like Karak Lakki Marwat& DI Khan may expand in case of prolonged droughts. The policy has proposed measures for drought mitigation including Develop contingency plans for short term measures to adapt to water shortages that could help to mitigate droughts.

A15.7. Forest Acts:

The Forest related Acts and Rules of KP include:

- i. NWFP Forestry Commission Act 1999
- ii. NWFP Forest Ordinance 2002
- iii. Compensation of forest offense and value of case property Rules 2004
- iv. NWFP Duty on Forest Produce Rules 2004
- v. NWFP Management of Guzara Forest Rules 2004
- vi. NWFP Mazri Control Rules 2004
- vii. NWFP Forest Officers (Powers, Duties & Rewards) Rules 2004

- viii. NWFP Forest Produce Transport Rules 2004
- ix. NWFP Sale, Sawing and Processing of Timber Rules 2004
- x. NWFP Joint Forest Management (Community Participation) Rules 2004
- xi. NWFP Forestry Roundtable Rules 2004
- xii. Notification of Protected Forests
- xiii. NWFP Protected Forests Management Rules 2005
- xiv. NWFP Forest Development Fund (Management & Utilization) Rules 2004
- xv. Khyber Pakhtunkhwa Forest Force Rules 2013
- xvi. Khyber Pakhtunkhwa Disposal of Exploitable Trees of Woodlots Rules 2007

A15.8. Government Departments dealing with drought like situations:

The Provincial Government is overcoming the issue of drought through various Departments and agencies. The main government departments directly involved in combating the causes of desertification and ultimately drought include Forestry, Agriculture, Irrigation and some extent Local Government and Community Development. The brief of these departments is as under:

- Provincial disaster management authority: The mandate of Provincial disaster management authority is to engage in activities concerning to all four stages of Disaster Management Spectrum. The mission is to minimize disaster risks within KP through formulation of comprehensive DRM strategies and their implementation.
- Forest Department is mandated to use innovative skills to improve the forest cover, wildlife, natural resource management and environment in the province.
- Agriculture Department develops and promotes innovative skills to increase production of agricultural crops and livestock in different areas including arid and semi-arid areas. Livelihoods of rural population that is about 85 percent of the province depends directly or indirectly on agriculture and livestock.
- Irrigation Department executes and operates water sector schemes for efficient water utilization and small dams to overcome water scarcity and recharge groundwater.

A15.9. Drought years and main causes of Drought in KP

Main causes of drought are as follows:

1. Population growth

Due to increase in population, the consumption of household firewood and water is increasing at a high rate.

2. Deforestation and Land degradation

Conversion of forest land to non-forestry purposes causes increase in soil erosion, land degradation and ultimately drought. Land degradation and soil erosion lead to weakening of the resilience of ecosystem and livelihood of the population when confronted with drought.

3. Overgrazing

Pasture/ rangeland productivity and services and functions of ecosystem is reduced causing soil compaction, wind and water erosion and natural resilience to climate variability as a result of overgrazing. In the areas of degraded rangelands, in addition to decreased feed and fodder availability for the livestock, water penetration into the soil to support groundwater recharge is reduced causing drought like situations in the area.

4. Climate change

Khyber Pakhtunkhwa has been facing the brunt of climate change hazards because of its unique topography. Being home to extreme cold and hot weather significant losses have been incurred which can be linked to climate change related disasters i.e. floods, glacial melting, drought heat waves etc¹⁵⁷.

5. Increased anthropogenic activities

Main causes of land degradation in KP include vegetation deterioration, bad management and overgrazing. Anthropogenic activities like removal of natural vegetation cover, excessive cultivation of marginal lands, excessive pumping and inappropriate use of groundwater increase the use of water in access to renewable water supply and emission of greenhouse gases that lead to more erratic rains and increased temperature supporting drought phenomenon. Excessive pumping of groundwater also results in depletion of groundwater resources.

6. Inappropriate use of land without considering land capability classification

The Land Capability Classification describe soil productivity and capabilities for planning either grasslands, forest or croplands on an area.

7. Soil Problems, mostly causing increased vulnerability to drought

Wind erosion is among the main causes of drought.

A15.10. Main Impacts in KP

The dry spells of 2009-2010 severely affected the province of KP, badly affecting the crop production¹⁵⁸. During 1998-2003, extreme drought particularly in Kakul, Dir and Balakot. Caused groundwater depletion, causing crop failure and even starvation¹⁵⁹.

Over 2.2 million acres of cultivable land in KP was affected by the drought during the Kharif 2001 cropping season. Especially affected were the rain-fed areas in the southern and northern parts

¹⁵⁷ <https://reliefweb.int/report/pakistan/pdma-khyber-pakhtunkhwa-heat-wave-action-plan-2022>

¹⁵⁸ <https://cscr.pk/explore/themes/energy-environment/lessons-pakistan-droughts-past/>

¹⁵⁹ <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0249718>

of the province. The districts of KP most affected by the drought include Mardan, Swabi, Kohat, Hangu, Karak, Mansehra, Abbottabad, Haripur, Battagram, Buner, Bannu and Tank¹⁶⁰.

A15.11. Proposed/ On-going projects

Table A15.2. Projects under Federal PSDP-KP

Action/ Activity	Lead agency	Coordinating agencies	Indicative timeframe	TF 1.7.24, Mil. Rs
1. Water Conservation in Barani Area of Khyber Pakhtunkhwa - (Provincial Share-PM's Agriculture Emergency Program).	MoNFS&R	KP on-farm Water Magt. Dept.	2024-30	3,190
2. 10-BTTP Up-Scaling Green Pakistan Program, Revival of Forestry Resources in Khyber Pakhtunkhwa (ADP & PSDP Funded).	Forest Dept.	MoCCEC	2024-28	7,107

Table A15.3. Main Projects under Provincial ADP – KP

Action/ Activity	Lead agency	Indicative timeframe	TF 1.7.24, Mil. Rs
3. Creation of Forest Knowledge Parks in Southern Districts	Forest Dept.	2024-26	147
4. Development of designated forests carbon stock assessment for REDD + and Promotion of Carbon Credit Marketing in Khyber Pakhtunkhwa		2024-26	182
5. Billion Tree Afforestation Support Project - BTASP (KFW ASSISTED)		2024-26	321
6. Billion Tree PLUS		2025-30	7,500
7. Promotion of Chilghoza intervention and Research activities in North and South Waziristan	Accelerated Implementation Program	2024-26	297
8. Gomal Zam Dam Command Area Development and On Farm Water Management for High Value and High Efficiency Agriculture Project (USAID-Assisted).	Agriculture Deptt.	2024-25	852
9. Provision of Interest Free Loan to the Farmers of command Area under Gomal Zam Dam - Command Area Project.		2024-25	271
10. Poverty Alleviation through Enhancement of Milk Meat Value Chain in Merged Areas		2024-25	351
11. National Program for Improvement of Water Courses in Pakistan Phase-II (Provincial Share-PM's Agriculture Emergency Program).	On-Farm Water Magt.	2024-28	5775

¹⁶⁰ <https://reliefweb.int/report/pakistan/drought-pakistan-update-no-12>

Action/ Activity	Lead agency	Indicative timeframe	TF 1.7.24, Mil. Rs
12. National Program for Enhancement of command Area of Small & Mini Dams in Barani Areas (Provincial Share-PM's Agriculture Emergency Program).	On-Farm Water Magt.	2024-27	831
13. Enhancement of Agriculture land productivity through improved soil & Water conservation practices in Khyber Pakhtunkhwa	Soil Conservation	2024-27	379
14. Rain Water Harvesting in Merged Areas of Khyber Pakhtunkhwa. (AIP)		2024-25	1420
15. Reclamation of Culturable Waste Land and Solarization of Agriculture Tube Wells.	Agriculture Engineering	2024-26	596
16. Soil Fertility Mapping of Khyber Pakhtunkhwa		2024-27	43
17. Establishment of seed Industry in the Province		2024-27	90
18. Introduction of Certification Facilities for Quality Assurance and Creation of Market Linkages for Agriculture Interventions in Khyber Pakhtunkhwa		2024-27	138
19. Integrated Agricultural Development in Merged Areas		2024-25	139
20. Promotion of Olive in Merged Areas.		2024-26	1,670
21. Agriculture development in District Mohmand (80:20)		2024-25	176
22. Merged Areas contribution to the Prime Minister's National Agriculture Emergency Programme (AIP)		2024-28	3,343
23. Save the Calf Program in Khyber Pakhtunkhwa (Provincial Share-PM's Agriculture Emergency Program).	Agriculture Livestock	2024-25	618
24. Feedlot Fattening Program in Khyber Pakhtunkhwa (Provincial Share-PM's Agriculture Emergency Program).		2024-27	92
25. Introduction of Semi-Environmentally controlled Poultry Housing System and revival/revitalization of existing Poultry Forms in Khyber Pakhtunkhwa.		2024-27	686
26. Integrated Livestock Development Programme Khyber Pakhtunkhwa (Phase-I)		2024-27	898
27. Establishment of Model Dairy Farms in SDW and North Waziristan. [MA]		2024-25	345
34. Integrated livestock development in Merged Areas. (AIP)		2024-26	573
35. Introduction of Semi-Environmentally controlled Poultry Housing System and revival/revitalization of existing Poultry Forms in Merged Areas		2024-25	708
36. Establishment of Veterinary Facilities in Merged Areas		2024-25	370
37. Poverty Alleviation through Enhancement of Milk Meat Value Chain in Merged Areas		2024-25	351
38. 10-BTTP Up-Scaling Green Pakistan Program, Revival of Forestry Resources in Khyber Pakhtunkhwa (ADP & PSDP		2024-27	6,657
39. Billion Tree Afforestation Support Project - BTASP (KFW)		2024-26	171

Action/ Activity	Lead agency	Indicative timeframe	TF 1.7.24, Mil. Rs
40. Introduction to cultivation of the Magic crops, Quinoa as a new livelihood species with farm forestry species in Khyber Pakhtunkhwa		2024-26	28
41. Development of designated forests carbon stock assessment for REDD+ and promotion of carbon credit Marketing in KP		2024-26	161
42. Livelihood Improvement in Poverty reduction through Non-Timber Forest Product (NTFP) activities in Khyber Pakhtunkhwa.		2024-26	128
43. Diversifying livelihood opportunities through value chain development of high values chilghoa pine forests in Khyber Pakhtunkhwa		2024-27	263
44. Merged Areas Integrated Development Forestry Sector Project. (AIP)(Forestry Component)	Wildlife Dept.	2024-27	1,147
45. Strengthening of Forestry Research Activities in Newly Merged Areas DDWP (B)		2024-25	48
46. Capacity Enhancement of Forest Staff and Communities of Newly Merged Areas for Sustainable Management of Forest Resources DDWP (B)		2024-25	19
47. Promotion livelihood opportunities through NTFP interventions in Merged Areas (AIP-ii)		2024-26	432
48. Promotion of Chilghoza intervention and research activities in North and South Waziristan (B)		2024-25	277
49. Conservation, Development and Management of Wildlife in Khyber Pakhtunkhwa, Under Green Pakistan.		2024-27	125
50. Improvement of Management Effectiveness of Wildlife Sanctuaries in Khyber Pakhtunkhwa (B)		2024-25	35
51. Strengthening Community-managed Protected Areas for Conserving Biodiversity and Improving Local Livelihoods in Pakistan (GEF-Co-financing Project) (B)		2024-26	105
52. Merged Areas Integrated Development Forestry Sector Project. (AIP)(Wildlife Component)		2024-29	1,105
53. Implementation of water policy	MSD	2024-25	293
54. Establishment of Emergency Rescue Services (Rescue 1122) in District Chitral	PDMA	2024-25	22
55. Establishment of Emergency Rescue Service (Rescue 1122) Khyber Pakhtunkhwa in District Upper Chitral		2024-25	84
56. Disaster Mitigation, Preparedness and Rehabilitation in Khyber Pakhtunkhwa		2024-25	72
57. Expansion of Emergency Rescue Services 1122 to Tehsil Level and establishment of sub stations in Khyber		2024-26	1,302

Action/ Activity	Lead agency	Indicative timeframe	TF 1.7.24, Mil. Rs
58. Establishment of Emergency Rescue Services (Rescue 1122) in 07 Tribal Districts of Khyber Pakhtunkhwa. (AIP)		2024-25	745
59. Establishment of Emergency Rescue Services (Rescue 1122) in FR,s of Khyber Pakhtunkhwa.(AIP)		2024-25	395
60. Establishment of Khyber Pakhtunkhwa Emergency Services Academy at Shahkas, Khyber (Rescue-1122) (AIP)		2024-25	2,651
61. Extension of Emergency Rescue Service (Rescue-1122) Sub-Stations in Newly Merged District of Khyber Pakhtunkhwa (Phase-II)		2024-27	807
62. Construction of small dams in Khyber Pakhtunkhwa	Water sector	2024-25	892
63. Water Harvesting and Conservation Schemes in Southern Districts.		2024-26	120
64. Construction of Marobi Dam District Nowshera		2024-26	331
65. Construction of Jaroba Dam District Nowshera		2024-26	22
66. Construction of Chapra Dam in District Haripur.		2024-25	126
67. Construction of Small Dams in District Mansehra Khyber Pakhtunkhwa (Manchura Dam Project Provincial Share 12%) and Ichar Nullah Dam Project (Provincial Share 20%)		2024-25	626
68. Construction of Sarazoi Dam Project, District Hangu (Cost Sharing Project)	Water sector	2024-25	60
69. Construction of Chao Tangi Dam District South Waziristan Merged Areas (for remaining works of PSDP No. 188 against earlier funds released by Finance Division)		2024-25	327
70. Construction of Small Dams at Feasible sites across Merged Areas (Rs.9.00 Billion) Sub Scheme Construction of Shaktu Small Dam - TSD Bannu		2024-26	1,813
71. Construction of Small Dams at Feasible Sites across Merged Areas (Rs.9.00 Billion) Sub Scheme Construction of Ghozhezai Small Dam - TSD Tank		2024-26	1,124
72. Construction of Small Dams at Feasible sites across Merged Areas (Rs.9.00 Billion) Sub Scheme Zakar Khel Small Dam - North Waziristan		2024-26	1,067
73. Construction of Ramak Dam - TSD D.I. Khan		2024-25	568
74. Zangoti Small Dam - North Waziristan		2024-25	818
75. Construction of Check Dams & Water Reservoirs in Merged Areas		2024-28	1,499
76. Construction of Small Dams in Wana-South Waziristan		2024-28	451
77. Construction of Small Dams at Feasible sites across Merged Districts (Baz Ali Small Dam, Distt. Kurram) (AIP)		2024-26	251

A15.12. Deficiencies in ADP Development schemes in KP

Assessment of the vulnerability of water stressed and potential drought areas is not being implemented. There is no initiative to introduce improved rangeland management and drought resistant multi-cut varieties of fodder. Demonstration of low delta crops, agronomic practices, improved feed and urea molasses mineral blocks, community-based Drought early warning are not being focused.

Research on drought tolerant livestock breeds, preparation of Land use policy and land use and drought mitigation plans at the provincial and district levels, regulations for groundwater usage and management in drought prone areas, formulation of climate models at the province level, revision of crop calendars as per climate change scenario, support for systems utilizing indigenous knowledge for water saving crop production, bio-saline agriculture, provision of LPG and fuel-efficient stoves, Bio-gas, and honey bee production at subsidized rates is not mentioned in the ADP-KP.

