



# **Review of National Water Policy Documents and Strategies**

**in the context of SLM, NAP and UNCCD**



**Sustainable Land Management Project**  
Ministry of Climate Change  
Government of Pakistan

This document is a review of the existing water policies, strategies, & plans for Pakistan. It identifies gaps in the context of Sustainable Land Management (SLM), National Action Programme (NAP), UNCCD 10-Year Strategic Plan, and Climate Change impacts. It presents recommendations to address these gaps through policy reforms.

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**Published:** March 2013

**ISBN:** 978-969-9856-03-7

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**Design & Produced:** Compass Communication, Islamabad. (03005616302)

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# ABBREVIATIONS

AWB	Area Water Board
AJK	Azad Government of the State of Jammu & Kashmir
AKRSP	Agha Khan Rural Support Program
BISP	Barani Village Development Project
CACILM	Central Asian Countries Initiative on Land Management
CBD	Convention on Biological Diversity
CCI	Council of Common Interests
CCIA	Climate Change Impact Assessment
CDA	Capital Development Authority
CDM	Clean Development Mechanism
CRBC	Chashma Right Bank Canal
DMP	Drought Mitigation Plan
EC	Electrical Conductivity
ECNEC	Executive Committee of the National Economic Council
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
FAO	Food and Agriculture Organization of United Nations
FATA	Federally Administered Tribal Areas
FO	Farmer's Organization
FSMP	Forestry Sector Master Plan
GCMs	Global Circulation Models
GDP	Gross Domestic Product
GEF	Global Environment Facility
GFCF	Gross Fixed Capital Formation
GIS	Geographical Information System
GLOFs	Glacier Lake Outburst Floods
GNP	Gross National Product
GoP	Government of Pakistan
HKH	Hindu Kush-Karakoram-Himalayas
IBIS	Indus Basin Irrigation System
ICID	International Commission on Irrigation & Drainage
ICOLD	International Commission on Large Dams
IDPs	Internally Displaced Persons
IMF	International Monetary Fund of United Nations
IPCC	Inter-governmental Panel on Climate Change
IRSA	Indus River System Authority
IUCN	World Conservation Union (International Union for Conservation of Nature)
IWMI	Irrigation Water Management Institute
IWRM	Integrated Water Resources Management
KESC	Karachi Electric Supply Company
LBOD	Left Bank Outfall Drain
M	Meter
M.Acres	Million Acres
MAF	Million Acre Feet
MCM	Million Cubic Meter

MDGs	Millennium Development Goals
Mha	Million Hectares
Mhm	Million Hectares Meter
MINFAL	Ministry of Food, Agriculture and Livestock
Mt	Metric Ton
MTDF	Medium Term Development Framework
NAP	National Action Program
NCS	National Conservation Strategy
NCU	National Conservation Unit
NEAP	National Environmental Action Plan
NEMAP	National Environmental Management Action Plan
NEQs	National Environment Quality Standards
NFP	National Forest Policy
NGO	Non Governmental Organization
NRM	Natural Resource Management
NRSP	National Rural Support Program
NWC	National Water Council
NWMP	National Water Management Plan
NWRC	National Water Resources Council
O&M	Operation and Maintenance
ODA	Overseas Development Association
OFWM	On Farm Water Management
PEPO	Pakistan Environmental Protection Ordinance
PFD	Provincial Forest Department
PRSP	Poverty Reduction Strategy Paper
RBOD	Right Bank Outfall Drain.
RNR	Renewable Natural Resources
RSC	Residual Sodium Carbonate
SAR	Sodium Absorption Ratio
SCRIP	Salinity Control and Reclamation Project
SLM	Sustainable Land Management
SLMP	Sustainable Land Management Project
SWA	South Waziristan Agency (Tribal Area)
UNCCD	United Nations Convention to Combat Desertification
UNCOLS	United Nations Commission on Laws of Seas
UNCSD	United Nations Commission on Sustainable Development
UNDP	United Nations Development Program
UNFCCC	United Nations Framework on Convention for Climate Change
UNECE	United Nations Economic Commission for Europe
WAPDA	Water and Power Development Authority – Pakistan
WASAs	Water and Sanitation Agencies (Provincial)
WHO	World Health Organization of United Nations
WTO	World Trade Organization of United Nations
WUAs	Water User Associations
WWF	World Wide Fund for Nature

## EXECUTIVE SUMMARY

This study reviews draft National Water Policy 2006 under “Sustainable Land Management Project – Phase-I” funded by GEF, UNDP and GoP. Review also included water resources development, management strategies and plans, its strength and weaknesses in the context of SLM, NAP, UNCCD principles and its 10-year Strategic Plan. This is done to make recommendations for mainstreaming these in Draft Water Policy 2006 and water resources development plans. Regional and developed countries experiences in relation to SLM, NAP and implementation of UNCCD were also reviewed in order to take benefit for controlling land degradation and desertification.

Review of National Water Policy, strategic documents and plans highlighted the following challenges facing water sector:

- Inefficient use of water in all sub-sectors.
- Water logging and salinity.
- Reduction in river water supply due to construction of storage dams by India in the river catchments.
- Increasing demand for water, food and power due to growing population.
- Land degradation and desertification.

Draft National Water Policy 2006 focuses on holistic development and management of water resources.

Gap analysis of draft National Water Policy 2006 indicates that policy document is donor driven and is project oriented. Instead principles and guidelines for development, conservation and management of water resources could have been included. Sustainable Management of land with reference to desertification and climate change impacts has not been given due importance in the draft water policy and strategic documents. Important phenomena of climate change and its impact on other sectors could be reflected separately.

Regional experiences of Bangladesh, India and China and international experience relating to Australia, Germany and Japan in mainstreaming SLM, NAP and UNCCD were reviewed. Following major ingredients and strategic interventions need consideration in our water sector policies and strategies:

- Desertification and land degradation information system, drought monitoring and early warning systems are fully established,
- NAP has been fully integrated into their national development plans.
- Economic value of land, investments in SLM, NAP and UNCCD are reflected in water policy documents.
- These countries are implementing their national water policies, strategies and plans under broad policy and framework for environmental management.
- Several countries have put in place their legal framework in agriculture and water management to address droughts and desertification.
- They have planned to address the problems in land use planning which is recognized as major contributing factor to land and water resources degradation.
- Climate change is considered a major environmental issue.
- These countries are mainstreaming SLM, NAP, UNCCD to address desertification and impacts of drought.

Following recommendations may be incorporated in draft National Water Policy 2006 in the context of SLM, NAP and UNCCD:

- Expand fresh water reservoir capacity as a national priority. Also develop surface water resource.
- Establish an independent Federal agency to manage and develop water resources.
- Principle of “Polluter pays the price” be strictly enforced in Pakistan.



- To enlist broad-based public support for water resources develop and launch aggressive public awareness programme about climate change and its impact.
- Sweet water is already scarce. The situation is likely to worsen with impending climatic changes. More so in Pakistan.
- Develop long-term watershed management programmes in collaboration with provinces.
- Imposition of land or agricultural tax may be considered.
- Potential of harnessing surface and underground water resources in drylands has remained underutilized. Furthermore, potential of Rod Kohi (Hill Torrents) irrigation system has not been given due attention in water policies and plans.

Therefore policies and issues related to SLM, NAP, UNCCD and climate change be appropriately described in the Draft National Water Policy to combat drought and desertification.

# 1 CHAPTER

## INTRODUCTION

Ministry of water and Power drafted National Water Policy in 2006. It is awaiting approval of the Federal Government. Purpose of this study is to critically examine water policies and plans of Pakistan, analyze their strengths and weaknesses in the context of SLM, NAP and 10-year Strategic Plan of the UNCCD and to come up with recommendations for mainstreaming these in water policies and plans.

### 1.1 Background

Pakistan's total land area is 796,100 km². The country is administratively divided into four provinces: Punjab with a population of (55.1%), Sindh (22.9%), Khyber Pakhtunkhwa (15.9%) and Balochistan (4.9%). Federally Administered Tribal Area (FATA), Azad State of Jammu & Kashmir, Islamabad Capital Territory (ICT) and newly created province of Gilgit-Baltistan are also part of land area of Pakistan. About half the land area is mountainous, narrow valleys, foothills and other areas of limited productivity. Remainder is the Indus Plain spread over 202,000 Km² Indus Basin Irrigation System, the largest contiguous irrigation system in the world, commands about 14.7 Mha. All the major hydropower stations are also located in the Indus Basin.

Indus River and its tributaries are the main source of surface water supplies to canal irrigation network in Pakistan. Length of main and distributaries exceeds 60,000 kilometers. It serves over 14.7 million hectares of cultivable command area through 100,000 outlets

in 44 main canals in the four Provinces of Pakistan. Irrigation system is designed on the principle of gravity flow, runoff river system to support subsistence agriculture at low cropping intensities of 50 to 75 percent. The existing storage capacity of reservoirs is rather small; less than 10% of mean annual river flows. Further, time distribution of river flows is uneven, as more than 70% of the flows occur during three monsoon months.

Impact of global climate change and prolonged droughts on water resources are well understood. Manipulation of dynamics of hydrological processes in watersheds across trans-boundary landscapes would also require consideration. Scarcity of irrigation water and unsustainable management of water resources in Pakistan are likely to accelerate the process of land degradation and desertification in Pakistan. Moreover, these would hamper promotion of Sustainable Land Management (SLM).

Most of the policy issues hitherto related to water, focused on hydro-power generation and consumptive use for expansion in irrigated agriculture lands which increased from 8.4 Mha in 1947 to 18.09 Mha in 2009. Potential of harnessing surface and underground water resources in drylands through small dams and rain water harvesting has almost remained under utilized. Furthermore, potential of Rod Kohi (Hill Torrents) irrigation system has not been given due attention in water policies and plans.

Existing water resources in the country are under threat due to untreated discharge of municipal and industrial wastes to rivers and other surface water bodies. Majority of population of Pakistan is exposed to the hazard of unsafe and polluted drinking water. Untreated sewage, industrial effluents, and agricultural runoff are usually released in streams or drains into rivers and sea. Polluted water poses potential risk to public health. High incidence of water borne diseases can directly be attributed to polluted waters in lakes. Other impacts of high contamination in the waters include loss of biodiversity and ecosystems, reduction in fish population and damage to soils and crops in the irrigated areas.

Consumption of water in agriculture, industrial and domestic sector is as under:

**Table 1: Consumption of Water**

Sector	Water Use (% age)
Agriculture	92
Industry	03
Domestic	05

Source: Task Force on Climate Change - 2010

Water is not considered as a “precious commodity” in Pakistan as minimal water charges are levied on the treated domestic water or on agricultural water. There is no restriction on extraction of ground water for any purposes. Therefore, conservation of water resources does not get importance it deserves. Same is the case with treatment of sewerage and industrial toxic waste. Waste water is not treated because of weak enforcement of NEQS, lack of cost effective indigenous technology and resource constraint. Moreover municipal authorities are not interested to address this problem. Treatment of sewage and utilizing treated water for agriculture and forestry purposes could be a good option for a country like Pakistan.

Since untreated wastewater is discharged into the rivers and other water bodies, quality of water resources has been degraded. Lower riparian's in Punjab and Sindh have no choices except to drink untreated water. According to WHO, 25-30% of all hospital admissions are connected to water borne diseases and 60% infant deaths are due to infected water. It has been estimated that water, sanitation and hygiene related diseases cost Pakistan economy about Rs. 112 billion per year or Rs. 300 million a day, in terms of health costs and lost earning.

## 1.2 Economic Performance of Water Sector

Agriculture represents almost 92% water withdrawal in Pakistan. Water resources development for agriculture and energy (Hydel Power) contributes very significantly to economic growth. Irrigation network contributes to nearly a quarter of the country's GDP and most of its food. Livelihood of many families and economy of the country is very sensitive to the availability of water. Growing imbalance between water supply and demand has led to shortages; regional water related conflicts between stakeholders has restrained economic development. Development of new water storages is controversial. Improving irrigation efficiency requires political will and significant investment. Poor state of government finances limits the options available to the government.

Under the climate change predictions, eventual loss of glacier storages may significantly alter available water in river Indus. Unprecedented floods during 2010, devastated life, property, infrastructure and crops in the provinces. These floods caused damage worth US\$ 43 billion. In addition thousands of villages were devastated by floods and 20 million people were displaced. Many experts attribute these floods to Climate Change.

About 45% of the working population is employed in agriculture, forestry and fishing. As reported by FAO and other UN organizations, the expected water shortages and soil degradation, may adversely effect agriculture production and national economy. Pakistan is also prone to certain types of natural disasters with significant impacts especially earthquakes, droughts and floods.

## 1.3 Existing and Future Challenges of Water Sector

One of the key issues for Pakistan is the population growth, which is responsible for restraining water resource development. Estimated human population at this time is 180 million. It is growing at an alarming rate. To feed growing population, additional lands would need to be brought under cultivation. It is estimated that 215 MAF water would be required by 2013 and 277 MAF by 2025.

The projections of water requirements, availability and shortages are given in the following table 2.

**Table 2: Future Water Requirements**

Year	Water Required (MAF)	Water Available at Farm Gate (Surface+ Groundwater) (MAF)	Shortage (MAF)
2000	149	109	40
2013	215	107	108
2025	277	126	151

Source: WAPDA (2010)

Since no additional water is available, best option for Pakistan is to improve the existing water and land resource management. Otherwise, Pakistan will be facing acute shortages of food, fiber, and edible oils in near future. We need to effectively tackle issues such as, inadequate management, inefficient operation of irrigation systems, poor water application & unequal water distribution, depletion of ground water resources, reduction in storage capacities of existing system, and wastage of summer river surpluses and slow agricultural growth.

Challenges facing water sector are:

- Inefficient use of water in all sub-sectors with greatest potential for improvement in the irrigation sub-sector;
- Low crop yields;
- Deteriorating water quality;
- Low coverage and quality of service in domestic water supply and sanitation;
- Deteriorating infrastructure in the domestic and irrigation and drainage sub-sectors;
- Overuse of water in many irrigated areas, the main cause of deterioration of water quality;
- Water logging and salinity on irrigated land and disposal of saline drainage effluent;
- River Indus downstream Kotri Barrage has virtually dried out, adversely affecting the mangrove forests;
- India has constructed storage dams in the upper catchments of river Indus, Jhelum and Chenab, resulting in reduced river flow;
- Increasing demand for water, food and power due to high population growth rate;
- Insufficient water resources for the future demands;

Sustainable management of land and water resources is essential for socio-economic development and food security in the country.

## 2 CHAPTER

# LAND AND WATER RESOURCES OF PAKISTAN

### 2.1 Land Resources

Pakistan's total land area is 79.61 million hectares. However, if Gilgit-Baltistan and AJ&K area is included the total area comes to 87.98 million hectares. Of this 20.58 million hectares are plains; 66.87 million hectares are mountainous and 0.913 million hectares under water bodies. About 21.21 million hectares are under cultivation of which about 19.40 million hectares are irrigated and remaining 1.80 million hectares are rainfed.

