Government of Khyber Pakhtunkhwa
Planning and Development Department

INTEGRATED WATER RESOURCE MANAGEMENT STRATEGY

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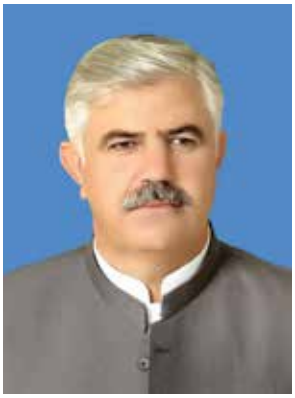
Acronyms

ACS	Additional Chief Secretary
CRBC	Chashma Right Bank Canal
DG	Directorate General
DRM	Disaster Risk Management
EAC	Extra Assistant Commissioner
EC	Electric Conductivity
EPA	Environmental Protection Agency
FATA	Federally Administered Tribal Areas
GW	Groundwater
GWA	Groundwater Authority
Ha	Hectare
ICT	Information Communication Technology
IWRM	Integrated Water Resource Management
Kg	Kilogram
KP	Khyber Pakhtunkhwa
LGE&RDD	Local Government, Election & Rural Development Department
MAF	Million Acre Feet
Mm	Millimetre
MNA	Member of National Assembly
MPA	Member of Provincial Assembly
MW	Mega Watt
NGO	Non-Government Organisation
NWP	National Water Policy
PEDO	Pakhtunkhwa Energy Development Organization
PFRI	Pakistan Forest Resource Inventory
PHED	Public Health Engineering Department
PKR	Pakistani Rupee
PPP	Public Private Partnership
P&D	Planning and Development
SDC	Swiss Agency for Development and Cooperation
SDS	Sustainable Development Strategy
TDS	Total Dissolved Solids
TMA	Tehsil Municipal Administration
TNO	Institute of Applied Geo Sciences, (known as TNO), The Netherlands
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Program
WAPDA	Water and Power Development Authority
WASH	Water Sanitation and Hygiene
WSSCs	Water and Sanitation Services Companies
WSSP	Water and Sanitation Services Peshawar

Message from
Mr. Mahmood Khan

Chief Minister
Khyber Pakhtunkhwa



"With faith, discipline and selfless devotion to the duty, there is nothing worthwhile that you cannot achieve",(Quaid-e-Azam Muhammad Ali Jinnah).

Pakistan today is facing a severe shortage of water, something we as a nation have to overcome taking guidance from the above quote from the founder of our country, Quaid-e-Azam Muhammad Ali Jinnah. Water is life and soul of the planet earth. With rapidly growing population however, Pakistan is heading towards a situation of water scarcity which is a threat to food security of our people. This situation warranted taking emergency steps to improve availability of water in the country and the provinces.

Taking cognizance from the situation, the federal government approved the first National Water Policy 2018, aimed at improving water quantity and quality in the country. The Policy recognizes the actions taken in the provinces as important and that they collectively contribute to containing the situation from worsening. Provinces are encouraged to develop provincial plans and strategies for sustainable management of water resources. As the Chief Executive of the province it is my pleasure to share that the KP province has taken a lead in formulating the first provincial Integrated Water Resource Management Strategy. The strategy has been completed in a highly participatory manner involving relevant stakeholders including government departments, community representatives, civil society and the development sector. I also proudly note that the provincial authorities have taken a lead in preparation of this strategy and sector papers which have informed this strategy. This indigenous effort brings international, and rich practical experiences of provincial authorities in one document.

Effective policy formulation and implementation for sustainable management of natural resources is the top priority of the federal and provincial governments. With this commitment, the next task for us is to bring the IWRM strategy to implementation. The provincial government is all set to take this challenge. I am sure that the strategy will prove a landmark in sustainable use of water resources in the province through integration and cooperation among all relevant water sector stakeholders. The provincial government will provide all the needed support for capacity building of relevant institutions aimed at improved integration of water uses at the provincial as well as at district levels.

I appreciate efforts of all those involved in the development of the Khyber Pakhtunkhwa Integrated Water Resource Management Strategy and extend best wishes for its successful implementation.

Message from
Dr. Kazim Niaz

Chief Secretary
Government of Khyber Pakhtunkhwa

Water Governance is an extremely important precondition for effective water conservation, especially in the contexts where water scarcity is rampant and leads to low human development indicators. Improving water governance is important because per capita surface water availability in the country has reportedly declined from 5,260 cubic meters per year in 1951 to around 1,000 cubic meters in 2016. This quantity is believed to decrease further to about 860 cubic meters by 2025 pushing Pakistan from water stressed to water scarce country. The effects of this decline will trickle down to the provinces. The Khyber Pakhtunkhwa has high incidence of multi-dimensional poverty. Among others, lack of access to water is a major driver of poverty and deprivation.

According to the water apportionment accord 1991, a total of 8.78 MAF of water has been allocated to the province against which the province utilizes 5.97 MAF with an annual unused resource of 2.81 MAF due to lack of infrastructure, something the National Water Policy 2018 has also highlighted. Around 32% of the total population is yet to be provided potable drinking water. Around 93% wastewater remains un-treated and 42% population is without basic sanitation. In addition, agricultural water productivity in the province is low. The yield of cereal crops in province is considerably below the national average. The province cannot afford to continue long with the above noted indicators related to water sector.

In line with the recommendations of the National Water Policy 2018, the provincial government has developed the Integrated Water Resource Management Strategy for the province aiming at improving water management and governance so that water sector related indicators are improved to benefit the population. The strategy identifies main pillars and associated actions to improve water governance in the province. The Provincial Planning and Development Department will be the focal department for coordinating implementation of the strategy and ensure integrated thinking across relevant water sectors. All other relevant departments of the government will pool necessary technical and financial support to make the implementation of the strategy a success.

I wish all success to the relevant departments and actors in successful implementation of the strategy.

