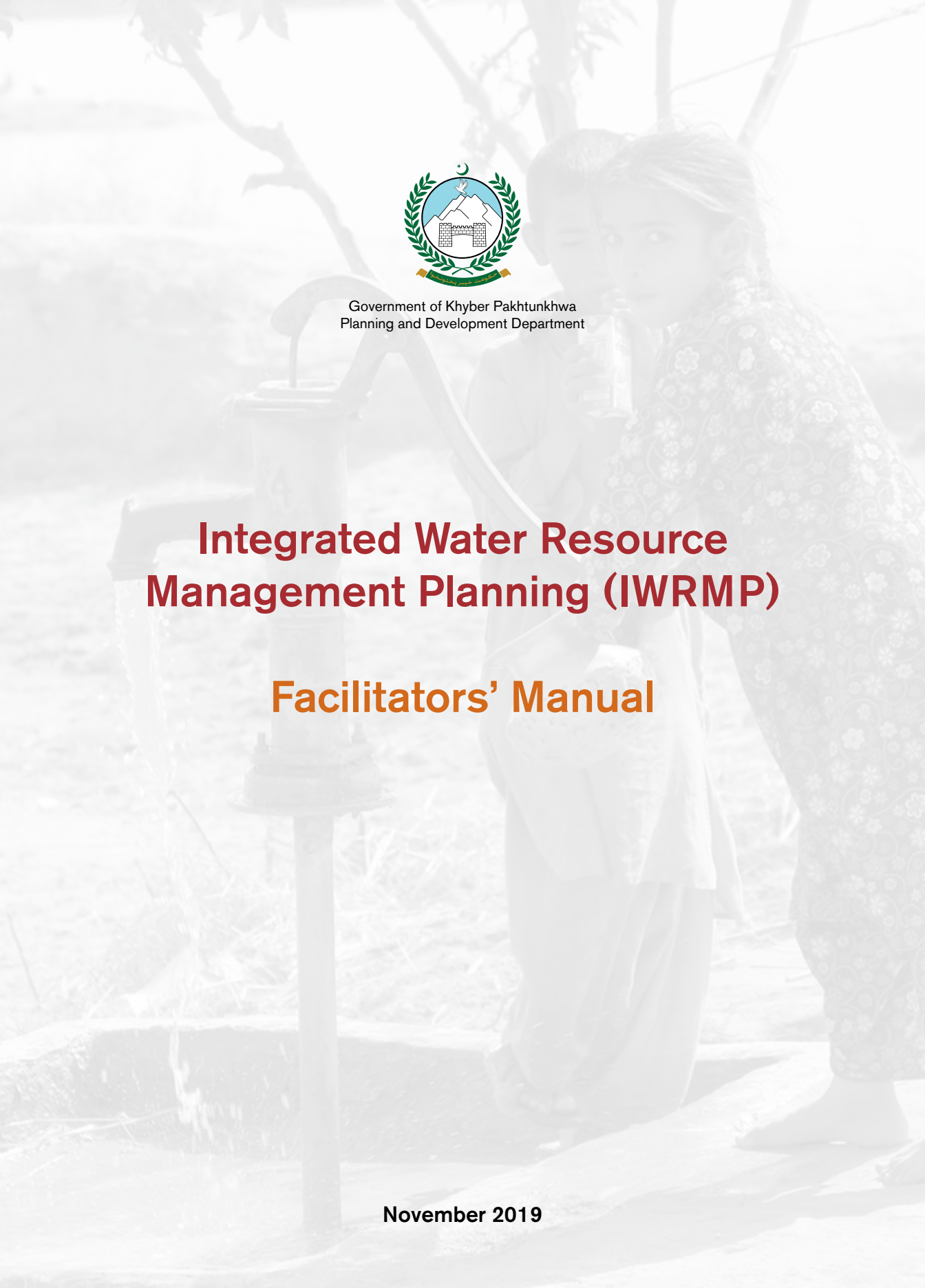
Government of Khyber Pakhtunkhwa
Planning and Development Department

Integrated Water Resource Management Planning (IWRMP)

Facilitators' Manual

November 2019



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Acronyms

3R	Retention, Recharge and Reuse
ADC - F&P	Additional Deputy Commissioner Finance and Planning
ADP	Annual Development Programme
BHU	Basic Health Unit
CBO	Community Based Organization
CCA	Culturable Command Area
DC	Deputy Commissioner
DI Khan	Dera Ismail Khan
DRR	Disaster Risk Reduction
DWSS	Drinking Water Supply Scheme
EAC	Extra Assistant Commissioner
GLA	Government Line Agencies
GW	Groundwater
HH	Household
ICWE	International Conference on Water and the Environment
IE	Irrigation Efficiency
IPCC	Intergovernmental Panel for Climate Change
IWRM	Integrated Water Resource Management
IWRMP	Integrated Water Resource Management Plan
KDA	Kohat Development Authority
KP	Khyber Pakhtunkhwa
MAF	Million Acre Foot
NFE	Non Formal Education
NGO	Non-Governmental Organization
NWP	National Water Policy
O&M	Operation and Management
PCRWR	Pakistan Council of Research in Water Resources
P&D	Planning and Development
PDA	Peshawar Development Authority
PHED	Public Health Engineering Department
RHC	Rural Health Centre
SCD	Soil Conservation Department
SDC	Swiss Agency for Development and Cooperation
TMA	Tehsil Municipal Administration
UC	Union Council
UNCED	The United Nations Conference on Environment & Development
VC	Village Council
VO	Village Organization
WARM	Water Resource Management
WP	Water Productivity
WSSC	Water and Sanitation Services Companies
WUA	Water User Association
WUE	Water Use Efficiency
WUG	Water User Group

Definitions

Dublin Principles on Water and the Environment

The Dublin Statement on Water and Sustainable Development was agreed at the International Conference on Water and the Environment (ICWE), on 26-31 January 1992, held in Dublin, Ireland. The Dublin Statement, which included four principles on water, was submitted to the UNCED in Rio de Janeiro, 3-14 June 1992, also known as The Earth Summit. Hence the name, Dublin principles. These include:

Principle No. 1:

Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.

Principle No. 2:

Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.

Principle No. 3:

Women play a central part in the provision, management and safeguarding of water.

Principle No. 4:

Water has an economic value in all its competing uses and should be recognised as an economic good.

Green Water

Green water is the water that moves back to the atmosphere through the process of transpiration from plants and evapotranspiration from soils.

Irrigation Efficiency

Irrigation efficiency aims at assessing the performance of the irrigation system.

Integrated Water Resource Management (IWRM)

Integrated Water Resource Management is a process which promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment.

IWRM Committee at District Level

This committee is identified as 3rd tier of the implementation in IWRM Strategy. It will be chaired by the Deputy Commissioner and overall facilitated by Additional Deputy Commissioner Finance &

Planning (ADC – F&P) as a Coordinator of the Committee. The Committee will provide over-arching support to the whole IWRM Planning process, monitor IWRMP process and coordinate with government line agencies and IWRMP Focal Persons at Tehsil and Village levels.

IPCC

The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change and supports parties to carve mitigation and adaptation pathways.

The IPCC was created to provide policymakers with regular scientific assessments on climate change, its implications and potential future risks, as well as to put forward adaptation and mitigation options.

Khyber Pakhtunkhwa Water Council

The KP Water Council, chaired by the chief executive of the province, is established as a policy level forum responsible for operationalization of the IWRM strategy in the province.

Khyber Pakhtunkhwa Water Commission

The KP Water Commission under the auspices of Planning & Development Department will supervise and monitor the implementation of the IWRM strategy.

Khyber Pakhtunkhwa Groundwater Authority

The KP Groundwater Authority is an autonomous body to govern groundwater in the province. This authority will be housed under the Planning & Development Department of the Government of Khyber Pakhtunkhwa reporting to the Additional Chief Secretary.

Neighbourhood

Neighbourhood means a mohallah, a group of streets, lanes or roads, in areas with urban characteristics, designated as Neighbourhood by Government.

Neighbourhood Council (NC)

Neighbourhood Council is the second tier of the Local Government, corresponding to Village Council, notified in Amendment Bill 2019 of Khyber Pakhtunkhwa Local Government Act 2013 for neighbourhood in areas with urban characteristics. It has representation (general seats, seats reserved for women, peasants and workers, youth and non-Muslims) from a whole number of a census block or a combination of whole number of census blocks/muaziaat notified by the Government.

Tehsil

Tehsil means a Tehsil/land unit notified under the West Pakistan Land Revenue act, 1967 (W.P. Act XVII of 1967)

Tehsil Council

Tehsil Council is the first tier of Local Government notified in Amendment Bill 2019 of Khyber Pakhtunkhwa Local Government Act 2013. The council has representation (general seats, seats reserved for women, peasants and workers, youth and non-Muslims) from the Village / Neighbourhood Councils situated within the Tehsil.

Water Buffering

The essence of water buffering is to better manage natural recharge and to retain water longer. In this manner unused runoff and evapotranspiration can be reduced. The larger idea is tackling a local water crisis through storing water when it is plentiful and to make it available for the dry periods and to extend the chain of uses. Storage is, thus, the central concept. 3R presents an alternative concept of using many smaller systems and storing water in the landscape.

Water Productivity

Water productivity is defined as the amount of agriculture output per unit of water consumed. Improvement of water productivity aims at producing more food, income, better livelihoods and ecosystem services with less water.

Water Users' Associations (WUAs)

Water Users' Associations are legally recognized bodies representing communities and aims governance including up, mid and downstream levels in a certain geographical unit (catchment, small watershed, sub valley, zam, VC, Tehsil where several villages share water resources).

WUAs normally comprise a formal, usually legally bound group of water users, often located around a canal or borehole, with responsibility for managing and maintaining the part of the system that serves them. Motivated by the search for efficiency and cost savings, WUAs can be viewed as a form of privatization , with the government agency adopting the role of service provider rather than operator.

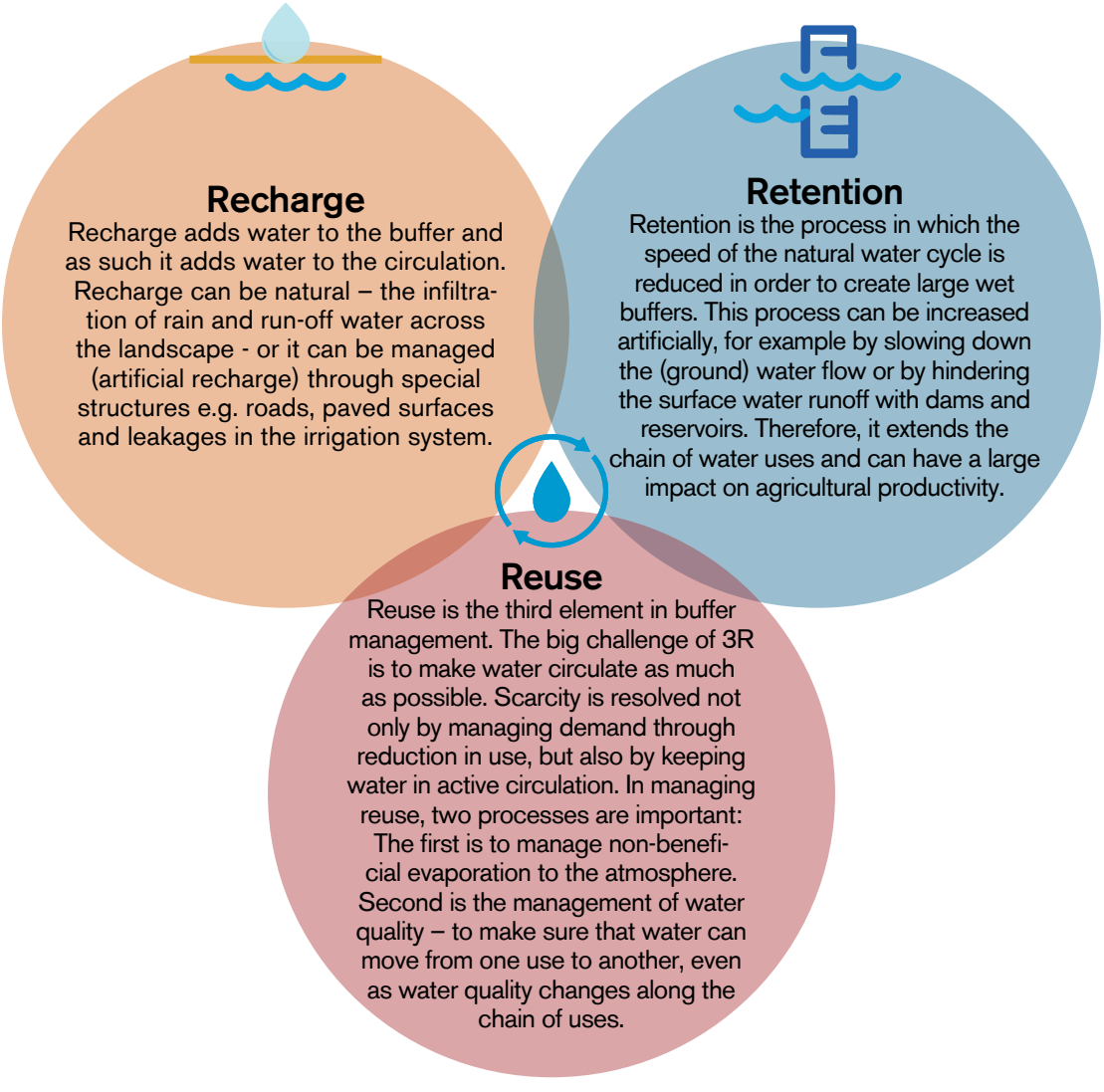
Village

Village means an integrated and contiguous human habitation commonly identified by a name and includes a Dhok, Chak, Kalay, Goth, Gaown, Deh, Basti or any other comparable habitation.

Village Council (VC)

Village Council is the second tier of the Local Government notified in Amendment Bill 2019 of Khyber Pakhtunkhwa Local Government Act 2013. The council has a representation (general seats, seats reserved for women, peasants and workers, youth and non-Muslims) from one or more muaziaat/census villages.

3 R (Retention, Recharge & Reuse)



About this Manual

Pakistan is the 6th most populated country in the World with a 5.5% growth rate (Wasti 2018). The country is ecologically diverse with a predominantly agrarian economy contributing to over 21% of GDP, employing 45% of total labour force and a major contribution to export (2010). Water is a major driver of economy as 80% imports directly dependent on agriculture. Agriculture sector is the main consumer of the available water (around 90% freshwater) and a source of livelihoods of the people. There are several sectors competing for the available water. Therefore, finite water resources must be managed in a manner that secure water for people, food production, industrial development and protecting ecosystems. With a rapidly declining per capita availability of water in Pakistan from a minimum level of 1000^{m3}, we are soon to join the category of water stressed countries. Therefore, it is essential to aim for a water regime management that carefully disciplines and mediates among competing water demands in an efficient manner. The district based Integrated Water Resource Management Plan (IWRMP) is a tool to facilitate this process.