Following are the barriers / constraints to sustainable land management in the country:

- Policy
- Institutional
- Financial
- Socio-economic

#### 2.1.1 Land Degradation and Desertification

Pakistan is mainly a dryland country, where 80% of its land is arid and semi-arid. The livelihoods of communities in drylands depend on agro-pastoral activities. However, like many other developing countries, Pakistan is severely affected by land degradation and desertification. Causes of land degradation include: poor irrigation and drainage practices, overgrazing, deforestation, increasing competition for water, drought, migration/permanent settlement, intensification of agriculture, flooding and

population pressure.

These problems have threatened sustainability of ecosystems, and structural and functional integrity of critical ecosystem services. Situation is further aggravated by scarcity of water, frequent droughts and mismanagement of land resources, contributing to expansion of deserts and reduced land productivity leading to increased rural poverty. Besides, there are several other factors which contribute to the desertification process and are potential barriers to Sustainable Land Management (SLM): like limited knowledge, information gaps and limited institutional capacity.

Irrigated areas are infested with twin-menace of water logging and salinity. Because of mismanagement there is substantial damage to crops and property by flash floods in Suleiman Rod Kohi areas. Underground water resources in western dry mountains of Balochistan are shrinking due to little recharge, over-exploitation of the meager quantity of water for horticulture and crop cultivation. Productivity of rangelands is hampered by heavy livestock pressure. Arid coastal and mangrove areas are under increased environmental stress due to reduced fresh water flows, sewage of industrial pollution and overexploitation of natural resources.

#### 2.1.2 Issues related to Land Degradation and Desertification

Following are the key issues related to land degradation and desertification:



- Water erosion
- Wind erosion
- Deforestation
- Overgrazing
- Loss of Biodiversity
- Water logging and Salinity
- Depletion of soil fertility
- Droughts and Floods
- Socio-economic pressure

### 2.1.3 Approach to address Land Degradation & Desertification

Magnitude of land degradation and desertification problems in Pakistan is so vast and complex that it requires programmatic approach to enhance land productivity, alleviate rural poverty, and remove key barriers to sustainable management of land resources. The Government of Pakistan (GoP) has launched Sustainable Land Management Programme to combat desertification in collaboration with the Provincial governments. This programme is jointly funded by Global Environment Facility (GEF), United Nations Development Programme (UNDP), and GoP. It is being implemented in two phases. Phase-I is focusing on addressing policy, institutional, and knowledge barriers, and implementation of 9 pilot projects in different agro-ecological zones to test SLM practices. While Upscaling Phase will focus on replicating best SLM practices at larger landscape through integrated management of land and water resources.

On-going SLM project has the following components:

- Creation of enabling environment for mainstreaming SLM principles
- Building capacities for SLM
- Mainstreaming SLM into land use planning
- Participatory pilot projects for demonstration of best SLM practices
- Adaptive management, documentation of lessons learnt and best practices

## 2.2 Water Resources

A host of multi-faceted factors restrain performance of water sector that ultimately reflects on sustainability of agriculture and environment. Major issues facing water management include physical constraints, financial inadequacies, institutional issues and environmental degradation particularly water-logging and salinity. The following table illustrates the water resources situation in the country.

**Table 3: Scenario of Water Resources**

Surface Water Resources	Annual Water Flow (MAF)
Water available at canal heads (1947)	67
Water available at canal heads (1960)	85
Rim station flow	147
Water diverted to canals	106
Water flow to the sea	32
Losses in the river system	8.6
Ground Water Resources	MAF
Recharge to groundwater	55
Recharge to groundwater within canal command	48
Groundwater pumping	39

Source: WAPDA (2010)

Some of the key water-related issues identified under this study are:

- Low efficiency –40% efficiency of IBIS.
- In-equitable water distribution within the canal commands.
- Poor Macro Water Management.
- Lack of coordination between suppliers and end-users.
- Delivery not compatible with cropping patterns.
- Un-used floodwater and runoff from hill torrents causing serious land erosion problems.
- Water-logging and salinity.
- Poor water resource management in Rod Kohi and Barani areas.

### 2.2.1 Surface Water

River Indus and its tributaries (Jhelum, Chenab, Ravi, Sutlej and Beas Rivers on the east and Kabul on the west), draining an area of 586,802 sq. km, are the main source of 151.58 MAF surface water in Pakistan. This includes 143.18 MAF from Western rivers (Indus, Kabul, Chenab and Jhelum) and 8.40 MAF from the Eastern Rivers (Ravi and Sutlej). Water in Eastern Rivers includes inflows from India as well as those generated within Pakistan. Average contribution from the flows generated within Pakistan is about 3.99 MAF. Allowing for a potential reduction in inflows from the Eastern Rivers due to increased utilization by India, the long-term total surface water availability in Indus Basin is estimated at 147.17 MAF.

In addition to the Indus there are several smaller basins which can be grouped into two main hydrologic units in Balochistan, namely the Kharan Desert, which is a closed basin, and Makran Coastal Basin, which flows

to the sea. Rivers in Makran basin have an average flow of about 3.0 MAF, which could be harnessed for use on 2.78 Mha. Rivers in Kharan Basin have an average inflow of 0.79 MAF, which could be used, on 1.06 Mha. Some flood irrigation is practiced based on these inflows. These Rivers carry a high sediment load, exacerbated by large scale watershed degradation.

**Table 4: Actual Surface Water Availability (MAF)**

Period	Kharif	Rabi	Total
Average System Usage	67.1	36.4	103.5
2003-04	65.9	31.5	97.4
2004-05	59.1	23.1	82.2
2005-06	70.8	30.1	100.9
2006-07	63.1	31.2	94.3
2007-08	70.8	27.9	98.7
2008-09	66.9	24.9	91.8
2009-10	67.3	26.0	93.3

Source: IRSA (2010)

**Table 5: Ground Water Balance**

Parameters	Punjab	Sindh	Khyber Pakhtunkhwa	Balochistan
Recharge Component (MAF)				
Rainfall Recharge	9.90	1.96	0.87	1.21
Recharge from Canal System	21.70	6.76	1.00	0.29
Return flow from Irrigation	7.08	8.58	1.02	0.37
Domestic and Industrial return flows	0.57	-	-	-
Other return flows	-	0.79	0.13	0.08
Recharge from Rivers	3.50	0.30	0.13	0.18
Total	42.75	18.39	3.15	2.13
Discharge Components (MAF)				
Groundwater Abstraction (Private, STWs, and PTWs)	31.50	3.49	1.77	0.45
Groundwater Abstraction (Domestic and Industrial)	2.50	-	-	-
Non-beneficial ET losses	8.75	13.75	0.24	1.13
Sub-surface Outflow/change in GW	-	-	0.90	0.41
Base flow to Rivers	-	1.15	0.24	0.14
Total (MAF)	42.75	18.39	3.15	2.13

Source: ACE and Halcrow Consulting Limited (2001)

### 2.2.3 Water Resources Management and Conservation

Annual flow in the Indus Basin System on an average is 142 MAF below rim stations. However, there are wide variations in surface water flows during wet and dry years. Highest availability of surface water in the Indus basin has been recorded at 186 MAF and lowest at 91 MAF. Because of snowmelt and monsoon, large quantity of water is availability during summer. As a result, rivers in Pakistan swell rapidly, resulting in

### 2.2.2 Ground Water

Several studies have estimated available ground water. These vary from 45.6 MAF to 53.3 MAF, with an average of 51.1 MAF. Abstraction of groundwater for irrigation, and for urban & rural drinking water supplies is estimated about 41.6 MAF. While these figures may suggest some potential for further exploitation, these are based on little monitoring of resources or abstraction and should be treated with caution. Other evidence, such as increasing salinity of groundwater in many areas and declining water levels in others, suggests that there is little, if any, further potential for groundwater exploitation. The strategy has assumed only 1 MAF of additional groundwater will be successfully exploited.

Associated Consulting Engineers and Halcrow during 2001 prepared an estimate of groundwater recharge and discharge in their interim report of the study on exploitation and regulation of fresh groundwater which is given below:

about 82% of water flows during summer months. Low rainfall occurs during winter. Snowmelt is nominal or non-existent during this period. As a result, rivers are mere creeks and many of them even dry up. Surface water flows during winter months are only 18% of the annual flows.

Water conservation and increase in the productivity or value of water are not an alternative as much as an imperative, since no amount of infrastructure investment is likely to make Pakistan or Indus Basin

system water abundant. Water conservation is strongly linked to efforts to solve the chronic problem of low productivity of water. There is considerable experience of water conservation – watercourse lining and land leveling – progress and experience on raising productivity of water use, improving water course maintenance.

Storage capacity of reservoirs is decreasing year-by-year due to sedimentation. This can be controlled through watershed management practices in the catchment of rivers. Additional water can be generated by harvesting and storing hill torrents runoff.

2.2.4 Water Diversions from the River System

Irrigation network in Pakistan diverts 106 MAF of surface water. This system results in huge delivery losses both in canals and in watercourses. Net water supply at farm gate on an average is 62 MAF. Total irrigated area in Pakistan is about 18 million hectares. Most of this is in the Indus Basin.

2.2.5 Current Supply Situation

Pakistan has experienced a prolonged drought over past 4-5 years. Rainfall is erratic and scanty. Rivers flow at a subsided level. Water in Tarbela dam reaches the dead level almost in late February or early March each year. March and April are most crucial months. This is the time when water is badly needed for maturing wheat crop in Punjab and for sowing of cotton in Sindh. Availability of water during this period from reservoirs has generally exhausted and is mainly dependent on surface water flows which are lowest during this period. To meet shortages of water, sub soil water is exploited. Pakistan exploits about 48 MAF from the sweet subsurface water aquifer. This is at a huge cost in the shape of investments in energy (electricity/diesel bills), adding to the cost of production. This increase in cost of production of crops is not generally compensated proportionality by increase in output returns. This makes the growing of crops under such irrigation scheme, a fragile and marginalized farming practice. For distribution of water among provinces and to share the shortages, an Indus River System Authority (IRSA) has been setup in Pakistan. Current reservoir capacity is rapidly silting up and live capacity has been reduced to 14 MAF. There is growing resentment amongst provinces against IRSA on the issue of distribution of water. Downstream provinces generally blame the upstream provinces for theft of water. To build confidence, a telemetry system has been installed on major water bodies to gauge alleged

downstream/diverted water. In coming decades, water availability from the existing reservoirs would decrease considerably. Therefore there is need for building new water storage dams. There is lack of consensus among provinces on the sites of new proposed dams.

2.2.6 Investments in Water Sector

Little investment in mobilization of additional water supplies for irrigation and expansion of irrigated areas has been made during last two decades. Recent drought has exposed vulnerability of the vast Indus Basin Irrigation System and environmental issues in lower riparian and delta. Need for additional storage to improve and increase supply and provide greater operating flexibility has been felt. However, supply options are increasingly costly and approaching their physical limits and demand management (efficiency, productivity, pricing) has received little attention. Among the supply options, ground water development is already nearing its practical limits, water conservation may be able to add about 10-15% to total supply through improved efficiency of existing irrigation system which is reported to be 40%. WAPDA vision 2030 may improve situation slightly but with diminishing reliability. Till to-date efforts have been on solving water problems by focusing mainly on the supply side of the equation. Demand side – water delivery and use efficiency, governance, water pricing, rehabilitation and modernization of infrastructure and improved operation and maintenance (O&M), incentives for wise and productive use of water is being focused currently.

In order to ensure food security and produce surplus for export, water resources development and management in future need to be focused. This would require balanced approach to supply and demand management coupled with management of investment in water infrastructure and management. Expansion in infrastructure and water supply is felt necessary for poverty alleviation in rural areas. In the first instance, scant rainfall needs to be harvested and conserved in the barani areas. Limited summer rains offer few opportunities for a good crop production. Incentives be offered to individuals to construct small water storage dams. Such dams would facilitate ground water recharge. This water can be utilized during period of shortages.

Persistent low cropping intensity in both Rabi and Kharif seasons, high proportion of landless and small farmers likely to benefit from irrigation expansion or intensification and high rate of population growth support that water supplies, irrigated areas and the productivity of scarce water supplies should be increased. Rod Kohi/hill torrents currently are irrigating

about 0.7 million hectares. Water flows out of hills at high velocity, damaging crops farm households/property. It also removes fertile topsoil. Pakistan has neglected to tame the creeks generating hill torrents. There is a potential to irrigate 2 million ha of agricultural land and this would need an investment of Rs. 5 billion.

Table 6: Potential for Water Resources Development

Water Sources	MAF
Surface water reservoirs (Kalabagh, Basha, and Dassu)	17
Surface water reservoirs (12 small dams sites proposed)	16
Water lost in canals and distributaries	21
Water lost in minors	5
Water lost in water courses	15
Ground Water	9
Sub Total:	83

Source: WAPDA (2010)

2.2.7 Water Management Program

On-Farm Water Management Program was launched during early 1970s included activities such as lining of watercourses, precision land leveling, installation of high efficiency irrigation system and harvesting of rainfall in barani areas. Performance of this program was reported satisfactory especially by Water User Associations.

2.2.8 Interventions for Improvement of Water Productivity

Following suggestions are made for improvement of water productivity in agriculture as a major user of water resources.

- Farmer’s Training
- Precision land leveling/Laser land leveling
- Reduce Tillage/Resource conservation cultivation
- Raised Bed Cultivation
- Rain Water Harvesting (Barani areas/Rod Kohi)
- Drip and Trickle Irrigation Systems
- Sprinkler Irrigation System
- Watercourse Lining and Improvement
- Water Storage Reservoirs
- Demonstration centers
- On-Farm Drainage

Pakistan has so far undertaken a few small-scale irrigation projects although there is urgent need to go for large-scale reservoirs. Since construction of new

dams takes almost a decade, it appears that in view of the changes in climate and lack of undertaking major water projects both for capacity building and conservation of resources more difficult times are envisaged. Water will become scares for agriculture, drinking purpose and for the growing industry, thus posing serious threats to food and economic security in the country. Solution to this difficult situation is immediate construction of large-scale water storage dams. Also adopt construction measures like efficient agronomic practices, pressurized irrigation systems like sprinkler/drip.

2.2.9 Water Resources Institutions

Water Resources Institutions dealing at the Federal level are: (i) Ministry of Water & Power, (ii) Chief Engineering Advisor / Chairman Federal Flood Commission, (iii) Water and Power Development Authority (WAPDA), (iv) Commissioner for Indus Water, (v) Planning & Development Division, (vi) Ministry of Finance and Economic Affairs, (vii) Ministry of Food Security and Research (viii) Ministry of National Disaster Management, (ix) Capital Development Authority (CDA) and (x) Public Works Department of FATA and Gilgit-Baltistan.

Water Resources Institutions at Provincial level are: (i) Irrigation and Power Departments, (ii) Provincial Irrigation and Drainage Authorities (PIDAs), (iii) Planning & Development Departments / Boards, (iv) Agriculture Departments, (v) Environmental Protection Agencies (Department in Punjab), (vi) Physical Planning & Housing Department (Punjab) and Public Health Engineering Departments (other provinces) and (vii) Labor Departments.