Message from
Mr. Shakeel Qadir Khan

Additional Chief Secretary
Government of Khyber Pakhtunkhwa

It is a moment of great satisfaction that Khyber Pakhtunkhwa launches its first Integrated Water Resource Management Strategy for the province. More than two hundred experts from the government line departments and other relevant institutions including private and development sector have contributed towards the development of this document. The document therefore brings together rich practical experiences and indigenous knowledge.

The strategy encourages integration of all uses of water to improve overall water governance in the province. Such an integration is imperative and a bold step in the wake of decreasing per capita water resources in the county and the provinces. Water is a vital natural resource and its integrated management is essential for sustainable development. Conflicting and competing uses often result in water resource management issues, mainly in terms of securing water for people, food production, protecting ecosystems and gender disparities. Water is the lifeline for the livelihoods of Pakistanis and several actors are engaged in the sector directly or indirectly as users, managers and regulators. Therefore, engaging in water sector development and improving access to water may improve wellbeing of the people as well as promote harmony.

According to National Water Policy 2018, 'water crisis is descending like a thunder bolt'. The Policy further noted that 'fresh water being a finite resource is progressively becoming more scarce, due to persistent increase in its competing demands'. The National Water Policy is based on the principles of integrated water resource management and provides a framework for the provinces to develop provincial plans and strategies for sustainable management of water resources. The Khyber Pakhtunkhwa has remained a flag bearer for integrated resource management through several international and Government financed development projects at various scales using various tools and approaches. The development of IWRM Strategy is another addition to these achievements.

The provincial government will make sure that the recommendations of the strategy are implemented in its true sense where stakeholders, particularly multiple water users, understand their rights as well as obligations in relation to good management and governance of water resources of the province. The provincial government will also ensure close cooperation with federal ministry of water resources for seeking support in operationalising this strategy.

Foreword

Mr. Atif Rehman

Secretary
Planning & Development Department
Government of Khyber Pakhtunkhwa

Integrated Water Resources Management is a collaborative approach to improve water governance by involving relevant stakeholders especially the user communities and the private sector. Improved water governance through this approach is believed to optimize socio-economic returns of resource management while ensuring sustainability of vital ecosystem. The development of the Integrated Water Resources Management was a lengthy and tedious work involving more than a hundred contributors and stakeholders. The Planning and Development Department of the province successfully provided coordination support to the contributing departments and individual experts.

Khyber Pakhtunkhwa faces multifaceted challenges in water sector development. At the core of these challenges is the way water is managed and governed. Enabling equitable, inclusive and sustainable development of the sector requires shared, concrete solutions, and an integrated framework to manage competing uses of the depleting resource in face of the expected population growth and climate changes. Strengthening partnerships is an integral part of the development policies of KP Government whereas the KP Public Private Partnership Act 2014 provides for the participation of the private sector in different sectors including water supply, sanitation, treatment or distribution; power generation; canals or dams; sewerage or drainage and; solid waste management, among others.

The IWRM strategy provides strategic pillars and priority areas influencing the water sector performance and creating conditions for private sector involvement with advance technology and performance. Besides, the private sector is expected to invest in environmental protection in response to services provided by the government and as social corporate responsibility. Public Private Partnership as one of four key pillars of the KP IWRM strategy aims at regulating use of water by private sector and ensuring its contribution in water sector promotion.

I acknowledge the efforts of all contributors and hope and pray that this strategy is successful in motivating engagement of all the relevant actors including industry, communities, academia and citizens for better management of water resources of the province.

Acknowledgement

Mr. Shah Mahmood Khan

Additional Secretary
Planning and Development Department
Government of Khyber Pakhtunkhwa

This gives me an immense pleasure to acknowledge institutions and individuals who have contributed to the Khyber Pakhtunkhwa Integrated Water Resource Management Strategy. This landmark document has been prepared as a result of untiring efforts during the last one year by over 200 experts and professionals belonging to provincial line departments, a number of federal departments, universities, development sector organizations, civil society and water users. The Planning and Development Department, Government of Khyber Pakhtunkhwa coordinated the entire exercise and provided secretariat for the development of the strategy. Unfortunately, it will not be possible to list all the institutions and individuals who have contributed, on one page. However, it is compulsory to mention the secretaries of all relevant departments including Mr. Atif Hussain, Secretary P&D, Mr. Zahir Shah, Secretary Local Government and Rural Development, Mr. Behramand Khan Secretary Public Health and Engineering Department (PHED), Mr. Muhammad Israr, Secretary Agriculture, Mr. Daud Khan, Secretary Irrigation and Mr. Naeem Khan former Secretary and water expert.

I also acknowledge the immense contribution of all the actors who played a leading role in completion of the strategy. All relevant line departments of the Government of Khyber Pakhtunkhwa provided technical support and contributed to the sectoral papers as well as to the strategy. A Core Committee notified by the provincial government played a central role in its development. The sectoral papers were written by designated committees led by learned focal persons. Each sectoral paper is a wealth of knowledge and brings together all the facts and figures as a baseline available today and will continue to be improved in future. Findings of the sectoral papers provided inputs to the strategy in hand. The Water for Livelihoods Project of the Helvetas Swiss Intercooperation funded by the Swiss Agency for Development and Cooperation (SDC) provided technical and financial support for the development of sectoral papers as well as for the strategy. Helvetas also assisted in the consultative process. Being long-standing partners of the Provincial Government, and highly committed stakeholders in water sector, the provincial government is thankful to SDC and Helvetas for this partnership.

Final product of this joint effort is a dynamic document which is now in your hands. This is the first ever strategy in Khyber Pakhtunkhwa on water with an integrated water resource management approach. It is therefore an important challenge and a test case for the Provincial Government in favour of improved water resource management and governance in the province. Departments are highly encouraged to frame their project pipelines taking ideas from the strategy action lines.