This Facilitators' Manual provides a mean to achieve integrated water resource management planning at the district level. The Government of Khyber Pakhtunkhwa has approved provincial water strategy in 2019 with an aim to ensure coordinated and integrated water resource management in the province. Preparation of the district level IWRM plans has been recommended as a tool to operationalize the strategy at district level and achieve the overall goals. This facilitators' manual will help IWRM planning facilitators to prepare these plans and acquire approval as per guidelines provided.

This manual has four modules:

01 Understanding IWRM – based on theoretical definitions and global concepts

02 Conducting Integrated Water Resource Management Planning (IWRMP)

03 Implementation and Financing of IWRMP

04 Institutions behind Integrated Water Resource Management Planning and Implementation

Contents

Background

Pakistan is predominantly an arid - semi-arid country. About 80% geographical area receives less than 375 mm, of which 70% receives 250mm or less rainfall per annum (Rashid et al. 2004). Pakistan's dryland agriculture is a high-risk, low-input enterprise for resource-poor farmers. Access to surface water is limited due to its inadequate availability. Therefore, groundwater is excessively used for supplementing water needs of agriculture and other sectors. More than 60% irrigation water supplies, over 90% drinking water and almost 100% water used in industry come from groundwater (Qureshi and Ashraf 2019). The groundwater has played a major role in increasing the overall cropping intensity in Pakistan from about 63% in 1947 to about 120% in 2018 (Qureshi and Ashraf 2019).

Khyber Pakhtunkhwa is home to about 35.5 million people with high incidence of multi-dimensional poverty (2017). Among others, lack of access to water is a major driver of poverty and deprivation (Ali et al. 2014). Therefore, engaging in water sector development and improved access to water may lead to improvement in people's well-being and harmony. According to Water Apportionment Accord (Anwar and Bhatti, 2018), a total of 8.78 MAF of water at the ratio of 7.5 % has been allocated to KP against which the province could utilize 5.97 MAF with an annual unused amount of 2.81 MAF. The major reason for less utilization is the non-availability of irrigation infrastructure. Currently, only 34% cultivable area is covered by irrigation and the remaining is rainfed. Apart from agriculture, there are several other uses that require coordination to reduce pressure on water resources. The coordinated planning would require an agreed upon methodology for all stakeholders to follow.

IWRM promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. The general framework for this approach has three dimensions: economic efficiency, ecological sustainability and social equity. The National Water Policy 2018 strongly supports IWRM concept and suggests provinces to arrive at their own water related strategies including IWRM. "An IWRM strategy which can promote the coordinated development and management of water and land resources in a sustainable and equitable manner, has as yet not been achieved" (2018). Since 1980s, KP remained a flag bearer for integrated resource management through several international and government financed development projects at various scales using various tools and approaches. KP may use past experiences and contextual realities for developing IWRM strategy and ensure inter-departmental and multi-actor coordination.

IWRM approach takes water as one shared, finite and economic entity. IWRM including water conservation and efficient water use is the cornerstone of an effective water strategy. IWRM approach recognizes that various sectors may have their own policies and strategies. However, IWRM promotes a paradigm shift from sub-sector to cross-sectoral water management. The approach will help actors to achieve all water objectives using the same shared, finite water resource. In pursuance to achieving this, the KP has launched an IWRM Strategy with technical assistance of Helvetas and the financial support of Swiss Agency for Development and Cooperation (SDC). Most of the strategy actions are expected to be implemented at the district level.

The IWRMP tool is an integral part of the IWRM strategy. It was tested in four districts, further refined based on experiences, and aligned with the current local government set up. IWRMP induces dialogues among various stakeholders and water users to arrive at an agreed plan of action for certain number of years. Communities, often represented by WUAs and district government, are locus institutions for such a plan. This will not only function as a planning tool but will also help in multi-sectoral coordination, implementation and monitoring of the IWRM strategy implementation.

Module 1:

Understanding IWRM – Theoretical definitions and global concepts

Module objectives:

To introduce **general concepts of water and water management (the water cycle, global water distribution, watershed)**, the IWRM approach, Dublin Principles and techniques of water buffering.

By the end of the module the trainees are expected to:

- Understand the water cycle and its impact on water management at local level.
- Understand the concept of IWRMP.
- Understand potential techniques and their scope in the context of local water planning and management.

Teaching time:

At least 3 sessions of about 1.5 hours each, with two breaks.

1.1. Understanding Water – Basic Concepts

1.1.1. Water Cycle

Water on planet Earth is in constant motion and continuously changes its state between solid, liquid and vapour. Precipitation falls in the form of snow and rainfall etc. Snow at higher altitudes accumulates into packs, melts, directly contributes to runoff and flows into the rivers, sea and lakes, and infiltrates into the ground. Part of the precipitation directly evaporates from water bodies or transpires from plants and goes back into the atmosphere forming clouds. All these processes are part of a large system called the water cycle **(Figure 1)**.

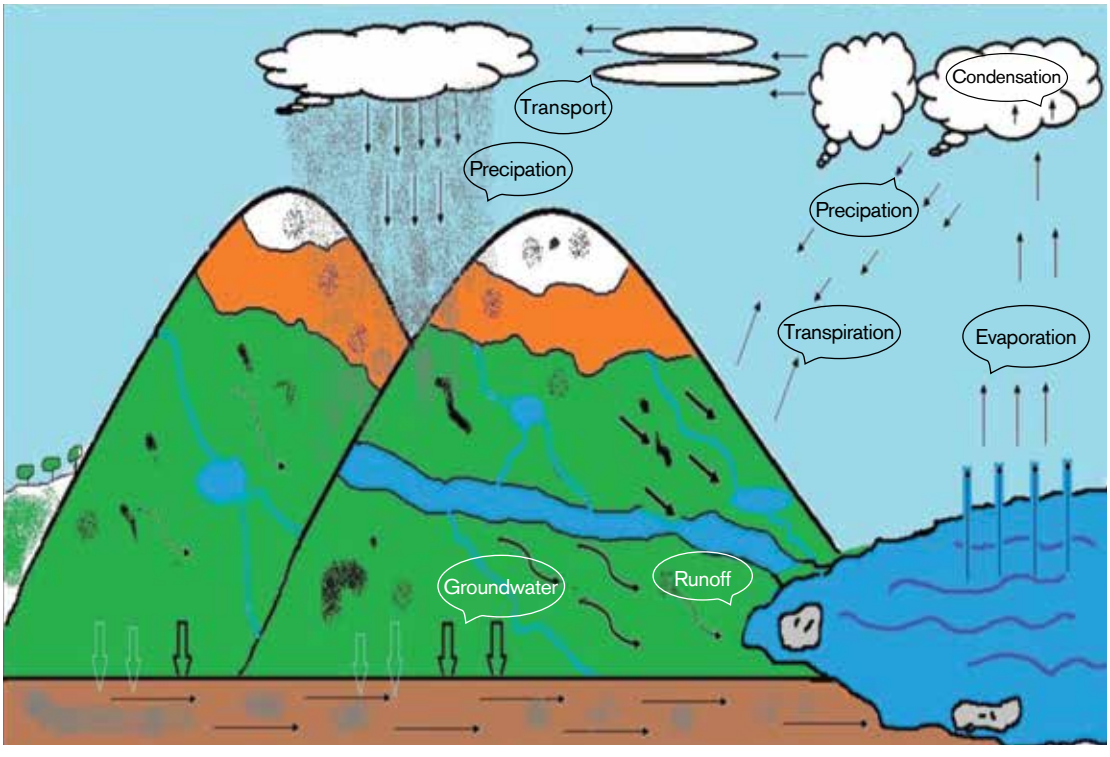


Figure 1: Global Water Cycle

Although water is constantly recycled through the earth's system, the total amount of water circulating is finite. The water cycle is currently undergoing big alterations due to human interventions. These changes are becoming critical and drastic due to climate change phenomenon. Climate change affects the water cycle. An increase in global temperatures means that the atmosphere has the capacity to hold greater moisture, trigger changes in the amount of water vapour and circulation of water in the atmosphere.

The 20th century has seen an increase in precipitation in Northern latitudes, but then a downward trend in the tropics, particularly after the mid-1970s. Areas that have seen an overall reduction in precipitation are likely to have seen an increase in extreme rainfall events. At the same time rainfall has become unpredictable and erratic. The predictions are that the intensity of rainfall events will increase even further, leading to more water running off the land and less being retained in the soil. Therefore, it will become even more important to implement water retention and storing measures for use during periods of less precipitation.

1.1.2. Global Water Distribution

There is a total of approximately 1,400 million km^3 water on earth. Most of the water is saline and found in the oceans. Of the available fresh water, the majority is stored in the form of ice in glaciers and ice caps. Water directly accessible is only a small fraction (1.3%) of the total water available on the planet for domestic, agricultural and industrial requirements **(Figure 2)** (Shiklomanov 1993).

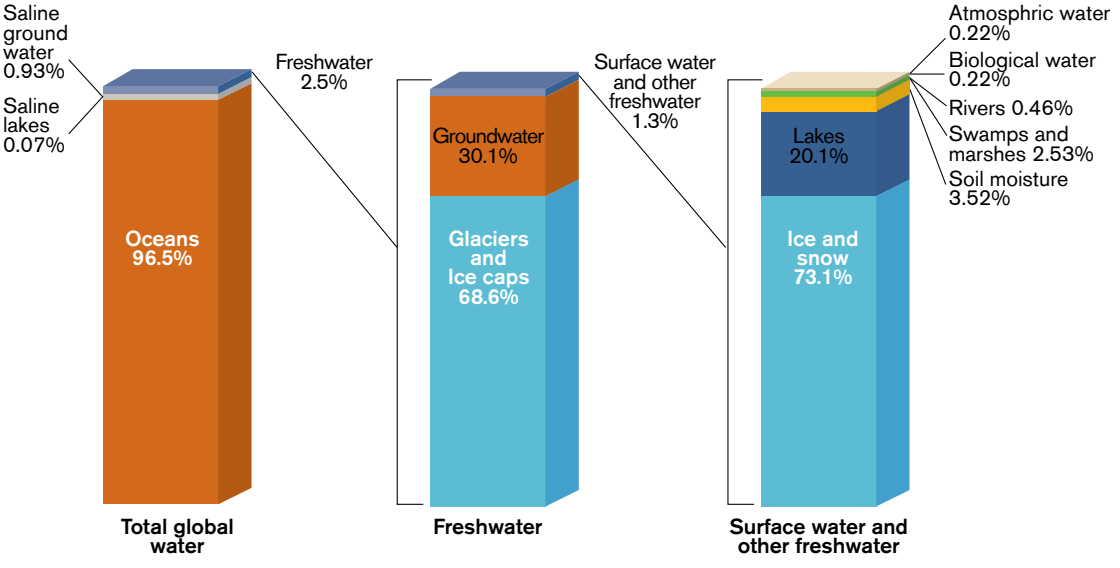


Figure 2: Distribution of Earth's Water

1.1.3. Blue, Green and Brown Water

We identify water as Blue, Green and Brown with the following description:

a. Blue Water

Blue water is the water in rivers, lakes, wells and ponds from where it can be easily collected in a container (Figure 3). Blue water refers to water that we drink or that can be poured or channelized into a vessel. This is the water that moves in the form of rivers, runoff and groundwater from one point to the other. If sufficient in quantity, surface water may percolate further down and enrich the **groundwater** (water table). There is an immense amount of water in aquifers below the earth's surface. Some part of the precipitation landing on the ground surface infiltrates into the subsurface. The part that continues downward through the soil until it reaches rock material that is saturated in groundwater

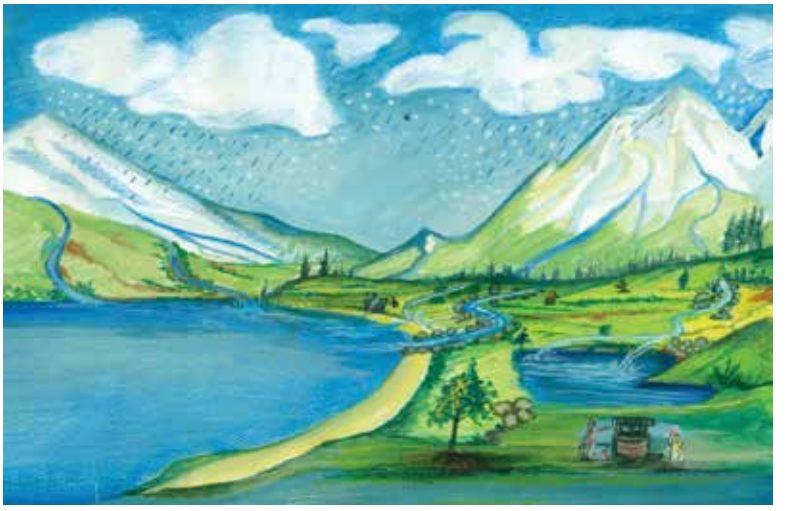


Figure 3: Blue Water

recharge. Water in the saturated groundwater system moves slowly and may eventually discharge into streams, lakes, and oceans. The groundwater table is located in one or more layer(s) of fissured rock, soil or weathered rocks that trap water like a big sponge. Runoff from rain is seasonal in nature, and it only occurs during the rainy season, whereas groundwater flow is steady during a given time period. Some water underlies the Earth's surface almost everywhere, beneath hills, mountains, plains, and deserts. This is **sub-surface water**, which is not always accessible, at times not fresh enough for use without treatment, and it is sometimes difficult to locate or to measure and describe. This water may occur close to the land surface at shallow depths.

b. Green Water

Green water is the water that is absorbed by the plant for growth and makes up the green water footprint of the crop (Figure 4). Green water is the soil moisture from precipitation used by plants via transpiration; it is part of the evapotranspiration flux in the hydrologic cycle. Some of the green water moves back to the atmosphere through the process of evapotranspiration from plants and soils; called "green water flow". Green water cannot be fetched with any kind of bucket, jerry can or pump. The only pump, able to use this water is the plants root system. Once the plants have used this water to grow and thrive, the water transpires back to the atmosphere.