At urban level, Water Resources Institutions are: (i) Karachi Water and Sewerage Board, (ii) Water and Sanitation Agencies (WASAs), Lahore, Rawalpindi, Faisalabad, Multan and Gujranwala Development Authorities, and (iii) Town Committees and Municipal Committees.

NGOs in Pakistan dealing with water resources development and management are: (i) World Conservation Union (IUCN), (ii) Irrigation Water Management Institute (IWMI), (iii) World Wide Fund (WWF), (iv) Agha Khan Rural Support Program (AKRSP), and (v) National Rural Support Program (NRSP).

# 3 CHAPTER

## REVIEW OF NATIONAL POLICY DOCUMENTS, STRATEGIES AND PLANS

Government of Pakistan has drafted a National Water Policy 2006. The document encompasses water resources development, irrigated agriculture, water rights, allocation and distribution of irrigation water, participation of stakeholders, drought and water quality issues. However this document has gaps in relation to potential of Hill Torrents (Rod Kohi), Small Dams, rain harvesting and impacts of climate change on natural resources. Issues of land degradation and desertification need adequate mention. There is need to upgrade the document in light of guidelines issued by the UNCCD for remedial measures for affected areas and vast potential of Hill Torrents (Rod Kohi System) in Pakistan.

Review of the national water policy document, strategies and plans in relation to SLM, NAP and UNCCD is as under:

### Surface Water

Objectives of water sector development in the National Plans include:

- Overcoming scarcity of water through augmentation and conservation.
- Restoring productivity of agricultural land through control of water logging, salinity and floods.
- Managing quantity and quality of drainage effluent in an environmentally safe manner.
- Groundwater management through tube well

transition, aquifer monitoring and management etc.

- Implementing an integrated flood control and management program.
- Promoting beneficiary participation in development initiatives.
- Enhancing performance of water sector institutions and implementing effective O&M mechanisms through institutional reforms, private sector participation and capacity building.

### Policy/Strategy Gaps

Impact of climate change on surface water resources is missing as a major issue of water resources availability. Issue of frequent floods, droughts and sustainable land management of land resources needs special mention and approach in the context of NAP and UNCCD.

### Drought Management

Droughts are frequent events specifically in arid and semiarid regions in which a major part of Pakistan is located. In Pakistan droughts are particularly devastating in Balochistan, Thar Desert, Thatta and Dadu districts in Sindh, and Cholistan Desert, Bahawalpur and Rahim Yar Khan Districts in Punjab.



A Drought Management Plan (DMP) is an essential tool for government to ensure that appropriate institutional and legal structures are in place prior to the onset of drought conditions and that necessary action is well-thought out in advance. DMP has to be tailored to the specific requirements of a river basin. For Pakistan two types of DMPs would be required separately; one each for Indus River Basin and the Hill Torrent Basins. Plans also need to take into account climate change, which may mean an increasing prevalence of droughts.

To improve the situation under drought conditions, there is need to:

- Encourage development and dissemination of water conservation technologies for rainfall harvesting in non-irrigated areas.
- Plan and expedite measures to carry surplus river flows through diversion and other structures to drought-prone areas.
- Consider seriously need for construction of carryover storages which is the only effective way of overcoming drought year(s).
- Encourage and support Meteorological and other Departments/Agencies to carrying out research work in reliably predicting droughts (in terms of several months or even a year ahead). So that feasible counter-measures can be taken timely through modified releases from reservoirs and other water management strategies. Research should aim at developing appropriate mathematical models.
- Encourage and support provinces to prepare Drought Management Plans (DMPs) for different drought prone areas.

### Wetlands, Ecology and Recreation

Protection and restoration of natural environment and its biodiversity including wetlands, mangroves, national parks and river ecosystems be a part of all future development and management strategies. All agencies responsible for planning, design, implementation, operation and maintenance of water resource developments have to be responsible for enhancing and protecting environmental assets. A review of existing environmental legislation (1997 Act, 1994 NEQS) indicates that the law is generally punitive in nature.

Towards this end, there is need to:

- Adopt an effective National Wetland Management Plan to ensure that endangered habitats are registered, monitored and managed according to the overall needs of wetland species. Detailed Wetland Survey be carried out in order to define

the resources presently available, and identify incipient or future changes likely to occur as a result of current trends and anticipated future development.

- Strengthen existing regulations for the protection of public health and environment. Enforce the principle of “polluter pays”.
- Promote afforestation, re-afforestation, soil conservation and improvement in land use of the catchments of storage reservoirs.
- Minimize downstream as well as upstream environmental impacts, and embody appropriate measures as a part of the design of reservoirs and other development works.
- Ensure that sufficient fresh water flows through the rivers to the sea to maintain a sound environment for conservation of the coastal ecosystem. Environmental concerns be addressed while framing “release of water rules” from the major storage dams for hydropower and irrigation. Such water flows would help maintain eco-balance in the Indus Delta.
- Promote development of natural water bodies, where ever possible, for recreational use.
- Ensure sufficient water availability for sustainable inland fisheries.
- Review existing environmental legislation (1997 Act, 1994 NEQS) and incorporate incentive clauses if feasible.
- Promote programs for raising public awareness and community education about environmental concerns.
- Analysis of draft water policy document indicates that a number of policy measures relating to SLM, NAP and UNCCD have been already undertaken as part of various sectoral programmes and projects in the country.

### 3.1 National Commission / Task Force on Water

Ever since independence, water sector has remained of importance to Pakistan. Situation became critical, when exclusive water use of three eastern rivers Ravi, Sutlej and Beas was given to India. Internally provinces and agencies have been feuding over allocation, development and management of water. A number of commissions have been setup under the Chief Justices of Supreme Court of Pakistan to look into the issue and make recommendations. The commissions were;

- Anderson Water Commission (1935)
- Rao Water Commission (1939)
- Akhtar Hussain Water Commission (1968)

- Fazale Akber Water Commission (1970)
- Anwar-ul-Haq Water Commission (1981)
- Haleem Water Commission (1983)
- National Task Force on Climate Change (2008)

Due to non-implementation of the recommendation of National Commission on water distribution between Provinces, a consensus at national level could not be developed to construct storages on Indus Basin and that created scarcity of fresh water resources in the country, impacting both land and water resources.

### 3.2 National Polices

Important national polices formulated by Government of Pakistan are discussed as under:

#### 3.2.1 Draft National Water Policy – 2006

Water has always played an important role in the economic development of Pakistan and is likely to continue as such in the future. However, support for development initiatives in the water sector has suffered from lack of a consolidated National Water Policy.

Main objectives of the Draft Water Policy 2006 are as under:

- Efficient management and conservation of existing water resources.
- Optimal development of potential water resources.
- Encourage private sector participation and community involvement in the water sector development.
- Promote equitable water distribution in various areas and canal commands.
- Effective measures for replenishing declining ground water levels in low-recharge areas.
- Strengthen institutions and agencies responsible for development, planning and design of water resources and provision of service delivery across the water sector.
- Develop data information base and network for all water related information.
- Increase public awareness and understanding of water issues.
- Enhance water storage facilities for conservation of surface and run-off water as a drought mitigation strategy.
- Encourage water conservation technologies for rainfall harvesting in non-irrigated areas.
- Promote rehabilitation of degraded upland watersheds to ensure sustainability of water resources.

- Devise effective mechanisms to prevent water pollution in rivers, surface water bodies and groundwater.
- Promote hydropower development to meet energy shortages in the country.
- Minimization of water logging, salinity and other environmental hazards in irrigated areas and safe disposal of saline agricultural drainage.
- Improved flood control and protective measures.

Detail analysis of the policy gaps in the draft National Water Policy 2006 is given in the Chapter 5 of this report.

#### 3.2.2 National Agricultural Policy – 1991

Agriculture is the single largest sector of the economy. It contributes 24 percent of the GDP, employs 48.4 percent of country's workforce and is a major source of foreign exchange earnings. About 68% of population lives in rural Pakistan and depends upon agriculture for sustenance. Major crops like wheat, cotton, rice, sugarcane and maize account for 41% of value added, and minor crops account for 10% in overall agriculture. Livestock has emerged as an important sub-sector of agriculture. It accounts for 37.5% of agriculture value added and about 9.4% of the GDP. Similarly, fisheries play an important role in national income through export earnings.

Water conservation and increase in the productivity or value of water are not an alternative as much as an imperative since no amount of infrastructure investment is likely to make Pakistan or Indus Basin system water abundant. Water conservation will help Pakistan to overcome the scarcity of water during droughts. There is considerable experience of water conservation in the country. However, there is an urgent need of organizing farming community to adopt water conservation technologies and low delta crops.

Current canal water distribution is wasteful as 60-65 % of the water available at the canal head is lost through seepage, evapo-transpiration, before it reaches root-zone. Current irrigation methods and practices are wasteful. There has been little progress in introducing modern technology (low pressure pipe, drip/trickle, and sprinkler systems). Only a little progress has been made in land leveling, an important approach to improve irrigation efficiency. Farmers have appreciated this approach. Various estimates put the potential savings from current supply at about 10-15 MAF – primarily by lining of water courses and proper land leveling under On Farm Water Management (OFWM) projects of province(s). Challenges are daunting. Only about



32% of all watercourses have been renovated. Many of renovated watercourses have since deteriorated because of lack of maintenance.

Review of the National Agriculture Policy 1991 indicates that impact of climate change on water availability for agriculture, cropping patterns, reduced field crops as a result of rise in temperature and adoption of climate resilient SLM practices have not been adequately covered. These need to be incorporated in the National Agriculture Policy which is under the formulation stage.

3.2.3 Agriculture Perspective and Policy – 2004

Agricultural Perspective and Policy, 2004 prepared by the then Ministry of Food, Agriculture and Livestock provides for the management of degraded lands and strategies for the control of desertification in Pakistan. It also contains updates on implementation of UNCCD and NAP in Pakistan, control of salinity and sodicity, water-logging, control of erosion in the mountains, foothills and river plains. This policy document also lays down strategies for the control of wind erosion in Thar, Cholistan and Kharan deserts through measures such as control of grazing, sand dune stabilization, Check dam construction, growing shelter hedges around cultivated fields and use of new technologies to control soil erosion.

3.2.4 National Forest Policy – 2009

Pakistan has revised its National Forest Policy (NFP) and is under consideration of the Federal Cabinet for adoption. The policy highlights the need to conserve and develop Renewable Natural Resources (RNR), including forests, watersheds, rangelands, wildlife, and its habitat. It seeks to launch a process of eliminating the fundamental causes of depletion of RNR through active participation of concerned agencies and stakeholders to realize sustainable development of the land resources. NFP is an umbrella policy which provides guidelines to the provinces and districts to draft their own policy. Key policy thrusts of the proposed National forest policy are:

- Reducing impact of socio-economic causes
- Reducing political interference in the Forestry & Wildlife Departments
- Renovating and invigorating institutions of RNR
- Supporting local governments in the sustainable development of their RNR
- Preparing and implementing policies for fragile

Eco-systems

Review of the National Forest Policy indicates that SLM, NAP and UNCCD have been placed strongly in the forest policy. Recommendations on watershed management and land degradation, UNCCD guidelines on combating desertification and drought have been explicitly covered in the policy document.

3.2.5 National Environment Policy – 2005

Pakistan has adopted its first ever National Environment Policy in July 2005. The policy aims “to protect, conserve and restore Pakistan’s environment in order to improve the quality of life of people of Pakistan through sustainable development”. The main objectives of the policy are: (1) conservation, restoration, and efficient management of natural resources, (2) integration of environmental considerations in policy making and planning processes, (3) capacity building of government agencies and other stakeholders, (4) meeting international obligations effectively, and (5) creation of a demand for environment protection through mass awareness and community mobilization.

Many of the policy guidelines are in line with Pakistan’s NAP as well as requirements under the UNCCD. The policy calls for “development of strategies and programs to tackle desertification in line with NAP and to establish a National Desertification Control Fund” (GoP 2005). There are Specific provisions relating to environment protection and SLM principles which have been incorporated in the policy and these need to be reflected in the national water policy documents and development plans.

3.2.6 National Drinking Water Policy – 2009

In September 2009, Pakistan approved its 1st National Water Drinking Policy which aims to provide adequate quantity of safe drinking water to the entire population in an equitable, efficient and sustainable manner. Only 21.4% of population has easy access to clean and safe drinking water. Highlights of the new policy:

- Access to safe drinking water is a basic human right of every citizen and it is responsibility of the state to ensure its provision to all its citizens’ right of water for drinking takes precedence over rights for water for all other uses such as environment, agriculture, industry, etc.
- Provide a supportive policy framework that encourages alternate options thru private provision, public-private partnerships, role of NGOs and community organizations.

- State must balance its function as service provider and regulator.
- Ensure participation of women in decision-making. Introduce financial viability through levying appropriate water charges and cost recovery.

Review of the drinking water policy indicates that provision of adequate drinking water supply to human beings and livestock shall be the first priority on any available water source. As such the policy is in line with provisions of the NAP under UNCCD.

3.3 Water Sector Legislation

Water is a federal subject in Pakistan. However, with the exception of national distribution of water through the Indus River System Authority (IRSA), provinces mainly administer the water sector. There are several laws and regulations enacted to manage water, which provide the required authority and powers to manage water sector. However, there is need to review the existing laws in the context of providing Integrated Water Resource Management (IWRM) in the country. The most significant laws and regulations are briefly

described below.

3.3.1 National Legislation

Following are the federal laws dealing with water sector:

Table 7: Main National Legislation Related to the Water Sector

Enactment	Year	Responsible Agency
Pakistan Penal Code (Act XLV of 1860)	1860	Federal Government
West Pakistan Water and Power Development Authority Act	1958	Federal Government
The Indus Water Treaty	1960	Federal Government
The Constitution of Islamic Republic of Pakistan	1973	Federal Government
On Farm Water Management Water Users Association Ordinance	1981	Federal Government
Water Apportionment Accord	1991	Federal Government
Indus River System Authority Act	1992	Federal Government

3.3.2 Provincial Legislation

Table 8: Main Provincial Legislation Related to the Water Sector

Enactment	Year	Responsible Agency
The Canal and Drainage Act	1873	Punjab Irrigation Department
Sindh Irrigation Act	1879	Sindh Irrigation Department
Punjab Minor Canal Act	1905	Punjab Irrigation Department
NWFP Amendment Act	1948	Khyber Pakhtunkhwa Irrigation Department
Balochistan Canal and Drainage Act	1980	Balochistan Irrigation Department
Soil Reclamation Act	1952	All Irrigation Departments & WAPDA
Balochistan Ground Water Rights	1978	Department of Irrigation Balochistan
Punjab Water Users’ Associations Ordinance	1981	Punjab Agriculture Department
NWFP Water Users’ Associations Ordinance	1981	Khyber Pakhtunkhwa Agriculture Department
Balochistan Water Users’ Associations Ordinance	1981	Balochistan Agriculture Department
Sindh Water Users’ Associations Ordinance	1982	Sindh Agriculture Department
Rural Area Drinking Water Supply Act	1985	Khyber Pakhtunkhwa Irrigation Department
Salinity Control and Reclamation of Land Ordinance	1987	Khyber Pakhtunkhwa Irrigation Department
Balochistan Water and Sanitation Ordinance	1988	Balochistan Water and Sanitation Authority
Punjab Irrigation and Drainage Authority Act	1997	PIDA
Sindh Irrigation and Drainage Authority Act	1997	SIDA
Khyber Pakhtunkhwa Irrigation and Drainage Authority Act	1997	KPIDA
Balochistan Irrigation and Drainage Authority Act	1997	BIDA
Pakistan Environmental Protection Act	1997	Federal / Provincial EPAs / EPD Punjab
IEE and EIA Regulation – 2000	2000	Federal / Provincial EPAs / EPD Punjab
Community Irrigation Farmer Organizations Regulations	2001	Balochistan Irrigation and Drainage Authority
Local Government Ordinances	2002	Local Government and Rural Development
River Protection Ordinance	2002	Khyber Pakhtunkhwa Irrigation Department

The review of water related legislation indicates that although adequate provisions to check mismanagement of land and water resources are existing but there is need to strengthen the legislation in terms of impending impacts of Climate Change. Provisions for disaster management need to be incorporated in the water sector legislation.