A15.13. Recommendations and implementation actions for KP

Important actions proposed to mitigate drought risk are as follows:

1. Introduce drought resistant multi-cut varieties of fodder,
2. Plant indigenous Forest trees, raise nursery, enhance tree cover on state forest lands, reforestation & regeneration of vacated forest land,
3. Conserve and develop new water resources and raise awareness through awareness raising sessions, print, electronic and social media,
4. Assess the vulnerability of water stressed and potential drought areas,
5. Chart out and demonstrate interventions to rehabilitate drought and water stressed areas,
6. Community based drought mitigation programs.
7. Increase command area of water resources,
8. Do Livestock vaccination for diseases like HS, BQ, FMD, ETV and PPR,
9. Establish Provincial Drought Management Fund to improve Drought Governance support system and to Conserve and develop new and alternative water resources and raise awareness.
10. Rangeland management to mitigate drought through
 - 10.1. establishing Seed banks of local and improved grasses and shrubs at divisional/district levels,
 - 10.2. Promote Rangeland reseeding,
 - 10.3. demonstrate community managed controlled grazing practices,
 - 10.4. develop animals watering points, construct ponds and mini-dams at potential sites
 - 10.5. Signing Agreements need between Forest/Rangeland departments and local communities for controlled grazing and rangeland improvement
11. Provide Fodder and Urea molasses mineral/ vitamin block to the drought hit areas,

12. Demonstrate low-delta crop, shrubs and grass varieties including low delta fruits like ber (Zyziphus), olive and grapes, and agronomic practices of low-delta cropping like Zero tillage, mulching. Develop calendars of such crops and practices.
13. Focus on Preventive measures for animal diseases, fodder improvement, feed supplements, train community activists for Animal health and production,
14. Do research on drought tolerant livestock breeds,
15. Develop Land use plan at province level
16. Do gap analysis of existing relevant legislative framework to mainstream/ align drought early warning and mitigation in these documents. Develop regulations for groundwater usage and management in drought prone areas to reduce overdraft and drawdown of water-tables, tube-wells and springs.
17. Enhance liaison of line departments and communities with Regional Meteorological Observatories/ stations regarding early warnings, in addition, enhance the capacity and upgrade these to automation.
18. Formulate Climate Models at the province level in KP.
19. Involve Stakeholders' including famers, the poor, rural residents, marginalized people, women-headed households, line departments from planning to implementation to monitoring of proposed actions to get their ownership and give them responsibility during and after the implementation. In case of drought, adopt coordinated response to avoid duplication of efforts.
20. Improve Communication system, outreach of drought and its mitigation measures and emergency response capacities in drought prone areas. Educate Communities on drought response measures, climate change adaptation, safe drinking water, sanitation and other related topics.
 - 20.1. Ranges/frequencies of National Broadcasting Radios may be enhanced for effectively disseminating Climate forecasts to the farmers and community in far-flung areas.
 - 20.2. Encourage establishment of clean and green clubs in schools for awareness on tree plantation and water management for its saving and increase clean green Pakistan Index.
 - 20.3. Services of telecommunication companies may be utilized for dissemination of information regarding drought.
 - 20.4. Broadcast programs focusing on drought coping techniques on electronic media including radio Pakistan and private FM channels as well as social media.
21. Develop and submit concept notes/ PC-1s/ Project documents to potential donors for funding to mitigate drought.
22. Conduct Post drought evaluation, document and disseminate among stakeholders to assists in learning lessons from accomplishments and mistakes.
23. Consider Gender issues when planning and conducting risk assessment and implementation of identified actions. Assist Vulnerable groups and women to tackle drought and its impacts,
24. Do research on seeds of drought tolerant varieties of crops and multiply such seeds in adaptive

research farms and on fields of progressive farmers. To store the improved seed, promote seed banks,

25. Revise Crop calendars in line with climate change projections.
26. Encourage systems utilizing indigenous knowledge for water saving crop production, bio-saline agriculture, Bio-gas, and honey bee production,
27. Provide LPG and fuel-efficient stoves at subsidized rates and increase natural gas network in the drought prone areas, provide subsidy wherever, biogas plants are feasible,
28. Diversify sources of income in drought prone areas through initiatives including ecotourism,
29. Develop and incorporate disaster related indicators in the planning policy and documents (PC1). Monitor drought, especially continuous observation of rainfall levels and comparisons with current usage levels to help prevent man-made drought
30. Develop and implement Drought Mitigation Plans at provincial and district levels.

A15.14. Need for new projects to meet the drought challenges in KP

The new projects needed to tackle drought in KP are as follows:

Table A15.4. Proposed main projects/ Action plan for KP

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost, Mil. Rs
1. Constructing 2000 ponds, mini dams to use floodwater to recharge water sources	Irrigation Dept.	2026 - 30	240,000
2. Introduce drought resistant multi-cut varieties of fodder	Agriculture Dept.	2026 - 30	200
3. Assess the vulnerability of water stressed and potential drought areas		2026 - 30	200
4. Promote low delta crop and water saving agronomic practices		2026 - 30	2000
5. Sustainable land management	Forest Dept.	2026 - 30	10000
6. Promotion of Agro-Forestry through indigenous Forest trees in Mini Dams Command Area		2026 - 30	20000
7. Sustainable Use of Non-Timber Forest Products with the involvement of Local Communities and Private Sector		2026 - 30	1500
8. Introduction of Sustainable Land Use Practices including dry afforestation, rainwater harvesting - collection and storage of rainwater from roofs or another suitable catchment & low delta cropping with the Involvement of Local Communities		2026 - 30	2000
9. Water & Soil Conservation structures (Contour trenches, spurs & eye brows) for water conservation in forest plantation		2026 - 30	1500
10. Protection of Forest from Fire in government & private lands		2026 - 30	1500

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost, Mil. Rs
11. Development of sustainable forest landscape to promote biodiversity conservation, mitigation of climate change & ecosystem services		2026 - 30	4500
12. Forestry research, rangelands & REDD+ Preparedness		2026 - 30	180
13. Promotion of watershed/ social forestry, especially indigenous species & community-based forest nurseries through women involvement		2026 - 30	10000
14. NTFP based enterprise development		2026 - 30	1000
15. Promotion of alternative energy resources like LPG, enhanced energy efficiency by providing fuel-efficient stoves & Resource Management for conservation of forests		2026 - 30	2000
16. Promotion of energy efficient cooking, heating & housing technologies		2026 - 30	100
17. Reducing soil & water erosion	Forest Dept.	2026 - 30	5000
18. Conservation of threatened & vulnerable flora species through in-situ & ex-situ cultivation		2026 - 30	1000
19. Rangeland & pasture management, establishment of seed banks for grasses, rangeland productivity assessment, reseeding, establishing micro-catchments, ponds & controlled grazing		2026 - 30	3500
20. Up-gradation of Forestry Research Division, KP		2026 - 30	100
21. Development and initiation of implementation of Protected areas magt. plans and development of new PAs		2026 - 30	1200
22. Development of oasis and botanical gardens in drought prone areas		2026 - 30	1500
23. Capacity building for FD staff		2026 - 30	1000
24. Establishment of GIS Lab.		2026 - 30	200
25. Efficient use of forests waste materials		2026 - 30	1500
26. Introduction of mechanical sand barriers like semi-buried straw checkboards for sand dune stabilization		2026 - 30	3000
27. Promote Eco-tourism	Tourism Department	2026 - 30	5000
28. Introduce drought tolerant livestock breeds	Livestock Department	2026 - 30	200
29. Livestock vaccination program		2026 - 30	4000
30. Establish Provincial Drought Management Fund for KP	P&DD	2026 - 30	500
31. Transfer, testing and introduction of technology for drought mitigation.	P&DD	2026 - 30	10,000
32. Develop Community based drought early warning dissemination and respond system	P&DD	2026 - 30	1000
33. Development of KP Drought mitigation / water	PDMA	2026 - 30	100

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost, Mil. Rs
shortage contingency plans			
34. Improve Regulations for groundwater usage and management in drought prone areas	Irrigation Dept.	2026 - 30	120
35. Improving sailaba/ spate irrigation system in D.I. Khan and surrounding areas		2026 - 30	1000
36. Conduct feasibility studies to divert flood water to drought hit areas like construction of a canal to recharge its groundwater		2026 - 30	500
37. Conserve and develop new water resources and raise awareness		2026 - 30	1,000
38. Promotion of Drinking water treatment plants and sand filters for water purification	LG Dept.	2026 - 30	300
39. Capacity building of newly merged districts (NMDs) on climate change adaptation as well as mitigation strategies for drought	EPA	2026 - 30	3000
40. Develop hazard maps showing grey areas prone to different disasters	EPA	2026 - 30	100
41. Upgrade Regional Meteorological Observatories/ stations in KP to automation	PMD	2026 - 30	5000
42. Cloud seeding- a form of Intentional weather modification to induce rainfall to be conducted on warm clouds	PMD	2026 - 30	700
43. Provide subsidy for biogas	PCRET	2026 - 30	150
44. Restoration and rehabilitation of irrigation network in drought prone areas Stone pitching/ apron, earthwork, re-sectioning and rehabilitation of gates of canals in drought prone areas 45. De-silting of canals in drought prone areas 46. Cement concrete lining of canals in drought prone areas 47. Renovation, reconstruction and improvement of canals in drought prone areas 48. Ratification of regulators and allied guiding systems of canals 49. Construction of supplementary channels along canals 50. Lining and rehabilitation of minors and Distry (distributaries) in canals. 51. Construction of retaining and protection walls along canals in drought prone areas 52. Restoration and rehabilitation of irrigation network in drought prone areas	Irrigation Dep.	2026-35	200,000
Total			547,350

ANNEXURE XVI: STATE DROUGHT PLAN – GILGIT BALTISTAN

A16.1. Executive Summary

Gilgit-Baltistan covers 72,472 km² and have an estimated total population of 1.3 million (in 2013). The rocks/barren lands, snow/glaciers, alpine/summer pastures, winter pastures, natural forests, farm forests, agricultural land, water bodies and built-up area cover 9.83%, 4.71%, 3.58%, 0.61%, 0.55%, 0.26 and 0.1%, respectively. There are four main rivers, lakes (>3,000 Nos), lofty barren mountains with snow covered peaks and Glaciers (>7,000 Nos). Karakorum, Himalaya and Hindukush meet here. Government and armed forces' service, agricultural, horticulture, transhumance, livestock, and its byproducts are main livelihood sources. Hotel business, tourism, transportation and trade is in cities. In winters, a large part of male population moves to the other parts of the country for labor. Mountaineering expeditions are the other sources of income for Baltistan that serve as porters. Agriculture mostly depends on irrigation channels fed from streams and glacier water through gravity flow. Crops like wheat, barseem, alfalfa, maize, seed potato and vegetables are grown. If properly managed, alpine meadows located at 3,300-4,000 meters above sea level (masl) contain an average stocking capacity of five animal unit per hectare. The GB has seven national parks (NPs), 3 Wildlife sanctuaries (WS), 8 Game reserves and 20 Community Controlled Hunting Areas from where the communities are benefitted through trophy hunting programs. Some medicinal plant species such as Mushrooms, Kuth, Karoo and Zeera are being harvested commercially. A rock excretion called Salajeet is also exploited from the mountains of the area. The climate of a vast region of GB is arid, at observatory Gupis, with long cold dry winter and moist short summers. Average annual precipitation is 127-254 mm. One of the highest deserts in the world, Cold Desert, Katpana Desert, Skardu valley, Khaplu Valley, Shigar Valley to Nubra in Indian-occupied Ladakh at about 7,303 ft. (2,226 meters) comprising sand dunes shifted by string winds, has 80 – 100 mm precipitation. The main livestock include wild sheep, goats and yak. About 90.5 percent of the soils of GB have certain limitations for growing agricultural crops, forests, and even rangelands. During 1903-04 extreme drought impacted GB. Another significant drought hit some areas of GB from 2000- 2003; with the drying of natural springs about half of the human population was affected in the affected areas, water flow in streams was reduced, crops and fruit orchards suffered, livestock underfed and starved, and fisheries negatively impacted in the drought impacted areas of GB.

The GB has approved its Climate Change Strategy and Action Plan 2017. The strategy for drought is to identify the areas that are prone to water stress and drought, and adopt appropriate mitigation measures. The actions include (i) Assess the vulnerability of water stressed and potential drought areas, (ii) Chart out and demonstrate interventions to rehabilitate drought and water stressed areas, (iii) Introduce drought resistant multi-cut varieties of feed and fodder and (iv) Organize research projects in response to various forest types to increased temperature and drought spells. Factors contributing to desertification and ultimately drought in GB, include water scarcity, overgrazing, over exploitation of land and water resources, over cultivation of marginal lands, deforestation, soil erosion and use of inappropriate agricultural technologies on marginal lands and slopes. About two thousand yaks perished because of insufficient vegetation at higher altitudes. The irrigation system had become redundant and channels were choked. Furthermore, the standing crops, livestock, cattle herds, land fishery and fruit orchards were severely affected, which resulted in estimated losses as a result of droughts 1999- 2001. Losses were approximately PKR.100 million.

Important actions proposed to mitigate drought risk include improved rangeland management, provision of fodder and urea molasses mineral/ vitamin block to the drought hit areas, demonstrating low-delta crop and practices, taking Preventive measures for animal diseases, training community activists on Animal health

and production, providing feed supplements to the livestock, doing research on drought tolerant livestock breeds, assessing the vulnerability of water stressed and potential drought areas, charting out and demonstrating interventions to rehabilitate drought and water stressed areas, introducing drought resistant multi-cut varieties of fodder, forest trees plantation, community based drought mitigation programs. There is also need to conserve and develop new water resources and raise awareness through awareness raising sessions, print, electronic and social media, increase command area of water resources, Livestock vaccination, do research projects in response to various forest types to increased temperature and drought spells, establish State Drought Management Fund, develop Land use plans at GB, district and valley levels to mitigate drought and climate change impacts, do gap analysis of existing relevant legislative framework to mainstream/ align drought early warning and mitigation in these documents, develop Regulations for groundwater usage and management in drought prone areas to reduce overdraft and drawdown of water-tables and springs.

Stakeholders may be involved from planning to implementation to monitoring of proposed actions. In case of drought, adopt coordinated response, improve Communication system, outreach of drought and its mitigation measures and emergency response capacities in drought prone. Communities may also be educated on drought response measures, climate change adaptation, safe drinking water, sanitation and other related topics. Other initiatives include encouraging establishment of clean and green clubs in schools to increase clean green Pakistan Index. Services of telecommunication companies may be utilized for dissemination of information regarding drought. Concept notes/ PC-1s/ Project documents may be developed and disseminated to the potential donors for funding to mitigate drought. Post drought evaluations may be conducted and results disseminated among stakeholders. There is also need to consider gender issues when planning and conducting risk assessment and implementation of identified actions, support vulnerable groups and women to mitigate drought and its impacts, do research on seeds of drought tolerant varieties of crops and promote seed banks, revise crop calendars in line with climate change projections, encourage systems utilizing indigenous knowledge for water saving crop production, bio-saline agriculture, and honey bee production, provide LPG and fuel-efficient stoves at subsidized rates to the drought prone areas, diversify sources of income in drought prone areas through initiatives including ecotourism, develop and implement Drought Mitigation Plans at State and district levels.

A16.2. Context

Gilgit Baltistan is located in the north of Pakistan covering an area of 72, 472 km² and having an estimated total population of 1.49 million (in 2017¹⁶¹), 80% of which is rural population. The rocks/barren lands, snow/glaciers, alpine/summer pastures, winter pastures, natural forests, farm forests, agricultural land, water bodies and built-up area cover 9.83%, 4.71%, 3.58%, 0.61%, 0.55%, 0.26 and 0.1%, respectively. The literacy rate in male and female is 70% and 50%, respectively¹⁶². The area has 13 main rivers (Indus, Gilgit, Hunza, Hisper, Hushe, Astore, Rupal, Braldu, Saltoro, Shaksgam, Shigar, Shingo and Shyok), streams, lakes (>3,000 Nos), cultivable lands, meadows and pastures, some green forest pockets, lofty barren mountains with snow covered peaks, Glaciers, which are the main sources of fresh water. World's three famous ranges of mountains i.e., Karakorum, Himalaya and Hindukush meet here.