Government of
Khyber Pakhtunkhwa
حکومتِ خیبر پختونخوا

Integrated Water Resource Management Strategy

Khyber Pakhtunkhwa

The goal of the IWRM strategy

Strive for a ***coordinated development*** *and* ***management*** *of* ***water*** *and* ***land resources*** *in a* ***sustainable*** *and* ***equitable manner*** *for the* ***greater provincial interest*** *and welfare of the* ***people of Khyber Pakhtunkhwa.***

OVERALL OBJECTIVE

OPTIMISE THE ECONOMIC, SOCIAL AND ENVIRONMENTAL RETURNS ON WATER RESOURCES.

ENSURE EQUITABLE ALLOCATION

JUDICIOUS USE BY CONSUMERS

SAFE DISPOSAL OF POST-USE EFFLUENTS.

SUSTAINABLE WATER RESOURCE MANAGEMENT

- Ensure 100% coverage of population for WASH
- Improve water balance in the province
- Enhance water productivity through infrastructure and technology
- Manage watersheds to regulate flow and recharge aquifer

IMPROVED WATER GOVERNANCE

- Effective coordination and collaboration among actors
- Formulate missing policies and improve existing regulations
- Build capacities of government departments
- Structured participation of water users

EFFECTIVE PUBLIC PRIVATE PARTNERSHIP

- Regulate use of water by private sector
- Acquire knowledge of private sector in water sector promotion

IMPROVED KNOWLEDGE AND AWARENESS ON WATER

- Improve database on water resources
- Increase citizens' awareness

P&D Department
Government of
Khyber Pakhtunkhwa
www.pndkp.gov.pk

Technical Assistance
HELVETAS PAKISTAN

Financial Assistance
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Swiss Agency for Development and Cooperation SDC

Executive summary

Water is a lifeline for Khyber Pakhtunkhwa's (KP) predominantly agriculture-based livelihoods and also a factor of vulnerability due to water governance issues and frequent extreme hydro-meteorological events. With 35.5 million people (83.5% rural), KP has a high incidence of multi-dimensional poverty, lack of access to water for drinking and irrigation being an important factor. Therefore, engaging in water sector development for improved access to water is a key driver to improve well-being of the people. The KP province comprises of diverse landscape with substantial seasonal variations which is an asset as well as a challenge for resource planning. The province faces high vulnerability to climate variability and change, especially in mountain areas. The province is rich in water resources playing an important role in the regional hydrological cycle. This potential needs to turn into an opportunity for the people of the province. However key challenges yet to be addressed in the province include water management and governance.

In the past, several development initiatives at various scales promoted integrated approaches in the province for nearly four decades. A culture of cross-sectoral coordination therefore exists among various actors within the government. However key challenges yet to be addressed in the province include water resource management and governance. Factors such as lack of clarity on roles and responsibilities with respect to service delivery and limited capacities in relation to integration and public participation have impacted water governance.

The National Water Policy 2018 supports Integrated Water Resource Management (IWRM) and suggests the provinces to develop their own water related strategies including IWRM. The IWRM approach takes water as one shared, finite and economic entity. The Government of KP recognises the competing demands for water from various sectors including but not limited to drinking water and sanitation, agriculture, irrigation, manufacturing and industry, environment and ecosystems, and hydropower. Based on provincial needs and in line with the recommendations of the National Water Policy, the provincial Government has formulated an Integrated Water Resource Management (IWRM) strategy for the province. This strategy takes into account all competing uses of water, respective challenges and attempts

to suggest necessary measures that may lead to equitable access of water resources by all sectors. The strategy recognises water as a precious and economic good for encouraging its rational use. The core rationale of the strategy is to maximize the resultant economic development and social welfare in an equitable manner from available water resources. The strategy believes in integration of natural (quality, quantity, type, nature) and human systems (sectoral demands and supply, coordination, participation) without compromising the sustainability of vital ecosystems.

The KP IWRM strategy is a result of highly participatory process involving all relevant stakeholders including government line departments, civil society, academia, and the development sector. The strategy development process was supported by several sub-sectoral status reports and individual consultations among expert groups on topics which needed deeper understanding and elaboration. The strategy believes that improved coordination will lead to reducing cost of water management and increasing revenues by introducing paradigms that influence rational and efficient use of water resources.

Contextual realities related to water sector in KP

- There is still an unserved 21% rural and 2% urban population for drinking water supply and sanitation services. In addition, not all drinking water supplied meet the recommended quality standards.
- According to Water Apportionment Accord 1991, a total of 8.78 MAF of water at the ratio of 7.5% has been allocated to the province against which the province utilises 5.97 MAF and 2.81 MAF annually remains unused due to limited infrastructure.
- The province has a total area of 18.40 million acres (7.04 million hectares) out of which the cultivable area is 6.72 million acres (2.007 million hectares). In total, an area of 2.28 million acres (0.93 million hectares, 34%) could be brought under irrigation as opposed to 60.67% at country level. The 4.44 million acres (1.008 million hectares, 66%) is either barren or rainfed with uncertain crop growth.
- Out of 2.28 million acres (0.93 million hectares), the government canals irrigate 1.47 million acres (0.595 million hectares) and civil canals irrigate the remaining area. Lift irrigation schemes and tube wells also irrigate 0.109 and 0.101 million acres respectively (total 0.085 million hectares).
- Overall there is a low productivity of agriculture as well as a low water productivity in the province with 50% losses in the field.
- Water tables at different locations are dropping at fast rates with excessive abstraction and the recharge is inadequate.
- Climate change is expected to change seasonal availability of water with annual precipitation in most districts expected to be stable or slightly increase until 2030, albeit with temporal shifts. After 2030 an overall decline of precipitation is predicted.
- Climate trends indicate increased precipitation during spring and summer resulting in more frequent water induced disasters, and reduced precipitation in winter and autumn having an impact on water availability and thus on productivity of crops.
- About 142 hydropower project sites, with a total capacity of about 24,000 MW have been identified with high, medium and small heads. Out of these, 19 projects are already in operation, 27 projects are under implementation in the public sector by WAPDA and PEDO and 11 are under implementation by the private sector.
- The government of KP encourages a big shift in energy mix towards hydroelectricity and other indigenous resources of renewable energy.
- KP has been a forerunner in introducing participatory approaches in development sector with good results. The promotion of participatory approaches in water sector however have been random.