Figure 4: Green Water

c. Brown Water

The wastewater resulting from different uses of blue water such as water used for washing household items, clothes, vehicles, industries, water from drainage of irrigation systems, sanitation, is called brown water **(Figure 5)**. This water is of lower quality, but it can be recycled through various techniques for reuse, thus augmenting the efficiency of the water cycle.

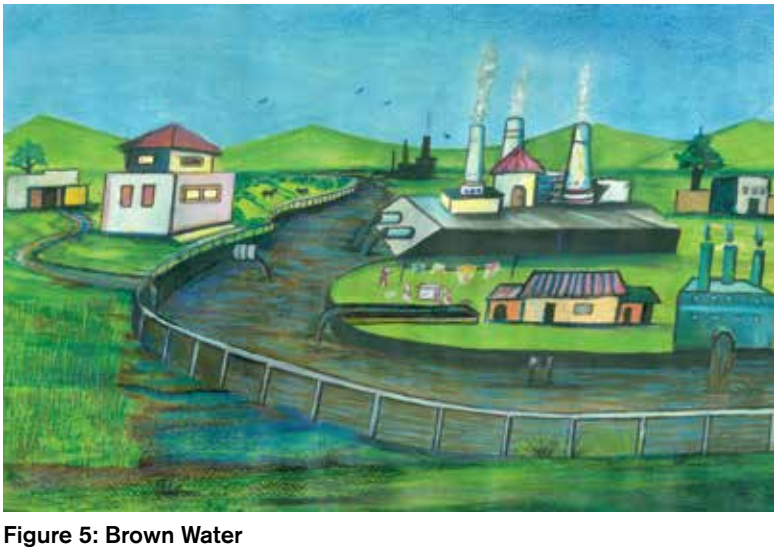


Figure 5: Brown Water

1.1.4. The Concept of Watershed

The rule of water is to move from higher to the lower grounds. It follows ridges and flows into natural depressions. It always uses the same pathways and concentrates at the lowest point. The landscape area **(Figure 6)** of which run-off water resulting from rainfall is collected and drained through a common point (the outlet) is called a watershed (Desta et al. 2005; Tiki et al. 2016). A watershed includes all forms of natural resources in the area such as water, land and vegetation.

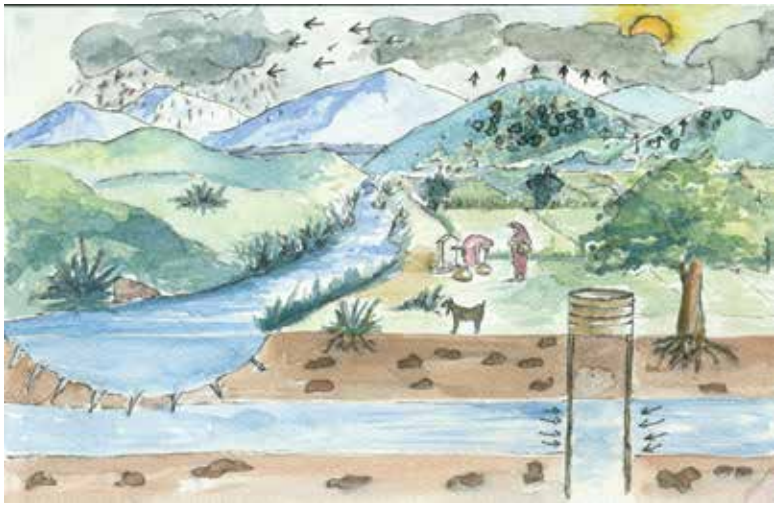


Figure 6: Landscape Area of a Watershed

A watershed is a divide through an imaginary line running through the highest points such as mountaintops and ridges making a basin where water is converged or can be collected **(Figure 7)**. On each side of the divide, the runoff water will run away on opposite directions from the divide/ ridge line. Every watershed has a drain into another watershed.

Figure 7: A cross section of catchment to understand watershed

Every activity in a watershed has an implication for water movement, recharge, retention and quality. It is therefore important to understand a watershed and how it can be managed for a better water regime. One watershed is linked with the other in an upstream – downstream relation. Therefore, management or mismanagement of one watershed has implications for the other.

1.2. Climate Change and Water

- **Climate is the statistical representation of weather over days, months, seasons, years, decades and longer (IPCC 2014).**
- **Weather describes the details of what we experience over the course of hours and days. It can change a lot within a very short time.**

Climate change is a long-term change in the earth's climate, especially a change due to an increase in the average atmospheric temperature. According to the Intergovernmental Panel on Climate Change (IPCC), climate change is a change in the state of the climate that can be identified (e.g., using statistical tests) by changes in the mean and / or the variability of its properties that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes, external forcing, or persistent anthropogenic changes in the composition of the atmosphere and/or land use.

Intensive consumption and industrial processes release carbon dioxide and other gases into the atmosphere. Coupled with deforestation and urbanization, most of the gases are entrapped around earth surface serving as a blanket to absorb and emit heat. These heat-trapping gases are also called greenhouse gases. While these gases are naturally part of the atmosphere to keep the earth warm enough for life, their excess into the atmosphere is causing earth to get warmer and to experience the effects of climate change.

1.2.1. Impact of Climate Change on Water

Climate change is manifesting itself at regional and local levels. These changes have biological, economic and social impacts and consequences. Globally, Pakistan is included in the list of most vulnerable countries to climate change impact (Kreft et al. 2014). These impacts are already threatening the security of livelihoods and assets in Pakistan. These threats, based on knowledge about changing climate trends and land suitability, may be transformed into opportunities. Climate change exacerbated by human practices, poses an additional pressure on crucial and limited resources such as water and land. The most critical climate change factor is the aridity combined with the dependence on a single river system – the Indus – which supports the biggest irrigation system of the world (Chaudhry 2017). Several national studies have identified the effects of climate change on water and that such effects differ across different regions (Nelson et al. 2009; Tubiello and Rosenzweig 2008; Orlowsky et al. 2017). Water and agriculture are highly sensitive to climatic conditions and are directly affected by climate change. It is therefore very important to understand climate change trends for longer term planning and preparedness.

Changes in climate may be expected to have significant impacts upon crop yields through changes in both temperature and moisture availability. As climate pattern shifts, changes in the distribution of diseases and pests may also have impact on agriculture. Increased temperature and rainfall variability have resulted in shifting of agro-ecological zones, prolonged dry spells and higher incidences of pests and diseases. Temperature drives the hydrological cycle, influencing hydrological processes in a direct or indirect way. In a warmer climate more evaporation occurs resulting in more precipitation. Such changes may affect the spatial and temporal distribution of runoff, soil moisture, groundwater reserves, cropping systems, etc. More evaporation from land may increase the frequency of droughts and more precipitation may increase the frequency of floods.

Watershed or Administrative boundaries? Administrative boundaries follow manmade constructed divisions. Political, administrative and any other human boundaries are not respected by water. River courses – for example – may pass through several regions and cross several political boundaries. These boundaries are however important for decision making such as elections and resource allocation for development activities as well as development planning including census units and local administration. In case of IWRMP, the nerve of the process lies in decision making, equitable resource distribution (water) and commitments (including financial). Therefore, IWRMP follows an administrative boundary of a Village, Tehsil or District. WUGs and WUAs are also organized within these boundaries to be recognized as partners with the authorities for advocating their role. Within the administrative boundaries, however, several small watersheds form basis of sustainable water resource management and planning.

A most optimal way to ensure that the district IWRMPs are climate compatible, is to keep track of climate scenarios for the planning unit. This is possible by analyzing trends and changes in precipitation and temperature scenario and interpreting consequences for water resources for drinking, irrigation, domestic use and other needs.

Climate (temperature and precipitation) scenario – An example of D I Khan

In DI Khan, the climate scenario **(Figures 8-9-10)** suggest that winter will become cooler while trends for summer and fall show insignificant changes with only a slight increase in maximum temperatures but a declining trend for minimum temperatures. The annual rainfall has increased in the current decade (2011 – 2020) compared to the 30-year normal base (1981-2010). These are further expected to significantly increase by 2030. Winter and fall rainfalls are showing a slightly decreasing trend. On the other hand, rainfall during spring and summer is expected to significantly increase. Given that the average rainfall is showing an increasing trend till 2030, rainfed areas may benefit from these scenarios. Necessary measures would also be needed to introduce water conservation practices e.g. mulching, rainwater harvesting and water storage techniques.

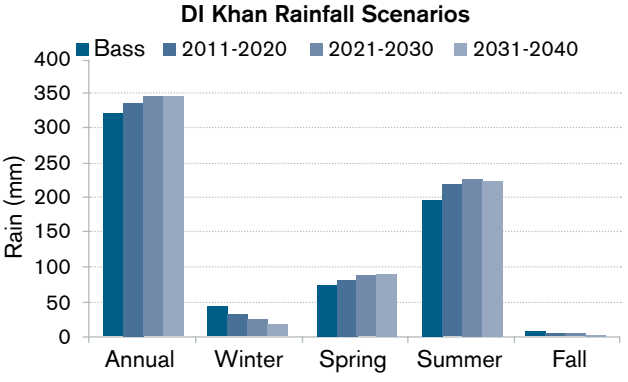


Figure 8 : D I Khan Rainfall Scenarios 1981-2040

Adaptation measures may also look at the possibility of re-introducing / improving seeds of traditional crops like pulses, millet, peanut and gram that are heat and water resistant under the changing climate. At the same time, early preparedness is needed to address declining rainfall from 2030 onwards.

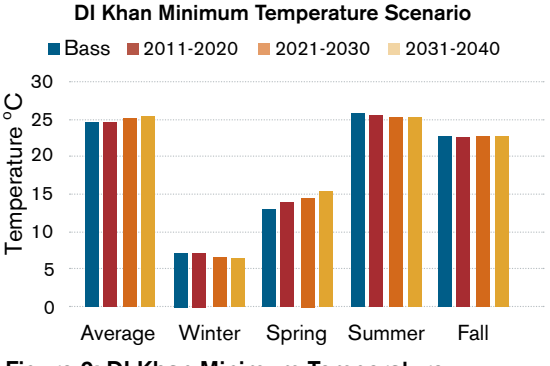


Figure 9: DI Khan Minimum Temperature Scenario 1981-2040

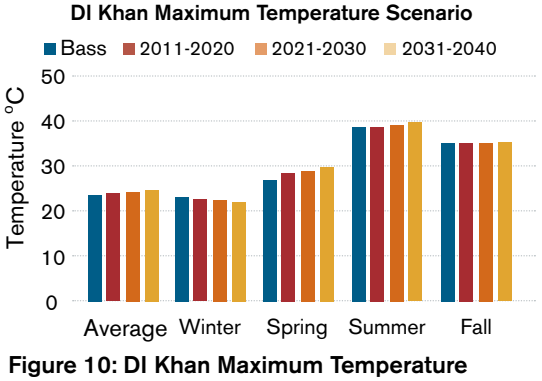


Figure 10: DI Khan Maximum Temperature Scenario 1981-2040

1.3. Integrated Water Resource Management Concept – An introduction

IWRM is a process, which promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (Rana and Kelly 2004).

Effective and efficient water management has emerged as one of our greatest challenges for which

many approaches have shifted over the last few decades:

- During 1960-70s the paradigm of water resource development dominated where water was a resource to be exploited through engineered structures.
- Later, in the 1980s it was recognized that water may be over-exploited by human beings leaving irreparable losses to livelihoods and economy. Regional and national strategies were encouraged instead of a project approach taking into account ecological and social constraints.
- In 1990s, water was also recognized as an environmental good. The paradigm was shifted towards water resources management with an integrated outlook for economic, social and environmental outputs.

The general framework for this approach has three dimensions: economic efficiency, ecological sustainability and social equity (**Figure 11**) (Agarwal et al. 2000).

The concept of IWRM was recognized in Agenda 21 of the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, to a large extent based on Dublin Principles (**Figure 12**) developed earlier in the same year (Gorre-Dale 1992). In relation to principle 4, a major debate emerged at the time of its formulation. In the meantime, the United Nations declared that access to drinking water and sanitation is a basic human right. This should not mean that people won't have to pay for water, but in this case, water should be affordable by all social profiles and segments of people living in a country.

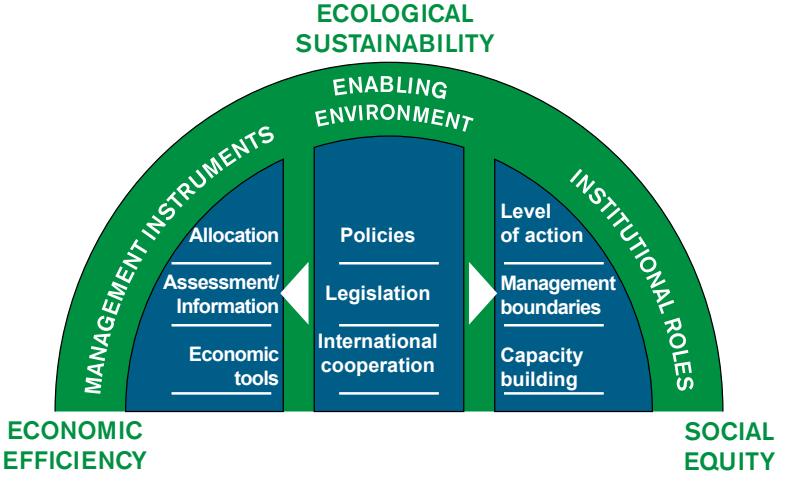
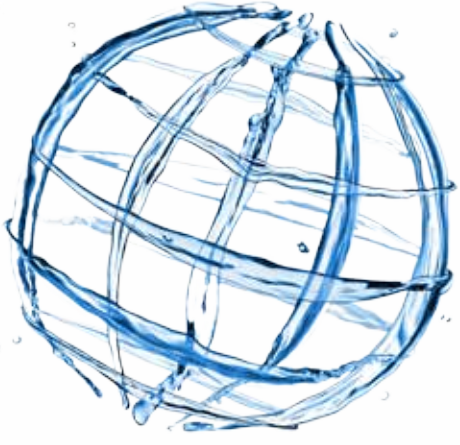


Figure 11 : Economic, Efficiency, Ecological Sustainability and Social Equity in Integrated Water Resource Management

THE DUBLIN PRINCIPLES[1] WATER AND SUSTAINABLE DEVELOPMENT

Scarcity and misuse of fresh water pose a serious and growing threat to sustainable development and protection of the environment. Human health and welfare, food security, industrial development and the ecosystems on which they depend, are all at risk, unless water and land resources are managed more effectively in the present decade and beyond than they have been in the past.