¹⁶¹ https://en.wikipedia.org/wiki/2017_Census_of_Pakistan

¹⁶² <http://gilgitbaltistan.gov.pk/DownloadFiles/GBFinancilCurve.pdf>

Table: A16.1 GB Land use

District=>		DIAMER	ASTORE	GILGIT	GHIZER	SKARDU	NAGAR	HUNZA	GHANCHE	SHIGAR	KHARMANG	Total		
Sub-Land Use	Land Use Type	Area(sq.km)										Sub-Total (sq. km)	Sub-Total(ha)	Percentage (%)
Forest Land														
Natural Forest	Dense Broad leaved	51.340	11.001	11.269	6.562	2.182	11.352	0.000	0.000	0.000	0.000	93.705	9,370.520	0.130
	Dense Conifer	875.544	52.245	115.175	20.415	8.278	6.976	0.000	0.000	0.000	0.000	1,078.632	107,863.226	1.550
	Dense Mix	68.936	5.894	16.192	1.486	1.828	2.601	0.000	0.000	0.000	0.000	96.937	9,693.669	0.140
	Sparse Broadleaved	176.865	50.191	30.492	8.092	2.301	10.005	1.223	0.000	2.043	0.568	281.781	28,178.059	0.400
	Sparse Conifer	545.101	167.911	59.627	25.104	11.429	12.337	2.598	4.292	9.071	4.464	842.934	84,293.426	1.210
	Sparse Mix	54.458	12.935	21.240	1.479	1.907	3.170	0.000	0.000	2.428	0.444	98.063	9,806.259	0.140
Sub-Total (sq.km)		1,772.244	300.177	253.995	63.138	27.925	46.442	3.821	4.292	13.542	5.476	2,492.052	249,205.159	3.580
Farm Forest	Linear/Block plantations/ Orchard	15.286	17.564	53.489	115.503	60.828	17.326	46.207	44.490	38.376	18.489	427.558	42,755.760	0.610
Cropland														
Agricultural Land		54.395	31.160	43.103	110.887	30.403	21.406	9.336	30.480	45.994	5.065	382.229	38,222.930	0.550
Grassland														
Pastures / Range land	Alpine/ Summer	476.934	1,636.790	693.987	1,132.040	1,995.460	210.705	158.080	191.433	310.000	101.496	6,852.925	685292.500	9.830
	Water Pastures	942.172	560.199	426.992	464.580	126.661	126.406	217.984	153.271	231.601	31.785	3,281.651	328,165.070	4.710
Wetland														
Water Bodies	Rivers/Lakes	32.300	9.911	19.224	33.219	26.738	4.736	12.815	17.723	18.450	7.381	182.507	18,250.690	0.260
Built-up Area	Settlements	2.379	3.886	27.341	10.649	13.530	0.311	3.807	3.916	3.488	1.050	70.358	7,035.758	0.10
Other land														
Rocks/ Barren land		2065.000	2,182.850	8,893.520	5,214.140	1,586.480	8,164.670	2065.000	5,567.561	3,306.320	2,321.420	42,772.681	4277268.100	61.380
Snow/ Glacier		431.055	476.401	1,062.370	399.054	1,280.290	2,920.370	431.055	3,103.430	3,279.550	43.324	13,223.644	1,322,364.360	18.980
Total (sq.km)		6,995.220	5,055.743	5,055.743	4,123.392	11,885.905	7,894.738	3,294.101	11,537.090	5,055.743	2,535.485	69,685.603	6,968,560.327	100.000
https://fwegb.gov.pk/forest-land-use-maps/														

Most of the area is above 1200 meters from the sea level and inhabitant-farming communities subsist up to an altitude of 3000 meters. The irrigation is based on water supply from rivers and streams that are nourished with melting snow and spring water from upland watersheds. The availability of water and land for agriculture are the major factors that limit the subsistence of human settlements on terraces and alluvial fans on either side of the accessible streams and rivers in deep ravine valleys.

Government and armed forces' service, agricultural, horticulture, transhumance, livestock, and its byproducts are main livelihood sources. In Baltistan, communities mostly prefer government or armed forces services and agriculture. Hotel business, tourism, transportation and trade is in cities. In winters, agriculture is mostly stopped and a large part of male population moves to the other parts of the country for labor. Mountaineering expeditions are the other sources of income for Baltistan that serve as porters. In Diamer District, the main sources of income are livestock rearing, commercial harvesting of forests, collection of fuel wood and Non timber Forest Produce (NTFP), Government services and hotel business. The women are involved in agriculture and livestock rearing while men's role is only limited to tillage and seed sowing. A local product made from wool, Pattu is used for blankets and clothes making. In Gilgit District public and private employment, tourism, business, hospitality and agriculture are main livelihood sources.

Agriculture mostly depends on irrigation channels fed from streams and glacier water through gravity flow. Fruits and potato are sold and poultry, cereals etc. are imported from other parts of the country. Up to 2000 meters' elevation both summer and winter crops like wheat, barseem, alfalfa, maize and vegetables are grown. at 2000 – 4000 meters' elevation, only summer crop like barley, wheat, potato, vegetables and maize fodder can be grown. Forty percent of rural households earn five to six thousand rupees per annum from apricot and its byproducts¹⁶³. Moreover, the production of almond is 120,650 tons annually¹⁶⁴. The other fruit trees include cherry, apple, grapes, pear, peach, pomegranate, mulberry and walnuts. Most of tree production is organic so export of these can raise the income of farmers. Due to storage and connectivity issues, a large volume of fresh and dry fruits and vegetables cannot be marketed and goes wasted. More than ninety-one percent of rural households of GB own livestock¹⁶⁵.

The ecological and vegetation zones/ Forest types of the area include:

1. Dry alpine & permanent snow fields,
2. Alpine scrub & meadows,
3. Sub-alpine, includes birch, juniper, willow, ephedra, andropogon, viburnum, ribes, Ionicera and berberis.
4. Between 750-3,900 meters above sea level, Montane Sub-Tropical Scrub Forests are found along the River Indus in Raikot and Bunji. Artemisia, Pistachio, Capparis, Spinosa, Saccharum, Rosa moschata, Dodonaea, Berberis and Daphne oloides are the plants prevalence in such areas.
5. Coniferous dry temperate forests containing juniper (*Juniperus spp.*), dry deodar (*Cedrus deodara*), Blue pine (*Pinus wallichiana*), spruce (*Picea smithiana*), fir (*Abies spectabilis*) and chilgoza (*Pinus gerardiana*) are found in Diamer, Skardu, Ghizer and Gilgit District.
6. Dry temperate ever-green scrub containing oak (*Quercus ilex*), willow (*Salix*), ash (*Fraxinus spp.*) and poplar (*Populus*)

¹⁶³ <https://nation.com.pk/13-Mar-2017/gb-is-country-s-largest-apricot-producing-region>

¹⁶⁴ <https://www.ztbl.com.pk/wp-content/uploads/Documents/Publications/Research-Studies/AgriPromotionGilgit.pdf>

¹⁶⁵ http://www.gilgitbaltistan.gov.pk/DownloadFiles/PDD/MICS_GB_1617.pdf

A16.3. Types of Rangeland

There are two main types of rangeland in Gilgit-Baltistan: trans-Himalayan rangelands and alpine pasture. Trans-Himalayan rangelands

The climate is cold desert, dry summers and moderate or heavy snowfall in winter Trans-Himalayan rangelands. Areas less than 2,300 masl altitudes receive scanty precipitation and both seasonal and diurnal temperature variations. Areas from 2,300 to 3,300 masl possess temperate climate and receive moderate or heavy snow. Areas more than 3,300 masl have limited growing season as these are very cold. Most of the areas do not receive summer monsoon as these are in the rain shadow zone. Average annual precipitation is 100-300 mm that is received during early spring in the form of snow and in winters.

Agriculture including livestock rearing, horticulture and small patches of agroforestry is main occupation of local communities. Buckwheat, wheat, barley, seed potato and maize are the main crops at lower elevations.

Excessive firewood collection and livestock overgrazing result in deterioration of grazing areas. Forage production varies from 300-1,500 kg per hectare. The Trans-Himalayan rangelands are found in the Haramosh, Naltar, Kargah, Astore, Tangir, Darel and Jaglote valleys.

Some of the common floral species found in the rangelands include:

- Trees and shrubs: *Quercus ilex*, *Juniperus macropoda*, *Cedrus deodara*, *Pinus gerardiana*, *P. wallichiana*, *Artemisia sacrorum*, *A. maritima*, *Fraxinus xanthoxyloides*, *Ephedra spp.*, *Indigofera spp.*, *Sophora spp.*, *Daphne oleoides*, *Parrotia jacquemontiana*, *Cotoneaster spp.*, *Jasminum spp.*, *Salix spp.*, *Caragana spp.* and *Sorbaria tomentosa*
- Grasses: *Dichanthium annulatum*, *Chrysopogon spp.*, *Pennisetum orientale*, *Cymbopogon spp.*, *Aristida spp.*, *Dactylis glomerata*, *Oryzopsis spp.*, *Bromus inermis*, *Poa spp.*, *Rottboellia exaltata*, *Agrostis spp.*, *Eragrostis spp.* and *Phacelurus speciosus*
- Forbs: *Polygonum spp.*, *Tulipa stellata*, *Iris spp.*, *Lotus comiculatus*, *Sambucus sp.*, *Medicago lupulina*, *Lathyrus spp.*, *Plantago lanceolata*, *Nepata spicata*, *Thymus linearis*, *Taraxicum officinalis* and *Viola spp.*
- NTFP/ Medicinal plants: *Carum bulbocastanum*, *Artemisia maritima*, *Ephedra nebrodensis*, *Thymus* and *Ferula*, *Zizyphus sativa*, *Pinus gerardiana* and *Juglans regia*.

Table A16.2. Important medicinal plants in GB

Local Name	Botanical Name	Local Name	Botanical Name
Kala zeera	<i>Carum spp.</i>	Kuth	<i>Sausuria-lappa</i>
Chora	<i>Artemisia branvifolia</i>	Karoo	<i>Picrohiza-kurruva</i>
Patrees	<i>Aconitum hetrophyllum</i>	Gao zaban	<i>Macrotomia-benthami</i>
Rund	<i>Artemisia bravifolia</i>	Rhewand chini	<i>Rheun emodi</i>
Resha Khatmi	<i>Lavatera kashmirianian</i>	Laljari	<i>Onasin echiodides</i>
Oman (asmani booti)	<i>Ephedra spp.</i>	Bannanajwainu	<i>Shymus serphyllum</i>
Besh	<i>Aconitum lavae</i>	Chiretta	<i>Swertia chiretha</i>
Ban kakri	<i>Podophyllum-emodi</i>	Salib misri	<i>Orchus-latifolia</i>
Mohri	<i>Aconitum chasmanthum</i>	Zakhmay hayat	<i>Saxifrage ciliate</i>
Heeng	<i>Ferula feotida</i>	Mushak bala	<i>Valeriana wallichii</i>
Banafsha	<i>Viola serpens</i>		

Alpine pastures

Alpine pastures mostly meadows located at 3,300-4,000 meters above sea level (masl) remain under snow cover for about 6 months. Growing season lasts only June to September at higher elevations like Khunjerab and Deosai plateau. Sub-alpine scrub is below this zone. Forage production depends on altitude, moisture availability and slope. Average above ground biomass is 700 kg per hectare and it varies at different places. If properly managed, alpine meadows contain an average stocking capacity of five animal unit per hectare. Shrubs, perennial herbs and grasses are the main vegetation. The main flora includes.

- Shrubs and trees: *Rosa webbiana*, *Juniperus communis*, *Cotoneaster* spp., *Berberis* spp.
- Grasses: *Agrostis gigantea*, *Phleum alpinum*, *Poa* spp., *Trisetum* spp., *E. caninus*, *Elymus dentatus*, *Alopecurus gigantea*, *Festuca ovina*, *Pennisetum lanatum*, *Dactylis glomerata*, *Clamagrostis pseudophragmites*, *P. filacidum*, *Carex* spp. and *Oryzopsis* spp.
- Forbs: *Plantago major*, *P. lanceolata*, *P. ovata*, *Trifolium repens*, *T. pratense*, *Fragaria nubicola*, *Potentilla* spp., *Medicago lupulina*, *Polygonum alpinum*, *Rumex nepalensis*, *Thymus linearis*, *Anaphalis contorta*, *Taraxicum officinalis*, *Astragalus* spp., *Nepata spicata*, *Saxifraga* spp. and *Iris hookeriana*.
- NTFP/ Medicinal plants: *Podophyllum hexandrum*, *Aconitum chasmanthum*, *A. heterophyllum*, *A. laeve*, *Rheum emodi*, and *Saussurea lappa*.

The region contains about 41 endemic butterfly species including genus *Parnassius*, Apollo butterfly. The major mammalian fauna inhabiting the alpine zone include snow leopard (*Uncia uncia*), brown bear (*Ursus arctos*), markhor (*Capra falconeri*), Himalayan ibex (*Capra ibex sibirica*), musk deer (*Moschus chrysogaster*), Royle's high mountain vole (*Alticola roylei*), long-tailed marmot (*Marmota caudata*), True's vole (*Hyperacrius fertilis*), Chinese birch mouse (*Sicista concolor*), ermine (*Mustela ermine*), and migratory hamster (*Cricetulus migratorius*).

Major bird species include golden eagle (*Aquila chrysaetos*), snow partridge (*Lerwa lerwa*), Turkistan hill pigeon (*Columba rupestris*), snow pigeon (*Columba leucoconota*), yellow-billed chough (*Pyrrhocorax graculus*), red-billed chough (*Pyrrhocorax pyrrhocorax*) and Eurasian blackbird (*Turdus merulus*). Baltistan toad (*Bufo siachensis*), gecko (*Tenuidactylus baturensis*) and Skinks (*Liolopisma ladacensis*, *Agama himalayana*) and are also found in alpine pastures.

High-altitude rangeland Interfaces. Some interfaces in GB include:

Natural interfaces

Peatlands are interfaces between wetlands and rangelands. About 25,000 hectares area of GB is peatland mostly in the Phunder valley or Langar-Shandoor wetlands, Deosai plateau, Shimshal valley, Broghil valley and Fairy Meadows. Estimated 25,000 ha of GB is covered by peatlands. In Phunder and Broghil valleys, major source of domestic fuel are the peatlands. Degradation due to climate change and anthropogenic activities are major threats to peatlands.

The alpine timberline is predominant interface between alpine meadows and forests, mostly at 3,300 - 4,000 masl elevation in Haramosh, Naltar, Bagrote, Astore, Puniyal, Roundu Nagar and Diamer valleys. It contains dry coniferous forest species including *Picea smithiana*, *Pinus wallichiana* and *Abies pindrow* at lower elevations, *Juniperus*, *Betula*, *Rhododendron*, *Salix* and herbaceous species dominate at higher elevations. Climate change and anthropogenic activities such as excessive cutting of fuelwood, overgrazing, soil erosion and trampling effects result in its downward shift.

Agriculture-Forest interfaces: It contains areas between mountain agricultural fields and forests at lower timberline. Dry coniferous forest species such as *Ephedra intermedia*, *Quercus ilex*, *Monothea buxifolia*, *Artemisia maritima*, *Sophora mollis*, *Corylus coluna* and *Cotoneaster nummularia* are found at 1400-2000 masl. The lower timberline interfaces are experiencing excessive erosion and degradation due to intensive agriculture, infrastructure development, deforestation, disasters including drought, flash floods, mud slides, and land slips. Buffer zones of protected areas as interface:

The GB has seven national parks (NPs), Central Karakorum NP, Qurumber NP, Khunjab NP, Deosai NP, Shandur-Hundrup NP, Nanga-Parbat NP and Himalaya NP. Wildlife sanctuaries (WS) include Astore WS, Baltistan WS and Snow leopard/ Naltar WS. Furthermore, there are eight Game reserves¹⁶⁶ and 20 Community Controlled Hunting Areas from where the communities are benefitted through trophy hunting programs generating enough financial resources to support community development works.