This strategy strongly urges the inclusion of water users in management of water resources by providing an institutional infrastructure and systematic planning mechanism to maximise benefits from limited water and financial resources.

Strategic framework - goal, objectives, main pillars and priority areas of action

The goal of the IWRM strategy is to strive for a coordinated development and management of water and land resources in a sustainable and equitable manner for the greater provincial interest and welfare of the people of Khyber Pakhtunkhwa.

An overall objective of the strategy is to optimise the economic, social and environmental returns on water resources, ensure equitable allocation among its competing demands as well as judicious use by consumers and safe disposal of post-use effluents.

The strategy has four main pillars, twelve priority areas and one hundred action lines. The main pillars and priority areas are:

1. Sustainable Water Resource Management

1. Ensure 100% coverage of population for WASH
2. Improve water balance in the province
3. Enhance water productivity through infrastructure development and adoption of improved technology
4. Manage critical watersheds to regulate water flow and recharge aquifer

2. Improved Water Governance

5. Effective coordination and collaboration among actors
6. Prepare/ formulate missing policies and improve existing regulations
7. Build capacities of government departments
8. Structured participation of water users

3. Effective Public Private Partnership

9. Regulate use of water by private sector
10. Acquire knowledge of private sector in water sector promotion

4. Improved Knowledge and Awareness on Water

11. Improve database on water resources
12. Increase citizens' awareness

IWRM implementation strategy

The implementation framework for this strategy constitutes five structural levels 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 Planning and Development Department
3. Provincial Groundwater Authority, an independent structure to govern groundwater
4. District IWRM Committees to steer IWRM planning at district level and implementation
5. District / tehsil Water Users Associations to ensure integration of community/ citizens' perspective in IWRM planning and play their role as duty bearers towards their fellow community

This strategy has been devised for a period of 10 years. While the strategy should remain a living document with the possibility to make amendments, it is essential to let the strategy work in the field and be revisited in five years (or earlier only in case of any critical change in the context).

1. Introduction

The Khyber Pakhtunkhwa (KP) Province is home to about 35.5 million people (settled districts 30.523 million and tribal districts 5.001 million), of which 83.5% live in rural areas (81.22% settled districts, 97% tribal districts)[1]. The population of KP is increasing at an average of 2.65%[2] per annum and will cross 51 million by 2030 and 89 million by 2050[3], if the current rate of growth remained unchecked. The newly merged districts of the former Federally Administered Tribal Areas (FATA) located along western border of Pakistan with Afghanistan are a new addition to KP. KP has a high incidence of multi-dimensional poverty (UNDP, 2017). Among other, lack of access to water is a major driver of poverty and deprivation. Therefore, engaging in water sector development for improved access to water is a key driver to improve people's well-being and harmony.

Pakistan's economy is predominantly agrarian in nature and therefore water is a crucial resource for the livelihoods of people and economy. Water and agriculture are highly sensitive to climatic conditions and are directly affected by climate change in a reciprocal relationship with impact on people's livelihoods and food security. KP comprises of diverse landscape with agricultural plains, drylands and mountains. The province is extended from north to south with diversity of terrain causing substantial seasonal variations. A large area of KP comprises highlands which are highly vulnerable to climate variability and change[4] and rich in water resources playing an important role in the regional hydrological cycle[5]. This diversity is an opportunity but at the same time increases exposure to vulnerability due to climate variability and change. Land holding in KP is generally small and owners have very little risk-taking capacity. Adaptation to efficient and innovative methods of water management and conservation is very important in this scenario.

1 Bureau of Statistics, Government of Pakistan 2017.
2 An average growth in KP and FATA computed from the Census report 2015.
3 Projection based on the current rate of population growth.
4 Ali, J and Nizami, A. 2014. Hydro-meteorological Hazards, Vulnerabilities and Coping Strategies in Garam Chashma Chitral, Pakistan.Helvetashttp://www.asianhighlands.org/uploads/soft/150415/1-150415133358.pdf
5 Grumbine, E. R., Nizami A. et al. 2014. Water Governance in Asian Highlands. Working paper 198. Kunming Institute of Botany China, Helvetashttp://www.asianhighlands.org/uploads/soft/150409/1-150409163518.pdf

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[6]. Coordination of various actors and water uses, however, received a high attention after 2010 mega floods with the realisation that lack of coordination among actors, leads to mismanagement and increases the effects of disasters. Key challenges in the province include water management and governance with limited accountability for service delivery due to divided responsibility for services; and, the need for capacity development of municipal authorities and other relevant agencies for delivering cost effective services.

Pakistan has a water economy with agriculture being the backbone of the country's major export[7]. Water is a lifeline for livelihoods of Pakistanis and several actors are engaged in the sector directly or indirectly as users, managers and regulators. The Government of KP recognises the competing demands for water from various sectors including but not limited to drinking water and sanitation, agriculture, irrigation, manufacturing and industry, environment and ecosystems, hydropower etc. This strategy takes into account all competing uses of water with respective challenges and attempts to suggest necessary measures that may lead to equitable access of all sectors to the water resources.

1.1 Rationale for Developing the IWRM Strategy for KP

The National Water Policy 2018 supports the concept of Integrated Water Resource Management and suggests the provinces to develop 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, as yet has not been achieved"* (National Water Policy 2018, page 2). The IWRM approach takes water as one shared finite economic entity.