### 3.3.3 International Conventions and Protocols

Following international conventions and protocols are related to water sector:

#### The UNECE Water Convention – 1992

This is a convention on the protection and use of trans-boundary watercourses and International Laws. The convention obliges parties to prevent, control and reduce water pollution from point and non point sources.

#### Protocol on Water and Health – 1999

Under the convention, protocol on water and health, adopted in London 17 January 1999, but became operational in August 2005. It is the first international convention of its kind adopted specifically to attain an adequate supply of soft drinking water and adequate sanitation for everyone and effectively protect water as source of drinking water.

#### Protocol on Civil Liability – 2003

This was adopted in Kiev, Ukraine on May, 2003. This involves all actors of water use, government, private sector, and non government organizations. This is for trans-boundary damage caused by hazardous activities.

#### Convention on the Law of the Non Navigation Uses of International Water – 1997

This is a convention on the protection and use of Trans-boundary Watercourses and International Lakes.

#### International Commission on Irrigation & Drainage (ICID) – 1950

The Commission is a scientific, technical and voluntary, non Government Organization dedicated to enhance the worldwide supply of food and fiber for all people by improving water and land management of water.

#### International Commission on Large Dams (ICOLD) – 1928

This organization leads the profession in ensuring that dams are built safely, efficiently, economically and

without detrimental effects on the environment.

#### The Ramsar Convention on Wet Lands – 1971

This provides framework for national action and international cooperation for the conservation and wise use of wet lands and resources.

#### United Nations Convention to Combat Desertification (UNCCD) – 1994

The objective of this convention is to combat desertification, land degradation and drought by adopting Sustainable Land Management practices.

#### UN Watercourses Convention – 1997

A global legal framework that establishes basic standards and rules for cooperation to protect international watercourses.

#### Kyoto Protocol – 1997

United Nations Framework Convention on Climate Change (UNFCCC) – International Treaty to Control Global Warming.

#### International Court of Justice – 1945

It is the primary Judicial Organ of UN to settle legal disputes submitted to it by states and to give advisory opinion to legal questions of UN body.

#### UN Convention on Laws of Sea (UNCOLS) – 1982

Provide guidelines for fixing limits of the sea boundary.

#### UN Commission on Sustainable Development (UNCSD) – 1992

To monitor report of the earth summit

#### World Water Commission on Dams – 1998

Financed by aid agencies to look at the good the bad and the ugly impacts of dams around the world

There are adequate provisions for SLM, NAP and UNCCD in the water related international conventions for which Pakistan is also a signatory but the progress on implementation is very slow on account of inadequate follow-up and financial resources.

## 3.4 Strategies for Water Sector

Development planning for water in Pakistan should put more emphasis on increasing water productivity, control of water-logging and salinity, water conservation, involvement of water users in the decision making process and control of adverse impacts of climate

change on availability of water for different uses. Strategies for water sector should include principles of sustainable land management, NAP and UNCCD.

Strategies for managing water resources are as follows:

- Prepare and adopt a national water policy and action agenda, based on a national water sector assessment.
- Form a sector apex body and water law and strengthen information and other institutions.
- Invest to manage the country's priority river basins, including development of physical infrastructure, institutions and capacity building and particularly construction of large reservoirs including carry over storages.
- Increase the autonomy and accountability of service providers in the water supply and irrigation sectors.
- Develop incentives, regulations and awareness for sustainable water use.
- Manage the use of shared water resources and develop cooperation between and within countries.
- Enhance water information, consultation and partnerships.
- Investment in non-conventional water resources such as rainwater harvesting and development of hill torrent irrigation systems (Rod Kohi) on most modern lines.

### 3.4.1 Pakistan National Conservation Strategy

Pakistan National Conservation Strategy (NCS) reviews Pakistan's socio-economic development within overall context of environment. The NCS began with a two-year start-up phase, followed by three years of preparation, during which a strategy document was prepared, reviewed, revised and submitted to Cabinet for approval. Pakistan's NCS was approved by cabinet in March, 1992, and has been regarded as one of the most comprehensive documents. Main implementation phase was launched with a donor conference in January 1993, although partial implementation began in 1991, with allocations in the federal budgets of 1991-92 and 1992-93. The strategy has been commonly referred to as more than just a product, but a process based on a participatory methodology that had the net effect of creating an "environmental movement" within Pakistan, committed to implementing its goals and objectives. This development is key to the central tenet of the NCS, which postulates that documents and policies do not make change, only people do.

### 3.4.2 Water Vision 2030

Water vision 2030 prepared by the Planning Commission envisages mega program including development of 64 MAF of storage capacity with an investment of US\$ 50 billion over next 25 years in three phases. Phase-1 comprises fast track projects to be completed in first 5-7 years (2002-2006). This includes construction of Gomal Zam Dam, Mirani Dam, Greater Thal Canal, Kachhi Canal, Raineer Canal, Raising of Mangla Dam and Satpara Dam. These dams would add about 5 MAF and bring more than 0.8 million hectare of land under cultivation besides generating 332 M.W of power. Feasibility studies for Basha Dam, Kurram Tangi Dam are underway. Detailed design of Sehwan Barrage and Chashma 1st lift project would also be started. Phase-II include Basha Dam on Indus with 5.70 MAF storage capacity and power generation 3360 MW, Sehwan Barrage on Indus with 0.65 MAF storage capacity Phase-II of Thar Raineer Canal in Sindh, Phase II of the Greater Thal Canal and a high Dhoke Pathan and combined storage from Sanjwal and Akhori Dams in Punjab. Phase-III would include Kalabagh Dam with Storage capacity of 6.10 MAF, Yugo Dam on Syhok River in Northern Areas with 9.82 MAF capacity, Skardu Dam with 15-52 MAF capacity and Kalan Dam on Swat River.

### 3.4.3 National Action Program NAP – 2002

NAP, identifies the factors contributing towards desertification in Pakistan and suggests measures and strategy using an integrated and coordinated bottom up approach to combat desertification and mitigate effects of drought. Main program areas relating to water sector in NAP are increased water use efficiency, rehabilitation and reclamation of saline / sodic soils, improvement of on-farm drainage water conservation and rain water harvesting. NAP also addresses the effects of droughts in Pakistan. However, progress of implementation of NAP is slow and would require inter-agency cooperation for joint programming and implementation.

### 3.4.4 National Policy and Strategy for Fisheries & Aquaculture Development 2006

Five Year Plans have been prepared in past for medium term planning. A separate committee for fisheries was constituted for the preparation of these plans and its recommendations accommodated. However, none of the five year plans have catered for many of the broad issues faced by those in the fisheries and aquaculture sectors.



### 3.5 Plans

#### 3.5.1 Eighth Five Year Plan (1993-98)

This Plan ended up in achieving far less than proposed development targets, dealt with the issues of sustainable environment and management of water resources. Efforts were made for improving environmental legislation and enforcement of National Environmental Quality Standards (NEQS); initiating Environmental Impact Assessment (EIA) procedures for public and private investments, and incorporating more environment-related investments in all development expenditures. The Water Resources Development component of the Plan included a specific objective of protecting land and infrastructure from water-logging, salinity, and floods. Strategies adopted for achieving the objective were neither comprehensive nor integrated and water logging, salinity, and floods, thus, continued to affect the poor and vulnerable sections of the society.

Federal Government in their review of MTDF for 2005-10 has indicated the following challenges for irrigation / water sector at national level:

- Low water storage capacity and its continuous deterioration due to reservoir sedimentation.
- Impartial assessment of optimal downstream Kotri outflow to the sea and national consensus on building of new reservoirs and water distribution.
- Low overall irrigation efficiency and inefficient water use at the farm level.
- Excessive extraction of groundwater and use of poor quality water for irrigation.
- A national water quality management program to monitor quality and enforce standards for disposal of effluent discharge into rivers lakes, and streams.

#### 3.5.2 Ten Years Perspective Development Plan 2001-2011

In September 2001, the Government approved Ten Year Perspective Development Plan 2001- 2011. This Plan includes the Policy Guidelines for development of all sectors including water sector.

Ten Year (2001-2011) Perspective Plan recognizes the need for development of water resources and increased hydropower. The Plan comprises a macroeconomic framework, a public sector development program and sectoral strategies including those for water, agriculture, energy (including hydropower), the environment and other sectors of the national economy. Ten Year Plan encompasses WAPDA's comprehensive integrated

water resource and hydropower development Mega-plan, 'Vision-2030' for development of additional storage capacity and hydropower generation.

#### 3.5.3 Forestry Sector Master Plan 1992

Pakistan has adopted its first 25-year (1993-2018) Forestry Sector Master Plan (FSMP) in 1992. The plan addresses policy issues and highlights needs for sustainable land management, controlling land degradation, protecting environmental values and alleviating poverty from rural areas. FSMP provides strategies for conserving soil and water resources, protecting watersheds, improving rangelands, and involving local communities in natural resources management. It also outlines a program for sand dune stabilization and strengthening research in these areas. It also identifies the social, economic, and physical causes of depletion of forest resources in the country and focuses on key areas, including soil conservation, watershed management, sustainable forest management, ecosystems and biodiversity conservation and building capacities of federal and provincial forestry institutions.

FSMP also provides framework for the government agencies, NGOs, donors, private sector and local communities for making investments for sustainable management of forest resources of the country. Since adoption of FSMP in 1992, a number of forestry programs and projects both with local and donor funding have been executed. Most of these projects follow integrated and holistic approaches for the sustainable management of forests with the involvement of local communities.

#### 3.5.4 Annual Development Plans

##### 2008-09 Plan

Inspite of financial crunch, water sector has been given the highest priority in the resource allocation for 2008-09 with an allocation of Rs 73.7 billion (including On-Farm Water Management Program). Maximum resources have been given to the timely completion of ongoing projects, including water storages and canal.

Rs 43.1 billion (68 percent of the total water sector's allocation) was allocated for irrigation projects (dams, canals, lining and improvement of provincial irrigation infrastructure). Under this sub-sector, eight ongoing dams / canals projects (Gomal Zam, Raising of Mangla, Satpara and Kurram Tangi dams, Greater Thal, Kachhi, Raineer, and Khirther canals) were protected for timely completion whereas adequate funds were also provided for revamping / rehabilitation of irrigation system of Sindh, Punjab and Khyber Pakhtunkhwa,

lining of irrigation channels in Punjab, Sindh and Khyber Pakhtunkhwa.

##### 2009-10 Plan

Water Sector has been given highest priority in the budget allocation for 2009-10 with an allocation of Rs 59.92 billion (Rs 47.19 billion for Water and Power and Rs 12.7 billion for On-farm Water Management Program), which is 51 percent higher than last year's revised budget allocation of Rs 31.2 billion. Maximum resources have been given to the timely completion of on-going projects, including water storages and canals. Main strategies and policies to be adopted in water sector are to achieve the planned targets reflected under MTDF (2005-10). New initiatives started in water sector are initiation of groundwater recharge, lining of canals and construction of small & medium dams. Out of total allocation of water sector in PSDP 2009-10, the respective shares of national projects, Punjab, Sindh, Khyber Pakhtunkhwa and Balochistan stand at 44, 9, 20, 8.6 and 18.4 percent.

An amount of Rs 39.7 billion (84 percent of the total M/O Water and Power allocation) has been allocated

for irrigation projects (dams, canals, lining and improvement of Provincial irrigation infrastructure) during 2009-10. Under this sub-sector, three on-going dams, six canals projects (Gomal Zam, Raising of Mangla, Satpara dams, Greater Thal, Kachhi, Raineer, CRBC additional works, Extension of Pat Feeder and Khirther canals) have been protected for timely completion whereas adequate funds have also been provided for revamping/rehabilitation of irrigation system of Sindh, Punjab and Khyber Pakhtunkhwa, Lining of Irrigation Channels in Punjab, Sindh and Khyber Pakhtunkhwa. The major ongoing irrigation projects are the same as mentioned above.

Review of the National Development Plans indicates that impact of climate change on SLM, water and forest needs to be incorporated in detail so as to mitigate negative impact of climate change on national resources. Recommendations of the National Task Force on climate change established by P&D Division of Government of Pakistan be kept in view in formulating the new Draft Water Policy.

# 4 CHAPTER

## REGIONAL AND INTERNATIONAL EXPERIENCES IN MAINSTREAMING SLM, NAP AND UNCCD INTO WATER POLICY AND PLANS

### 4.1 Regional Experiences

Regional experiences in mainstreaming SLM, NAP and UNCCD into water sector policy and plans for the following important countries of this region are discussed below:

- Bangladesh
- India
- China

#### 4.1.1 Bangladesh

National Water Policy of Bangladesh, 1999 published by the Ministry of Water Resources declares making river basins the focus of management. Bangladesh has a National Water Resource Council (NWRC) mandated to formulate policy and oversee implementation of a National Water Management Plan (NWMP). It also issues policy directives for appropriate coordination among different water agencies in the country. This water policy aims to provide direction to all agencies working with the water sector, and institutions that relate to the water sector in one form or another, for achievement of specified objectives. These objectives of the National Water Policy are:

- To address issues related to the harnessing and development of all forms of surface water and ground water and management of these resources in an efficient and equitable manner
- To ensure the availability of water to all elements

of the society including the poor and the underprivileged, and to take into account the particular needs of women and children

- To accelerate the development of sustainable public and private water delivery systems with appropriate legal and financial measures and incentives, including delineation of water rights and water pricing
- To bring institutional changes that will help decentralize the management of water resources and enhance the role of women in water management
- To develop a legal and regulatory environment that will help the process of decentralization, sound environmental management, and improve the investment climate for the private sector in water development and management

The country has developed a state of knowledge and capability that will enable the country to design future water resources management plans by itself with economic efficiency, gender equity, social justice and environmental awareness to facilitate achievement of the water management objectives through broad public participation.

The National Water Policy stressed the need for preparing and implementing the National Action Program (NAP) for combating land degradation, drought and desertification under the UNCCD as a national obligation. Following priority areas may be



considered in formulation of the action programs with regard to implementation of the UNCCD:

- Strengthening the knowledge and information base;
- Expansion of intensive soil and water conservation and afforestation activities;
- Development and promotion of agro-forestry system and sustainable alternative livelihood;
- Development of comprehensive anti-desertification program integrated with national environment and development plans;
- Development of drought preparedness and drought relief and self-help schemes; and
- Launching public awareness and promotion of popular participation programs.