01 Water is finite

02 Participatory development and management

03 Women have a central role

04 Water as an economic good

DUBLIN PRINCIPLES

Concerted action is needed to reverse the present trends of overconsumption, pollution, and rising threats from drought and floods.

Principle No. 01

Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment

Since water sustains life, effective management of water resources demands a holistic approach, linking social and economic development with protection of natural ecosystems. Effective management links land and water uses across the whole of a catchment area or groundwater aquifer.

Principle No. 02

Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels

The participatory approach involves raising awareness of the importance of water among policy-makers and the general public. It means that decisions are taken at the lowest appropriate level, with full public consultation and involvement of users in the planning and implementation of water projects.

Principle No. 03

Women play a central part in the provision, management and safeguarding of water

This pivotal role of women as providers and users of water and guardians of the living environment has seldom been reflected in institutional arrangements for the development and management of water resources.

Principle No. 04

Water has an economic value in all its competing uses and should be recognized as an economic good

It is vital to recognize first the basic right of all human beings to have access to clean water and sanitation at an affordable price. Past failures to recognize the economic value of water has led to wasteful and environmentally damaging uses of the resource. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources.

[1]The Dublin Statement on Water and Sustainable Development, also known as the Dublin Principles, was a meeting of experts on water related problems that tool place in January 1992 at the International Conference on Water and the Environment (ICWE), Dublin, Ireland, organized from 26-31 January 1992.

Figure 12: DUBLIN Principles

1.3.1. Components of IWRM

Similar to other planning processes, IWRM has a systematic planning cycle. The Water Resource Management Chair (in short WARM Chair) is used as a means to explain IWRM components not to be missed out during the planning process **(Figure13)** (Tharu et al. 2015).

- The legs represent the different **water uses**

- The stretchers are measures for water **management, retention, recharge and reuse opportunities**
- The seat stands for the **stakeholder dialogue**
- The backrest for **capacity development**

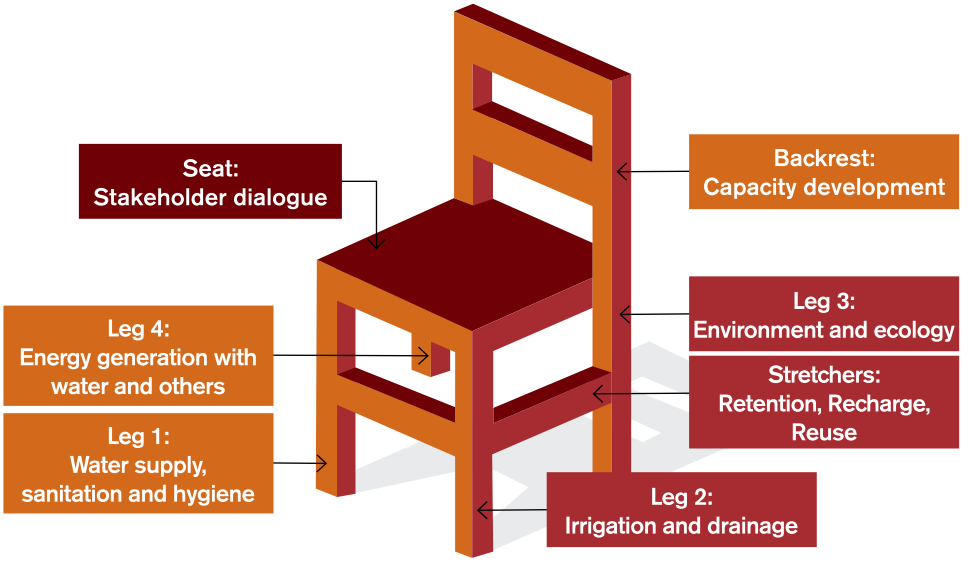


Figure 13: WARM Chair to Explain IWRM Planning Guidelines

IWRM approach takes water as one shared, finite and economic entity. IWRM including water conservation and efficient water use are the cornerstones of an effective water strategy. IWRM recognizes that various sectors may have their own policies and strategies. However, the best way to achieve integrated implementation of these multiple policies is to follow an IWRM strategy. IWRM will help the district to achieve all water objectives using the same shared and finite water resource. It focuses on both sides of the equation: Water uses for all purposes and ensure its conservation and availability for sustainable use **(Figure 14)** (Agarwal et al. 2000).

Water has great social and economic importance. Human society, culture, and livelihoods depend on availability of, access to, and control over water sources. Women, especially in rural areas, have high attachment to water, as they spend many hours each day collecting water for domestic, farm and livestock uses. Water should also be considered from the perspective of cultural heritage and economic value for a prosperous and equitable society.

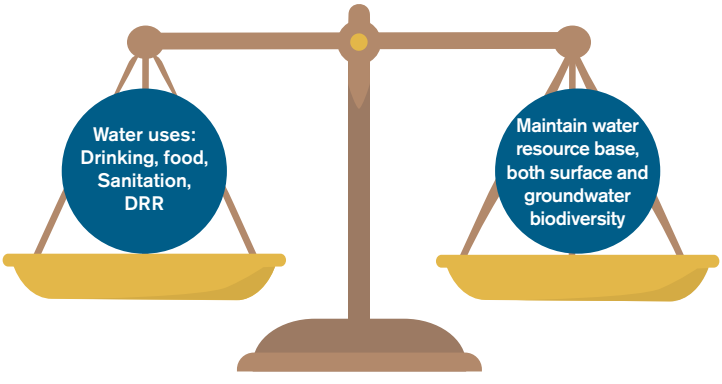


Figure 14: Water Uses Vs. Resource Water Base

1.4. Concept of Water Conservation, Buffering and Water Productivity

Water is abundant during the rainy season, but it becomes quickly scarce during the dry season as it flushes out of the system as runoff and non-productive evaporation. Therefore, it is necessary to integrate water conservation and buffering measures into the development of water and agricultural schemes.

1.4.1. Water Conservation and Buffering

Water Conservation may also be referred to as efficient utilization of water in all uses and improved water productivity in agriculture although these are different concepts as explained below:

Water Buffering is to reduce unused runoff and extend the chain of uses for increasing chances for natural recharge and to retain water for longer into the system.

In many areas of Pakistan rainfall is often concentrated within a limited period. Typically, it rains for a few months and for the rest of the year there is little or no rain. Diverting rainwater to storage is thus the central concept of buffering. Often storage is associated with large surface reservoirs and mega-dams. However, apart from retention and storage, the concept of water recharge and reuse are equally important (Foster et al. 2012) – using many smaller systems and storing water within the landscape such as rainwater harvesting, to:

- **Recharge water** for optimizing the infiltration of rainfall and runoff water thus improving groundwater recharge.
- **Retain water** to keep water longer in the area, slow down the outflow and help rejuvenate groundwater.
- **Reuse** retained water for extended period of time and multiple purposes including its recycling multiple times.

Most of the stored water is invisible. It is placed in the ground - in the upper layers of soil (the unsaturated zone) or below the water table (the saturated zone). Four types of storage may be distinguished as in **(Figure15)**.

Figure 15: (A) Ground Water Storage, (B) Soil Moisture Storage in Root Zone (C) Closed Surface Water Storage and, (D) Large Open Surface Water Storage

There are many small measures that may be used to improve the local water buffering capacity of the area. If landscapes are transformed at scale, many processes change and improve with it; the hydrology, sedimentation processes, microclimate, soil chemistry, nutrient cycle, regeneration of vegetation cover and of course the well-being of people depending on this water.

The figure below **(Figure 16)** depicts a typical Pakistani mountainous landscape without and with measures in place.

Figure 16: Comparison of Two Landscapes (A) without and (B) with Measures in Place

The following headings provide examples of sources for water retention and recharge and the challenges faced in their management.

I. **Water sources including seasonal streams**: A proper overview and quantification of existing water sources helps in understanding where alternative water sources are needed the most. It also gives an indication of what kind of technologies are already in use and known to the local community and what risks are these sources facing. It is important to understand legal entitlements of these sources and if there are any legal and institutional issues to be sorted out before these are planned for the entire watershed.

II. **Presence of rills and gullies**: Gullies and rills collect dispersed runoff water from surrounding areas and quickly drain it away towards bigger natural courses. They are not stable and tend to expand year after year subtracting precious land, but also water and soil nutrients from farmland. Gullies also act as unproductive drains that suck water out of the surrounding soils and shallow groundwater.

III. **Road drains and culverts**: Roads often change watersheds drastically. A road can in fact divide a watershed into two minor watersheds and collect a noticeable amount of water in its drains. Commonly the water is not safely disposed or used and causes damages downstream where it erodes big portions of land underneath. Alternatively, this water may be collected, retained or recharged into the aquifer.

IV. **Runoff from rocks and roofs**: The water runs off as a dispersed sheet of water or in nullahs. Hard and not fractured rock outcrops can generate a great amount of runoff. Also laminated, tiled and cemented roofs may produce substantial amount of precious runoff water. Where feasible, by introducing measures to check the movement of this water, two objectives are possible to achieve: First, erosion of soil and consequent loss of soil nutrients may be reduced. Second, the water may be retained for longer in the field, where it infiltrates into the soil and enriches the soil moisture storage and recharge the groundwater.

V. **Evapotranspiration**: It is important to improve the recharge of soil moisture storage, but it is also important to limit its depletion. Reducing wind speed and augmenting (sun) shades in the fields and over surface water may limit evapotranspiration. Additionally, some agro-

nomic measures, such as mulching and composting, help in keeping moisture longer into the system.

VI. **Excess water from agricultural fields**: Drains, from irrigation schemes and the like may be reused and re-introduced in the water buffer. Accordingly, the efficiency of the water buffer use is improved. Quality management of this water is important since it has implication for reuse. Also waste water from kitchens; light industries may sometimes be reused.

VII. **Soil moisture**: A soil moisture scan should be undertaken together with the community. The first areas that show signs of water stress and the areas that are greener for longer during the dry season must be identified and mapped. When the most moisture stressed areas are known, it is possible to think of solutions to increase green water storage and therefore augment crops and livestock production.

1.4.2. Water Productivity

Water productivity (Mali 2016) is an important element in improved water management for sustainable agriculture, food security and healthy ecosystem functioning. Water productivity is defined as **the amount of agriculture output per unit of water consumed. Improvement of water productivity aims at producing more food, income, better livelihoods and ecosystem services with less water**. Water productivity is explained by the following equation:

Water Productivity (WP) (Kg/M^3) = Output derived from water use (kg) / Water input (M^3)

The concept of water productivity started gaining importance since the realization of increasing threshold being faced by countries and regions on account of its available water resource, particularly with respect to the huge allocation of Fresh Water towards agriculture sector (e.g. 90% as reported in Pakistan). Water productivity is a plausible option for quantifying the extent of sustainable water use in agriculture and thereby proposing suitable economic policies to ensure intelligent and informed allocation of scarce resource among crops to meet the present demand without foregoing the needs of the future generations.

Water productivity reflects the goal of producing more food, income, livelihoods and ecological benefits at less social and environmental cost per unit of water. Water resources around the world are threatened by scarcity, degradation and overuse. Food demands are projected to increase. It is important to improve our ability to produce food with less water. WP defined as above, varies from region to region and from field to field, depending on many factors, such as crop and climate patterns (if rainfall fits crop growth), irrigation technology and field water management, land and infrastructure, and inputs, including labour, fertilizers and machinery. It may be enhanced by either increasing crop yield or reducing water consumption and maintaining the yield level or by both. Increasing water productivity means using less water to complete a particular task, or using the same amount of water, but producing more.

1.4.3. Difference between Irrigation Efficiency, Water Use Efficiency and Water Productivity

The terminologies, Irrigation Efficiency (IE), Water Use Efficiency (WUE) and Water Productivity (WP) have different definitions and applications.

IE aims at assessing the performance of the irrigation system. Molden (1997) mentioned that pro-

ductivity takes different forms with different units, but efficiency has only one form (dimensionless). Haidari (2014) indicated that WP is distinct from WUE (Mali 2016).

WP refers to crop production in relation to total water consumed while the WUE is a dimensionless ratio of total amount of water used to the total amount of water applied, "as WP terms are not dimensionless, i.e. cannot be categorized in efficiency terms, they are just some ratios with different units in the numerator and denominator".

Table-1: Difference between IE, WUE and WP

Irrigation Efficiency (IE)	Water Use Efficiency (WUE)	Water Productivity (WP)
Ratio of water consumed by crops to water diverted from the source	Dimensionless ratio of total amount of water used to the total amount of water applied	Refers to crop production/ benefits in relation to total water consumed
Applies to irrigation system	Applies to crop	It is related to benefits from a system
Used to evaluate the performance of water system	Performance of crop	Performance of production system as a whole
Objective: water saving	A simple assessment of amount of water taken up by the plant	Objective: getting the best returns from applied water
Non-dimensional	Non-dimensional	Has dimension
Considers losses, seepage, soil evaporation	Does not consider losses	Accounting the loss depends on context: supply or depletion of WP
Improved IE and WUE contributes in improving WP		

1.4.4. Efficient Utilization of Water - A Water Bucket Concept

To improve efficiency of water in any system (a household, a farm, a watershed), the following actions may be possible:

A. Augment the amount of water entering the bucket (access resource, recharge)
B. Close as many holes as possible (prevent losses, retain)
C. Plan water in the bucket for all uses on the list (use, reuse)
D. Monitor water use and reuse as per plan and negotiate minimum losses

Once the water is in the bucket, it is easier to claim ownership, keep it for longer time, and if all users agree, access and make a productive use of water for multiple uses. The point is to think in advance on all possible losses (bucket hole, mishandling), misuses (use more than allocation or requirement), and create a system to achieve maximum objectives from the same quantity of water.

Water use efficiency is a rather diverse term which may mean differently in different contexts. In urban context it refers to using limited water supplies wisely (customer end) and ensure equitable and continuous supply services and maintenance on paid basis (supplier side). In rural context water efficiency often refers to efficiency of irrigation systems for agriculture and reduce water wastage from source to roots (plant).

In conclusion, the principle is still the same that water is an economic good, it is finite, and needs to be used with care.

1.4.5. Self-evaluation Questions

This is an individual evaluation of your understanding of the information presented in this module. Answer the (multiple choice) evaluation questions and check your own answers (provided at the end of the module). More than one answer might be right. In case your answers are wrong, it is suggested that you review the module again before proceeding.

Exercise: Please fill in the missing types of water in figure 17. You can check your answers with the original illustrations in the main text of module 1.