With rapidly growing population, Pakistan is heading towards joining the list of water stressed countries (860 cubic meter per capita by 2025)[8]. KP is in a relatively better situation due to the water availability in the mountainous Northern districts but still the water resources need cautious management while keeping in mind future scenarios of climate change and population dynamics. There is still an unserved 21% rural and 2% urban population for drinking water supply and sanitation services in KP[9]. Overall there is a low agriculture as well as water productivity in the province with 50% losses in the field[10]. Water tables at different locations are dropping fast with excessive abstraction and inadequate recharge[11]. This has an impact on not just the water availability, but also quality due to arsenic contamination and salinity intrusion. Climate change is expected to change the water situation in the province with annual precipitation in most districts expected to be stable or slightly increased until 2030. However, in this period a temporal shift of precipitation is expected in all districts with increased precipitation during spring and summer resulting in more frequent water induced disasters, and reduced precipitation in winter and autumn having an impact on water availability and thus crops. After 2030 an overall decline of precipitation is predicted[12].

Freshwater is essential to ensure quality of life and sustainable development. This finite resource is facing competing demands and therefore needs to be holistically managed involving users, planners and policymakers at all levels. This strategy recognises water as a precious and economic good for encouraging its rational use. The core rationale for IWRM strategy is to maximise the resultant economic development and social welfare in an equitable manner from available water resources. The strategy believes in integration of natural (quality, quantity, type, nature) and human systems (sectoral demands and supply, coordination, participation) without compromising the sustainability of vital ecosystems.

6 Kalam Integrated Development Project (1982) followed by similar projects in Mardan, Dir, Malakand, Tarbela watershed, Integrated Natural Resource Management Programme (2006) etc.
7 National Water Policy – 2018.
8 National Water Policy – 2018.
9 KP Status Report on drinking water and sanitation – 2019.
10 KP Status Report on Water Productivity – 2019.
11 KP Status Report on Groundwater – 2019.
12 KP Status Report on Climate Change – 2019.

1.2 Strategy Development Process

The Government of KP had notified a Roadmap for IWRM Strategy formulation in June 2018 to steer IWRM strategy development process in the province. A Core IWRM Working Group with 21 members supervised implementation of the roadmap under the chairmanship of the Secretary Planning and Development Department with technical support from various expert institutions and departments. As part of the strategy development, 14 sub-sector reports were developed on which this strategy is based. Apart from current situation on water use, supply and demand, the sector reports provide information on the existing and possible future role of the sub-sectors in relation to IWRM in the province. The status reports are the product of a rigorous process of secondary (and primary where necessary) data collection, review of literature and thematic expert discussion. Each group worked independently to write the reports including methodology with progress reported to the Core Working Group periodically. The draft status reports were presented to the relevant departmental heads and the Core Working Group for feedback, and then peer reviewed by one or more external experts and finalized. Appendix I includes list of these status reports available with the respective departments.

This strategy also benefited from several large-scale moderated consultations. The first consultative workshop was held in May 2018 with 65 representatives from 27 organisations including government departments, district administration, Pakistan Metrology department, Water Supply and Sanitation companies, local and international development organisations, academia, farmers and representatives of water user associations. The participants unanimously suggested development of an IWRM strategy for the province with an agreed work plan. This workshop was followed by the first meeting of the Core Working Group in June 2018 and a draft roadmap was developed and notified by the Government of KP. Its implementation began with the identification of thematic expert groups for preparation of status reports to provide background material and input for the IWRM strategy. The second large scale workshop was held in November 2018 when all the status reports were presented and analysed. This workshop was facilitated by an international water expert and was attended by 50 participants from 25 organisations. This two-days' workshop concluded major pillars of the IWRM strategy based on findings of the status reports and identified additional thematic areas to be included in the strategy. A final consultation was held in April 2019 when the contents of the strategy were discussed and agreed.

The strategy development process was also supported by several individual consultations among expert groups on topics which needed further deeper understanding and elaboration. The entire process has benefited from the experiences of over two hundred experts from water and associated sectors..

1.3 Data Challenges in Water Sector

Developing 14 subsector reports was a challenging task. During the process it was additionally experienced that alongside data deficiency there are data reliability and systematic data management challenges as well. The experts therefore had to authenticate available data with other sources in addition to collecting primary data in some instances. The process of writing sub-sector reports therefore served as an opportunity to raise internal awareness on data collection, data gaps and management. It is important to note that the sub-sector reports for this strategy were supposed to be based on secondary data assuming that data are abundantly available. Collecting primary data for the entire province within given time and resources may not have been possible. However, the strategy emphasizes on recognising all the sub-sector status reports as baseline since these have a possibility for consolidating scattered and new data, into a single document.

2. Status of Water Resources in Khyber Pakhtunkhwa

2.1 Khyber Pakhtunkhwa Water Balance

According to Water Apportionment Accord 1991 a total of 8.78 MAF of water at the ratio of 7.5% has been allocated to KP from the Indus Basin River System. Against this, the province has the capacity to utilise 5.97 MAF with an annual un-utilised resource of 2.81 MAF. The erstwhile FATA do not receive any share from the Indus – however the total rain and groundwater potential of FATA is 4.06 MAF of which annual demand is 0.12 MAF with an un-channelised share of 3.94 MAF[13]. This water needs to be utilised for the welfare of people in this area. In addition, KP's water comes from 6,100 km of rivers and streams, 6,400 ha of lakes and 54,600 ha of dams and reservoirs which also serve as fish farms for around 3,200 tons of harvest per year. The annual surface water flows are carried by the 11 major rivers and streams traversing through KP. The total surface flow is about 29.51 MAF[14] which also includes 4 MAF from erstwhile FATA rivers and Zams[15].