#### 4.1.2 India

In India the first National Water Policy was formulated in 1987 and revised in 2002. Thrust of the Indian water policy is on water resource planning covering all aspects of a drainage basin as a whole, taking into account surface and ground water. It emphasizes water resource protection and conservation in the catchment areas through soil conservation and proven watershed practices, preservation of forests and increasing forest cover as an important policy measure.

The policy document identifies six key priority areas for water allocation: drinking water, irrigation, hydro-power, ecology, agro-industries and, navigation and recreation. Moreover, Indian water policy provides for development of a skeletal national policy for settlement and rehabilitation of populations effected during construction of mega water sector development projects. It provides clear guidelines and direction for financial and physical sustainability of existing facilities, participatory approaches to water resource management, private sector participation, water zoning, sea water intrusion, drought prone area development, flood control management, monitoring of projects, water sharing among states, S&C, Training and other related policy issues. The policy provides for development of a time bound action plan by relevant state and central organizations to realize objectives of the policy.

Following are the main sections of the Indian Water Policy:

- Need for a National Water Policy
- Information System
- Water Resources Planning
- Institutional Mechanism

- Water Allocation Priorities
- Project Planning
- Ground Water Development
- Drinking Water
- Irrigation
- Resettlement and Rehabilitation
- Financial and Physical Sustainability
- Participatory Approach to Water Resources Management
- Private Sector Participation
- Water Quality
- Water Zoning
- Conservation of Water
- Flood Control and Management
- Land Erosion by Sea or River
- Drought-prone Area Development
- Monitoring of Projects
- Water Sharing / Distribution amongst the States

Ministry of Environment and Forests in India as national focal point for UNCCD, has prepared National Action Plan (NAP) to combat land degradation and desertification. It has the following features:

- Water is diacritical element for building people's confidence and satisfaction level, reclamation of degraded lands for sustainable biomass production ultimately leading to a better quality of life and enabling conditions through empowerment of the local communities.
- Bottom up approach and project planning, evaluation and monitoring by Panchayat Raj Institutions (grass-root-level elected local self governments) in which women have at least 30% representation would be followed. Capacity of the National Institutes and CBOs constituted by them, like self-help groups and user groups, etc would be built up on all aspects of land development including rehabilitation of degraded areas, encompassing technical, financial and dynamics, equity, gender, etc.
- Convergence of resources and services. All resources available under different schemes will be channeled through Panchayats. Thus, a single window service will be available to the communities.
- Gaps in all the ongoing schemes of different departments will be identified and resources will be provided to fill them up for generating good impact at the ground level.

- The first five-year period will be experimental and include pilot projects and activities.
- Concurrent and continuous monitoring will be done and mid-course correction will be effected as the experiences are gained.
- Problem faced by the farmers will be reported to R&D institutions for finding solutions. Thus both lab-to-land and land-to-lab flow of information will be ensured.

#### 4.1.3 China

China has embarked upon a vigorous campaign over the past two decades to drastically reshape water development and management policies in the context of ambitious market reforms and a major reassessment of the legal, ideological, scientific and technical foundations of the water economy. Magnitude and complexity of this task is daunting. It represents a concerted large-scale effort to integrate long-standing policies defining State responsibility for judicious water development, protection, and use with newer economic and legal strategies for realizing the long-term benefits of sustainable water use. Ambitious water policy initiatives now underway in China thus see boldly to reshape deep-seated assumptions about the universal efficacy of engineering solutions for water supply, control, and quality problems.

China's urban policy favoured small towns and discouraged migration to large cities. This was communicated via the slogan "Grow small towns aggressively, promote medium city selectively and stop the growth of big cities".

China's current water policy experiments also provide insight into the potential benefits and shortcomings of recently-introduced foreign institutional models that aim to integrate engineering interventions, economic assumptions, and management strategies to achieve interrelated water quality, water supply, and water conservation goals in large and small scale projects. This paper briefly considers four dimensions of the policy adjustment process that Chinese water policymakers are addressing as they confront the challenges of developing and managing water resources in support of the country's economic and technological modernization. The main purpose is to introduce and assess in a preliminary way technical aspects of policy issues as considered in official Chinese sources. Larger Chinese water resources management issues or projects will not be evaluated or discussed. Four areas to be addressed include:

- Problems of building upon a basic 1988 Water Law to accommodate new water resource management concepts and approaches;

- Difficulties faced in shaping a dramatic policy shift since early 1999 which de-emphasizes planned structural engineering (gongchengshuili) interventions in favor of more comprehensive, yet diffuse policy initiatives. New concepts treat water more broadly as a "resource"(ziyuanshuili) to be developed and managed in response to a changing market;
- Theoretical and ideological issues involved in reconciling deeply-rooted cultural/historical perspectives on the role of water in mediating relations between society and the State, still prominent Marxist theoretical frameworks developed over the past half century, and recently adopted Western market-oriented water policy instruments to improve the efficiency of water engineering, use, treatment, and control; and
- Meeting the challenges of integrating Chinese and foreign perspectives on water science and engineering theory and practice to facilitate water policy development most relevant to China's needs and capabilities.

#### Compilation and Implementation of NAP

Chinese government has formulated the NAP in 1994. Compilation of NAP is in light of the UNCCD, "China Agenda 21, and on the basis of existing large-scale, trans-regional, trans-watershed ecological improvement program action plan organized by the Chinese government, such as the National Action to Combat Desertification, "Three North Regions" Shelterbelts Development Program, Plain Farmland Shelterbelts Development Program.

In recent years, the State Forestry Administration organized an in-depth survey and analysis of the ongoing NAP to Combat Desertification, which commenced in 1991. These surveys and analyses have played a critical role to secure the scientific and practical foundation of the new version of NAP. The Chinese government has updated some components of the 1994 version of the NAP in light of the new developments and the National Eco-environment Improvement Plan which presents a blueprint, strategic policies for ecosystem and environmental protection and strategic objectives on combating desertification in China.

The National Action Program has been started implementation and its financial resources are from three channels, i.e. central government allocation, local raised funds and loans with negative interest of Bank. In addition, the Ministry of Finance also provided funds for desertification monitoring.

## 4.2 International Experiences in Developed Countries

Experiences in mainstreaming SLM, NAP and UNCCD into water sector policy and plans for the following countries of the world are discussed below:

- Australia
- Germany
- Japan

### 4.2.1 Australia

Agriculture is Australia's most extensive form of land use, occupying 60 per cent of the total land area (461 million hectares). Cities and towns take up less than 1 per cent (7.6 million hectares), but more than 80 per cent of the Australian population lives in these cities and towns. Livestock grazing is by far the most extensive use of agricultural land. Arid or semi-arid lands held under grazing licenses make up 88 per cent of agricultural land use (406 million hectares) across the continent. Grazing intensity on these lands can be as low as one animal per 100 hectares. Other land uses, in order of area utilized, include conservation reserves, sown pastures, forestry, and other uses, such as urban.

Main causes of land degradation in the rangelands include over-grazing by introduced and native herbivores (total grazing pressure), mechanical removal of vegetation cover, woody weed invasion and land management without regard to climate variability. Effects of these processes include increased soil erosion, soil degradation, altered stream flow regimes, increased soil salinity and loss of biodiversity. Since the early 1970s, there has been an increasing awareness of and concern for environmental issues in Australia. These concerns have found expression in a broad range of community led activities. They have also led to legislation, regulation and expenditure by governments, at national, state and local level, to protect the environment. Despite a dedicated effort from governments and community and range of policy initiatives to promote sustainable natural resource use, Australia has significant challenges ahead to achieve ecologically sustainable land management. Key challenge influencing progress is the recognized need to increase involvement of regional communities and landholders in policy and planning initiatives to ensure ownership and adoption of outcomes.

There are no singular solutions for addressing land degradation and achieving ecological sustainability in Australia. Problems are numerous, varied and often site-specific and interrelated. Hence, Australia's

response has been to develop an integrated package of mutually reinforcing measures that recognize this complexity. This package incorporates:

- Comprehensive and integrated regulatory frameworks;
- Processes to manage the use of surface and ground waters, including specific allocation for the environment;
- Measures to improve water quality;
- A range of incentives for improved vegetation management, retention and protection;
- Diversifying the commercial use of agricultural land;
- Measures to encourage conservation and remediation;
- Reform and strengthening institutional delivery;
- Programs to build decision making capacity at all levels through improved access to information; and
- A range of community based, voluntary programs targeted at reducing land degradation.

### 4.2.2 Germany

Germany has made the United Nations Convention to Combat Desertification (UNCCD) since its creation an instrument of choice for its policy to combat desertification and drought and for sustainable management of land. More than ten years after the Convention has entered into force in 1996, Germany continues to view it as a key reference point and strategic instrument of its development cooperation. As a signatory state to the UNCCD and as a country hosting the UNCCD Secretariat, Germany is committed to support the Convention's successful implementation.

These broader programs frequently aim at the integration of desertification concerns with recipient countries development objectives through institution building, capacity development, strengthening the regulatory and policy framework, or research. Capacity development and policy advice, adjusted to the situation in each country, are aimed at:

- Participatory involvement in designing and implementing a NAP
- Strengthening civil society participation in the implementation of the UNCCD
- Strengthening inter-institutional steering committees, including decentralized structures
- Integrating UNCCD goals into sectoral and regional policy

- NAP management, in particular monitoring and evaluation capacity, as well as
- Improving management of knowledge with regard to combating desertification.

### 4.2.3 Japan

In Japan, overall water resources planning are with the national government. A comprehensive National Water Resource Plan has been prepared. Japan has a very effective system of water tariffs which include fixed and variable charges for different water uses in the country. While the tax revenues from income tax can be spent on any government expense, revenues from special purpose taxes can only be used for specified expenses stipulated by laws. Currently the only special purpose tax related to water resources management is the Forest Conservation Tax. The Mineral water Tax is under consideration at the local level.

Desertification is land degradation in ecologically fragile arid, semi-arid and dry sub-humid areas, resulting from various factors including climatic variations and human activities. Against this background, the socio-economic conditions of these areas are declining. And the recurrent drought is further hastening the progress of desertification.

In combating desertification, before measures are launched, it is necessary to get an adequate understanding of the actual circumstances of desertification and to clarify its causes and mechanisms sufficiently, including socio-economic factors in the affected areas. On that basis, effective anti-desertification programs, considering the local communities' living conditions, customs, traditional techniques etc., should be developed and implemented. Accordingly, in order to develop methods by which to understand the actual circumstances of desertification, strengthening the knowledge base of the local people and Japan in the affected areas, it is necessary to develop information and monitoring systems.

In the context of Land Desertification, Japan attaches importance to the implementation of following activities:

- In regions where desertification has progressed, Japan is conducting surveys regarding actual conditions of local geography, climate, hydrologic cycle, land use, vegetation, degraded areas, society and economy, social systems and farming operations. Based on these surveys, Japan will develop measures which conform to the conditions of analytical research on these various causes.
- In regions where desertification has not progressed

considerably, in addition to developing technology for drip-irrigation and conservation of farmland for the purpose of developing high-yield sustainable farming on existing farmland, Japan will encourage development of farmland and water management techniques conducted by local people.

- In regions where desertification has progressed, Japan will conduct comprehensive technological development and cooperative research, including that for the restoration of degraded land, water catchment agriculture which effectively utilizes rain water, moisture maintenance materials, crops which grow well on arid land, and agro-forestry. Japan will develop management technology for agricultural water and land, including the appropriate drainage technology to prevent salinization of irrigated land. Japan will also consider technological development, including that for underground dams, to make effective use of ground water.
- In order to reduce consumption of wood fuel, in addition to promoting development of alternative energy, Japan will also promote development of reforestation technology, including shelterbelts for shifting sand control, as well as other surveys and technology research for the restoration of forests. By means of such development, practical application of improved technology, and local adaption of this technology, including such "software" forms of technology as the organization of farm and forestry workers, Japan will study the way of cooperation, from perspective of farming and reforestation of arid land, and perform verification studies when necessary.

Considering desertification a serious problem, Japan has been positively participating in negotiations for the convention. It is also important for each country to provide assistance to local residents in their self-help efforts to solve the problem of desertification.

The experience of regional and international experience in developed countries in mainstreaming SLM, NAP and UNCCD in their water sector policies, strategies and development plans is compared as under:



Sr. #	Parameter / Issue	Regional Experience	Experience of the Developed Countries	Issues for Inclusion into Draft National Water Policy 2006 and Development Plans
1	Mainstreaming principles of SLM, NAP and UNCCD into policy documents and development plans and funding sources	Water policy documents make commitments to ensure implementation of action plans prepared under UNCCD. Policies and plans aim at preventing land degradation and restoring degraded land. Funds are provided in national budget through sectoral provisions in water, agriculture, forestry and environment. External funding is also procured through bilateral and multi-lateral donors including GEF.	Water policy documents make commitments to ensure implementation of action plans prepared under UNCCD. There are strong linkages between development program and actions to combat desertification and heavy investments in priority areas of UNCCD in all sector projects. Funding is provided to developing countries through technical assistance, grants and loans as priority areas of donor funding. Countries are also collecting land tax to fund water sector related projects of SLM, NAP and UNCCD.	Mainstreaming principles of SLM, NAP and UNCCD needs specific budget allocation and incorporations.
2	Sustainability of agriculture to ensure food security	Focus on sustainable use of both land and water resources. Heavy investments on irrigated agriculture projects and development of water resources projects are initiated to improve social and economic environments in areas inflicted with desertification and drought	Sustainable use of both land and water resources. Heavy investments on conservation of irrigated agriculture, conservation of water resources and also in bilateral environment projects.	Successful results of SLM Project Phase-I need replication throughout the country over larger areas.
3	Integrated water resources management	They have planned to provide water to everybody, but lack advanced technologies. Inefficient management causes water pollution and scarcity. Rivers in China are highly polluted.	Have developed advanced technology and knowledge base for efficient use of water and control of fertilizer and pesticides pollution in rivers. Punitive laws to check wasteful use of water have been framed.	Implementation of integrated water resources management is slow and control of pollution of water bodies needs focused attention
4	Adoption of river basin approach for development and management of water resources.	Have formulated plans to develop and manage water resources taking river basin as a unit.	Water resources development and management is based on river basin approach and linking one basin to another for transfer of supply of water when needed.	Adoption of river Indus basin as a unit in the master planning needs to be considered for achieving consensus of the stakeholders.
5	Developing and strengthening water systems for early warning and adoption to drought and desertification.	The development plans and policy frameworks are still in process of adoption of drought and desertification measures by getting help from the international bodies and developed countries. Efforts are being made for widespread network of meteorological stations and sharing of met data.	Developed new techniques resting on strong technology to control degradation of lands and pollution of surface and groundwater resources. Community based voluntary programs are targeted for reducing land degradation. Developed countries are helping developing countries to modernize their weather warning system.	Early warning system for drought and desertification needs improvements in the policy documents.
6	Water harvesting and development of small scale irrigation schemes.	Rainwater harvesting is practiced in all hilly and urban areas and is mandatory.	Water storage structures and small scale community based irrigation schemes are common. Promotion of alternate livelihood in vulnerable areas is also a priority area.	Rainwater harvesting and recharge of groundwater in dry areas be given due importance.
7	Ensuring good governance at regional, local and policy level	Efforts at all levels are being made to ensure transparency and accountability in development of water resources. This would ensure equitable distribution of water and efficient management of land resources.	Implementation is based on high level of good governance. All sector projects to ensure improvements in quality of public services. Priority is given to public and private partnership on sound footing.	In water policy documents good governance be highlighted and the political will of the government required to implement it.