Medicinal plants are another resource, which grow in a large number in Gilgit Baltistan. Some medicinal plant species such as Mushrooms, Kuth, Karoo and Zeera are being harvested commercially without any regularization. A rock excretion called Salajeet, which is used in medicines is also exploited from the mountains of the area.

A16.4. Climatic data:

The GB EPA in collaboration with PMD analyzed the thirty-year (1984–2013) climate data for mean monthly minimum and maximum temperature; and precipitation level for Gilgit, Skardu, Astore, Chilas and Gupis. For Hunza, data is available only for 6 years (2007-2013). The available data is considered to be representative and credible for the whole GB except for the high-altitude alpine areas. GB's aggregate temperature and precipitation data showed significant yearly spread and variation in maximum and minimum temperatures, GB received most of its precipitation during February to May. (Gilgit Baltistan Climate Change Strategy and Action Plan, 2017. GB EPA).

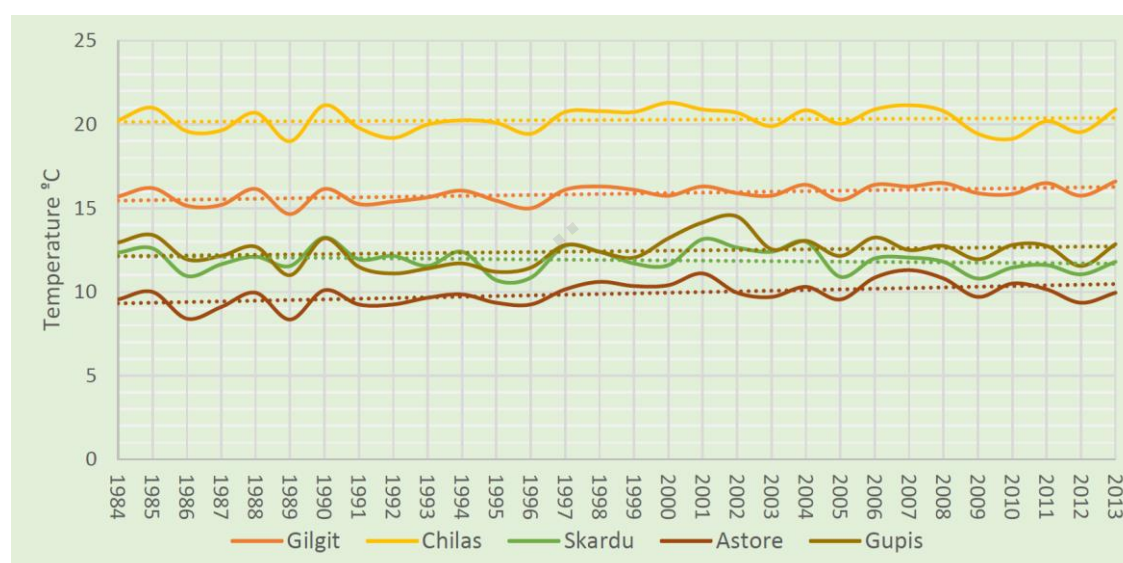


Figure A16.1. Average Annual Temperature of Five Weather Stations in GB

An increase in average annual temperatures for 5 weather stations except for Skardu was noted in temperature data, mean temperatures for 1984-2013 for Gilgit, Gupis, Chilas and Astore displayed

¹⁶⁶ <http://www.mockandoneil.com/biodiv-h.htm>

an overall annual increasing trend of +0.85°C, +0.84°C, +0.25°C and +1.197°C, respectively. Whereas, Skardu showed a decreasing trend of -0.45°C.

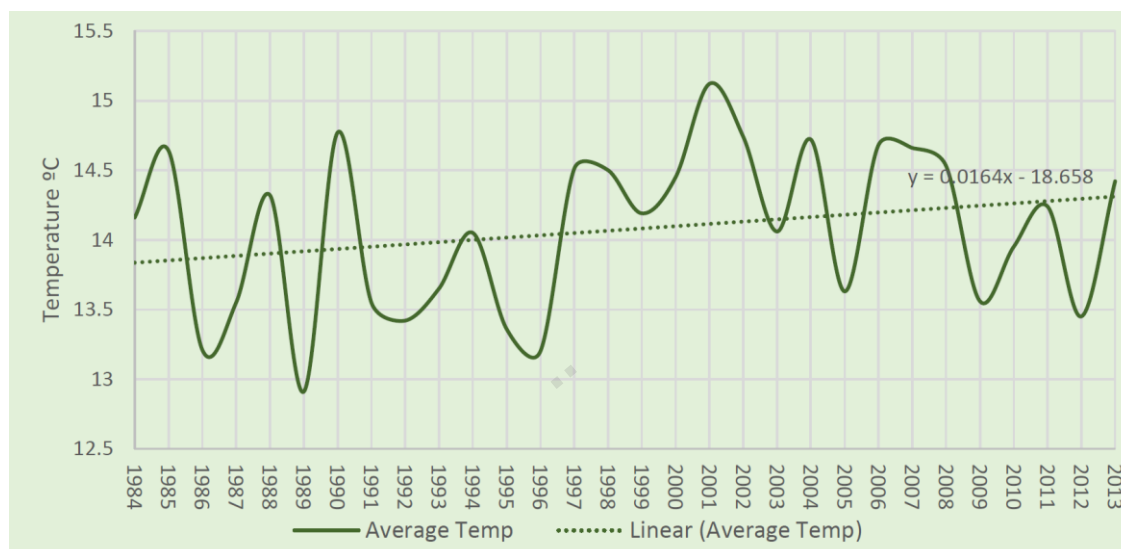


Figure A16.2. Average Annual Temperatures in GB

Average temperature of 30 years (1984-2013) from five weather stations installed at Astore, Gilgit, Chilas, Gupis and Skardu showed an increase of + 0.18°C per decade.

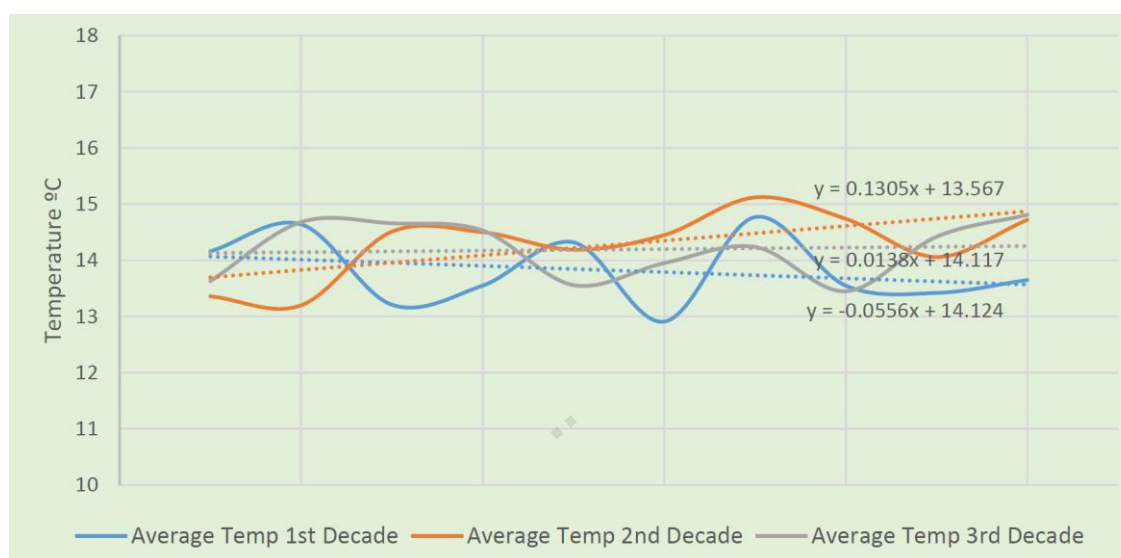


Figure A16.3. Average Decadal Temperatures in GB

During 1st decade (1984-1993), decrease of -0.5°C was recorded, followed by an upsurge of 1.2°C during 2nd decade (1994-2003) and a decline of -0.5°C during 3rd decade (2004-2013). Decade 1st and 3rd showed an equal decreasing trend but a shift of +0.68°C can be seen among these two decades.

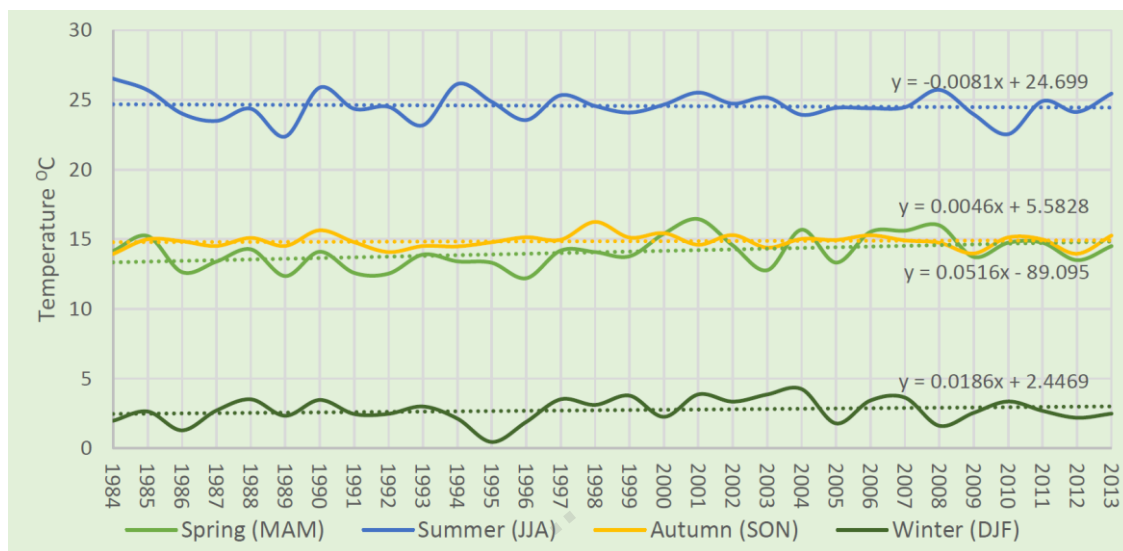


Figure A16.4. Average Seasonal Temperature of 5 Weather Stations in GB

In all-time series, seasonal increase in annual mean temperature of five weather stations during winter (DJF), autumn (SON) and spring (MAM) and a decrease during summer (JJA) was noted. An upsurge of $+0.5^{\circ}\text{C}$, $+0.138^{\circ}\text{C}$ and $+1.548^{\circ}\text{C}$ was recorded for winter, autumn and spring, respectively while summers showed a decreasing trend of -0.243°C , reflecting warming in winters, spring and autumn and cooling in summer temperatures.

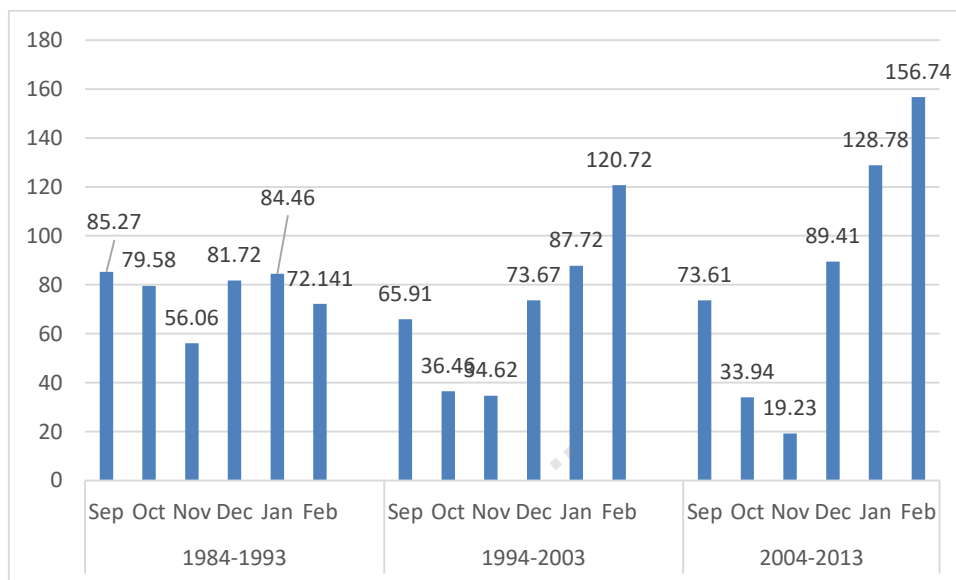


Figure A16.5. Average Decadal Precipitation of 5 Weather Stations in GB

During 1st decade the average precipitation was increased by 60 mm, followed by a decrease of 76 mm and 40 mm during 2nd and 3rd decade. From 1984 to 2013, decreasing trend in precipitation of Sept., Oct. and Nov. and increasing in Jan. and Feb. was observed.

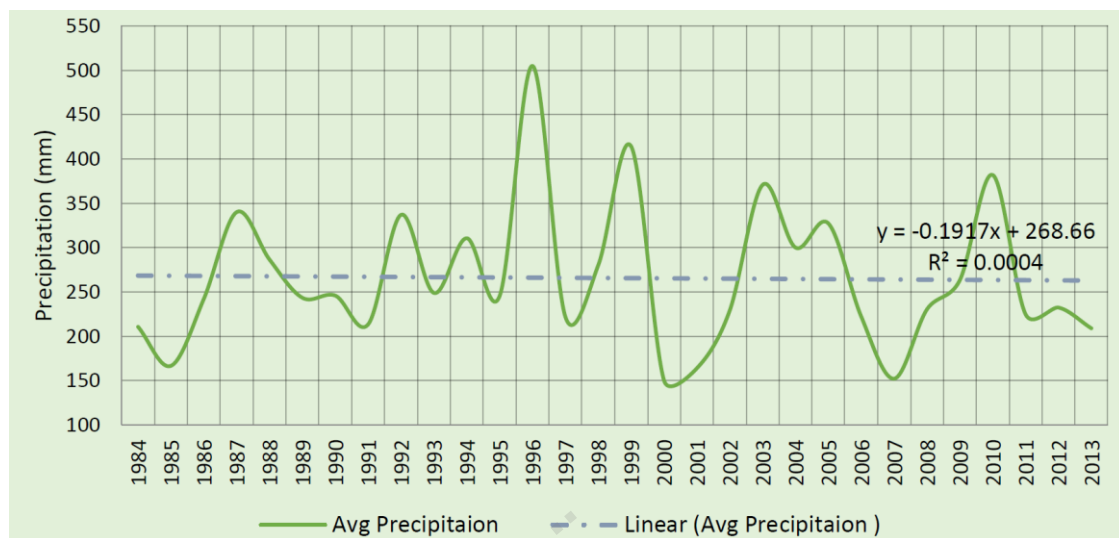


Figure A16.6. Average Precipitation of Five Weather Stations in GB

An average decrease of 8 mm in precipitation for a recorded period of 30 years was noted. It was established in a study that the glaciers in the HKH ranges have absorbed more heat compared to the plain areas during the last half century (Ghulam Rasul et al, 2011).

A16.5. Arid and semi-arid areas and drought years in GB

The climate of a vast region of GB is arid, at observatory Gupis, with long cold dry winter and moist short summers. Average annual precipitation is 127 mm to 254 mm and in April – May about 180 mm rainfall is received in Skardu, Gilgit, Bunji and Chilas. The climate of Astore is semi-arid¹⁶⁷.

Among the arid areas, the one of the highest deserts in the world, Cold Desert, Biana Nakpo or Katpana Desert, sometimes in winter snow bound located in Skardu valley, Khaplu Valley, Shigar Valley to Nubra in Indian-occupied Ladakh at about 7,303 ft. (2,226 meters) comprising sand dunes shifted by string winds, has 80 – 100 mm precipitation. Temperatures range from 81°F(27°C), In October mostly 46°F(8°C), and in December and January below 1°F(–17°C) and occasionally –13°F(–25°C)¹⁶⁸.