Canal systems

Three of the provincial canal systems i.e. Chashma Right Bank / Paharpur Canal System CRBC canal in DI Khan, Pehure Main Canal in Swabi and Pehure High Level Canal in Swabi take about 2.82 MAF of annual water from the right bank of River Indus. Beside these three on Indus, a number of other canals have been extracted for irrigation purposes in the province. These include Kabul River Canal, Lower Swat Canal System, Upper Swat Canal System, Warsak Canal System, Kurram Ghari Head Work, Baran Dam, Gomal Zam, and Bazai Irrigation Scheme. In addition to these, there are more than 3,000 Civil Channels[16] in all the districts (including newly merged districts) of the province. Civil channels are non-revenue channels which are maintained by the Irrigators themselves. These civil channels utilise a sizable quantum of irrigation water (3.00 MAF allocated under Water Apportionment Accord 1991). It is observed that the

[13] Assessment of water resources in FATA by PCRWR & IUCN 2018.
[14] Ibid
[15] Zam in DI Khan's specific Rudh Kohi context refers to the source of water or watershed of a hill torrent.
[16] Data obtained from Irrigation department Khyber Pakhtunkhwa and FATA Secretariat Peshawar.

efficiency of most of these channels is much lower than the Government Canals. Due to deferred and uncertain maintenance, the water supplies are not ensured and face interruptions with floods, landslides and other issues since no permanent diversion arrangements are available. After establishment of proposed Water Users Association for each civil canal, there are chances of improvement in overall efficiency of this community-based irrigation system.

Precipitation potential in KP

This part of the country also has comparatively better average rainfall. Taking climate trends into account, an average rainfall in the province is 738mm till 2020, 753mm till 2030 and 744mm till 2040. Annual rainwater potential in the province is about 4 MAF. So far, KP has been able to harvest about 0.28 MAF of local surface runoff through 31 small dams. The situation of rainwater harvesting and storage in the province is going to improve with the construction of Mohmand dam, Gomal Zam dam and KurramThangi dam as well as 33 more small dams to be constructed during the next few years. KP's mountainous topography has tremendous potential for small and medium dams. The history of small dams' construction in the province started in early sixties with the construction of medium scale Baran dam in Bannu. Three other small dams namely Tandadam and Kandar dam in Kohat and Khal dam in Haripur district were also completed in the same decade. Despite such a high potential, the provincial government took a very long undue pause of twenty years as no dam could be constructed till 1984. Irrigation department established a dedicated Directorate for small dams in early eighties which was later converted into a full-scale Directorate General (DG) office and since then, the department has completed almost 31 small dams with a capacity of 0.28 MAF. These dams also extend drinking water facility to the nearby villages, control flood damages and provide recreational facility to the local population. Beside this, these dams also recharge the groundwater aquifer in the downstream.

Groundwater potential

The groundwater potential in erstwhile FATA is estimated at 0.117 MAF[17]. For KP however, the exact groundwater potential of the province is not completely known since no fresh study has been conducted in KP on groundwater for the last three decades. However, the quantity of groundwater extraction is known for both the agriculture and domestic uses (4.02 MAF which include 0.05 MAF from FATA). In KP, total 37,117 tube wells (including drinking water wells) extract about 3.97 MAF of water annually[18] (Figure 1)

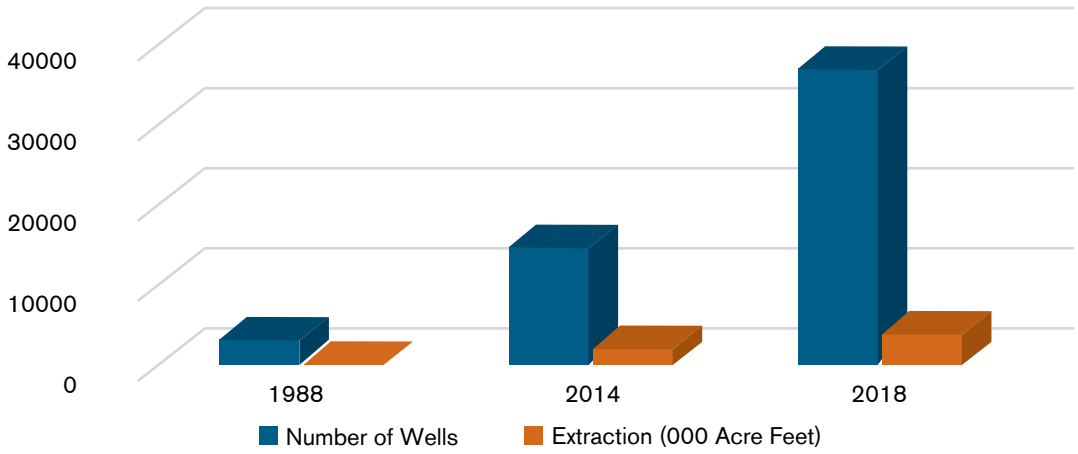


Figure: 1 Situation of Groundwater Extraction in KP (1988 – 2019)

Losses and out-takes from the system in KP

1. **Irrigation requirements in agriculture** are mostly met through surface water (34% canal water, 30% groundwater, the remaining rainfed).
2. **On-farm losses** from agriculture are reportedly around 51% - although this water remains somewhere in the system by either leaching down to join aquifer or is lost to the river bodies. Yet, an efficient use of water for water efficient crops may save water for more agricultural area and increase crop per drop of water.

[17]Assessment of water resources in FATA by PCRWR & IUCN 2018.
[18]Sub-sector IWRM report on groundwater 2019.

3. **The annual evapotranspiration losses** are about 0.043 MAF.
4. **Loss of water provided to the households is an** unquantified loss of fresh water to the drains due to poor practices. **Domestic requirements** are almost completely dependent on groundwater resource. There is usually no control on wasteful use of water due to flat rate system. The consumers are more careful and efficient in utilisation only in areas where drinking water is scarce.
5. **Loss of water quantity and quality in the industrial sector** is also unaccounted. However, it is speculated that it is higher than in domestic sector since despite the growing industry and production processes in KP, there is no single industry that uses water efficient and quality control practices.