REGIONAL AND INTERNATIONAL EXPERIENCES IN MAINSTREAMING SLM, NAP AND UNCCD INTO WATER POLICY AND PLANS

Sr. #	Parameter / Issue	Regional Experience	Experience of the Developed Countries	Issues for Inclusion into Draft National Water Policy 2006 and Development Plans
8	Participatory approach in implementing development plans in major sectors of the economy	Management of water resources for diverse uses is through participatory approach. Various governmental agencies, users and other stakeholders such as NGOs, CBO and civil society are involved	Participatory involvement in designing and implementing NAP and strengthening civil society participation in the implementation of UNCCD. Role of the NGOs is prominent in this regard. Active involvement of water users through Water Users Association is common. Enhanced emphasis in tackling issues of water quality control and monitoring.	Already exists in the policy documents but guidelines need to be developed to ensure participation of community in the decision making process.
9	Conservation of land and water resources	Conveyance losses in canal irrigation are reduced by concrete lining of the canals. Projects like soil and water conservation, national watershed programs, development of river areas and cleaning of polluted rivers are also being implemented	Mostly national water resources plans have been developed with strong conservation measures and the users to pay a very high tariffs which include fixed and variable charges for different water uses and recovery is ensured at all levels without any regard to status of the beneficiary.	Provisions already exist but implementation on ground is poor.
10	Linkage of water resource with SLM	Policy level document describes measures to control water-logging, salinity and desertification including drought measures. Measures taken for safe disposal of industrial effluent. Formulation of experts groups at science and technology level to seek advice on water related SLM issues.	Water resources have been developed on scientific lines and there is no chance for degradation of land resource. Strict pollution control has been enforced at basin level and also dry land areas are given preference for development in all sectors at community level.	Water rights in the rural areas of dry lands need to be revisited and poor community be also given due share of water
11	Water legislation supports SLM policy	Most of the water legislation documents contain provisions for sustainable use of land and water resources and support international commitments by adopting the conventions but still the progress is slow. Improvements under water legislation to strengthen provisions related to desertification. Updation of their legal framework in areas of water, agriculture and environment to address drought and desertification. New legislation includes framework environmental laws and also sectoral laws on land, water, forestry and agriculture.	Water legislation supports SLM policies and international conventions and compliance are ensured on strong monitoring and evaluation basis. Support is also extended to developing countries. Strong waste water treatment facilities to check pollution of water bodies.	Existing provisions are strong but implementation is weak.
12	Mitigation and adaptation measures for climate change to ensure sustainable development.	Irrigated agriculture is the main source of livelihood for most of the rural people. Same is true about those affected by climate change. Policy documents and development plans of water sector are not so responsive to impact of climate change. Access to basic social services empowerment of communities to check environmental degradation and help from developed countries for NAP implementation and also to check poverty. Strengthening management of focal institutions and putting in place consolidated implementation of international conventions and agreements such as UNFCCC. There is practice of establishing National Coordination Bodies (NCBs) for greater coordination among national institutions and also preparation of joint action programs at sub-regional and regional levels.	A strong connection has been developed between poverty reduction and resource protection. Sustainable land use and water resources in arid environments are ensured by incorporating the climate adaptation and mitigation measures in development strategies. International cooperation to lesser development countries is extended to build knowledge on climate change and significant funding is also provided through bi-lateral agreements and donations to developing countries.	Issue of climate change is lacking and mitigation and adaptation measures need to be mentioned in a separate Section under heading of the climate change.

## 5 CHAPTER

# POLICY GAPS IN THE CONTEXT OF SLM, NAP, 10-YEAR UNCCD STRATEGY

Pakistan's National Water Policy 2006 developed by the Ministry of Water and Power is still awaiting approval of the Federal Cabinet. Nevertheless the purpose of this review is to examine policy document to explore extent to which principles of sustainable land management are integrated into policy document, given the fact that land use has a direct impact on development and management of water resources in the country.

Review of National Water Policy along with sectoral policies reveals that Pakistan faces severe water scarcity, low agriculture growth, frequent food shortages and degradation of natural land & water resources. There are salinity and water logging problems due to poor water management and non-availability of safe drinking water unavailability to society.

Draft National Water Policy is donor driven and is project oriented, instead major principles and guidelines for development, conservation and management of water resources could have been included. Sustainable land management with reference to desertification and climate change phenomena has not been given due importance in the draft Water Policy document.

In Pakistan where headwater resources of rivers are located in mountains, effective management of watersheds through biological and engineering measures are necessary to prolong life span of dams and reservoirs. Water resource development is linked

with restoration and rehabilitation of degraded forests and watersheds with adequate vegetative cover. Incentives, payments for ecosystem services, and eco-compensation mechanisms for conservation efforts of the communities in upland watersheds need to be made an integral part of the national water policy.

Mountains produce 80% of global water, while only 10% of population lives in mountains. The notion that water is a free commodity does not hold true. Mountain populations are not compensated for protection of water resources used by downstream users and, as a result, water resources are degraded and not protected. Water needs to be managed not only in terms of scarcity but also as a diminishing resource, stressing the need for sustainability. Policy approaches could be royalties, such as in Colombia, where a part of the hydropower revenues are allocated to the upper catchments. Lesotho is selling water as an economic good to South Africa. However, it is important to identify appropriate institutional arrangements to ensure that the funds are used for efficient watershed management. In this context, existing customary rights need to be reviewed.

Ministry of Water and Power has engineered production of first National Water Policy. This is a commendable effort. However some aspects have not been addressed. There are gaps which are narrated in Para 5.3.



5.1 Framework for GAP Analysis and Mainstreaming

Review of the National Water Policy 2006 and related water sector documents has been carried out, keeping in view the following guiding principles and framework for mainstreaming SLM, NAP and UNCCD;

- Growing awareness for SLM, NAP and UNCCD for sustainable development of both land and water resources.
- Strong political will and good governance in the formulation and implementation of the policy.
- Holistic approach in country strategies and development plans of water sector to ensure availability of adequate fresh water resources to all.
- Sustainable coastal management and fisheries development in delta of Indus Basin.
- Protection of groundwater aquifer in dry areas and recharge measures taken accordingly.
- Need for providing land cover by forest and trees under improved forest management in all water sector projects.
- Promising interventions in water resources management broadly and climate change interventions / adaptations specifically. There should be a strong commitment to research, development, training and extension in use of land and water resources.
- Water policy must also be gender based.
- Environment and economic protection and poverty reduction be given priority in the policy documents. There should be a special support to the poor with less agriculture assets.
- Need for capacity buildings in terms of human resources, quality data, contribution of development partners, NGOs and regional institutions.
- Control on urban migration and a strong mechanism for conflict resolution on distribution of water resources between different users.
- Commitments on part of the government to fulfill obligations under international conventions such as UNCCD, CBD and UNFCCC.

5.2 Existing Policy Sections Relating to SLM, NAP and UNCCD

Draft National Water Policy 2006 contains the following sections wherein above guidelines in the form of issues and policy has been discussed:

- Section 1 – Integrated Planning and Development of Water Resources
- Section 2 – Irrigated Agriculture
- Section 10 – Flood Management
- Section 11 – Drought Management
- Section 12 – Drainage and Reclamation
- Section 13 – Water Quality
- Section 14 – Wetlands, Ecology and Recreation
- Section 15 – Information Management and Research
- Section 16 – Trans-boundary Sharing

Policy guidelines for drought management as provided under Section – 11 of Draft National Water Policy 2006 are reproduced for the benefit of readers. Following are the policy guidelines:

- Encourage development and dissemination of water conservation technologies for rainfall harvesting in non-irrigated areas.
- Plan and expedite measures to carry surplus river flows through diversion and other structures to drought-prone areas.
- Consider seriously the need for construction of carryover storages which is the only effective way of overcoming drought year(s).
- Encourage and support Meteorological and other Departments / Agencies in carrying out research work in reliably predicting droughts (in terms of several months or even a year ahead) so that feasible counter-measures can be timely taken through modified releases from reservoirs and other water management strategies. Research should aim at developing appropriate mathematical models.
- Encourage and support provinces to prepare Drought Management Plans (DPMs) for different drought prone areas.

5.3 Policy GAP Analysis and Suggested Amendments

Gap analysis of National Water Policy 2006 and water related documents for SLM, NAP and UNCCD have revealed the following major shortcomings and weaknesses:

Policy Gaps	Suggested Amendments
<p>Preamble Section: Need for Water Policy</p> <p>Under the Preamble Section, there is no mention of SLM, NAP, UNCCD and climate change impacts on water resources. There is also no mention of problems of land degradation and drought in the provinces.</p> <p><b>Section-1: Integrated Planning and Development of Water Resources</b></p> <p>In the draft policy document and strategy there is no mention of indigenous resources such as rain water harvesting, harnessing the potential of hill torrents and construction of small dams at feasible sites.</p> <p>There is no mention as to how funding for construction of storage dams and other development plans would be secured.</p>	<p>Basic principles of SLM, NAP and UNCCD and their relevance to agriculture productivity, poverty reduction and provision of livelihood in dry areas of the country, may be included in preamble.</p> <p>Construction of new storages has been unduly delayed. In order to expedite an independent implementation agency is recommended. Planning should be based on the concept of Indus Basin as a single Unit.</p> <p>There is vast scope to tap non conventional resources for development of water resources. It is suggested that development plans and the guidelines in policy document be amended to include development of resources based on rain water harvesting, potential of hill torrents and small dams in the province of Balochistan &amp; Khyber Pakhtunkhwa. Rainwater harvesting shall be mandatory for the following groups of users:</p> <p>Residential Complexes including Apartments on a plot of 2000 square meters and above</p> <p>Commercial plot of 1500 square meters and above</p> <p>Industrial units of 10,000 square meters and above</p> <p>Introduce annual awards for the best rain harvesting projects</p> <p>Allocation and water distribution be based on efficient and accountable manner and without any external interference.</p> <p>Through additional resources increased access to water for irrigation be provided to increase agriculture productivity.</p> <p>Agriculture or land tax be established to ensure sustainable funding for mainstreaming SLM, NAP and UNCCD into development plans.</p>
<p><b>Section-2: Irrigated Agriculture</b></p> <p>Sustainable land management includes the environment component of biodiversity, ecological integrity and natural capital, its use is heavily dependent on efficient water management and needs remedial measures in case of desertification during drought period. In policy document, this aspect of land management has not been given due consideration. Government of Pakistan has developed a 10 year National Action Plan (NAP) based on UNCCD 1994 but the policy does not contain mitigation measures of desertification.</p> <p>Issue of watershed management although very important for sustainable land and water management has not been given due importance.</p>	<p>A pool of agriculture and land tax be established</p> <p>Develop guidelines, specific projects, monitoring mechanism to address water logging and salinity.</p> <p>There is need to develop national watershed protection programs with support of provinces and the implementations be done for least 25 years.</p> <p>It is further suggested that a National Watershed Authority be created to implement the above projects.</p>
<p><b>Section-7: Economic and Financial Management</b></p> <p>It is mentioned in the policy documents that financial sustainability is poor all across water sector. There is a continuing burden on government financial resources for O&amp;M of the infrastructure. It is admitted that this aspect of water sector development is badly neglected but no attention has been paid to rectify the same.</p> <p>Outfall of untreated water into the river, canal and drainage network is prohibited under the Environmental Law but no action is being taken by the Federal / provincial agencies and also there is no mechanism to recover the arrears of water charges. Industrial owners are discharging heavy affluent into the systems but paying only nominal charges of Rs 10,000/- to Rs 20,000/- per year.</p>	<p>There is need to enforce recovery of government charges under relevant laws and even legislation / guidelines can be developed to discontinue supply of water to habitual offenders. It must be ensured that even development costs be recovered from major beneficiaries but at the same time no charges shall be recovered from poor segment of the society.</p> <p>Full recovery of surface water charges from beneficiaries be made to improve the O&amp;M and improvement of infrastructure in water sector otherwise no funds can be made available for sustainability of land and water resources in Pakistan. To overcome decrease in foreign direct investments, public private partnership be adopted.</p> <p>There is need to enforce the existing Environmental Laws very rigidly without any consideration of status of defaulters. Polluter must compensate damages done to the system especially polluting the groundwater resources and spreading water related diseases. Pollution of river Ravi around Lahore and pollution of river Indus at Hyderabad are creating serious environmental problems leading to numerous deaths. Enough water flow downstream Kotri be ensured to protect the Indus delta ecosystem.</p>

Policy Gaps	Suggested Amendments
<b>Section-8: Institutions and Legal Aspects</b>  National Water Council (NWC) has been proposed in the policy documents to implement activities  Existing legislation at federal and provincial levels need review, to meet the changed conditions  Existing water rights are linked to ownership of land affecting major segment of rural population.	Management Strategy to implement projects has to be with community participation. Technical and financial powers be delegated down to the implementation level.  There is need to develop National Water Law and revise of existing legislation to incorporate SLM, NAP and UNCCD.  Existing water rights be delinked to ownership of land and distributed to individuals.
<b>Section-9: Stakeholders Participation</b>  Donor driven institutional reforms have been introduced in all the four provinces by transforming irrigation departments into independent autonomous bodies called provincial irrigation and drainage authorities (PIDAs). Institutional reforms suggested by the donors are based on the concept that single size fits to all. Model suggested by the World Bank is successful in case of small to medium irrigation projects but not in case of large gravity irrigation systems of Indus Basin. Balochistan has not adopted this reform but all other three provinces have converted their irrigation departments into authority on pilot basis. The farming communities are not at all satisfied for this arrangement as frequent tail shortages have been reported in the areas of poor farming community. In fact through election process, the President and other members of Executive Body managed to be elected by using influence of the big landlords and elected representatives of the area. There is frequent breakdown of the network through cutting of banks and wide spread tampering of the outlets.  The new concept of public and private partnership is missing.	It is suggested that participatory approach of management at farming community level may be adopted in the operation and maintenance of the canal system. Management system may not be transferred to the farming community. This important institutional component of water sector be discussed / debated thoroughly and consensus of the stakeholders be obtained.  Existing laws may be amended to encourage public and private partnership in the development plans of the policy.
<b>Section-15: Information Management and Research</b>  It has been observed that there is overlapping of responsibilities between ministries at federal and provinces level, lack of qualified personnel and basic research equipments, scattered information and data on the water sector with little inter-sectoral collaboration.  There is no monitoring capacity for temporal changes in the volume of water coming from glaciers and snow cover etc. The impact of climate change through scientific research needs to be measured and adaptation measures taken accordingly.	There is need to create central land and water data base and also expand the network of monitoring stations to observe meteorological parameters and to improve early warning system for floods and droughts. The use of remote sensing and GIS techniques for data gathering to be encouraged.
<b>Section-16: Trans-boundary Sharing</b>  Conflict resolution is an important ingredient of water policy to resolve disputes among stakeholders rising on account of development and management of water. It has been observed in the past that although the water resource allocation of Indus Basin is managed by IRSA, but the IRSA Act 1992 is silent on agreement as to how water is shared during either periods of surplus or deficit which is a constant cause of disagreement and has lead to mistrust among provinces.  Pakistan and India singed famous “Indus Water Treaty” in 1960. Fifty years hence, against the provisions of the treaty, India has started constructing storage dams in the catchments of the Chenab, Jhelum and Indus. When the planned dam i.e. Baglihar & Kishan Ganga are completed, there would be acute shortage of water flowing into Pakistan. This situation would create problems between the countries. There is already insufficient flow in River Sutlej causing serious environmental problems. These rivers remain dry for 10-11 months during a year. It has caused depletion of ground water around these rivers, even brackish water has intruded into Bahawalpur city.	Water allocation disputes between provinces, under IRSA Act, be resolved in Council of Common Interest and be binding on the concerned parties.  Government of Pakistan must convince India to allow sufficient water flow though Ravi & Sutlej so as not to cause environmental problems along these rivers in Pakistan.  Reorganize office of Indus Water Commissioner with amended mandate so that conflicts are resolved amicably with India.