There is sparse vegetation, scanty patches of grasses and shrubs, apples with walnuts and apricots trees. Several species of birds such as Himalayan snowcock (*Tetraogallus himalayensis*), robins (*Prunella rubeculoides*), hoopoe (*Upupa epops*) and raven (*Corvus corax*) are common. Some of these are migratory birds. The animals include wild sheep and goats, yak and dogs. In the summer pea, beans, turnip and potato are mostly cultivated. Stunted growth of spiny plants of the legume family and Tamarix shrubs are sources of firewood¹⁶⁹. Soil Class VII (869 out of 5,780) makes for poor forests and rangeland soils while Class VIII soils (4,364 out of 5,780) are unfit for agricultural purposes. Thus, about 90.5 percent of the soils of GB have certain limitations for growing agricultural crops, forests, and even rangelands¹⁷⁰.

¹⁶⁷ https://www.researchgate.net/publication/346658658_Climate_of_Gilgit_Baltistan_Province_Pakistan

¹⁶⁸ https://en.wikipedia.org/wiki/Cold_Desert,_Skardu

¹⁶⁹ https://www.researchgate.net/publication/346658658_Climate_of_Gilgit_Baltistan_Province_Pakistan

¹⁷⁰ <https://www.slideshare.net/FAOoftheUN/soil-survey-in-pakistan-history-achievement-and-impact-on-agriculture-by-jarwar-attar-khan> published on 2015

During 1903-04 extreme drought impacted GB. Another significant drought hit some areas of GB from 2000- 2003; with the drying of natural springs about half of the human population was affected in the affected areas, water flow in streams was reduced, crops and fruit orchards suffered, livestock underfed and starved, and fisheries negatively impacted. the drought impacted areas of GB like Skardu, Thorgo, Hoto, Niali, Maidgo, Shigar, Nid Shigar, Kawargo and Kashmal¹⁷¹. Due to drought like situation in 2018-19, yield of apple was drastically reduced.

A16.6. Acts and rules:

The Acts and rules for GB related to drought mitigation are as under:

- Forest Act Amendment Order 1993, (KANA Order No.26(8)/92-NA-1 dated 25 February 1993 / LA-COMM-9 (7) / 92
- Northern Areas Forest Rules, 1983, No. D-5(4)/81-VIII,
- Northern Areas Wildlife Preservation Act 1975
- Gilgit Private Forest Regulation 1970, (KANA Order No. REG. HC. NTF-15/71 dated 4 February 1971)
- Northern Areas Cattle Trespass Act 1976 (Notification No.LA(RES)-NTF-9(1)/76, dated 20 September 1976)
- Wild Birds and Animals Protection Act 1912
- Draft Gilgit Baltistan Wildlife and Biodiversity Act-2015
- Pakistan Environmental Protection Agency Review of Initial Environmental, Examination and Environmental Impact Assessment Regulations 2000, (SRO 339(1)/2000 dated 13 June 2000), S.R.O. 339 (1)/2001

Acts developed by Ministry of Food Security have been extended to GB such as pesticide act which has been effectively implemented in GB. The other related rules are given below:

- Northern Areas Nature Rules 1978 focusing on cultivating tracts of uncultivated wasteland¹⁷²
- Northern Areas Nature Rules 1980, (Order No. G-1/ (7)/78 KANA Division dated 3 August 1980)

Climate Change Strategy and Action Plan 2017 for GB

The GB has approved its Climate Change Strategy and Action Plan 2017 that includes early warning, response and mitigation measures for disasters including drought. The strategy for drought is to identify the areas that are prone to water stress and drought, and adopt appropriate mitigation measures. The actions include (i) Assess the vulnerability of water stressed and potential drought areas, (ii) Chart out and demonstrate interventions to rehabilitate drought and water stressed areas, (iii) Introduce drought resistant multi-cut varieties of feed and fodder and

¹⁷¹ History profile of major natural disasters in Gilgit Baltistan. October 2014. By Abdul Latif Rao

¹⁷² https://www.iucn.org/sites/dev/files/import/downloads/pk_envlaw_na_vol_1.pdf

(iv) Organize research projects in response to various forest types to increased temperature and drought spells.

A16.7. Government Departments dealing with drought like situations:

The Provincial Government is overcoming the issue of drought through various Departments and agencies. The main government departments directly involved in combating the causes of desertification and ultimately drought include GB Disaster Management Authority, Forestry, Agriculture, Irrigation and Mountain Agricultural Research Centre (MARC), Gilgit. The brief of these departments is as under:

- The Forest Department is mandated to use innovative skills to improve the forest cover, wildlife, natural resource management and environment in the province.
- The Agriculture Department develops and promotes innovative skills to increase production of agricultural crops and livestock in different areas including arid and semi-arid areas. Livelihoods of rural population that is about 85 percent of the province depends directly or indirectly on agriculture and livestock.
- The Irrigation Department executes and operates water sector schemes for efficient water utilization and small dams to overcome water scarcity and recharge groundwater.
- GB Disaster Management Authority
- MARC, Gilgit is conducting research on vegetables, maize, wheat, food legumes, deciduous fruits, medicinal plants, spices and forestry etc. in the high-altitude arid areas.
- Karakoram International University and University of Baltistan, Skardu are the main universities to do research on drought,
- Aga Khan Rural Support Program (AKRSP) and Aga Khan Foundation are among the main NGOs.

A16.8. Contributing factors and Impacts in Northern areas/ Gilgit Baltistan

Factors contributing to desertification and ultimately drought in GB, including water scarcity, overgrazing, over exploitation of land and water resources, over cultivation of marginal lands, deforestation, soil erosion and use of inappropriate agricultural technologies on marginal lands and slopes.

Impacts on Agriculture & Economic

Pastoralists and agriculturists were among the most severely impacted by drought. About two thousand yaks perished because of insufficient vegetation at higher altitudes. The irrigation system had become redundant and channels were choked. Furthermore, the standing crops, livestock, cattle herds, land fishery and fruit orchards were severely affected, which resulted in estimated losses as a result of droughts 1999- 2001, though it continued till 2003. Losses were approximately PKR.100 million¹⁷³.

¹⁷³ <https://cms.ndma.gov.pk/storage/app/public/publications/September2020/a0krhDNvzMFiwgSahH1W.pdf>

Impacts on Pastures

CKNP pastures in Bagrote, Chipurson and Misgar valleys were severely impacted by droughts over the 1999-2010 or so¹⁷⁴.

A16.9. Proposed/ On-going projects

Table A16.3. Projects under GB ADP:

Action/ Activity	Lead agency	Indicative timeframe	TF 1.7.24 Mil. Rs
1. Sairab Gilgit-Baltistan (Construction/Rehabilitation of Irrigation Channels to bring cultivable lands under Crops in Gilgit-Baltistan) (Modified)	Agriculture Dept.	2024-26	90
2. Establishment of cold stores in Gilgit & Skardu to promote Agricultural Business		2024-26	140
3. Establishment of high value fruits nurseries in 10 districts (2 each in districts)		2024-26	50
4. Distribution of high value fruit plants (avocado, blue berries, cherries etc) to farmers across GB		2024-26	100
5. Promotion of Climate Smart Pest Management Practices in GB		2024-26	30
6. Promotion of Fruits and Honey Value added Products in GB		2024-26	50
7. Promotion of Poultry Activities/ Breed Imp. of Poultry in GB		2025-27	20
8. Development and Promotion of Olive and Walnut in Diamer/Astore Region		2024-27	34
9. Scale up of Buckwheat and Barley Production in Gilgit-Baltistan		2024-27	45
10. Post-Harvest Management Through Processed Food Value Chain in Baltistan Region		2024-27	48
11. Transforming Agriculture Production System Through Cluster Based Approach in Baltistan-Region.		2024-26	38
12. Transforming Agriculture Production System Through Cluster Based Approach in Diamer-Region		2024-25	33
13. Transforming Agriculture through Innovative Research System in GB		2024-27	79
14. Establishment of Fruit Packing and Processing Center and Plant in Halqa-IV Nagar		2024-25	30
15. Strengthening Sustainable Agriculture Practices to Expand Opportunities for the Farming Community in District Ghanche		2024-25	17
16. Integrated Development of Agriculture in District Astore		2024-26	37
17. Provision of Agriculture Extension Services in District Kharmang		2024-26	38
18. Pre and Post-Harvest Management of potential Fruits with Special focus on apple and Apricot in District Kharmang		2024-26	32
19. Establishment of Small Ruminant Farm in Taus Tehsil Yasin.	Livestock	2024-26	25

¹⁷⁴ http://www.fao.org/user_upload/docs/HAR_PDF

Action/ Activity	Lead agency	Indicative timeframe	TF 1.7.24 Mil. Rs
20. Establishment of Veterinary Dispensary Sharote Gilgit, Hupuk, Astore, Goharabad, Borith Ishkamen and Purchase of 03 Vet. Mobile Dispensaries	Dept.	2024-27	20
21. Construction of Vet. Dispensary at Taisot Jalalabad, Oshkhandas & Hanuchal Haramosh GBA-III	Livestock Dept.	2024-26	30
22. Effective Control of Ecto and Endo Parasites in Livestock of GB and Construction of Vet. Dispensary at Chilim Astore and Jutal Gilgit		2024-27	30
23. Promotion of Dairy Activities in GB. (Ph-III)		2024-27	261
24. Establishment of Animal Disease Reporting & Surveillance System in Gilgit-Baltistan (Ph-III).(Modified)(Revised)		2024-26	12
25. Targeting Blue Revolution Towards Food, Nutrition & Livelihood Security through Conservation of local Species in GB.		2024-26	60
26. Development of Yak at High Altitude Areas of Pakistan, Gilgit-Baltistan (Ph-II) (M)		2024-26	36
27. Strengthening of Breeding Services in GB.		2024-27	127
28. Establishment of Vaccine Storage Facility in Gilgit-Baltistan		2024-26	17
29. Provision of Artificial Insemination Services		2024-26	19
30. Up-gradation of Veterinary Dispensary Rattu and Gudai up to Hospital Level		2024-26	29
31. Strengthening of Poultry Services Involving Private Sector in Gilgit-Region i.e Rehabilitation of Vet. Hospital at Gilgit		2024-27	61
32. Strengthening of Poultry Services Involving Private Sector in Baltistan-Region		2024-26	45
33. Strengthening of Poultry Services Involving Private Sector in Diamer-Region		2024-25	25
34. Establishment of Jersey Demonstration Farm in Diamer Region	Livestock Dept.	2024-25	60
35. Construction of 05 Vet. Dispensaries at Halqa-I Astore		2024-25	40
36. Construction of Vet. Dispensary at Louse, Nowgam, Fina, Mushkay, Chongra & tatwal Astore		2024-25	35
37. Strengthening of Poultry through PPP Mode in District Hunza		2024-25	10
38. Establishment of Livestock Setup and Rural Development through Commercial Poultry Farming in Shigar		2024-26	50
39. Construction of 02 Nos. of vet. Dispensary at Katisho and Mantho Nullah Halqa-III Kharmong		2024-25	15
40. Construction of protective bund along Indus Chumik Skardu		2024-25	50
41. Strengthening Community-Managed Protected Areas for Conserving Biodiversity and Improving Local Livelihoods through Ecotourism Promotion in GB	Forests, Wildlife & Environment Dept.	2024-25	80
42. Procurement of Fire Fighting Equipment		2024-25	40
43. Construction of Water Irrigation through HDPE pipe from Shindar Nullah to Suplatar Nullah in Nagar	Irrigation Dept.	2024-26	55

Action/ Activity	Lead agency	Indicative timeframe	TF 1.7.24 Mil. Rs
44. Lift Water Irrigation Scheme at Shahyar Nagar		2024-25	80
45. Provision & Fixing of 15000 ft 4" Diameters HDPE irrigation Pipe from Barpo Glacier to Marook Hoper Nagar		2024-25	20
46. Construction of Pakka Channel at Gulmit Nagar Halqa-IV		2024-25	15
47. Providing/Fixing of Pipe for Irrigation System of Old Settlement Qourkondass Halqa-IV Nagar		2024-25	36
48. Strengthening of Head Works and Channels in Ulter Nullah Hunza		2024-25	15
49. Construction of Irrigation Water System for Nasirabad Hunza		2024-25	20
50. Pipe Irrigation Project from Giriakhdo Nallah to Baghicha and Bondokha		2024-26	20
51. Construction of Irrigation Channel for Midan-e-Sadaat		2024-25	20
52. Construction of Protective Bund, Water Supply, Micro Hydel, Water Channels, foot Bridges, Community Centers, Computer Lab, Pony Trek, Fishfarm & Water Tanks at Halqa-I Diamer		2024-25	65
53. Construction of Water Supply Khani Leeti 4" Diameters HDP Pipe and 02 Nos. Water Tanks		2024-25	20
54. Water Supply Scheme in Braqkhor, Dumsum and Kondus		2024-26	20

Table A16.4. Projects under Federal PSDP and other donors - GB

Action/ Activity	Lead agency	Coordinating agencies	Indicative timeframe	Remarks
1. Upscaling of Green Pakistan Programme (Revised)	Climate Change Division	Forest Dept.	2024-28	Ongoing

1. Upscaling of Green Pakistan Programme (Revised):

The Upscaling of Green Pakistan Programme (Revised), GB component is a project by Ministry of Climate Change and Environmental Coordination, Government of Pakistan. The project is being implemented across Gilgit Baltistan by the Department of Forest, Parks, Wildlife & Environment. A total of 170 million plants will be planted throughout Gilgit Baltistan. During the Global COVID-19 pandemic, the Forest and Wildlife Departments provided green jobs through green stimulus to 7,654 people.

2. Projects funded by National Disaster Risk Management Fund

Aga Khan Foundation Pakistan (AKFP), along with its implementing partner, the Aga Khan Planning and Building Service, Pakistan (now known by its new name, the Aga Khan Agency for Habitat, or AKAH), is implementing an integrated, multi-input program which will help to ensure that people living in the mountains of northern Pakistan are as safe as possible from the effects of natural disasters. The project is funded by NDRMF. The project, known as Promoting Integrated Mountain Safety in Northern Pakistan (PIMSNP) is being implemented in Hunza, Skardu and Ghanche. NDRMF is also supporting Rescue 1122 in GB.

A16.10. Recommendations and implementation actions for GB

Important actions proposed to mitigate drought risks in GB are as follows:

1. Mega project on integrated watershed management for GB in the dire need.

The rainwater takes the shallow soil towards the streams and rivers causing their siltation. Hunza River Slope is 2nd highest slope in the world. Higher Slope causes more loss of sediments which decreases the life span of dams downstream as in case of Terbela dam.

Approximately 5400 small, medium and large glaciers are in GB, source of 50.50 billion cubic meters of water to river Indus annually that is ~72% of total annual flow and ~44% of hydropower energy for Pakistan. Mountains of GB i.e. water towers regulate weather patterns, livelihood dependence of local communities, host alpine biodiversity, energy source (Hydel potential), and provide recreational activities and tourism opportunities for Pakistan.

2. Projects focusing on Glacier grafting need to be promoted.

A successful experiment of glacier grafting was conducted by GLOF-II project of Ministry of Climate Change and Environmental Coordination. Life and livelihoods of ~980 helmets in GB are dependent on glaciers. An increase of +0.15°C per decade in average temperature of five weather stations was recorded from 1984 to 2013. During the same period a decrease of -4.3mm per decade in average precipitation can be observed. A decreasing trend in precipitation of September, October and November and an increase in January and February were observed that is causing increased glacier melting. In Skardu, an increasing trend of precipitation was noted.

3. Projects promoting water lifting from streams and rivers through solar pumps or hydel energy, its storage in water tanks, ponds or mini dams, diversion channels and use for forest/fruit plantation to increase water holding capacity of the area are needed.

4. Survey of water deficient villages in GB, their source of water and identification of actions needed to mitigate water shortage need to be done.