Figure 17: Missing Types of water

Q1: What is the difference between Evaporation and transpiration?

a. None. Transpiration and Evaporation are the same thing
b. They both imply the passage of water from liquid to vapour state which is then transferred to the atmosphere
c. Evaporation takes place from the soil or from surface water. Transpiration instead is the water that is transferred from plants to atmosphere
d. With transpiration, plants absorb water from the soil. With evaporation plants lose part of the water to the atmosphere

Q2: What is blue water?

a. The water – in all its forms – that is present on the planet
b. The water of lakes, rivers and oceans
c. The water present in surface water bodies, in groundwater tables and flowing as runoff
d. Soil moisture and atmospheric water

Q3: What is green water?

a. It is the waste-water from the kitchen
b. It is the soil moisture
c. It is all the water that is present in plant tissues

Q4: What is a watershed?

a. Watershed is defined as any landscape area of which runoff water resulting from rainfall is collected and drained through a common confluence point
b. Watershed is the line that connects all the highest points in a landscape and encloses a catchment
c. A watershed is a planning area that is defined by administrators. It follows political boundaries

Q5: What is the main idea behind the water buffering approach?

a. Store water when it is abundant and made available during the dry season
b. Create water storage all over the landscape, in a dense and organized way
c. Build big reservoirs to keep water in a central location for the use of all local stakeholders
d. The creation of piped systems and deep bore-holes to satisfy the local community needs

Q6: What is Climate Change?

a. Is the change in temperature from night to day and vice versa?
b. Is a long-term change in the earth's climate?
c. Is the sum of all interventions needed to improve the local climatic situation?

Q7: What are the four legs of the WARM chair representing?

a. Water supply, Sanitation and Hygiene, Irrigation and Drainage, Environment and Ecology, Energy generation and other
b. Agronomic measures, Physical measures, Management measures, and Biological measures
c. Recharge, Retention, Reuse, and Recirculation

Q8: Looking at Figure 16, narrate what is different between picture 1 and 2.

1.4.6. Answers to self-evaluation questions

Q1: Answer B and C– Evaporation and transpiration make up for Evapotranspiration (Green water flow). They are the processes by which the environment returns water to the atmosphere.

Q2: Answer B and C – When thinking of water all of us think automatically of blue water that is the water that flows in rivers, that is found in wells, or that is captured in livestock pan and can be collected in a jerry can. Blue water can be easily extracted, it flows in the groundwater table, in streams and as overland flow. It moves from one point to the other as a visible flow. Ocean, river and lake water are all examples of blue water.

Q3: Answer B and C – Green water is the water stored in the soil profile. It cannot be fetched with any kind of bucket, jerry can or pump. The only pump-able mean to use this water is the plants root system and direct radiation from the sun that evaporates it.

Q4: Answer A – A watershed – also called catchment – consists of all the areas in which runoff is collected and drained to the same, common point. It is defined by the 'watershed divide' - an imaginary line which presumes the direction of the rainfall flow. On one side it will flow to a watershed, on the other side it will flow to another, adjacent watershed.

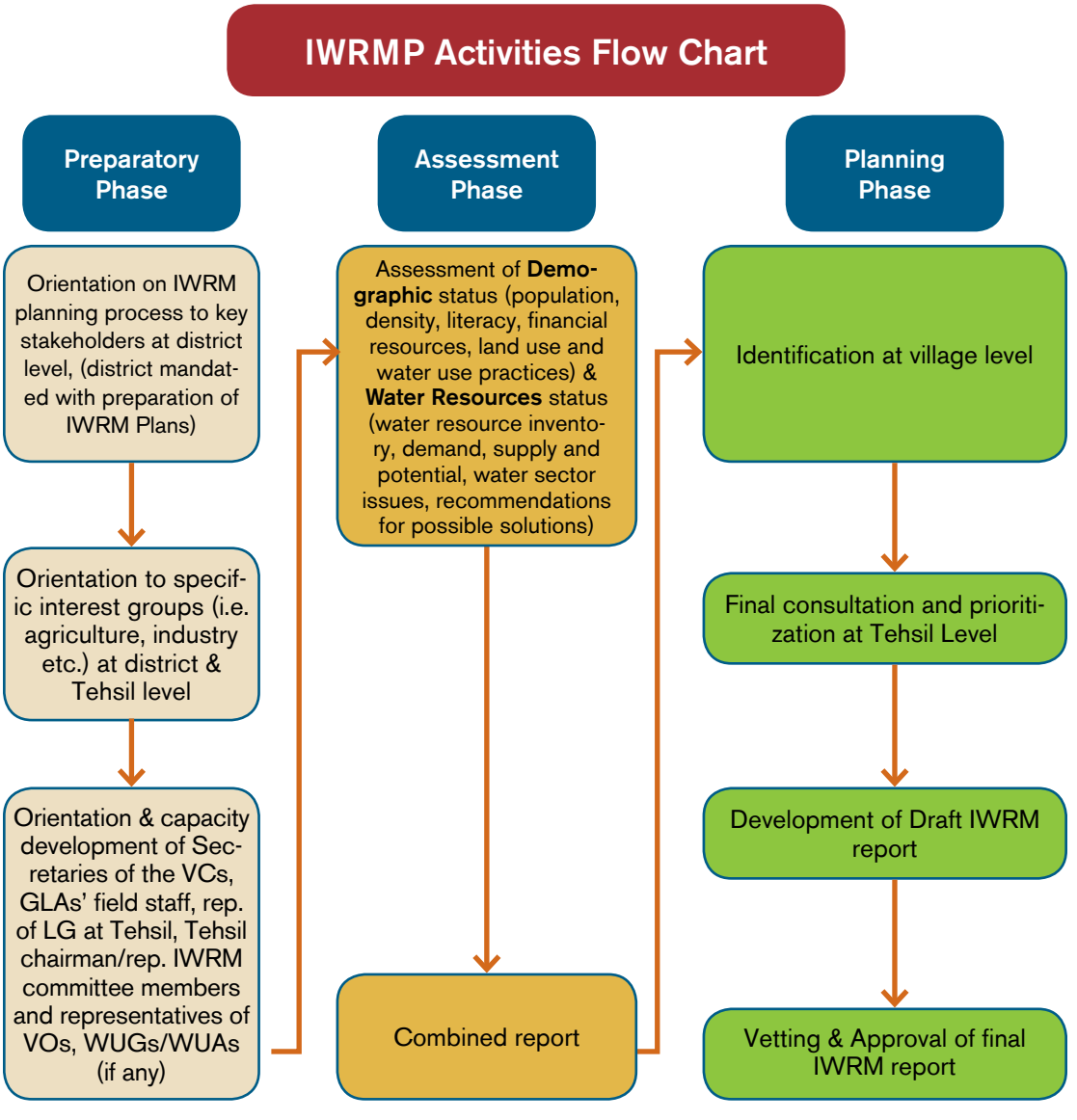
Q5: Answer A and B – Big reservoirs are not part of the approach because of various reasons. Among them the main constraints are their costs, the need of complex management bodies and the problems of reaching rural communities dispersed all over the landscape. Piped systems can help access the water present in the water buffer, but this is not the base for this. Many options and alternatives exist to abstract and deliver water retained in the buffer to the end users.

Q6: Answer B - Climate change is a long-term change in the earth's climate, especially a change due to an increase in the average atmospheric temperature.

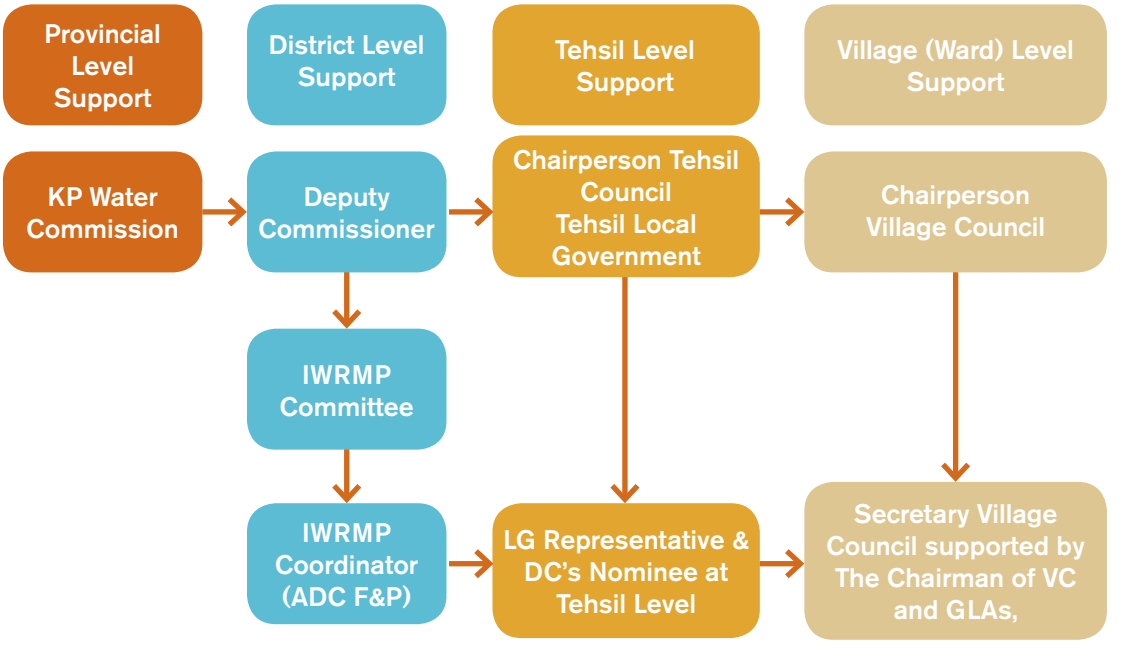
Q7: Answer A

Q8: Answer: Generate discussion around the following:

- Water sources and what can be done about them (mapping, quantification, legal entitlements, issues)
- Presence of rills and gullies– how can these be managed, plugged and minimised
- Impact of engineered structures such as road drains and culverts
- Impact of less or more runoff from rocks and roofs – how may this be lessened or slowed down
- Evapotranspiration – how this may be managed and retarded to retain the moisture longer into the system
- Excess water from agricultural fields, its quality management and possibilities for reuse
- Soil moisture management to increase green water storage and therefore augment crops and livestock production



IWRMP Facilitation Flow Chart



Module 2:

Conducting Integrated Water Resource Management Planning (IWRMP)

Module objectives:

- Understand different phases and steps to conduct and facilitate the IWRMP process at the district level.
- Understand the division of roles and responsibilities of various stakeholders in the IWRMP process.

Teaching time:

At least 6 sessions of 1.5 hours each with exercises and breaks.

2.1. Objective of Conducting IWRM Planning

The IWRM planning aims at:

- Equitable, efficient and sustainable management of water resource for the well-being and improved livelihoods of the people
- Delegate water resource planning and management to the Districts with active participation of all users including communities, public, private sector and other users
- Cross-sectoral implementation and monitoring of IWRM strategy

2.2. The IWRMP Process

The IWRMP preparation is a process-oriented methodology with **3 phases and 9-sub steps** over 4-6 months' duration **(Figure 18)**. Its preparation needs to be closely coordinated with all the stakeholders to ensure commitment in and ownership of the plan. The team involved in IWRMP process must have relevant capacity along with defined roles and responsibilities. The time span may be extended or shortened subject to weather and other unforeseen factors during assessing water resources and consultation at community level.

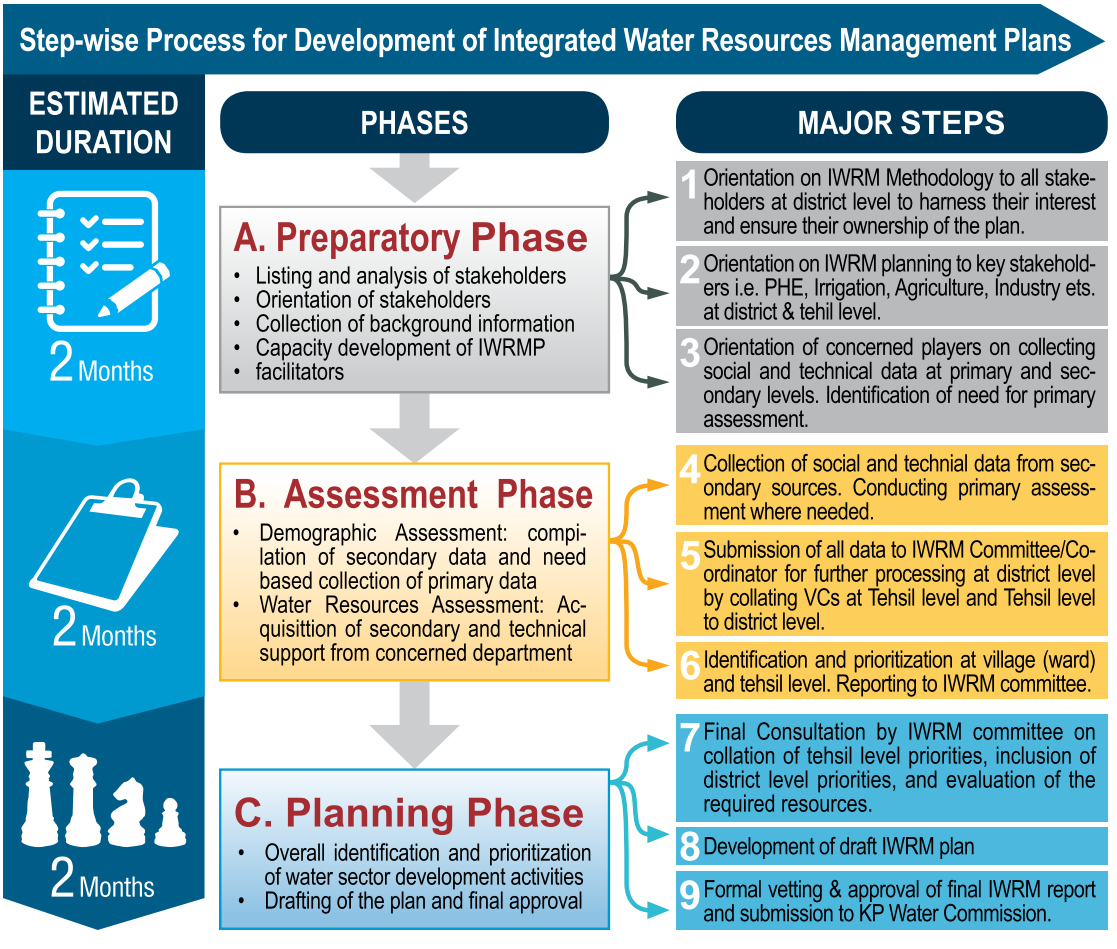


Figure 18: The IWRMP process

As per IWRM strategy, all the districts of the province are responsible for preparation of their IWRM plans within 1 year of the strategy's notification. The progress of IWRM planning will be monitored by KP Water Commission. The IWRM planning process will be steered and conducted by the District IWRM Committee as mentioned in the IWRM Strategy and supported on need basis by a trained resource group at provincial level called "**IWRMP Resource Group**".