Policy Gaps	Suggested Amendments
<b>New Policy Section: Climate Change</b>  Majority of population in Pakistan lives in arid rural areas. Global warming has triggered climate change. This has caused change in precipitation pattern and resulted in rising sea levels. Policy and strategy documents do not mention any guidelines to offset effects of climate change.	Climate change is impacting water resources development and management, significantly. Therefore it should be reflected separately in the policy documents. To address the issues & offset negative impact of climate change, special funds be created on the pattern of hydropower generation.  Draft National Water Policy (NWP) to be revisited in consultation with provinces to ensure basin level management strategies to deal with variability in rainfall and river flows due to climate change. This will include enhanced storages both above and below ground, rainwater harvesting coupled with equitable and efficient management structures. National water policy revision needs to pay special attention in providing drinking water supply to population under all development projects.  There is need to strengthen trans-boundary relationship to jointly face impact of climate change on the water sector and also to increase public awareness and education on water culture and climate change.  Support of international organizations be obtained for projects and programs in the water sector to check negative impacts of climate change in the country.
<b>New Policy Section: Gender Issues</b>  In the tribal and rural Pakistan women are fetching water from long distances as well as managing water at home but have no say in water planning or water management institutions.	This major problem relating to gender development must find a significant place on water policy agenda. Women in Pakistan be also associated in decision making process relating to drinking water supply and sanitation and also other important sub-sectors of water such as agriculture and environment.

# 6 CHAPTER

## CLIMATE CHANGE VISION AND APPLICATION

### 6.1 Climate Change Impacts on Land and Water Resources

Rising sea levels and accelerating melting of glaciers in the Himalayas are threatening sustainable development of water resources in Pakistan. Climate change is also causing dramatic changes in weather patterns such as increased droughts and flooding, and changes freshwater supply. Rising sea level is supporting intrusion of salty water into fresh water aquifer. By disrupting the entire ecosystem, climate change ultimately affects the lifestyle of millions of Pakistanis. However, there is still hope, if we take urgent steps to offset impact of climate change.

Studies based on the ensemble outputs of several Global Circulation Models (GCMs) project that average temperature over Pakistan will increase in the range 1.3-1.5 °C by 2020s, 2.5-2.8 °C by 2050s, and 3.9-4.4 °C by 2080s. This corresponds to an increase in average global surface temperature by 2.8-3.4 °C by the turn of the 21st century. Precipitation is projected to increase slightly in summer and decrease in winter with no significant change in annual precipitation. Furthermore, it is projected that climate change will increase variability of monsoon rains and enhance frequency and severity of extreme events such as floods and droughts.

#### 6.1.1 Threats to Water Security

Major climate change related threats to water security are identified as:

- Increased variability of river flows due to change in monsoon and winter rains. Loss of natural reservoirs in the form of glaciers.
- Increased frequency and severity of extreme events such as floods and droughts.
- Higher demand of irrigation water because of increased evaporation rates at elevated temperatures.
- Increase in sediment flow due to high intensity rains resulting in rapid loss of reservoir capacity.
- Changes in the seasonal pattern of river flows due to early start of snow and glacier melting at elevated temperatures and the shrinkage of glacier volumes (this will have serious implications for storage of irrigation water and its supply for Kharif and Rabi crops).
- Possible drastic shift in weather pattern, both on temporal and spatial scales.
- Increased incidences of high altitude snow avalanches and GLOFs generated by surging tributary glaciers blocking main un-glaciated valleys.
- The need for considerable expansion in reservoir capacity (a) to take care of the increasing frequency and intensity of floods and droughts, (b) to take advantage of the greater water flows over the next two to three decades due to glacier melting as well as to address the expected decreases of flows in the subsequent years after the glaciers have largely melted, (c) to provide regulated minimum environmental flows to the sea to prevent excessive



intrusion of sea water into Indus deltaic region, (d) to take care of the loss in reservoir capacity due to silting, and (e) to meet future increases in water demand. Even without specific consideration of the climate change related impacts, the Planning Commission envisages that without additional storage the water shortfall will increase by 12 per cent over the next decade alone.

- Increased degradation of surface water quality due to increase in extreme climate events like floods and droughts.
- Increased intrusion of sea water into the Indus deltaic region due to climate change could affect whole range of marine life besides causing degradation of crucial ecosystems such as mangroves, and coastal lagoons. Mangrove ecosystems are particularly vulnerable as they are unlikely to adapt quickly to changes associated with expected range of sea-level rise e.g. reduced build up of sediment level, undercutting of roots by erosion, salt stress caused by increased salinity etc.
- In addition to its environmental impacts, sea level rise would have serious long term impacts on coastal communities, in particular threat to their food production capacity due to decline in irrigation water quality and degradation of crucial ecosystems. Erosion of coastal areas due to sea level rise may also tarnish the great potential of tourist resorts along the coasts. A number of prominent archaeological sites are found scattered along the coast, some of which may be under threat from temporary or permanent inundation under the influence of climate change effects.
- It is feared that the cyclones developed in the Arabian Sea as a result of high temperatures will more often be able to penetrate into Balochistan and Sindh provinces causing loss of life and property not only in the coastal areas but also inland. Particularly under threat will be Karachi, the largest city of country and hub of its industry.

In view of adverse impacts on various sectors likely to result from climate change, it is a major concern for the national planners and policymakers as to what will be corresponding negative impact on national economy as a whole. Another point of concern is as to how large a cost the country will have to incur on coping mechanism, i.e. towards adaption measures, in order to minimize risks to key sectors: water, food, energy, coastal areas and human health, and what will be economic value of the damage if not avoided. Yet another economic concern arises from the fact that, as a responsible member of the world community, Pakistan is keen to contribute Task Force for Climate Change to the global mitigation effort, while most of

the mitigation measures are prohibitively expensive. These are not easy questions to answer but they are of crucial importance for the national planners and policymakers, who are keen to shape the country's development plans in the most optimal manner with limited available resources. Climate Change is a rapidly unfolding challenge of catastrophic global, regional and national proportions. Pakistan will be affected by the impacts far more seriously than is generally recognized by the policy makers and opinion leaders, floods of 2010 clearly indicate climate change impacts in Pakistan. Climate change scenarios are spread over time, it is necessary to conceptualize responses along three time horizons as articulated by the IPCC: short (2030), medium (2050) and long term (2070 and beyond).

### 6.1.2 Future Climate Change Safeguards

Pakistan's climate change policy for near to medium term future must be in harmony with country's vision for the economy as a whole for which VISION 2030 document envisages a developed, industrialized, just and prosperous Pakistan through rapid and sustainable development in a resource constrained economy by deploying knowledge inputs. Accordingly, main objectives of Pakistan's future climate change policy are to:

- Assist the government in pursuing goal of sustained economic growth.
- Ensure Water, Food and Energy Security of the country.
- Introduce and ensure Climate Change Impact Assessment (CCIA) in the scope of Environmental Impact Assessment (EIA) of all water projects.
- Minimize risks to the country's population and national economy arising from expected increase in frequency and intensity of extreme events: floods, droughts, tropical storms etc.
- Provide protection to population and economies of particularly vulnerable regions such as the coastal areas, rangeland, mountainous areas etc.
- Make full use of the new developments in science & technology to effectively address, mitigation and adaption aspects of climate change.
- Identify limitations of country's institutions for addressing climate change and help build / enhance the capacities of scientists in various organizations.
- Facilitate government in making effective use of opportunities available internationally e.g. through Clean Development Mechanism (CDM), Adaption Fund, Global Environmental Facility (GEF) etc.

- Help develop a mechanism that will enhance understanding and awareness of climate change issues among all relevant stakeholders, including national planners and policymakers and general public.
- Define Pakistan's position on key climate change issues for use in international negotiations under United Nations Framework Convention on Climate Change (UNFCCC) and other international forums.

## 6.2 Mitigation Strategies

Droughts are natural hazards, which have caused distress and havoc since the known history of mankind. Occurrence of droughts remains certain but their frequency and intensity are random which add complexity to planning process necessary to reduce their impact. It is a bitter reality that abnormal climatic change cannot be averted and man can only take measures to lessen their impacts on various disciplines. Effectiveness of any disaster (including drought) coping mechanism in any country is primarily dependent upon the: (i) institutional capacities available to address various aspects of any disaster e.g. (early warning signals, preparedness, contingency and mitigation plans etc.); and (ii) technological options/ interventions which can be employed to reduce or even safeguard the exposure of larger communities/ sectors to any disaster in that country.

Vulnerability of individuals and communities to climate change impacts is not simply determined by the location of their settlements, but also by how those settlements are serviced, how effective and capable their local governments are and to what extent communities are able to cope with climate change impacts. It is widely accepted that poorest communities are the most vulnerable, because they lack access even to the most basic urban services placing them at a comparative disadvantage and challenging their capabilities to take on additional stresses caused by climate change.

Such complex vulnerabilities require comprehensive responses that link climate change adaption and mitigation efforts to the sustainable development of these communities enhancing their adaptive capacity. It is not sufficient to concentrate on either mitigation or adaption, but a combination of these results in the most sustainable outcomes. Yet, these two strategies do not always complement each other, but can be counterproductive. A similar argument can be made for linking climate change adaption with sustainable development. In order to avoid these conflicts, priorities need to be set. This calls for a methodology and comparison tool to assess the most cost-effective and appropriate strategies for each community.

Strategies need to be evaluated in terms of their negative consequences and priority given to those that minimize these.

## 6.3 Adaptations Measures

There are two types of adaptations which help to cope with the negative impacts of climate change: autonomous and planned. Autonomous adaptations generally refer to those adjustments that are carried out irrespective of the knowledge of climate change, while planned adaptations are those made deliberately in order to address the expected climate change impacts. So far most of the adaption effort undertaken in Pakistan falls in the category of autonomous adaptations. Following sections describe the adaption needs for water sector in Pakistan and identify the corresponding ongoing national actions and plans.

### 6.3.1 Recommended Adaptation Measures for Water Security

Some key adaption measures that will help in enhancing Water Security in the wake of climate change are identified below:

- Watershed management programs shall be given priority in the development plans for sustainable management of both land and water resources of the country.
- Reduce losses of irrigation water supply system and use to the maximum possible extent by reducing seepages from canals and distribution networks and by adopting modern, more efficient irrigation techniques (e.g. use of sprinklers and trickle irrigation) to replace the conventional method of flow irrigation.
- Build sufficiently large reservoir capacity on Indus and its tributaries so as to ensure no flow of Indus water down Kotri, even during high flood years, in excess of that necessary for environmental reasons including prevention of excessive influx of sea water into the Indus deltaic region.
- Once a sufficiently large reservoir capacity is in place, use some of it as carry over dams instead of the current practice of seasonal storage only so as to be able to use excess water saved during a high flood year in the subsequent lean years.
- Ensure that, while making water allocations to various sectors in the medium- to long-term future, due consideration is given to changes in sectoral demands caused by climate change.
- Address sea water intrusion into Indus deltaic region by allocating enough water to ensure minimum environmental river flows down Kotri.



- Legislate and enforce industrial and domestic waste management practices to protect environment, in particular water resources, from further degradation.
- Protect and enhance resilience of water-bodies, lakes, flood plains, etc.
- Protect groundwater through management and technical measures like regulatory framework, artificial recharge.
- Introduce local rain harvesting measures.
- Sensitize existing schemes like flood and drainage plans to climate change impacts.
- Introduce stringent demand management and efficiency improvement measures in all water use sectors, particularly in the supply, distribution and use of irrigation water.
- Improve efficiency of around one million ground water pumping units which are currently operating at typical efficiency of 20-25%.
- Ensure measurement and monitoring of water delivery at various points of supply system for effective planning and management. This will also provide base for volumetric water pricing in future which is essential for conservation and high value use of scarce water resources.
- Formulate National Water Law for improved governance and accountability.
- Manage wastewater through proper treatment and reuse it in agriculture, artificial wetlands and groundwater recharge. In particular, improve water efficiency by managing and reusing marginal quality irrigation effluent.
- Enhance national monitoring capacities to monitor (i) gross river flows, (ii) temporal changes in the volumes of major glaciers and snow cover, and (iii) meteorological parameters, by increasing the number of monitoring stations in accordance with international norms, particularly in the northern areas of the country, and by upgrading their data gathering, and data transmission and processing capabilities. Full use should be made of state-of-the-art analytical tools such as Remote Sensing (RS) and Geographical Information System (GIS) techniques to obtain information which cannot be gathered through conventional techniques.
- Also enhance national capacity for making quantitative assessments of climate induced changes and for analyzing and implementing appropriate technical and management solutions. Again, full use should be made of state-of-the-art analytical tools such as Regional Climate Models and Watershed Models.
- Develop National Water Resources Information System for fast data communication and analytical planning to meet challenges of droughts and floods.
- Enhance capacity to address the impacts of floods, flash floods, droughts etc. by strengthening National Disaster Management Authority and related provincial and district level organizations.
- Improve inter-agency as well as international coordination for information collection and sharing.
- Develop a National Water Policy which, inter-alia, duly addresses the water related vulnerabilities induced by climate change.

### 6.3.2 Future Plan of Actions

Following are the actions needed to minimize impact of climate change on both land water resources:

- Action-1: Establish an agency to execute integrated land and water resources management.
- Action-2: Strengthen existing human resource capabilities and capacities in the water sector for improved management practices.
- Action-3: Formalize legal mandate and operations of the National Climate Change Committee for water.
- Action-4: Strengthen trans-boundary relationships to cover impacts of climate change on the water sector.
- Action-5: Increase public awareness and education on land and water culture and also climate change.