Assess the vulnerability of water stressed and potential drought areas. Develop Land use plans at GB, district and valley levels to mitigate drought and climate change impacts

5. There is need for promoting native vegetation like ziziphus, other drought resistant species, transfer, testing and introduction of technology for identifying true to type tree/plant varieties that can grow successfully in drought conditions and agronomic/silvicultural practices for growing trees and crops in mountains in drought conditions like terracing, plantation in slopes etc. through community-based projects and programs.

Demonstrate low-delta crop, shrubs and grass varieties including low delta fruits like ber (Zyziphus), olive and grapes, and agronomic practices of low-delta cropping like Zero tillage, mulching. Develop calendars of such crops and practices.

6. Soil testing Lab(s) are needed for GB

7. Office of Federal Flood Commission is needed as the drought in GB is flood induced.

8. Hydromet Department for GB is needed.

There are 7 Automatic/manual weather stations of PMD. WAPDA also has some weather and hydroflow measuring stations. GLOF-II project has assisted in establishing another Automatic weather station and plans to install more than thirty automatic weather stations. The hydromet department will analyse the data received and provide timely information for early warning of floods and drought.

9. Develop and incorporate disaster related indicators in the planning policy and documents (PC1)
10. Include following additional actions in drought preparedness and mitigation program:
 - 10.1. Establish drought mitigation fund for GB to improve Drought Governance support system
 - 10.2. Do gap analysis of existing relevant legislative framework to mainstream/ align drought early warning and mitigation in these documents.
 - 10.3. Manage Rangelands to mitigate drought in GB by assessing Rangeland productivity, developing local level grazing management plans in consultation with local communities, promoting community managed controlled grazing practices, establishing Seed banks of local and improved grasses and shrubs, do rangeland reseeding, developing Micro-catchments for water harvesting, promoting Animal watering points, ponds and mini dams, introducing semi-buried straw checkboards for sand dune stabilization and building capacity of staff of government departments working for rangeland improvement through training workshops and exchange visits in and outside the country.
 - 10.4. Involve stakeholders' including farmers, the poor, rural residents, marginalized people, women-headed households, line departments from planning to implementation to monitoring of proposed actions to get their ownership during implementation of actions and give them responsibility after the implementation. In case of drought, adopt coordinated response to avoid duplication of efforts.
 - 10.5. Improve Communication system, outreach of drought and its mitigation measures in drought prone. Services of telecommunication companies may be utilized

for dissemination of information regarding drought. Broadcast programs focusing on drought coping techniques on electronic and social media.

- 10.6. Do research on seeds of drought tolerant varieties of crops and multiply such seeds. Revise Crop calendars in line with climate change projections.
- 10.7. Provide LPG and fuel-efficient stoves at subsidized rates to the drought prone areas. Diversify sources of income in drought prone areas through initiatives including ecotourism.
- 10.8. Develop and implement Drought Mitigation Plans at State and district levels. Develop and submit concept notes/ PC-1s/ Project documents to the potential donors for funding to mitigate drought.

Table A16.5. Proposed main projects/ Action plan - GB

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost, Mil. Rs
1. Integrated watershed management for GB	GB Forest Dept.	2026-33	40,000
2. Glacier grafting project	GB Forest & Environment Dept.	2026-30	300
3. Community-based project for water lifting through solar /hydel energy, development of water harvesting structures & forest/fruit trees plantation	GB Forests & Agriculture Depts.	2026-30	5000
4. Survey of water deficient villages in GB & development of land use plans		2026-30	300
5. Transfer, testing and introduction of technology for drought mitigation.		2026-30	50,000
6. Two Soil testing Labs. for Gilgit Baltistan		2026-30	250
7. Establishment of Regional Office of Federal Flood Commission	Federal Flood Commission, Islamabad	2026-30	100
8. Establishment of Hydromet Department for GB	PMD, Islamabad	2026-30	200
9. Establishment of Drought Mitigation Fund for GB	P&DD	2026-30	500
Total			96,650

ANNEXURE XVII: STATE DROUGHT PLAN – AZAD JAMMU AND KASHMIR

A17.1. Executive Summary

Azad Jammu and Kashmir (AJ&K) is mainly a mountainous area with altitude up to 6,326 m and small terraced plains intercepted by rivers and streams while its southern part consists of a small zone of plain lands. Projected population of the State for 2019 is 4.179 million people. Male and female literacy rate is 86.9% and 67.3%, respectively. The population of cattle/ buffaloes and sheep/ goat is 1.299 million and 2.097 million, respectively. Local communities have traditional rights in terms of use of forests and on an average, three trees are burnt by one household every year as fuelwood. Similarly, about 5 trees are required to construct a house for which wood roofs have to be replaced every 8-10 years. There are landslides and soil erosion further aggravated by the mindless expansion of roads coupled with insufficient efforts to properly dispose of flood waters.

The area of the State is 13,297 sq. kms. Out of this, area under control of Forest department, under cultivation, cultivable and un-cultivable waste area is 42.63%, 13.01%, 2.41% and 41.95%, respectively. Average annual rainfall in Mirpur district is the least in AJ&K, about 297 mm. For more than nine months there are drier periods in Bhimber district with precipitation < 1 mm. Wheat, millet, citrus and mango are the main crops of the area. Dry sub-tropical scrub forests are found in such areas. Droughts of 1999 – 2001 impacted most of the areas of AJ&K. Some of the relevant policy and legal frameworks related to drought include AJK Climate Change Policy, 2017, AJK Environmental Protection Act, 2000 and Jammu and Kashmir Forest Regulation, 1930 and Ordinance XCIX of 1980. The main government departments involved in combating drought include State Disaster Management Authority, Forest, Agriculture, Irrigation and Water Conservation, Live Stock & Dairy Development, Land use Planning, Environmental Protection Agency. NGO like Islamic Relief, NRSP, AJKRSP and PPAF can be the partner in mobilizing communities for drought preparedness and mitigation.

Major constraints causing desertification and ultimately drought include lack of institutional capacities in meeting the challenges of sustainable land management; lack of awareness among the stakeholders regarding drought; unwillingness of farmers, due to ignorance or lack of resolve, in adopting sustainable land management practices; lack of financial resources required for early preparedness and mitigation of drought; population pressure; no facility of natural gas; expansive LPG and poverty, so people use limited sources of available fuelwood in drought prone areas in AJ&K; over-grazing and rangeland degradation.

The challenges posed by nature are further worsened by the geo-political state of AJ&K. Important actions proposed to mitigate drought risk include provision of LPG at subsidized rates to the drought prone areas, improved rangeland management, provision of fodder and urea molasses mineral/ vitamin block to the drought hit areas, demonstration of low-delta crop and practices, fodder improvement and feed supplements, doing research on drought tolerant livestock breeds, promoting Veterinary health services, training community activists for Animal health and production, community based drought mitigation programs, Water resources monitoring and impact assessment, conserving and develop new water resources and raise awareness, increasing command area of water resources, Livestock vaccination, establishing State Drought Management Funds, build Capacity of the land use planning section, draft and submit to State government necessary legislation to implement land use plans for drought prone areas of the

State, develop Regulations for groundwater usage and management in drought prone areas. Floodwater may be used through its proper management to recharge water sources.

In case of drought, adopt coordinated response to avoid duplication of efforts. Improve Communication system, outreach of drought and its mitigation measures and emergency response capacities in drought prone areas. There is a need to educate communities on drought response measures, climate change adaptation, safe drinking water, sanitation and other related topics, encourage establishment of clean and green clubs in schools for awareness on tree plantation and water management for its saving and increase clean green Pakistan Index, utilize Services of telecommunication companies for dissemination of information regarding drought, broadcast Programs focusing on drought coping techniques on electronic media including radio Pakistan and private FM channels, develop and submit concept notes/ PC-1s/ Project documents to the potential donors for funding to mitigate drought, conduct and disseminate results of post drought evaluation among stakeholders. Consider Gender issues when planning and conducting the risk assessment and implementation of identified actions. Support Vulnerable groups and women to tackle drought and its impacts.

Other initiatives may include doing research on seeds of drought tolerant varieties of crops, promoting seed banks, revise crop calendars in line with climate change projections, encouraging systems utilizing indigenous knowledge for water saving crop production, bio-saline agriculture, and honey bee production, diversifying sources of income in drought prone areas through initiatives including ecotourism, developing and implementing Drought Mitigation Plans at State and district levels.

A17.2. Context

Located in the Himalayan belt Azad Jammu and Kashmir (AJ&K) is mainly a mountainous area with small terraced plains intercepted by rivers and streams while its southern part consists of a small zone of plain lands. Altitude varies from 360 m in the south to 6,326 m in the north¹⁷⁵. Projected population of the State for 2019 is 4.179 million people. Male and female literacy rate is 86.9% and 67.3%, respectively. The population of cattle/ buffaloes and sheep/ goat is 1.299 million and 2.097 million, respectively¹⁷⁶.

Local communities have traditional rights in terms of use of forests and on an average, three trees are burnt by one household every year as fuelwood. Similarly, about 5 trees are required to construct a house for which wood roofs have to be replaced every 8-10 years¹⁷⁷.

There are eight agro-climatic zones¹⁷⁸, (i) Glaciers and cold caps, (ii) very cold temperate continental winter rains, (iii) cold dry temperate continental winter rains, (iv) very cold temperate continental winter rains/ monsoon alpine, (v) cold temperate continental winter rains/ monsoon, (vi) moist warm temperate continental monsoon/ winter rains, (vii) humid warm sub-tropical continental monsoon/ winter rains and (viii) sub-humid hot sub-tropical continental monsoon/ winter rains zone. The mountain ecosystems are fragile, characterized by a variety of ecological places for people to base their livelihoods. The increasing growth of human and livestock population together with improper water and land usage, has deeply deteriorated its natural

¹⁷⁵ <http://www.epaajk.gov.pk/uploadfiles/downloads/CC%20AJK%20Policy%202017.pdf>

¹⁷⁶ <https://www.pndajk.gov.pk/uploadfiles/downloads/AJK%20At%20A%20Glance-2020.pdf>

¹⁷⁷ <https://www.pndajk.gov.pk/uploadfiles/downloads/AJK%20at%20A%20Glance%202010.pdf>

¹⁷⁸ <http://www.epaajk.gov.pk/uploadfiles/downloads/CC%20AJK%20Policy%202017.pdf>

environment. Then there are landslides and soil erosion that are further aggravated by the mindless expansion of roads coupled with insufficient efforts to properly dispose of flood waters.

The area of the State is 13,297 sq. kms. Out of the total area, area under control of Forest department containing trees and rangeland, area under cultivation, cultivable and un-cultivable waste area (Figure A17.1) is 42.63%, 13.01%, 2.41% and 41.95%, respectively¹⁷⁹. of the cultivable land, 40% is double cropped in the summer (Kharif) and winter (Rabi) seasons but only 11% area is under irrigation. of the total area under trees and rangeland, only 12% is under productive forests. of the forest area, 25.8% are classified as commercial forests, 41.1% potentially commercial forests and the remaining 33.1% as protected forests.

According to the agricultural statistics of 2010, the farmland area of AJK is 333,946 ha distributed over approximately 236,381 farms.

However, only about 51% of the farmland area is cultivated while the remaining 49% is used as grasslands. About 72 percent of the farms are owner operated, about 25 percent farms are jointly managed by the

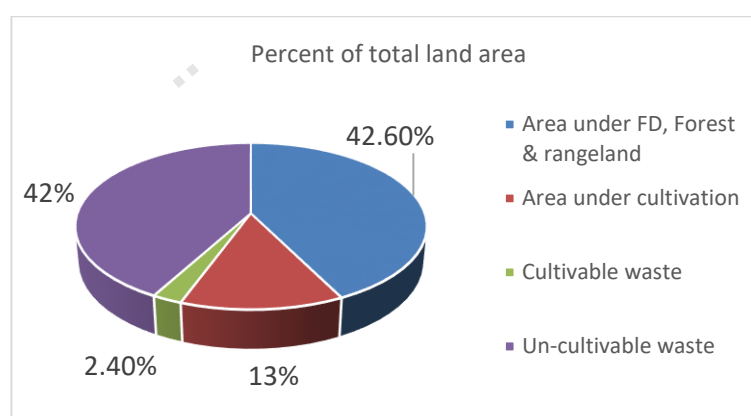


Figure A17.1. Land Utilization – AJ&K¹⁸⁰

owners and tenants, and only 3% are totally tenant operated. Over 80 percent of the owner operated and owner-cum-tenant operated farms are fragmented which adversely affect the possibilities of land improvement. Due to land inheritance and the existing tenurial system, the on-farm interests of owner operators are declining with the result that there is little hope for long term investment in land for sound management practices.

A17.3. Semi-arid areas and drought years in AJ&K

From April through June the weather is hot and dry in the southern parts of the State. Temperatures are greatly modified by altitude. Mirpur and Kotli are among the semi-arid districts in AJ&K which are part of dry sub-tropical climate. Average annual rainfall in Mirpur district is the least in AJ&K, about 297 mm¹⁸¹. For more than nine months there are drier periods in Bhimber district with precipitation < 1 mm¹⁸². The plains of Mirpur, Bhimber and Kotli are hot in summer and cold and dry in winter. Wheat, millet, citrus and mango are the main crops of the area. Dry sub-tropical scrub forests are found in such areas having Phulai (*Acacia modesta*), Olive (*Olea ferruginea*) Shisam (*Dalbergia sissoo*), Kangar (*Pistacia integerrima*), Sanatha (*Dodonea viscosa*), Bhaikar (*Adhatoda vasica*), Garanda (*Carissa spinarum*) and Patakhi (*Maytenus royleanus*)¹⁸³. Soils of inter-mountainous valleys are alluvial, deposited by surface waters. These have good agricultural potential.

¹⁷⁹ <https://www.pndajk.gov.pk/uploadfiles/downloads/AJK%20At%20A%20Glance-2020.pdf>

¹⁸⁰ <http://www.epaajk.gov.pk/uploadfiles/downloads/CC%20AJK%20Policy%202017.pdf>

¹⁸¹ https://en.wikipedia.org/wiki/Mirpur,_Pakistan#:~:text=The%20average%20annual%20rainfall%20is%20297%20mm.

¹⁸² <https://weatherspark.com/y/108055/Average-Weather-in-Bhimbar-Pakistan-Year-Round>

¹⁸³ <https://forest.ajk.gov.pk/montane-sub-tropical-semi-evergreen-forest>

The rainfall in dry temperate areas is about 700 mm, such areas are also prone to drought. Maize, beans, potato, walnut and some stone fruits are the main crops. Droughts of 1999 – 2001 impacted most of the areas of AJ&K.

A17.4 Legal & Policy Framework

Some of the relevant policy and legal frameworks related to drought are as follows:

AJK Climate Change Policy, 2017

The goal of the State Climate Change Policy is to mainstream climate change adaptation and mitigation in the vulnerable sectors of the State economy to steer Azad Government of the State of Jammu & Kashmir towards climate change resilient development. One of the objectives of the policy is to minimize the drought risks. The policy proposes to develop drought contingency plans for short term measures, develop drought resistant grasses and crops, drought management practices in crop production, develop livestock breeds that are more drought tolerance, strengthen drought monitoring, forecasting and early warning system, enhance capacities of men and women to address drought, take measures for resource mobilization and implementation of action plan on drought.

AJK Environmental Protection Act, 2000

The AJK Environmental Protection Act, 2000, requires State and local governments to establish, implement and review objectives, policies and methods to achieve integrated management of natural resources and to properly counter the adverse impacts of human activities on the environment. AJK Environment Protection Agency (AJK EPA) was set up under the Act to implement the same. However, the district level setup for environmental governance is not in place. Rules and guidelines related to soil, water and air pollution control, disposal of bio-medical and municipal solid waste and hazardous waste management etc. were promulgated. Reduction of soil, air and water pollution will be helpful in reducing probability of drought occurrence.