2.2 Water Related Factors and Sectors

Climate scenario of KP

KP is distributed into three rainfall categories based on annual average rainfall received (Figure 2), namely Low[19] (less than 600mm), Medium[20] (less than 1,000mm) and High[21] (above 1,000mm). Little shifts are noted in the overall quantity of average annual rainfall received from 2010 to 2040.The climate baseline of KP suggests that 18% districts of KP are experiencing a diminishing annual precipitation trend by the year 2040 whereas the remaining districts (82%) are either stable or increasing. On the other hand, seasonal variation and shifts are rather significant. In all the districts, Spring and Summer rains are showing an increasing trend whereas Fall and Winter rains are continuously declining. This shows that Spring and Summer are becoming wetter and Fall and Winter are becoming drier till 2040.

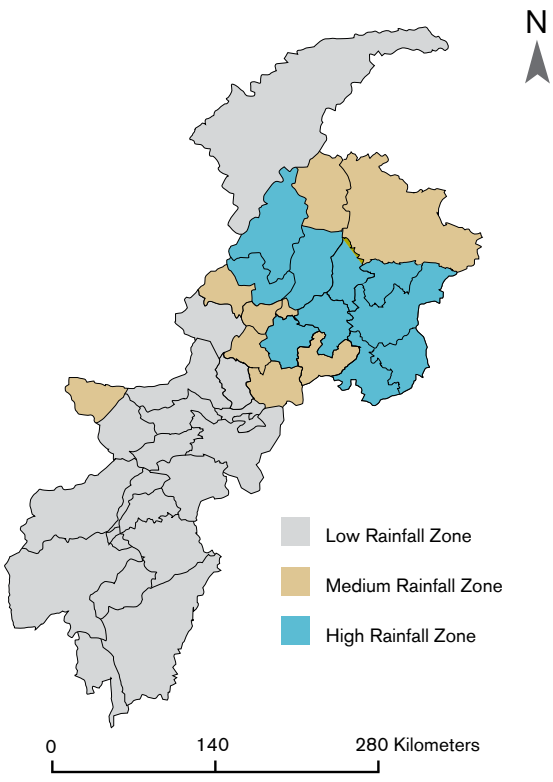


Figure 2: Overall Situation of the annual precipitation in KP (2019)

- The overall increase in annual average precipitation in KP is expected to be between 1-9%.
- By the year 2040, 85% districts will receive 14-18% less precipitation in Winter than the amount received today. An overall decline noted as 8-19% by 2040.
- With exception of 13% districts, others see an annual increase in Spring precipitation by the year 2040. In addition, snowfall in mountainous region is also likely to be received during early Spring instead of winter, increasing overall precipitation in Spring. An overall expected increase in spring precipitation is between 14-22% by 2040 in KP.
- Overall increase of 7-22% is noted in Summer rainfall in KP till 2040.
- Fall precipitation is declining by 17-33% by 2040.
- Total rainwater harvesting potential currently in the province is 4.13 MAF which will increase to 4.22 in the next decade and then decline to 4.17 in the following decade.

Nearly two-third or more of the total rains are received during Spring/Monsoon. The remaining is received during Fall and Winter. In decadal scenario, it is likely that annual average precipitation will continue to increase till 2030 and start declining from 2030 to 2040. Almost all the seasons during this period are showing a declining trend. In high altitude region, most of the precipitation is received in the form of snow. The climate baseline suggests that the snow maxima is shifting towards spring which has important implications for disaster risks in late spring and early summers, river flows during spring and summer and for future water storage capacity of glaciers.

[19]Peshawar, Charsadda, Khyber, Kohat, Hangu, Kurram (lower), Karak Bannu, Lakki Marwat, DI Khan Tank, Chitral, Mohmand, Orakzai, North and South Waziristan
[20]Swat (Upper), Malakand, Kurram (Upper), Nowshehra, Mardan, Swabi, Bajaur, Kohistan, Mansehra (North), Shangla
[21]Swat (Lower), Buner, Dir (Lower and Upper), Haripur, Kala Dhaka, Abbottabad, Mansehra (South), Battagram. Central Region (Mardan, North Karak, Swabi, Nowshera, Mohmand Agency)

Annual average temperature rise of 1.8°C is expected in KP by 2040. The temperature scenarios for the three regions of KP (Central[22], South[23] and North[24]) present a highly noticeable change. The maximum and minimum temperatures are showing increasing trend (average annual and seasonal). An average increase in temperature in the North (mountainous areas) is the highest (1.9°C) followed by the Centre (1.8°C) and the South (1.6°C, where South is already a heat surplus zone). Spring temperature is increasing at a higher rate followed by summer. The temperature trends in the North are crucial due to glacial activity and when this combines with late occurrence of snowfall, the likelihood of disasters is very high.

Surface water

According to Water Apportionment Accord 1991, a total of 8.78 MAF of water at the ratio of 7.5%[25] has been allocated to the province of KP against which the province could hardly utilise 5.97 MAF with an annual unused resource of 2.81 MAF[26]. The major reason for less utilisation is non-availability of infrastructure. Agriculture is the main user of available surface water (90%).

The province has a total area of 18.40 million acres (7.04 million hectares) out of which the cultivable area is 6.72 million acres (2.007 million hectares)[27]. In total, an area of 2.28 million acres (0.93 million hectares, 34%) could be brought under irrigation as opposed to 60.67% at the country level. The remaining 4.44 million acres (1.008 million hectares, 66%) is either barren or rainfed with uncertain crop growth. Out of 2.28 million acres (0.93 million hectares), the government canals irrigate 1.47 million acres (0.595 million hectares) and civil canals irrigate the remaining area. Lift irrigation schemes and tube wells also irrigate 0.109 and 0.101 million acres respectively (total 0.085 million hectares)[28].