### Financing Strategy and Action Plan

Government of Pakistan will be required to provide significant additional resources to implement the Strategy and Action Plan to control climate change negative impacts. It is suggested that at least five years indicative budget be prepared to implement the action plan. Support of international organizations can be obtained for projects and programs in the water sector. The government can also charge fees / taxes for control of negative impacts of climate change in the country.

### 6.3.3 Regional Collaboration

Regional collaboration is required, inter-alia, on the following aspects:

- Monitoring of HKH glaciers and snow cover using Remote Sensing and GIS techniques as well as ground based observations; exchange of available past data and results of analyses.
- Exchange of meteorological data, in particular the data obtained from high altitude monitoring stations.
- Provision of real time data on river flows by upper riparian countries to lower riparian countries.
- Exchange of results from simulation modeling experiments for inter-annual and decadal climatic projections, seasonal forecasts, and predictions of climate extremes in the region, and
- Exchange of data on monitoring of cyclonic activity in the Arabian Sea, Indian Ocean and Bay of Bengal.

### 6.3.4 International Negotiations for Future Climate Change Regime

Pakistan has been an active member of the international community and is a signatory to all the major international agreements on environmental issues. It signed the United Nations Framework Convention on Climate Change in June 1992 and ratified it in June 1994; it also signed the Kyoto Protocol in December 1997 and ratified it in January 2005. In its capacity as the then Chairman of the Group of 77 and China, Pakistan played a pivotal role in shaping the Bali Plan of Action during 13th Conference of Parties to UNFCCC held in Bali, Indonesia in December 2007. Pakistan stands firmly committed to the principles and objectives enshrined in various articles of the UNFCCC and the Kyoto Protocol.

# 7 CHAPTER

## MAJOR RECOMMENDATIONS

Government of Pakistan has drafted a National Water Policy 2006 to resolve issues and problems in the water sector. The National Water Policy represents a key milestone in the process of reforms of water sector as a whole and will have a far reaching effect on social, economic and environmental issue. The document encompasses water resources development, irrigated agriculture, water rights, allocation and distribution of irrigation water, participation of stakeholders, drought and water quality issues. Both land and water resources development and management have acquired new dimensions now in Pakistan because of a number of factors, which are reflecting adversely on the availability of water.

Following are the major recommendations/suggestions of the study for incorporating into respective sections of the Draft Water Policy 2006:

### Integrated Planning and Development of Land and Water Resources

- Water resources development for agriculture and energy (Hydro Power) contributes very significantly to economic growth. Irrigation network contributes to nearly a quarter of the country's GDP and most of its food and fiber requirements. The livelihood of many families and economy of the country is very sensitive to the availability of both land and water. Growing imbalance between water supply and

demand has led to shortages, regional competition conflicts between stakeholders and constraints on economic development. There is need to improve the governance and to stop exerting external influence in decision making process of water allocations and distribution and all decisions be taken in the public interest.

- The country is facing severe shortage of water supply. Current reservoir capacity is rapidly silting up and live capacity has been reduced to 14 MAF. Need of water for households and industry would also expand further reducing irrigation water supplies. This calls for expansion in water supplies by building up fresh water reservoir capacity. Construction of new Large Reservoirs along with Carryover Storages like the one at Skardu.
- Non-conventional methods for utilization of water such as through inter-basin transfers, artificial recharge of ground water and desalination of brackish or sea water as well as traditional water conservation practices like rainwater harvesting, including roof-top rainwater harvesting, flood water harnessing need to be practiced to further increase the utilizable water resources.
- It is essential to establish an integrated monitoring program that embraces the physical, chemical and biological data needed to assess the status of surface and groundwater bodies of the Indus Basin.

## Climate Change

- The climate change is an important cross-sectoral issue which is going to disturb normal cycle of rainfall and availability of surface flows etc. should be clearly defined in the objectives and goals of the National Water Policy. Access to good quality water in sufficient quantity is fundamental to the daily lives of people in Pakistan and to most of the economic activities. Worldwide water is becoming increasingly scarce. Changes expected under climate change will worsen the trend.
- Impacts of global climate change and prolonged droughts on water resources are well understood, manipulation of dynamics of hydrological processes in upstream watersheds across trans-boundary landscapes also needs to be taken into consideration. The scarcity of irrigation water and unsustainable management of water resources are likely to accelerate the process of land degradation and desertification in Pakistan. Similarly, these would be major barriers in promoting Sustainable Land Management (SLM).
- Policy document has missing links in relation to potential of Hill Torrents (Rod Kohi), Small Dams, Rain Water harvesting and impacts of climate change on natural resources. Issues of land degradation and desertification need adequate mention. There is need to upgrade the document in the light of guidelines issued by the UNCCD for remedial measures to affected areas and vast potential of non conventional sources of water. Wide spread awareness campaign can help in conveying the message very loud and clear that climate change is now a big challenge to land and water resources management in Pakistan.

## Land Uses

- Non-agricultural uses of land like urbanization; industrialization and construction of roads are blemishing the whole landscape. These threats of national disaster demand a national policy for conservation and rational use of land resource. Such a policy could ensure the use of marginal land for non-farm uses instead of grabbing prime agriculture lands closer to cities. There is an immediate need to develop provincial level landuse policy to curb this practice to protect the fertile lands in all provinces and to enhance productivity of water.
- Poverty is rampant in the rural areas, where people are in a state of human deprivation with regard to income, clothing, housing, health care, education, sanitary facilities and human rights.

Due to increasing population, natural resources are gradually depleting posing major constraints on the efforts to eradicate poverty. The problems, complex and enormous, are declining availability of agricultural land and agricultural workforce, marginal producers with small land holdings, decreasing per capita land availability, conflicting demands for scarce water resources, urbanization and youth evading traditional farming. In the coming years, Pakistan will require to produce food for larger populations from less and less land. It is recommended to increase per capita availability of water through construction of new large reservoirs.

## Watershed Management

- Ninety percent of water in Pakistan originates from the northern upland watersheds. With the construction of dams and reservoirs to generate hydropower and supply water to the massive irrigation works that support the national agricultural economy, watershed management in the mountains has become a national priority. Loss of vegetative cover in the watersheds seriously impairs the hydrological cycle resulting in landslips and flashfloods, causing damage to infrastructure, settlements and loss of human and animal lives. Causes of watershed degradation are forest conversion, improper agricultural practices and fragmentation of land, complex land tenure arrangements and poverty. During the last three decades, watershed management has assumed special significance but federal and provincial government did not pay attention to this aspect. There is need to develop watershed programming on long term basis for a period of at least 25 years with adequate budgetary allocations.
- The rich experience of NGOs both local and international can be of much greater help in mainstreaming SLM, NAP and UNCCD in watershed development projects.

## Land Degradation and Desertification

- Magnitude of land degradation and desertification problems in Pakistan is so vast and complex that it requires programmatic approach with the aim to enhance land productivity, alleviate rural poverty, and remove key barriers to sustainable management of land resources.
- Government of Pakistan (GoP) has launched Sustainable land Management Project (SLMP) in collaboration with the provincial Planning and Development Departments and line agencies.

The Project is funded by the Global Environment Facility (GEF), United Nations Development Program (UNDP), and GoP. It will be implemented over a period of 8 years in two phases. The Phase-I is focused on policy, institutional, and knowledge barriers, and implementation of 9 pilot projects in different agro-ecological zones to test SLM practices, while Phase-II will focus on replicating best SLM practices at larger landscape through integrated management of land and water resources. This approach needs to be replicated in all policy and strategy documents of water resources development.

- In order to fund, the water sector / SLM projects, there is need to create a national desertification control fund. This can be done either by imposing agriculture or land tax to ensure sustainable funding for mainstreaming of SLM, NAP and UNCCD into development plans.

## Disaster Management

Disaster management policy Section-11 shall also incorporate the following:

- There are no long-term, inclusive and coherent institutional arrangements to address disaster issues with a long-term vision. For instance, the Emergency Relief Cell is mandated to deal only with post-disaster scenarios.
- Disasters are viewed in isolation from the processes of mainstream development and poverty alleviation planning. Some of the large-scale development projects are bringing new forms of disaster and adding to the vulnerability of at-risk communities. Left Bank Outfall Drainage (LBOD) and Right Bank Outfall Drainage (RBOD) projects and also link canals are significant examples in Pakistan.

## Environment Control

Government of Pakistan announced the following as part of its commitments to the protection and preservation of environment:

- Environmental protection to be an integral part of all government policies in different sectors of the economy.
- All future development projects having potential adverse effect on environment be subjected to Environmental Impact Assessment (EIA), review and approval procedures.
- Establishment of an Environmental Fund at the federal level to support and finance the climate change projects.
- Government, Civil society and private sector to

actively participate in environmental protection.

- To guarantee protection of environment, implementation of national environment policy and action plan is ensured. It is essential that the minimum downstream Kotri flows be maintained to avoid ecological disaster in delta in Sindh.

## Regional & International Experiences in Context of SLM, NAP and UNCCD

After reviewing water policies and experience of regional and international countries in the context of SLM, NAP and UNCCD, following recommendations may be included in the water sector policies;

- Water resources development and management be based on the concept of IWRM with particular needs of all elements of the society including poor, under privileged women and children be focused.
- There is need to follow Chinese policy “grow small towns aggressively, promote medium cities selectively and stop the growth of big cities”.
- Decentralization of water resources with enhanced role of women in water management be encouraged.
- Soil moisture conservation, water harvesting, minimizing evaporation loss, recharge ground water and water diversion practices may followed in drought prone areas.
- Community based voluntary programs to target reducing land degradation.
- SLM, NAP and UNCCD goals be integrated into sectoral and regional policy initiatives.
- To reduce negative impacts of climate change, programs be launched to combat desertification with international assistance
- Participatory involvement in designing and implementing NAP.
- Strengthen civil society participation in the implementation of the UNCCD.
- Strengthen inter-institutional steering committees, including decentralized structures.
- NAP management, in particularly monitoring and evaluation capacity, be improved.

## Institutional Reforms

- An apex body responsible for formulation of National Water Policy be created. Prime Minister of Pakistan is to act as a Chairman with Chief Ministers of each province as members and Secretary to Ministry of Water & Power to act as a Secretary of this body. Its responsibility would be



to initiate, coordinate and formulate schemes for development, conservation and utilization of water resources for the purposes of irrigation, flood control, drinking water supply and hydropower.

- A strong information system for water related data be developed at national / provincial levels for resource planning.

#### **Cost Recovery for Financial and Physical Sustainability**

- Huge charges are pending against different water users. Untreated industrial and sewerage is discharged into rivers and irrigation canals. Only nominal charges are recovered under the existing Environmental laws. This law needs to be enforced strictly. The principle of “the polluters must pay” be followed.
- It is recommended that an effective water charges recovery mechanism be established. Rate of

water charges be automatically raised annually. To raise financial resources for water development programs, it is also recommended that agriculture tax must be levied.

#### **Gender Issues**

- Women in rural areas are the main player’s viz-e-viz water. They fetch water from quite some distance and manage it at home. But they have no say in water planning etc. Women be associated with decision making of water supply, sanitation, agriculture and environment.

The National Water Policy 2006 and Pakistan water sector strategy documents treat SLM, NAP and UNCCD simply as environmental issues. However issues of sustainability of land and desertification need to be addressed. These may be included in all development plans/programs of water sector.

## 8 CHAPTER

# THE WAY FORWARD

Mainstreaming of SLM, NAP and UNCCD as recommended to be made part of the respective sections of Draft Water Policy and new sections of climate change along with mitigation and adaptation measures be made part of the new draft. This policy must focus on raising issues of minimum environmental flows in rivers Sutlej & Ravi. International organizations such as UNCCD Secretariat, UNDP and FAO be requested to help Pakistan in this regard.

There is need to draft a New National Water Policy and seek public review. All the stakeholders be given opportunity to debate implications of the policy document. Thereafter prepare Final draft National Water Policy and submitted for Cabinet approval.

Pakistan will be affected by climate change far more seriously than is generally recognized by the policy makers and opinion leaders. Floods of 2010 & 2011 clearly indicate the climate change impacts in Pakistan.

Climate change scenarios are spread over time, it is necessary to conceptualize responses along three time horizons as articulated by the IPCC: short (2030), medium (2050) and long term (2070 and above).

There is need to undertake selective monitoring with respect to objectives, climate change and hydrological change to revise the adopted National Water Policy and its implementation plans as required after 15 to 20 years. The revision should take into account the changed objectives, availability of water and new scientific information available under water sector.

Overseas Aid Programs be requested to help combat desertification by taking up development project for efficient management of both land and water sectors. Land tax is to be imposed to generate financial resources for mitigation and adaptation measures to climate change.

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## ANNEXURE-1 TORs OF THE STUDY

TORs of the study and the specific tasks to be performed are as under:

### Task-I: Inception meetings, methodology, work plan, and draft table of contents

This task will include:

- Holding inception meetings with SLMP Project Team at the NCU and concerned persons in the Ministry of Water and Power (i) to review the process for conducting study, (ii) Identify preliminary background information related to the water sector, and (iii) finalize the methodology, work plan and draft table of contents for the final study report.

### Task-II: Review national water policy documents, strategies and plans

- Take stock and review of relevant literature and existing water policy documents and plans of Pakistan with special reference to SLM.
- Identify key issues; define assessment criteria in the context of UNCCP, NAP, SLM principles and UNCCD's strategic document for reviewing policy documents/ plans.
- Review and analyze water related policies, strategies, and plans with special reference to UNCCD, its 10-Year Strategic Plan, NAP and SLM and to identify key policy gaps, including strengths

and weaknesses.

### Task-III: Study regional experiences in mainstreaming UNCCD, NAP, and SLM into water policies/ plans

- Identify and review at least three national policies documents plans and best practices of other countries where UNCCD, NAP and SLM have been mainstreamed into water sector related policies/ plans.
- Based on this review of these national policies prepare a brief summary to facilitate stakeholders discussion.

### Task-IV: Prepare recommendations for integrating UNCCD, its 10-Year Strategic Plan, NAP and SLM principles into policies & developmental plans of the water sector

- Hold consultations with key stakeholders for discussing status of UNCCD, its 10-Year strategic Plan, NAP and SLM mainstreaming into water or other related policies/ plans for capturing views on policy reforms for mainstreaming UNCCD, NAP and SLM.
- Based on stakeholders inputs, investigate, analyze strengths and weaknesses of the policy documents and plans in the context of NAP, SLM

principles and UNCCD and develop policy reform options.

- Prepare first draft report of the study containing recommendations regarding policy reforms for mainstreaming UNCCD, NAP, SLM principles and 10-year Strategic Plan of the UNCCD into water policies and plans and share with SLMP Team to take inputs/ feedback.
- Incorporate inputs/ feedback from SLMP Team and prepare the second draft of the report.

**Task-V: Seek validation of recommendations from Stakeholders**

- Facilitate a National Validation Workshop for discussing the study findings and taking inputs from key stakeholders and water sector experts including from Government agencies and NGOs.
- Present findings of the study to the stakeholders in the workshop for validation of the study report and finalizing its recommendations.
- Prepare a brief workshop report focusing on stakeholders' feedback.
- Finalize study report based on inputs during the stakeholders' workshop.

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