The Jammu and Kashmir Forest Regulation, 1930 and Ordinance XCIX of 1980 relate to forests protection and distribution of timber through local bodies. There are concessions under the rules for the collection of fuel wood, timber and grazing of animals by the local communities. In return, communities have certain obligations, which mostly they ignore. Involving local population in forest management along with the professionals of the forest department and their awareness will result in better forest management.

A17.5. Government Department dealing with drought like situations:

The Provincial Government is overcoming the issue of drought through various Departments and agencies. The brief of main government departments involved in combating the causes of desertification and ultimately drought is as under:

- State Disaster Management Authority as per its mandate is the leading agency in disaster preparedness, management and its mitigation in AJ&K. Its mission is to decrease vulnerability of human life, property and environment to man-made and natural disasters including drought through coordination, preparedness, mitigation and awareness.
- The Forest Department's mission is to sustainably and scientifically manage forest and rangeland resource and watershed effectively to reduce sedimentation, environmental services' amelioration, conserve biodiversity and alleviate poverty. It assists in overcoming the problem of deforestation and rangeland degradation which ultimately assists in drought mitigation.

The Agriculture Department is committed to facilitation & build capacity of the farmers to get prosperity and food security. The Department assists in sustainably increasing crop productivity through promoting low delta crops, improved agronomic practices, efficient use of available resources, and controlling pests that ultimately helps in mitigation of land degradation and drought.

- The Irrigation and Water Conservation Department's aim is to design and implement socially acceptable and economically feasible irrigation systems. The Department executes and operates water sector schemes for efficient water utilization and its conservation to overcome water scarcity, recharge groundwater and ultimately reduce drought occurrence.
- Department of Live Stock & Dairy Development's mission is to increase livestock productivity through disease control, advisory services, breed improvement and farmer education.
- Land Use Planning section under P&DD

The main targets of the section included:

1. Aerial photography of main agricultural area of Azad Kashmir
2. Production of large-scale topographical contour base maps.
3. Assessment of land use patterns.
4. Development of Land Capability and Land Suitability Classification systems for AJK.
5. Thematic maps production on sub-watershed basis.
6. Present land use survey and land capability assessment.

Land use Plan of AJ&K was prepared by the section.

- EPA & CCC

The office of Climate Change Center is working under Environment Protection Agency (EPA). The functions of EPA include the following:

Administer and implement the Environment Protection Act 2000, its rules and regulations.

Review of IEE/EIA, preparation of procedures and guidelines

Preparation of revision and enforcement of NEQS (Industries, Municipalities, Vehicular emission) Establish & maintain laboratories, certification of laboratories for conducting "tests and analysis" Assist local Councils/Authorities, Govt. Agencies in execution of projects

Establish a system for surveys, monitoring, examination and inspection to combat pollution

Conduct training for Govt. functionaries & industrial management

Provide information and education to the public on environmental issues

Publish the Annual State of the Environment report.

Survey & Qualitative & Quantitative data on air, soil, water, industrial/Municipal & traffic emissions Take measures to promote environment related R&D activities

- NGO like Islamic Relief, NRSP, AJKRSP and PPAF can be the partner in mobilizing communities for drought preparedness and mitigation
- GSP can assist in Studies of Natural Hazards and hydro-geological aspects, preparation of Geo-Hazards Maps & Reports, drought mitigation Measures and evacuation strategies during drought occurrence.
- PCRWR may assist in assessment and mapping in case of drought, tree plantation by using rain water and groundwater.
- PARC may assist in the following

- development of soil conservation and drought reclamation techniques by planting of drought tolerant plants with rainwater harvesting, pitcher irrigation, drip irrigation,
- establishing trails of Agro-forestry systems of raising trees in conjunction with crops,
- Irrigation efficiency and groundwater management

A17.6. Relevant past projects:

Some projects related to forests include reforestation of blanks; establishment of forest nurseries; integrated land management, watershed management; and participatory watershed management. Project related to agriculture include strengthening of IPM based on environmental needs involving communities; evaluation of nutrient status & fertility mapping of soils; establishment of progeny orchards; apiculture development; rejuvenation of nurseries; animal health support services; productivity enhancement by development of irrigation facilities; water conservation and productivity enhancement through high efficiency irrigation system; and rehabilitation of water channels.

A17.7. Major constraints causing desertification and ultimately drought

Major constraints causing desertification and ultimately drought include

1. Lack of region/area specified knowledge / data.
2. Absence of area specified programs for drought mitigation.
3. Lack of Rangeland Management Policy for AJ&K.
4. Inadequate water storage / harvesting facilities in drought prone areas lack of institutional capacities in meeting the challenges of sustainable land management;
5. lack of awareness among the policy makers, natural resource managers and practitioner at field level on the causes and consequences of drought; unwillingness of farmers, due to ignorance or lack of resolve, in adopting sustainable land management practices;
6. lack of financial resources required for early preparedness of drought;
7. absence of a coherent land use policy for proper land use planning;
8. lack of coordination among natural resource management agencies; and general apathy and non-serious attitude towards the impending disasters.
9. population pressure
10. no facility of natural gas; expansive LPG and poverty, so people use limited sources of available fuelwood in drought prone areas in AJ&K.
11. over-grazing and rangeland degradation
12. inadequate EIA enforcement
13. windstorms

The challenges posed by nature are further worsened by the geo-political state of AJ&K, an everlasting conflict and hostility between Pakistan and India impeding mitigation measures for natural disasters.

A17.8 On-going projects

Table A17.1. Main Project under Federal PSDP - AJK

Action/ Activity	Lead agency	Coordinating agencies	Indicative timeframe	Remarks
1. Upscaling of Green Pakistan Programme (Revised)	Climate Change Division	Forest Dept.	2024-28	On-going

Table A17.2. Main Projects under AJ&K ADP:

Action/ Activity	Lead agency	Indicative timeframe	Tentative cost/ TF 1.7.24, Mil. Rs
2. Expansion of Immunization Programme against Contagious Diseases and Strengthening of Existing First Aid Centres in AJ&K	Livestock Dept.	2024-25	104
3. Sheep/Goat Development Programme in AJ&K		2024-25	57
4. Production of Quality Fruit Plants by Providing Certified Agricultural Inputs at Departmental Nurseries	Agriculture Dept.	2024-25	19
5. Promotion of Olive Cultivation in AJ&K		2025-26	45
6. Feasibility Study Bhimber-Dam Project (GoAJ&K Share: 60.564 M)	Irrigation Dept.	2025-26	116
7. Feasibility Study of a Multipurpose Small Dam on Nullah Saheli, District Mzd	Irrigation Dept.	2025-26	48
8. Range Land Management in AJ&K	Forest Dept.	2024-25	33
9. Demarcation of Forests in AJ&K.		2024-25	99
10. Reforestation Program in Demarcated Forests of Muzaffarabad Forests Circle.		2024-25	13
11. Reforestation Program in Demarcated Forests of Poonch Forests Circle.		2024-25	9
12. Reforestation Program in Demarcated Forests of Mirpur Forests Circle.		2024-25	12
13. Forest Fire Prevention and Control in The Forests of AJ&K		2025-27	284
14. Support to Natural Regeneration in Demarcated Forests of AJ&K. (Phase-III)		2024-25	109
15. Integrated Community Based Watershed Management in Muzaffarabad Forests Circle.(Phase-III)		2024-25	5
16. Integrated Community Based Watershed Management in Poonch Forests Circle. (Phase-III)		2024-25	19
17. Integrated Community Based Watershed Management in Mirpur Forests Circle. (Phase-III)		2024-25	16

A17.9. Recommendations and implementation actions for AJ&K

Important actions proposed to mitigate drought risk are as follows:

1. Do research to collect Base line data regarding drought extent and impacts in AJ&K

2. Provide LPG and alternates for timber e.g., CGI sheets etc. at subsidized rates to the drought prone areas
3. Promotion of hydel generation
4. Provision of subsidized electricity to populations residing in vicinity of forests and in drought prone areas
5. Provision of Solar energy systems
6. Development of Range Lands Management Policy for AJ&K
7. Range lands resource inventory throughout AJ&K
8. Promote Rangeland reseeding, development of animals watering points and community managed controlled grazing practices. Agreements need to be signed between Forest/Rangeland departments and local communities for controlled grazing and rangeland improvement,
9. Provide Fodder and Urea molasses mineral/ vitamin block to the drought hit areas,
10. Demonstrate low-delta crop, shrubs and grass varieties including low delta fruits like ber (Zyziphus), olive and grapes, and agronomic practices of low-delta cropping like Zero tillage, mulching. Develop calendars of such crops.
11. Demonstrate fodder improvement and feed supplements.
12. Do research on drought tolerant livestock breeds and drought tolerant forest tree species and introduction of the same in drought prone areas
13. Promote Veterinary health services, train community activists for Animal health and production,
14. Use floodwater in drought plan for water sources recharge. For this particular proposal development of water sources e.g. mini dams, water ponds, needs to be constructed in drought prone areas.
15. Include Following actions as a priority in drought preparedness and mitigation:
 - 15.1. Forest trees plantation. Plantation of indigenous low delta forest trees in drought prone areas with intensive management by watering.
 - 15.2. Community based drought mitigation programs.
 - 15.3. Water resources monitoring and impact assessment
 - 15.4. Conserve and develop new water resources and raise awareness
 - 15.5. Increasing command area of water resources
 - 15.6. Livestock vaccination for diseases like HS, BQ, FMD, ETV and PPR
 - 15.7. Establish State Drought Management Funds to improve Drought Governance support system.
16. Build Capacity of the land use planning section and necessary legislation to implement land use plans for drought prone areas of the State may be approved.
17. Do gap analysis of existing relevant legislative framework to mainstream/ align drought early warning and mitigation in these documents. Develop Regulations for groundwater usage and management in drought prone areas to reduce overdraft and drawdown of

water-tables, tube-wells and springs.

18. Floodwater may be used through its proper management to recharge water sources.
19. Involve Stakeholders' including famers, the poor, rural residents, marginalized people, women-headed households, line departments from planning to implementation to monitoring of proposed actions to get their ownership during implementation of actions and giving them responsibility after the implementation. In case of drought, adopt coordinated response to avoid duplication of efforts.
20. Improve Communication system, outreach of drought and its mitigation measures and emergency response capacities in drought prone areas. Educate Communities on drought response measures, climate change adaptation, safe drinking water, sanitation and other related topics.
 - 20.1. Encourage establishment of clean and green clubs in schools for awareness on tree plantation and water management for its saving and increase clean green Pakistan Index.
 - 20.2. Utilize Services of telecommunication companies for dissemination of information regarding drought.
 - 20.3. Broadcast Programs focusing on drought coping techniques on electronic media including radio Pakistan and private FM channels.
 - 20.4. Develop and submit concept notes/ PC-1s/ Project documents to the potential donors for funding to mitigate drought.
 - 20.5. Conduct and disseminate results of Post drought evaluation among stakeholders that assists in learning lessons from accomplishments and mistakes.
21. Consider Gender issues when planning and conducting the main steps of risk assessment and implementation of identified actions. Support Vulnerable groups and women to tackle drought and its impacts.
22. Do research on seeds of drought tolerant varieties of crops and multiply such seeds in adaptive research farms and on fields of progressive farmers. To store the improved seed, promote seed banks by the government and the NGOs.
23. Revise Crop calendars in line with climate change projections.
24. Encourage systems utilizing indigenous knowledge for water saving crop production, bio-saline agriculture, Bio-gas, and honey bee production,
25. Diversify sources of income in drought prone areas through initiatives including ecotourism.
26. Develop and incorporate disaster related indicators in the planning policy and documents (PC1)
27. Develop and implement Drought Mitigation and adaptation Plans at State and district levels.

Table A17.3: Action Plan: Forestry Sector, AJK (New planned projects), Lead Agency: Forest Dept.

Projects/ Programs	Indicative timeframe	Tentative cost, Mil.Rs	Actions/ Remarks
1. Forest Fire control in southern AJ&K and private lands	2026 -32	50	Concept notes/ PC-1 for State/national & international donors to be developed.
2. Protection of Forest from Fire in northern AJK		163.38	
3. Development of sustainable forest landscape in AJK to promote biodiversity conservation, mitigation of climate change and ecosystem services		450	Concept notes/ PC-1 for State/national & international donors to be developed. - Women will be encouraged to participate
4. Forestry research, rangelands and REDD+ Preparedness		180	Concept notes/ PC-1 for State/national & international donors to be developed.
5. Promotion of watershed/ social forestry, especially indigenous species and community-based forest nurseries through women involvement		100	Concept notes/ PC-1 for State/national & international donors to be developed. atleast 25% of the training participants will be women. ¹⁸⁴
6. NTFP based enterprise development	2026 -31	100	Concept notes/ PC-1 for State/national & international donors to be developed. - Women will be encouraged to participate
7. Promotion of alternative energy for timber e.g. CGI sheets, enhanced energy efficiency & Resource Management for conservation of forests	2026 -31	200	Concept notes/ PC-1 for State/national & international donors to be developed.
8. Promotion of energy efficient cooking, heating & housing technologies	2026 -32	100	
9. Landslide stabilization and reducing soil and water erosion	2026 -30	500	
10. Conservation of threatened & vulnerable flora species ¹⁸⁵ through in-situ and ex-situ cultivation.		100	
11. Rangeland & pasture management		100	
12. Up-gradation of Forestry Research Division, AJ&K	2026 -31	50	
13. Protected areas magt. in State forests	2026 -31	50	More focus on community involvement. Concept notes/ PC-1 for State/national & international donors to be developed.

¹⁸⁴ Species suitable under prevailing climatic conditions will be planted. Valuable indigenous spp. will be focused.¹⁸⁵ like Taxus, Corylus, Betula, Ulmus, Fraxinus, Trillium, Fritillaria, Saussurea costus, Aconitum

14. Development of botanical gardens in drought prone areas	2026 -31	50	Concept notes/ PC-1 for State/national & international donors to be developed.
15. Capacity building for FD staff	2026 -31	50	- Ensure that at least 25% of the training participants are women.
16. Establishment/ strengthening of GIS Lab.	2026 -31	50	Concept notes/ PC-1 for State/national & international donors to be developed. Boundary of demarcated forests to be digitized down to compartment level.
17. Efficient use of forests waste materials	2026 -31	50	Concept notes/ PC-1 for State/national & international donors to be developed. - Materials like Bio-Bricks/ Briquettes, Bio-gas, Use of Rotten wood & Other wood products - Involvement of local communities will be ensured as a mitigation measure
18. Community Development Program-II, Forestry Component	2026 -32	480.00	Follow up with national government to contact IFAD for funding. - Women will be encouraged to participate.
19. Sub-catchment management	2026 -31	100	Concept notes/ PC-1 for State/national & international donors to be developed.
20. Community Based Eco-Tourism (CBET) in AJK	2026 -31	2678.250	Proposed for Kashmir Development Package
21. Water Harvesting through Soil Conservation Measures in Azad Kashmir	2026 -31	2502.410	
22. Provision of LPG as Substitute for Fuel Wood in Azad Kashmir	2026 -31	1582.250	
23. Forestry Extension	2026 -31	100.000	Community awareness regarding climate change, drought mitigation & adaptation
24. Olive Grafting in AJK	2026 -31	100.000	Livelihood Community improvement through Olive Grafting

Table A17.4: Action Plan: Forestry Sector (Projects under ADP/ ADB/ National Flood Protection Plan-IV)

Projects/ Programs	Indicative timeframe	Tentative cost, Mil. Rs	Actions/ Remarks
Integrated Community Based Watershed Management in drought prone areas	2026-30	500	Develop concept note for NDRMF. Climate change vulnerability reduction measures to be focused. - Women will be encouraged to participate

Table A17.5: Action Plan: Agriculture (new planned projects), Lead Agency: Agriculture Dept.