2.2.1. Major Stakeholders/Actors involved in the Process

Provincial IWRMP Resource Group:

This is a group of trained and certified professionals at provincial level who may have multiple tasks, such as:

- Move in the districts on need basis for conducting orientation of IWRM Committee
- Brief their departmental heads at provincial and district level on what is IWRM planning and why this is important
- Act as support force within the province for its implementation
- The KP Water commission may consult them to peer review plans
- Make recommendations to KP Water Commission for approval of district IWRM plans

District IWRM Committee:

This committee is identified as 3rd tier of the implementation in IWRM Strategy. It will be **chaired by the Deputy Commissioner** and facilitated by ADC - F&P as a **Coordinator of the Committee**. ADC F&P is also an IWRMP resource person at district level who will orient IWRMP facilitators and lead the process at district level. The KP Water Commission will ensure that IWRM Committees are mobilized in the respective districts of the province. The Committees will provide over-arching support to the whole IWRM Planning process, monitor the process and coordinate with government line departments and IWRMP Focal Persons at Tehsil and Village levels. The committee includes members as follows: heads of all line departments, chairpersons of Tehsil Councils, and additional members of the IWRM Committee chosen by the Deputy Commissioner based on his / her best judgement of relevance and ability to deal and coordinate district water issues (e.g. from WUAs, a development project, academia, industry in the district).

The facilitators will include:

Relevant government line departments' representatives at district level – included but not limited to:

- Social Welfare, Special Education and Women Empowerment Department
- Agriculture, Livestock and Cooperative Department (Agri. Extension Agri. Research, Soil & Water Conservation, On Farm Water Management, Livestock & Fisheries)
- Population Welfare Department
- Tehsil and Town Municipal Administration (Municipal Services including water and sanitation)
- Local Government, Election & Rural Development Department
- Public Health Engineering Department
- Irrigation Department
- Environment, Forest and Wildlife Department
- Revenue and Estate Department
- Primary & Secondary Education
- Coordination, Human Resource Management, Planning Development, Finance & Budgeting for the devolved offices

They will be responsible for provision of secondary data to the IWRMP Committee. They will provide

support in conducting consultations and guidance in technical assessments of water resources (and in the field where needed), planning & prioritization, pre-feasibility and rough costing at District, Tehsil and VC levels where needed.

Chairperson Tehsil Council (IWRMP focal person for the Tehsil) supported by Tehsil Municipal Administration (TMA): Take a lead role in the IWRMP process at tehsil level, assure ownership for the plan and responsibility for its implementation. This process will also be steered by a representative from the district administration. This level in case of urban areas may include Water and Sanitation Services Companies (WSSCs) and local authorities e.g. Peshawar Development Authority (PDA), Kohat Development Authority (KDA) etc.

Secretary Village Councils (IWRMP focal person at village level): Secretary from VC will be assigned lead role along with elected representative (chairman/chairperson of VC) who will provide support in organizing meetings at Village and Village Council levels for data collection and getting relevant support accordingly (demographic and water resources assessment). The elected chairperson will supervise the identification process of water sector issues at village level and his participation in the prioritization events at Tehsil level will be crucial.

Office bearers Community organisations / WUAs (if any)
Any other important stakeholders such as academia, industry, development projects or development NGOs located in the district.

2.2.2. The Phases of IWRMP

The IWRMP process has been further divided into three phases which include nine steps. Each phase along with the concerned steps is briefly explained below:

A. Preparatory phase:

Preparation phase includes listing analysis, and orientation of stakeholders, collection of background information (baseline data / secondary data), and developing capacities of IWRMP facilitators regarding preparation process of IWRMP. The IWRMP committee at district level will mobilize the facilitators.

Step 1: Orient all the stakeholders to the IWRMP methodology to harness their interest and ensure their ownership of the plan. They are expected to contribute to the planning processes and later its implementation after the approval and endorsement by the concerned authorities/IWRM Committee at district level. This step will help identify key stakeholders and human resource allocation for the plan. Collection of relevant literature, documents and secondary data for review is also part of this step.

Step 2: Conduct IWRM planning orientation meetings at district level with all stakeholders enlisted above and inform the participants about the IWRM Planning methodology. Identify key issues confronted by these stakeholders in water sector, establish demand for possible support in primary and secondary data collection and announce responsibilities.

Step 3: Deals with organizing support for collecting all the required data, including:

i. Social data
ii. Technical data

B. Assessment Phase:

This phase mostly includes collection of secondary and primary data. A final assessment report will form the basis of IWRM plan at district level.

- Demographic assessment/data: Includes compilation of secondary data and supporting documents from concerned departments and need base collection of primary data
- Water resources assessment: Acquire secondary data and technical support from concerned departments

Levels of data collection and assessment: village, village councils and Tehsil level to be collated at district level.

Tools for data collection:

- Secondary data – consult existing data available with departments and other reliable sources as established in Phase I
- Primary data – as established in Phase I (collected through Focus Group Discussions, site visits, field observations, technical assessments)

Step 4: Collect all the required data including:

i. Social data
ii. Technical data

Step 5: All data will be submitted to IWRM Committee / Coordinator for further processing at district level by collating VCs at Tehsil level and tehsil level to district level.

C. Planning Phase

This phase includes overall identification and prioritization of water sector development activities, drafting of the plan and final approval. It is important to note, that the VC level identification will be respected in the tehsil level prioritization rounds. Based on this identification and prioritization, a plan will be drafted. The draft version is to be shared amongst the concerned stakeholders in order to incorporate their feedback. This plan will be formally approved and notified by the Chairperson IWRM Committee and submitted to the KP Water Commission for perusal and necessary allocation.

Step 6: Identification and prioritization of water sector issues:

- Prioritization begins at VC level – collated at Tehsil level and conveyed to the district
- The activities/interventions that are not limited to VC – may be identified and prioritized at Tehsil level
- The activities/interventions that are not limited to a Tehsil – may be identified and prioritized at the district level
- All levels will seek support from the government departments concerned with the issues identified by the three levels (Village, Tehsil, District)
- The concerned focal persons will be responsible to facilitate the process based on mutual agreement and consensus. This is only to identify what is to be addressed on urgent basis
- No priorities will be turned down (even if identified by a minority segment of population) until and unless:
  - There is a serious dispute among identified list of initiatives
  - It is strongly against the environmental considerations
  - It is strongly against water efficiency principle and the objectives of the IWRM strategy

Step 7: The IWRM Committee analyzes Tehsil Council reports and collates all the priori-

ties. It includes district level priorities and evaluates the resources required for implementing this plan. The committee forwards questions to the concerned level where necessary. The Committee also organizes a final sharing of prioritization at district level with participation of all key stakeholders. Based on this, the plan will be ready for finalization.

Step 8: Collate all the available material and prepare final draft of the plan.

Step 9: Formal vetting and approval of the IWRM plans and submission to the KP Water Commission.

A detailed breakup of activities, their timeline and responsible stakeholders are provided in Table 2.

Table 2: Activities of the module along with expected timeline and responsible stakeholders.

Activities	Responsibility	Who will do it	Time	Methodology	Reference
Mobilization of IWRMP Committee	Provincial Water Commission	DC of the district	Week 1	Letter by the Chairperson of the IWRM Committee	Step #1
Kick off meeting of IWRMP Committee	DC of the district	DC of the district	Week 1	Internal meeting	Step #1
IWRMP Committee prepares a work plan for IWRM planning	DC of the district	ADC F&P	Week 2	Work plan	Step #1
Identification of all water related stakeholders and consensus building within IWRMP Committee and with key stakeholders	ADC F&P	IWRMP Committee	Week 2	Stakeholders list	Step #1
IWRMP work plan shared with key stakeholders	DC of the district	ADC F&P	Week 2	Through Letter	Step #1
Acquire / give go ahead for the district-based orientation meeting and next steps	DC of the district	ADC F&P	Week 3	Invitation for the workshop released	Step #1
Orientation of stakeholders on IWRM work plan. Announce demand for baseline data Demographic Assessment/ Social Data Form Water Resources Assessment Form	DC of the district	ADC F&P & IWRMP Committee	Week 3	Workshop Minutes of meeting shared with participants. Provide forms for: Secondary data collection Primary data collection	Step #2
Orient / guide Tehsil Chairmen for collecting social data	Chairman Tehsil Council	ADC F&P	Week 4	Describe and follow the forms	Step #3
Orient / guide Secretaries of VCs for collecting Social data	ADC F&P	Chairman Tehsil Council	Week 5	Workshop: Describe and follow the forms	Step #3

Technical data – check secondary data availability (with departments and other credible sources) and identify need for primary data	ADC F&P	IWRMP Committee members to coordinate with Relevant Government Line Departments	Week 6	Secondary data establish grounds for the need based primary data collection (see next activity)	Step #3
Inform Chairman IWRMP Committee on the need for primary assessment / data collection including means required. This includes list of equipment needed for primary data collection if necessary. Such assessments may be needed at District or Tehsil level	Relevant Government departments	Relevant Government departments	Week 6	Letter with justification and need for resources	Step #3
Approval of the primary assessment	DC of the district	ADC-F&P	Week 6	Approval notification	Step #3
Village level Social data	Chairman VC	Secretary of VC together with: Water User Association and village organisation (if any)	Week 7	Secondary data and need based primary data	Step #4
Technical data	ADC-F&P Approval of the primary assessment by DC	IWRMP Committee members to coordinate with Relevant Government Line Departments	Week 7	Secondary data and need based primary data (see next activity)	Step #4
Conduct primary assessment where needed with approved means and resource. Most such assessments may be needed at District or Tehsil level	ADC F&P	Relevant Government departments	Week 7	Primary data	Step #4
Identification and prioritization at Village Council	Chairman VC	Secretary VC	Week 8	VC meeting	Step #6

Tehsil level social data	ADC F&P	Chairman Tehsil Council together with Secretary VC, relevant departments responsible for social services, local NGOs, WUA and VO (if any)	Week 8	Follow the forms and ensure VC data are received and collated at this level	Step #4
Report of prioritization from VC level to the Chairman Tehsil Council with a Copy to ADC F&P	Chairman VC	Secretary VC	Week 9	Letter / report	Step #6
Prioritization at Tehsil level: Collate VC priorities Include Tehsil level priorities	Chairperson Tehsil Council	Tehsil Council	Week 10	Tehsil Council / TMA meeting	Step #6
All assessments and data reach IWRMP Coordinator office	ADC F&P	All focal persons, All relevant Government departments	Week 10	Forms duly filled up along with necessary reference documents	Step #5
Report of prioritization from Tehsil level to the Coordinator IWRMP Committee with a Copy to the Chairman / Secretary VC	ADC F&P	Chairman Tehsil Council	Week 11	Letter / report	Step #6
Analysis of Tehsil reports on prioritization in the IWRMP Committee	ADC F&P	IWRMP Committee	Week 11	Internal meetings	Step #7
Prepare water resources inventory of the district	DC of the district	IWRMP Committee	Week 12	Combined report of social and technical data / assessment	Step #5
If necessary, consult relevant level for further refining priorities and remove ambiguities	Relevant VC / Tehsil focal persons	ADC F&P	Week 12	Face to face meetings	Step #7
Analyze need for resources for meeting all the priorities	ADC F&P	IWRMP Committee	Week 13	Internal meetings	Step #7
Send out invitation for district level sharing of the IWRM Plan	DC of the district	ADC F&P	Week 14	Letter of invitation	Step #7
Conduct district level sharing of the priorities	DC of the district	ADC F&P	Week 15	Workshop with all key stakeholders including VC and Tehsil Council	Step #7

Preparation of draft IWRM plan	ADC F&P	IWRMP Committee	Week 17	Internal sharing of work	Step #8
The Coordinator IWRMP (ADC F&P) improves, finalizes and submits the IWRM Plan to the Chairman of the IWRMP Committee of the district	DC of the district	ADC F&P	Week 19	Finalize draft report based on feedback from the concerned stakeholders and submit through a letter	Step #8
A presentation of the final draft IWRM Plan to the DC	DC of the district	IWRMP Committee ADC F&P	Week 20	A formal presentation followed by discussion	Step #9
Formal vetting, approval and notification	ADC F&P	DC of the district	Week 20	Approval letter	Step #9
Submission to the KP Water Commission	IWRMP Committee	DC of the district	Week 21	IWRM Plan with a letter	Step #9

Module 3:

Implementation and Financing of IWRMP

Module objectives:

- Understand different levels of IWRM implementation.
- Internalize where the resources for interventions will come from.
- Be able to facilitate beneficiaries in implementing IWRM plans.

Teaching time:

One session of about 1.5 hour

3.1. IWRM strategy implementation framework

An IWRM Plan prepared under the guidelines of the IWRM Planning Manual in a highly participatory way will stand a better chance for channelizing of the district, Tehsil Local Government funds, international donors funds (if available) within the districts and Tehsils. Any shortcuts in the process will bring lack of involvement and ownership of stakeholders, enlist unrealistic demands and jeopardize right prioritization which is a key to trigger a necessary push for resource generation (most important being funds for infrastructure schemes).

The IWRM Plans will limit their scope of work/targets within the following sectors /sub sectors priorities relevant for the Tehsil and district:

1. Drinking water, sanitation and solid waste management
2. On farm water management, use and efficiency
3. Agriculture, water productivity
4. Water conservation and behavioural change
5. Watershed management / conservation
6. Groundwater recharge and monitoring
7. Power generation using local micro-hydro potential
8. Disaster risk reduction measures for flood / drought
9. Regulating water use by private sector under the provincial policy

The scale of interventions related to the context of the above-mentioned sectors / sub sector priorities, primarily initiates from village level and may lead to scalable interventions from VC to Tehsil levels.