Project/ Program	Indicative timeframe	Tentative cost (Mil. Rs.)	Action/ Remarks
1. Climate Smart Agriculture: Enhancing Adaptive Capacity of Crops in AJ&K	2025-31	250.00	Concept paper/ project proposal for international donors like Adaptation Fund to be developed. - Women farmers will be encouraged to participate.
2. Establishment of Horticultural Theme Parks in drought prone districts	2026-30	300.00	- Low delta varieties vulnerable to climate change may be grown. PC-1 to be developed
3. Promotion of low delta horticulture		100.00	- PC-1/ proposal for State/national & international donor funding to be developed - Women farmers will be encouraged to participate.
4. Promotion of solar vegetable/ fruit and crop dryer		80.00	
5. Indigenous honey bee keeping		50.00	
6. Engaging Academia in research, cross learning & sharing exercises in agriculture		50.00	Internship programs for university students will be encouraged
7. Community Development Program-II, Agriculture Component	2026 – 32	340.00	Follow up with national government to contact IFAD for funding. - Women will be encouraged to participate.
8. Develop/ Maintain database of crops and climate parameters	2026-30	10.00	Involve stakeholders including communities and women in data collection
9. Introduction of drought resistant fodder varieties		50	- PC-1/ proposal for State/national & international donor funding to be developed - Women farmers will be encouraged to participate.
10. Introduction & adoption of drought resistant varieties of cereal and leguminous crops to improve soil fertility, organic matter and field-		50	

level water (residual moisture) conservation			
11. Adopting Climate Resilient Measures to Combat Desertification and land degradation in AJ&K		80	

Table A17.6: Action Plan: Water Sector (Irrigation, Local Government and Rural Department & Municipalities, EPA, new planned projects)

Project/ Program	Lead agency	Indicative timeframe	Tentative cost (Mil. Rs.)	Actions/ Remarks
1. Develop/ Maintain database of water related parameters	Irrigation dept.	2026 -31	10.00	Involving stakeholders including communities and women in data collection
2. Prepare infrastructure standards in the water sector to withstand and provide adaptation to the impacts of climate change	Irrigation dept.	2026 -31	100.00	- PC-1/ proposal for State/national & international donor funding to be developed. Infrastructure standards for water harvesting, aquifer recharge, irrigation, drainage, flood control & watercourse improvement interventions will be prepared
3. 50 Rainwater harvesting structures (rooftop, ponds & mini dams)	Irrigation dept.	2026 -31	150.00	- PC-1/ proposal for State/national & international donors to be developed. - Proper site selection. - Women farmers will be encouraged to participate.
4. On-farm water management	Irrigation dept.	2026 -31	230.00	- PC-1/ proposal for State/national & international donors to be developed. Female participation in water user associations will be ensured.
5. Community development program-II, irrigation component	Irrigation dept.	2026 -31	480.00	Follow up with national government to contact IFAD for funding. - The program will be made gender responsive by mainstreaming gender issues.
6. Undertake spring water and groundwater quality studies	EPA	2026 -31	200.00	- PC-1/ proposal for State/national & international donors to be developed.

National Drought Plan - Pakistan

7. Conservation of wetlands	Irrigation/ Forest dept	2026 -31	100.00	PC-1/ proposal for State/national & international donors to be developed. - The program will be made gender responsive by mainstreaming gender issues.
8. Building climate change resilience in water sector to mitigate and adapt climate change impacts	Irrigation, & Forest & Local Govt. dept.	2026 -31	150.00	PC-1/ proposal for State/national & international donors to be developed. Female participation in water user associations will be ensured
9. Capacity building of women in water saving and purification for drinking water in drought prone areas	District level Water and Sanitation Agencies	2026 -31	50.00	PC-1/ proposal for State/national & international donors to be developed.
10. Scaling up urban & rural sanitation in drought prone areas	LG&RDD/ Municipalities	2026-31	400.00	PC-1/ proposal for State/national & international donors to be developed.
11. Provision of WASH in schools in drought prone areas	LG&RDD	2027-32	160.00	- Climate change resilience measures will be considered in construction work. - UNICEF is a potential donor

Table A17.7: Action Plan: Local Government & Rural Development Sector in waste to energy

Project	Lead agency	Indicative timeframe	Tentative cost Mil. Rs.	Actions Remarks
1. Waste to energy projects in drought prone areas	Municipal Corporations	2025-30	150.00	PC-1/ proposal for State/national & international donors to be developed.
2. Improving water supply by up-slope landscape management investments	Municipal Corporations	2026-31	100.00	

Table A17.8: Action Plan: Disaster preparedness & Management & Climate Change

1. Capacity building of DDMA's & other relevant departments & NGOs for DRR	SDMA	2026 -31	200.00	- Concept note to be developed for NDRMF.
2. Community based early warning system	CCC/EPA		100.00	
3. Provision of Solar energy systems	CCC/EPA	2025-28	80.00	Proposal/ PC-1 to be developed
4. The climate situation during the last 30 years in drought prone areas like Bhimber and future projections may be worked out	CCC/EPA	2025-28	2.00	

Table A17.9: Action Plan: Capacity Building (New planned projects/ programs)

Project	Lead agency	Indicative timeframe	Tentative cost, Mil.Rs	Remarks
1. Enhance capacity for effective climate change-related planning and management at all levels	Climate Change Center/EPA	2026 -31	180.86	- Ensure that at least 25% of the training participants are women.

Table A17.10: Action Plan Hydel energy (New planned projects/ programs)

Project	Lead agency	Indicative timeframe	Tentative cost, Mil.Rs
1. Micro and Small Hydropower Development to Reduce GHG Emissions from Power Generation	AJ&K Power Development Organization	2024 -29	4,716.00

Total cost of planned projects for AJK = PKR. 106.069 billion



ANNEXURE XVIII: POTENTIAL DONORS FOR PROJECTS ON DROUGHT

1. National
 1. National Disaster Risk Magt. Fund
 2. Pakistan Poverty Alleviation Fund
 3. Federal /Prov. PSDP
 4. Pakistan Science Foundation
 5. HEC
2. International
 1. Global Environment Facility
 2. Green Climate Fund
 3. Adaptation Fund
 4. NAMA Facility
 5. World Bank's Forest Carbon Partnership Facility
 6. IFAD
 7. UN Agencies: UNDP's Small Grants Program, UNDP, WFP, WHO, UNICEF
 8. World Bank, ADB, Islamic Development Bank
 9. CDM
 10. JICA, GTZ, Korea International Cooperation Agency (KOICA), Australia-Pakistan Water Security Initiative, USAID, ICARDA
3. Private: Petroleum companies

ANNEXURE XIX: METEOROLOGICAL AND SATELLITE-BASED DROUGHT INDICES

The main drought indices/ anomalies mostly being used by Pakistan Meteorological Organization include:

- **Standardized Precipitation Index (SPI):** The Standardized Precipitation Index (SPI-n) is a statistical indicator comparing total precipitation received at a particular location during a period of n months with the long-term rainfall distribution for the same period of time at that location. SPI is calculated on a monthly basis for a moving window of n months, where n indicates the rainfall accumulation period, which is typically 1, 3, 6, 9, 12, 24 or 48 months¹⁸⁶.
- **Standardized Precipitation-Evapotranspiration Index (SPEI):** The SPEI uses the monthly (or weekly) difference between precipitation and potential evapotranspiration (PET). The SPEI allows comparison of drought severity through time and space, since it can be calculated over a wide range of climates¹⁸⁷.
- **Reconnaissance Drought Index (RDI):** The RDI is based on the precipitation to potential evapotranspiration ratio (P/PET). It is ratios of precipitation over Reference Crop Evapotranspiration (ET₀) for different time scales, to be representative of the region of interest¹⁸⁸.
- **Deciles:** Decile is an analytical method used in statistical studies to divide a set of data into ten equal subsections¹⁸⁹. Rainfall deciles rank the rainfall over the period of interest in terms of the relative quantity of rain that fell in that period compared with the total distribution of all recorded rainfalls over the same period¹⁹⁰.

Moreover, the following satellite-based drought indices and hydrological reservoirs data are mostly used to determine the drought. They are calculated by using the primary data of precipitation, temperature etc.

- **Normalized Difference Vegetation Index (NDVI):** It calculates variation between the quantity of red light received by vegetation and the quantity of near-infrared light that is strenuously reflected by vegetation. It quantifies the density and health of vegetation. Its values range from -1 to 1, with values -1 to 0 dead plants or inorganic items like roads, stones and buildings; 0-0.33 unhealthy plants; 0.33-0.66 moderately healthy plants and 0.66-1.00 very healthy plants¹⁹¹.
- **Temperature Vegetation Dryness Index (TVDI):** TVDI is calculated from satellite data (Terra/MODIS), estimates hydric stress on vegetation and soil moisture, ranging from 0 (wet condition) to 1 (dry condition)¹⁹².
- **Vegetation Condition Index (VCI):** VCI evaluates the current vegetation health in comparison to the historical trends. The VCI relates current dekadal Normalized Difference Vegetation Index

¹⁸⁶ <https://climate-adapt.eea.europa.eu/en/metadata/map-graphs/spi-standardized-precipitation-index>

¹⁸⁷ <https://spei.csic.es/home.html#p5>

¹⁸⁸

[https://agrimetsoft.com/fag/Difference_between_Reclamation_and_Reconnaissance_Drought_Index#:~:text=The%20reconnaissance%20drought%20index%20\(RDI\)%20is%20based%20on%20the%20precipitation,investigated%20by%20Tsakiris%20et%20al.](https://agrimetsoft.com/fag/Difference_between_Reclamation_and_Reconnaissance_Drought_Index#:~:text=The%20reconnaissance%20drought%20index%20(RDI)%20is%20based%20on%20the%20precipitation,investigated%20by%20Tsakiris%20et%20al.)

¹⁸⁹

<https://cleartax.in/g/terms/decile#:~:text=Decile%20is%20an%20analytical%20method,done%20using%20percentiles%20or%20quartiles.>

¹⁹⁰ https://climateapp.net.au/About/About_A08_HowsTheDrought

¹⁹¹ <https://geopard.tech/blog/what-is-ndvi-normalized-difference-vegetation-index/>

¹⁹² <https://ui.adsabs.harvard.edu/abs/2022cosp...44..115F/abstract>

(NDVI) to its long-term minimum and maximum, normalized by the historical range of NDVI values for the same dekad. The VCI was designed to separate the weather-related component of the NDVI from the ecological element¹⁹³.

- **Land Surface Temperature (LST):** Land surface temperature is how hot the “surface” of the Earth would feel to the touch in a particular location. Commercial farmers may also use land surface temperature maps like these to evaluate water requirements for their crops during the summer, when they are prone to heat stress¹⁹⁴. It describes processes such as the exchange of energy and water between the land surface and atmosphere, and influences the rate and timing of plant growth¹⁹⁵. Mostly a high LST suggest poor vegetation health¹⁹⁶.

Similarly, for agriculture drought indices, in addition to the above, the following additional indices may be included.

- **Vegetation Health Index (VHI):** VHI is among the remote sensing drought monitoring indices composed by: the vegetation condition index (VCI) and the thermal condition index (TCI) using formula $VHI=0.5VCI+0.5TCI$ ¹⁹⁷. It considers local biophysical and climatic conditions, and can be used for actual plant drought monitoring¹⁹⁸.
- **Temperature Condition Index (TCI):** TCI is used to determine stress on vegetation caused by temperatures and excessive wetness. Conditions are estimated relative to the maximum and minimum temperatures and modified to reflect different vegetation responses to temperature. TCI varies from 0, for extremely unfavorable conditions to 100 for optimal conditions¹⁹⁹.
- **Soil Moisture Anomaly (SMA):** The SMA indicator may be computed based on estimates of daily soil water content. Soil water content is converted into the soil moisture index (SMI, ranging between 0 and 1), which is computed by normalizing the soil moisture between the wilting point and the field capacity. SMI is equal to 0 when the soil is severely dry (wilting point) and equal to 1 when the soil moisture is above the field capacity. SMA indicator is used for determining the start and duration of agricultural drought conditions²⁰⁰. An anomaly is a difference from a defined long-term average²⁰¹.
- **Cumulative Precipitation Anomaly (CPA):** The CPA measures the shortage of precipitation compared to the long-term mean. The timescale of this method is not fixed and can vary from monthly to annual precipitation. A disadvantage of the CPA is that the mean precipitation is often not the same as the median. Using the mean, indicates a normal distribution, while precipitation is often not normal distributed. Another disadvantage is that the begin of a dry spell is not clearly indicated. Therefore, the drought initiation time is usually the point when the precipitation anomaly is declining. The CPA is used as an additional index to indicate drought

¹⁹³ <https://data.apps.fao.org/catalog/iso/095904fb-5d70-4f0d-bdea-9a1da6819b03>

¹⁹⁴ https://earthobservatory.nasa.gov/global-maps/MOD_LSTD_M#:~:text=Land%20surface%20temperature%20is%20how,the%20atmosphere%20to%20the%20ground.

¹⁹⁵ <https://climate.esa.int/en/projects/land-surface-temperature/#:~:text=Land%20Surface%20Temperature%20is%20an,and%20timing%20of%20plant%20growth.>

¹⁹⁶ <https://www.nature.com/articles/s41597-023-02255-3>

¹⁹⁷ <https://data.apps.fao.org/catalog/iso/095904fb-5d70-4f0d-bdea-9a1da6819b03>

¹⁹⁸ <https://www.nature.com/articles/s41597-023-02255-3>

¹⁹⁹

[https://dms.sig.ac.in/facts/indices.html#:~:text=Temperature%20Condition%20Index%20\(TCI\),different%20vegetation%20responses%20to%20temperature.](https://dms.sig.ac.in/facts/indices.html#:~:text=Temperature%20Condition%20Index%20(TCI),different%20vegetation%20responses%20to%20temperature.)

²⁰⁰ https://edo.jrc.ec.europa.eu/documents/factsheets/factsheet_soilmoisture.pdf

²⁰¹ <https://codes.ecmwf.int/grib/param-db/?id=173228>

situations²⁰².

- **Rainfall Anomaly Index (RAI):** In RAI average precipitation of a week, month, or year is used to calculate relative drought. Ranking is done based on the 10 most extreme drought events of the long-term records. The choice of time scale is done based on the distribution of precipitation. In areas with long dry periods a larger time scale is used, than in areas with (very) short dry periods²⁰³.

Moreover, following Hydrological droughts indices may be incorporated.

- **Stream-flow drought index (SDF)** is based on monthly observed streamflow amounts at various time scales, to characterize hydrological drought situation, availability of water in the short, medium, and long term of a study area²⁰⁴.
- **Water balance index (WBI):** The interaction between water supply and demand is captured using a water balance index. The water balance index increases with the water availability and decreases with the water demand. When the index is lower than zero or certain value, it triggers the water supply or water demand management options. The demand management options will decrease the water demand, which in turn increases the index. The supply management options will increase the water supply through alternative water supply sources, such as reclaimed water and water transfer, which can offset the freshwater withdrawal and increase the water availability²⁰⁵.
- **Soil moisture index (SMI):** SMI is defined as the proportion of the difference between the current soil moisture and the permanent wilting point to the field capacity and the residual soil moisture. The index values range from 0 to 1 with 0 indicating extreme dry conditions and 1 indicating extreme wet conditions²⁰⁶.

²⁰² <https://edepot.wur.nl/160049>

²⁰³ <https://edepot.wur.nl/160049>

²⁰⁴

[https://www.sciencedirect.com/science/article/pii/S2405844022032881#:~:text=The%20Streamflow%20Drought%20Index%20\(SDI,the%20same%20efficiency%20and%20simplicity.](https://www.sciencedirect.com/science/article/pii/S2405844022032881#:~:text=The%20Streamflow%20Drought%20Index%20(SDI,the%20same%20efficiency%20and%20simplicity.)

²⁰⁵ <https://digitalcommons.usf.edu/cgi/viewcontent.cgi?article=6360&context=etd>

²⁰⁶ <https://mdpi-res.com › proceedings-07-00002>