Five structural levels are recommended to ensure coordinated implementation of the strategy with all the relevant departments and other actors in the province:

1. The KP Water Council – housed in the office of the Chief Executive of the province
2. The KP Water Commission – housed in the P&D Department
3. Provincial Groundwater Authority, an independent structure to govern groundwater
4. District / tehsil IWRM Committees to steer IWRM planning and implementation at district level
5. District / tehsil WUAs to ensure integration of community / citizens' perspective into IWRM planning so as to play their role as duty bearers towards their communities

3.2. Khyber Pakhtunkhwa Water Council

In line with the National Water Policy (NWP) and in pursuance of the IWRM strategy goals and objectives, the KP Water Council, a high-level political forum to the cause of this governing body, is established. The proposed KP Water Council will be a policy level forum with the following proposed composition and roles:

1.	Chief Minister of KP	Chairperson
2.	Provincial Minister for Irrigation	Member
3.	Provincial Minister for Power	Member
4.	Provincial Minister for Finance and Planning	Member
5.	Provincial Minister for Public Health Engineering	Member
6.	Provincial Minister for Local Government & Rural Development	Member

7.	Chief Secretary, Government of KP	Member
8.	Additional Chief Secretary, P&D Department, Government of KP	Member/ Secretary

The Council shall meet at least once a year and perform the following functions:

1. Endorse/approve new policies for operationalizing the IWRM strategy in the province
2. Undertake informed decisions on major issues brought to the Council by KP Water Commission and other authorities
3. Approve water tariffs, subsidies, and revenue collection under the KP water pricing policy to be prepared under the IWRM strategy
4. Any other function deemed necessary by the Council in the best interest of the IWRM in the province
5. Undertake/initiate dialogue with National Water Council for taking appropriate decisions on provincial water issues

3.3. Khyber Pakhtunkhwa Water Commission

The KP Water Commission under the auspices of P&D Department will supervise and monitor the implementation of the IWRM strategy. The KP Water Commission will have the following composition:

1.	Additional Chief Secretary, P&D Department	Chairperson
2.	Secretary Finance	Member
3.	Secretary P&D Department	Member/ Secretary
4.	Secretary Irrigation Department	Member
5.	Secretary Public Health Engineering Department	Member
6.	Secretary Agriculture Department	Member
7.	Secretary Environment Department	Member
8.	Secretary Energy & Power Department	Member
9.	Secretary Local Government and Rural Development	Member
10.	Vice Chancellor, The University of Agriculture Peshawar	Member
11.	Vice Chancellor University of Engineering & Technology Peshawar	Member
12.	Representative of the Private sector	Member
13.	Representative of the Civil Society with thematic expertise in the sector	Member
14.	Senior Water Resource expert with a long track record in the sector	Member

Role / Functions of the KP Water Commission to supervise implementation of IWRM strategy

- Provide necessary information to the KP Water Council for taking strategic and policy decisions pertaining to integrated water management in the province
- Provide necessary information and policy briefs for KP Water Council to prepare the discussion with the Federal Government particularly National Water Council on national and provincial water issues
- Review the implementation of IWRM strategy and its periodic update
- Monitor the targets fixed in IWRM strategy for different departments and issue directives where necessary to expedite achievement of targets
- Create an enabling environment in the province by promoting broader multi-stakeholders' participation for IWRM
- Supervise preparation of KP water pricing policy

- Propose water tariffs, subsidies, and revenue collection under the KP water pricing policy to be prepared under the IWRM strategy
- Steer development of credible technology-based mechanism for transparent revenue collection (connections and monthly fees) from all users in KP to shift from the current manual collection system
- Acquire authentic data from relevant departments regarding demand, supply and use of water resources
- Empower P&D monitoring cell to maintain data on demand and supply of water resources by various sectors in the province for informed decision making by the council and commission, and for sharing with relevant stakeholders
- Ensure that IWRM plans are prepared for all districts of the province and provide guidance where needed to the districts for their implement
- Monitor the financial resource allocation to the water sector in the province

3.4. Khyber Pakhtunkhwa Groundwater Authority

The KP Groundwater Authority will regulate use of groundwater in the province. This authority will be housed under the auspices of the P&D Department of the Government of KP reporting to the Additional Chief Secretary.

The authority will perform the following functions:

- Prepare a Groundwater abstraction policy including connections and monthly fees to be endorsed by the KP Water Commission
- Expeditious implementation of regulation mechanism and regimes to ensure sustainability and optimization of Groundwater abstraction
- Issue, establish and enforce standards for the development and utilization of Groundwater
- Raise alarms on deterioration of Groundwater levels based on continuous monitoring
- Issue permit for installing wells/tube-wells
- Ensure collection of connections and monthly fees for abstraction as per KP Groundwater abstraction policy
- Maintain Groundwater data and atlas – and ensure a regular update
- Collaborate with departments and private sector depending on Groundwater for ensuring that Groundwater policy is well understood, complied and issues arising thereof addressed
- Any other task assigned to the Authority by the office of the Additional Chief Secretary or KP Water Commission

3.5. District IWRM Committees

To further operationalize the strategy, IWRM Committees will be established at district level to technically steer the process of district IWRM planning and execution besides ensuring technical supervision of individual activities performed in IWRM spirit. These committees will be chaired by the Deputy Commissioner of the district. The heads of relevant line departments will join as members of the committee, Co-opted members will be invited by the Chairperson (e.g. Extra Assistant Commissioner (EAC) Rudh Kohi in case of D I Khan and Tank; a representative of an important development project, NGO, industry, academia etc.) and a member of WUA where in existence.

3.6. Integrated Water Resource Management Plans

The rationale of developing IWRM plans is to devise a mechanism for implementation and monitoring of IWRM strategy. An IWRM planning manual prepared and piloted during the process of this strat-

egy development is its integral part. It sets the planning frame and steps for the IWRM planners. All the devolved units will be expected to prepare their IWRM plans within one year of its notification.

The goal of developing an IWRM plan is to delegate water resource planning and management to the districts and ensuring active participation of all users including communities, private sector, and other users. By doing so, it is ensured that water resource is used judiciously, shared equitably and efficiently by users in a sustainable manner while considering different needs. These plans will be prepared through a coordinated process with an agreed upon methodology for all stakeholders under the guidelines of the IWRMP Manual in a highly participatory way. This will help in better channelizing of district funds (including devolved funds of district government and international donor funds if available within the district). The IWRM plans will limit their targets within the nine sectors / sub-sector priorities given earlier in this module.

IWRM planning is a participatory and inclusive methodology for integrated planning and management of water resource. It identifies the estimated water demand, supply, resource inventory and potential of water resource for its development and multiple uses at district level. As a participatory and transparent process, it must aim at improving water governance and empowering disadvantaged people to claim their right for equitable sharing of water within and between communities. It also provides opportunities for integrated small-scale technological solutions as well as financial allocations to other users such as private sector. The impact of climate change manifests on availability of water, either too little or too much as a challenge to deal with.

The IWRM plan preparation is a process-oriented methodology with 3 Phases and 9 steps closely coordinated with Village and Tehsil Councils (elected representatives) and local authorities (government line departments and district authorities) to ensure commitment and ownership for the plan. It will be prepared for the devolved administrative units as per Local Government Act (revised) 2019. Additional financial and human resources will be provided to facilitate participatory resource planning process.

3.7. What will Happen when District IWRM Plan is Ready and Endorsed?

The Chairman IWRM Committee will submit the IWRM plan to the KP Water Commission and will disseminate the IWRM Plans amongst relevant government line departments, P&D Department Government of KP, potential donors and other actors for their information, perusal and consideration for implementation.

The VCs, Tehsil Local Government, District Administration and district-based line departments will make efforts to implement part of the IWRM Plan priorities from their own respective allocations. The IWRM Committees will build alliances with organizations related to water sector and provincial authorities to use IWRM Plans as a planning tool for their water relevant projects or preparation of their Annual Development Plans.

3.8. Monitoring of IWRM Plans

The Monitoring & Evaluation Directorate of P&D Department, Government of KP, will monitor the IWRM Plans at regular intervals at district level. Besides, review and updating of IWRM Plans after every 5 years will be crucial for their long-term adaptation in the context of natural calamities and climate change. However, most of the plans may require nominal effort in the process of updating. Certain changes in the policy / mandates would be helpful to adjust and implement IWRM Plans.

The report of IWRMP Plan implementation progress will be submitted to KP Water Commission on annual basis or as asked by the Commission. The Commission's interest is in observing how the IWRM is implemented on ground and how it involves and coordinates amongst relevant actors to save time and resources.

Module 4:

Institutions behind Integrated Water Resource Management Planning and Implementation

Module objectives:

- The roles and responsibilities of WUAs and the importance of organizing these institutions
- The role of District IWRM Committees and what can be expected of them

Teaching time:

Two sessions of 1.5 hours each with a break

This module emphasizes on the district level institutions meant to serve as drivers for the success of IWRM planning and implementation process. Their roles and responsibilities therefore are important to understand for rationalizing expectations.

4.1. IWRM Strategy Statement on Participation

KP has been a forerunner in introducing participatory approaches in development sector. These efforts by the government, international donor financed initiatives and NGOs for the promotion of participatory approaches, however, have been random. With a history of over sixty years of government-led support for water through several highly organized and largely staffed departments, the population is still suffering due to water related issues. One important reason for this is the limited participation of the communities and beneficiaries in water management. Poor operation and maintenance of infrastructure schemes is a rampant challenge faced in the province. Traditionally, communities are seen only as recipient of public services provided with tax-payers' money. Several examples in Pakistan and around the world suggest that formal and regulated community participation increases access to water and enhances chances for proper management of water resources, operation and maintenance of infrastructure schemes. This strategy therefore strongly **urges the inclusion of communities in IWRM by providing an institutional infrastructure and systematic planning mechanism to maximize benefit-sharing from limited water and financial resources in KP.**

4.2. Water Users Groups and Associations

Formation of informal **WUGs takes place in the villages**, whereas a district / Tehsil level **WUAs serves as formal institution to participate in decision making in water sector at district level**. The village based WUGs (which may also be the Village Council or CBOs of the villages) will assist in addressing drinking water and sanitation, on farm water use efficiency, drainage requirements and other water sector issues relevant for the village and then feed the information to the association so they can perform their role. The WUG will raise village concerns on water resource with the WUA. They perform their obligations regarding maintenance of schemes and ensuring citizen's participation in decision making and in promoting judicious use of water.

4.2.1. The Water Users' Group Formation

This is an informal social organization within the VC. The manual does not recommend extra energies to mobilize, form, maintain and register this level of social organization. The WUG is associated with the VC as either a sub-committee of the VC or the VC itself that is eager to play the WUG role.

4.2.2. The Water Users' Associations

WUA has a general body constituted by all the WUGs / VCs. The executive body of the WUA will include 7 members elected from this general body.

- Each WUG / VC must contribute at least one member in the general body of the Association
- During the nomination process for the Association, the WUGs must encourage inclusion of youth
- Women must form at least 30% of the association's membership

4.2.3. Legal position of Water Users' Associations

The WUAs will be registered by the District IWRM Committee chaired by the Deputy Commissioner under the auspices of the IWRM strategy. The district authority holds the power to dissolve this association and assess its performance under the following expected roles:

- The WUA will be responsible to take all WUGs / VC on board in a democratic way and ensure their equitable representation in its general body
- Elect executive committee in a transparent manner and duly inform district authorities in case of change

- Take responsibility for supporting and facilitating the IWRMP process
- Represent interests of Tehsil / district level community water users at the District IWRM Committee
- Engage WUGs in finalizing IWRM priorities and build their internal capacities to implement these priorities
- Strive for water sector development and act as advocacy group to attract civil societies, local authorities and development projects for addressing water priorities under the IWRM Plan
- Develop productive linkages with relevant authorities and other development actors for seeking technical and financial support for water sector development
- Influence the district authorities and concerned line departments for prioritization of IWRM Plan targets in district Annual Development Programmes (ADPs) and their proper and timely implementation
- Ensure equitable water rights and promote improved water governance in their area
- Build good rapport with the authorities through assisting them in resolving local disputes around water and ensuring do no harm principle
- Engage Tehsil Local Government in IWRM planning and implementation process
- Play their due role in monitoring and evaluation of the IWRM Plans, implementation and identifying challenges

4.2.4. Capacity Building Training of WUAs

For the WUAs to be able to play their role, the capacity building initiatives need to mainly focus on:

- Planning procedures, participatory planning tools identification and prioritizing methodology of water sector initiatives at village, UC, VC and Tehsil levels
- Consensus on the roles and responsibilities of the WUGs and WUAs
- Basic administrative and financial management skills to manage a group
- Guide on the process of water sector needs identification and prioritization
- Ensure that the WUAs are inclusive in their approach and do not abandon the WUGs
- Advocacy to mobilize resources for IWRM Plan
- Link technical departments with WUAs for mutual support
- Awareness on legal provisions related to water rights, optimal uses, operation and maintenance of water infrastructures, and mandates of Government Line Departments
- Resolution of disputes related to the use of water
- Other relevant areas (i.e. efficient water use application, climate change, exposure visits, proposal writing, O&M system)
- Gender responsive participatory process and to ensure that at least 30% women participate in the association executive committees.

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Annexes

I- Guidelines

SAMPLE GUIDELINES/SELECTION CRITERIA FOR IDENTIFICATION OF WATER SECTOR ISSUES AT VC AND PRIORITIZATION AT TEHSIL LEVEL (competition within VC and among VCs at in a Tehsil)

Example: Drinking Water Supply and Irrigation Issues
Based on these, guidelines/selection criteria can be modified for different sectors accordingly (i.e. Sanitation, DRR, water conservation, capacity building, Health & Hygiene etc.).

Selection of issues will be strictly based on the following factors:

- Schemes which do not deteriorate the prevailing conditions in water sector of the Tehsil (e.g. tube wells in case of water table depletion
- Schemes contributing to overall water sector planning at Tehsil level (could become part of the ADP)
- Willingness to pay for services to ensure ownership & sustainability
- Do No Harm principle

S. No	DWSS	Irrigation
1	Where no facility exists	Where no facility exists
2	Cost effective	Cost effective
3	Rehabilitation takes precedence over new initiative	Rehabilitation takes precedence over new initiative
4	More beneficiary coverage	More beneficiary farmers & command area
5	More water hardship (i.e. distance, no. of trips)	More water availability (potential for bringing more area under command where possible)
6	Scheme benefitting more than one village	Scheme benefitting more than one village
7	Schemes benefitting more women and reducing their water hardship	Schemes benefitting more women and reducing their hardships
8	Willingness to contribute in kind	Willingness to contribute in kind
9	Community based O&M system exists (ensuring sustainability)	Community based O&O system exists (ensuring sustainability)
10	Social consensus developed/rights are recognized and ensured	Social consensus developed/rights are recognized and ensured
11	Where no dispute exists	Where no dispute exists
12	More distance to cover while fetching drinking water (specifically in the evening)	
13	Willingness of owner to share and devote water source for communal use with or without conditions	Willingness of owner to share and devote water source for communal use with or without conditions

14	Water quality is safe for drinking	
15	Rights are recognized and ensured between two or more villages during distribution (no dispute exists)	Rights are recognized and ensured between two or more villages on water distribution (no dispute exists)
16	Willingness of land owner for provision of land free of cost for storage tank, supply line and distribution network	Willingness of land owner for provision of land free of cost for storage tank and conveyance line (pipe, watercourse)

II- Questionnaire / Checklist

Part A - Demographic assessment / social Data Form

S. No	Question	Response
1	**Name of village**	
2	**Name of village council**	
3	**Name of tehsil & district**	
4	**Number of households in the village**	
5	**Population of the village (persons)**	
5.1	Number of men in the village	
5.2	Number of women in the village	
5.3	Number of children in the village	
6	**Number of households without landholding (including tenants)**	
7	**Number of households with landholding**	
7.1	Number of households with 1-3 acres land	
7.2	Number of households with 4-6 acres land	
7.3	Number of households with 7-9 acres land	
7.4	Number of households with 10 and above acres land	
7.5	Total	
8	**Public services locally available**	
8.1	Dispensary	

8.2	BHU			
8.3	RHC			
8.4	Primary school			
8.5	Middle school			
8.6	High school			
8.7	Higher secondary school			
8.8	College			
8.9	Madrassah			
8.10	Animal husbandry (advisory center)			
8.11	Civil veterinary dispensary			
8.12	Veterinary center			
8.13	Civil veterinary hospital			
8.14	Post office			
8.15	Total			
9	**Income sources/ expenditures/ professions/ employment details**			
	Particulars (Age 18 and above)	Men	Women	
9.1	Agriculture			
9.1.1	Business (including skilled self-employment)			
9.1.2	Service (jobs)			
9.1.3	Unemployed			
9.2	Total			
9.3	Income sources and expenditures			
	Type	Agriculture produce (Metric Ton)	Annual Income	
9.3.1	On-farm			
	Crops			
	Fruits & vegetables			
	Livestock & poultry			

9.3.2	Off-farm					
	Business (including skilled self-employment)					
	Service (job)					
	Remittances (foreign exchange)					
	Labor					
9.3.3	Annual expenses					
	Agricultural inputs					
	Education					
	Health					
	Other living needs					
	Water supply					
9.3.4	Total					
10	**Social and political status**					
	Particulars	Yes/No				
10.1	Do women participate in decision making?					
10.2	Do women have time for leisure activities?					
10.3	Are people hopeful about their good future?					
10.4	Do women cast vote?					
10.5	Are there any political or social activists? (M+F)					
10.6	Do they have representation in local government system?					
10.7	Are there disputes among different clans?					
11	**Access to drinking water**	**Source #1**	**Source #2**	**Source #3**	**Source #4**	
11.1	Source of water (tap, spring, dug well etc.)					
11.2	Number of households served					
11.3	Population (persons) served					
11.4	Fetching time (minutes, hour) if applicable					
11.5	Distance covered (km)					

11.6	Number of trips per day					
11.7	Total time spent (min, hour)					
11.8	Total distance covered (km)					
12	**Water Supply Charges (if applicable)**					
12.1	Number of households					
12.2	Charges per hour (tube well) in rupees (payment to whom e.g. govt. or private)					
12.3	Number of operational hours per day					
12.4	Charges per tanker					
12.5	Capacity of the tanker					
12.6	Number of tankers per month					
12.7	Cost of tankers per month					
12.8	Total annual expense (in rupees)					
13	**Major water sector issues faced by the village**					
	Issue (on the scale of 1-5 as appropriate)	Prioritization (1=low 5=high)				
13.1	Sanitation					
13.2	Drinking water access					
13.3	Drinking water quality					
13.4	Electricity					
13.5	Groundwater depletion					
13.6	Health & hygiene					
13.7	Seasonal floods					
13.8	Waterborne diseases					
13.9	O&M systems					
13.10	Disputes around water sources					
13.11	Irrigation					
14	**Sanitation status**					

14.1	what percent of the villagers have access to sanitation (toilet) system?					
14.2	Which sanitation type (toilet) is it? For example, pit, dug or flush?					
14.3	Where is the sanitation waste discharged?					
14.4	Where does the bathing and washing water drain?					
14.5	How is the kitchen waste disposed-off?					
14.6	Where does rainfall runoff drain?					
14.7	What are the local practices about Hygiene?					
15	**Land use and agriculture**					
15.1	Total land					
15.2	Cultivated land (acre) irrigated					
15.3	Cultivated land (acre) Arid					
15.4	Cultivable waste land (acre)					
15.5	Uncultivable waste land (acre)					
15.6	Forest and range land					
15.7	Farming system (traditional, mechanized or both)					
16	**Major crops**	**Crop #1**	**Crop #2**	**Crop #3**	**Crop #4**	
16.1	Food crops					
16.2	Fruit crops					
16.3	Vegetables					
16.4	Fodder crops					
16.5	Forest trees (fodder)					
16.6	Grasses (fodder)					
16.7	Major problems / diseases					
16.8	Weeds (yes/No)					
16.9	what is the cropping intensity of your field?					
17	**Crop seasons**	**Crop #1**	**crop #2**	**Crop #3**	**Crop #4**	

17.1	Crop					
17.2	season					
17.3	duration (months)					
17.4	Sowing (dates)					
17.5	Harvesting (dates)					
18	**Common livestock**	**Livestock #1**	**Livestock #2**	**Livestock #3**	**Livestock #4**	
18.1	Livestock					
18.2	Quantity					
18.3	Common livestock diseases					
18.4	Are treatments available for these diseases?					
19	**Fuel and energy sources**					
		electricity	Gas	Solar system	Wood	Dung
19.1	Percentage of households with access or consumption					
19.2	Hours per day					
20	**Health and hygiene status**	**Yes/No**	**%**			
20.1	Do local HHs clean water with chlorine or by filtering or boiling (in case of contaminated water)?					
20.2	Do children wash their hands before eating?					
20.3	Do men & women wash their hands before eating?					
20.4	Do children get routine vaccines regularly?					
20.5	Do adults get seasonal vaccines?					
20.6	Are Health & Hygiene days organized at schools?					
20.7	Are diseases like typhoid, hepatitis, polio, dysentery, cholera common amongst children?					
21	**Current education status**	**Government**	**Private**	**Madrassah**	**NFE**	

21.1	Number of school going boys (enrolled)						
21.2	Number of school going girls (enrolled)						
21.3	Percentage of literate men						
21.4	Percentage of literate women						
22	**Natural disasters-frequency and intensity**	**Intensity (mild, moderate, severe)**	**frequency (time interval)**	**physical infrastructure loss**	**Human loss (number)**	**Livestock loss (number)**	**Land (acre) loss**
22.1	Floods						
22.2	Heavy rains						
22.3	Drought						
22.4	Flash floods						
22.5	Windstorm						
22.6	Lightening						
22.7	Earthquake						
23	**Climatic variations**	**Yes/No**					
23.1	Increase in temperature observed						
23.2	Change in weather patterns (extreme warm/cold) observed						
23.3	Increase in occurrence of unprecedented Hazards observed						
23.4	Change in cropping patterns (time & duration) observed						
23.5	The above events have caused loss of lives, property and livelihoods						
23.6	Has changing life style become Inevitable?						
23.7	Change in rainfall frequency						
23.8	Change in rainfall intensity						
24	**Migration (seasonal/ permanent)**						
24.1	Number of families who migrated permanently						

24.2	Social status of families who migrated permanently		
24.3	Number of families who migrate on seasonal basis		
24.4	Social status of families who migrate on seasonal basis		
24.5	What time does seasonal migration take place?		
24.6	What are the causes of seasonal migration?		
24.7	For how long do they migrate (duration)?		
24.8	Where do they migrate?		
25	**Village council status**		
25.1	Name of the chairperson		
25.2	Number of men VC members		
25.3	Number of women VC members		
25.4	Number of projects implemented by the VC		
25.5	Financial sources (of the projects)		
25.6	Meeting frequency (monthly, bimonthly, biannual, annual)		
25.7	Number of literate members		
25.8	Availability of funds and their limit		
25.9	Does VC have vision / mission / village development plan?		
26	**Village organizations: CBO, VO, WUGs & WUAs status**		
26.1	Formation date		
26.2	Number of general body members		
26.3	Number of executive body members		
26.4	Number of women members in the executive body		
26.5	Registered (yes/no)		

26.6	If yes, registration number and authority		
26.7	Bank account (yes/ no)		
26.8	Bank account number		
26.9	Savings system yes/ no)		
26.10	O&M system yes/no)		
26.11	Number of projects implemented		
26.12	Financial sources (of the projects)		
26.13	Meeting frequency (monthly, bimonthly, biannual, annual)		
26.14	Coordination with other VOs yes/no)		
26.15	Exposure to other VOs yes/no)		
26.16	Does the VO have vision/mission/village development plan?		
26.17	Does the VO have sub committees/ interest group/WUG formed?		
26.18	If Yes, explain/detail		
26.19	Patwar circle		

Part B - Water resources assessment form

Analysis of Water Resources

Detail of available water resources										
Village Councils	**Description**	**Small Dams**	**Small Water Ponds**	**Springs/ Infiltration Gallery/ Karez**	**Seasonal Flood Streams**	**Dug Well**	**Tube Well**	**Pressure Pump**	**Hand Pump**	**Total**
	Private									
	Government									
	Others									
	Total									
Gross Total	Private									
	Government									
	Total									
Inventory of water infrastructure implemented by Government, Private and other actors including beneficiaries, benefiting land and their status										
S. No	Name of Department/ Organization	DWSS	No. of Beneficiaries (HHs)	Irrigation Schemes	No. of Beneficiaries (HHs)	Beneficiaries Land (acre)	Total No. of Schemes	Total No. of Beneficiaries (HHs)	Total Benefitted land (acre)	
1										
2										
Current Daily Demand										
Current Daily Water Demand										
Village Council	Human population			Avg. 45 ltr Per Capita Per Day	Livestock		Irrigation		Total Quantity Required Daily (ltr)	
	Access to Tap Water (Persons)	Fetching Water (Persons)	Total (Persons)		Livestock	Avg. 10 ltr/ cattle/day	Irrigated Land Acre	Avg. 0.15 ltr/ sec/acre for 2 Hrs for 4 times/365 days		

Water Resources Potential										
Summary of WRs (daily water demand and water available in different status)										
S/No.	Description									
A. Sub Surface / shallow Water										
A.1	Shallow Water (springs/infiltration gallery/karez)									
A.2	Sub Surface Water (dug/open well, tube well, pressure and hand pump)									
	Sub Total of GW (liter)									
B. Surface run-off Water										
B.1	Small Dam									

B.2	Small water ponds (irrigation water pond & livestock pond) (Community + SCD)								
B.2.1	Small water ponds, reservoir and mini dams (SCD)								
	Sub Total of B								
B.3	Seasonal flood stream								

Water Resources Assessment Form

Section A: Description of Villages and Stakeholders			
S.No.	Item	Description	Remarks
1	District Name		
2	Tehsil Name		
3	Valley/Zam		
4	Village Council Name		
5	Names of Villages within the Village Council		
6	Total HHs in the Village		

7	Total Population (persons) of the Village		
8	VO/WUG/WUA Name (If available)		
9	Name & Sig. of Secretary/ Chairman from Village Council and rep. WUG/ WUA		
10	Name & Sig. of expert from GLA		
11	Name of concerned GLA		

Existing water sources: Demand, Supply & Potential									
Description			Available Water Sources						
			I	II	III	IV	V	VI	VII	VIII
			Dams (small/min)	Water Ponds	Springs or Infiltration Gallery	Rivers or Streams	Open well	Tube well	Pressure Pump	Hand Pump
1	Location									
2	Ownership	1.2.1. Private (Quantity)								
		1.2.2. Government (Quantity)								
		1.2.3. Communal (Quantity)								

3	Water Frequency or Availability, Source Discharge (in liters or gal per min)	1.3.1. 24 Hours								
		1.3.2. Hours Per Day								
		1.3.3. Months								
4	Functional									
5	Non-functional									
6	Drinking Water Quality Test conducted (Yes/ No)									
7	Result of water quality test									
8	Source of water quality test (PHED, PCRWR & others)									
9	Community's Perception of drinking Water Quality									
10	No. of benefiting villages									

11	Number of Beneficiaries	1.9.1. No. of HHs								
		1.9.2. Population (persons)								
		1.9.3. No. of Livestock								
		1.9.4. Irrigation land (acre)								
		1.9.5. No. of Farmers' families								
		1.9.6. Industries (if any)								
12	O&M Committee (Yes/No)									
13	O&M Committee	Male:								
		Female:								
14	Source Condition Protected/Safe (Yes/No)									
15	Potential for Retention and Reuse of Surplus Water (liter, gallon per min, cubic feet per min)	1.14.1. Surplus Water								
		1.14.2. Households								
		1.14.3. Livestock								
		1.14.4. Irrigation land (acres)								
		1.14.5. others								

Quantity available per capita/day								
Sources		Capacity (MAF)	Availability throughout the year	Design Discharge (Cusecs)	Benefitting CCA (acre)	Benefitting HH		
Dams (small/mini)	Live Capacity (MAF)							
Water Ponds	Live Capacity (MAF)							
Lakes	Live Capacity (MAF)							
Sources	Ave. operational Hours per day	Discharge per hour (gal/ hour)	Discharge per day (gal/ day)	Number of facilities	Total extraction per day (gal)	Benefitting HH	Benefitting CCA (acre)	Source of power (electric or diesel)
Springs/ Infiltration Gallery								
Open well								
Tube well								
Pressure Pump								
Hand pump								
Artisan well								
Watercourse								
Others								

Other Sources	Frequency	Discharge per day	Benefitting CCA (acre)	Benefitting HH				
Under Surface Water Storage, sub surface dam (rain water harvesting practices) or flood stream								
Watercourse/ channel								
Rivers or Streams								

III- Pair-Wise Ranking

Priorities	Drinking Water Supply	Irrigation Channel	Plantation	Street Pavement	Electricity	Score	Remarks
Drinking Water Supply	X					8	1st
Irrigation Channel	X	X				4	3rd
Plantation	X	X	X			6	2nd
Street Pavement	X	X	X	X		0	5th
Electricity	X	X	X	X	X	2	4th

IV- Monitoring form

- Progress of IWRM Plan implementation in District
- District:
- Date of plan preparation
- Date of plan endorsement
- Priorities implemented

S. No	Priority (name)	Ranking	Implemented by	Funded by	Start Date	Status

Up-coming plans for the next year

Three Key Challenges:

Issues / Key message for KP IWRM Commission to address:

Reported by

Integrated Water Resource Management Planning (IWRMP)

Facilitators' Manual

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Planning and Development Department

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