Groundwater

Between 1988 and 2018 the status of groundwater in KP has been studied for some districts (including the newly merged districts). It is very difficult to compare the findings since the studies used different methodologies and focused on different geographical regions within KP. In order to get an idea of how things have changed over time, the strategy notes the following:

- The government of KP plans to conduct another study for the remaining districts to understand the overall status of resource in the province.
- 1988: A study assessed four districts of KP and noted an annual groundwater potential at 0.162 MAF that could safely be withdrawn in the first phase for irrigation, meeting domestic consumptions and other uses (Kruseman et al., 1988). The total number of wells at that time was noted at 3,467 annually extracting 0.072 MAF.
- 2013-2014: The Institute of Applied Geo Sciences, (known as TNO) Netherlands, study was revised with few additional districts and concluded that total annual extraction had reached to 2.17 MAF through 15,129 tube wells.
- 2018: A study conducted in the tribal districts indicated total groundwater resource potential at 0.117 MAF however the quantity extracted was unknown. The water table ranged between 5-150 meters depth due to frequent droughts.
- 2019: The On-Farm Water Management Directorate of KP Agriculture department reports that the total number of tube wells for irrigation and drinking (public and private) has reached up to 37,117 with an annual extraction of 3.97 MAF[29]. An overall share of drinking water is 14%. The rest of the extraction takes place for irrigation.
- Water quality was generally found satisfactory in terms of Electrical Conductivity (EC) value, and Total Dissolved Solids (TDS) and could be used both for drinking and irrigation purposes except in Mohmand district, where the EC value is more than 2,000 µ/cm[30]. In case of southern districts, the quality deteriorated due to saline intrusion.

[22] Central Region (Mardan, Charsadda,Swabi, Nowshera, Mohmand Agency, Peshawar, Khyber Agency)
[23] South Region (Bannu, Lakki Marwat, Karak, D.I khan, FR D.I. Khan, Orakzai, Kuram, Hangu, Kohat, Tank, Wazistan North, Waziristan South)
[24] North Region (Buner, Lower Dir, Upper Dir, Chitral, Abbottabad, Mansehra, Shangla, Swat, Chitral, Malakand, Kohistan, Kala Dhaka, Battagram Bajaur, Haripur)
[25] Water Apportionment Accord 1991 report
[26] IRSA and Irrigation department data
[27] Irrigation Department KP data
[28] Irrigation Department KP data
[29] KP Sub-sector status report on Irrigation. This figure includes tube wells exclusively meant for drinking water.

- 2020: A groundwater study of Peshawar valley (Peshawar, Charsadda, Mardan, Nowshera and Swabi districts) conducted by Helvetas and Pakistan Council of Research in Water Resources (PCRWR) determined that groundwater depletion rate is higher in urban areas such as Peshawar City due to excessive commercial pumping. The results of groundwater modeling estimate that groundwater is depleting at an average rate of about 1.42 meter annually. The study reveals that an overall water resource potential of about 26.35 MAF is available against total demand of about 2.96 MAF and generally the groundwater is of usable quality except some hotspots of groundwater salinity at Risalpur in Nowshera district. This groundwater reserve is available up to the depth of 300 meters.

Studies conducted so far in limited (selection of) districts have indicated inadequate watershed management and unplanned groundwater exploitation through fast multiplying tube wells as the main threat to the groundwater resource base.

Agriculture

KP is endowed with a geographical land area of 12.89 million hectares. Cultivated area is 1.89 million hectares while cultivable wasteland is 1.28 million hectares. Farming is mostly practiced at subsistence level. Livestock rearing is also an important component of farm economy in rural areas. The major source of irrigation is canals covering 77.4% of irrigated area followed by groundwater through tube wells irrigating 10.2% area. The remaining irrigation sources with respect to cultivable area coverage include wells (4.9%), lift pumps (3.3%) and other sources (3.9%). Half of its cultivated land depends on rainwater and 1.28 million hectares of cultivable wasteland. The agriculture sector which consists of rabi and kharif cropping patterns (Figures 3 and 4) provides livelihoods to the majority of the population, is the major consumer of the available water (around 90%). There are 76,268 watercourses carrying irrigation water to the farmers' fields, out of which 26,080 are lined. The underground water extraction through 32,218 tube wells and dug wells is estimated as 3.4 MAF.

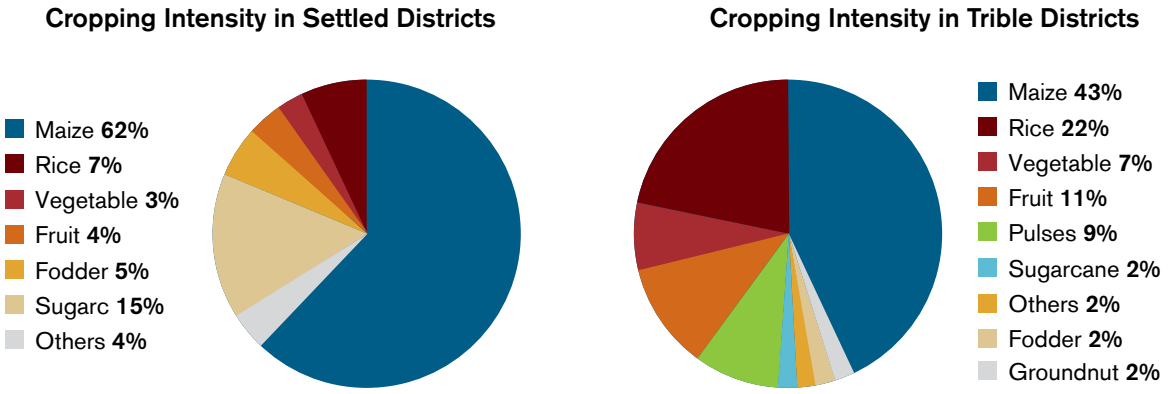


Figure: 3 Kharif Cropping Intensity in Khyber Pakhtunkhwa

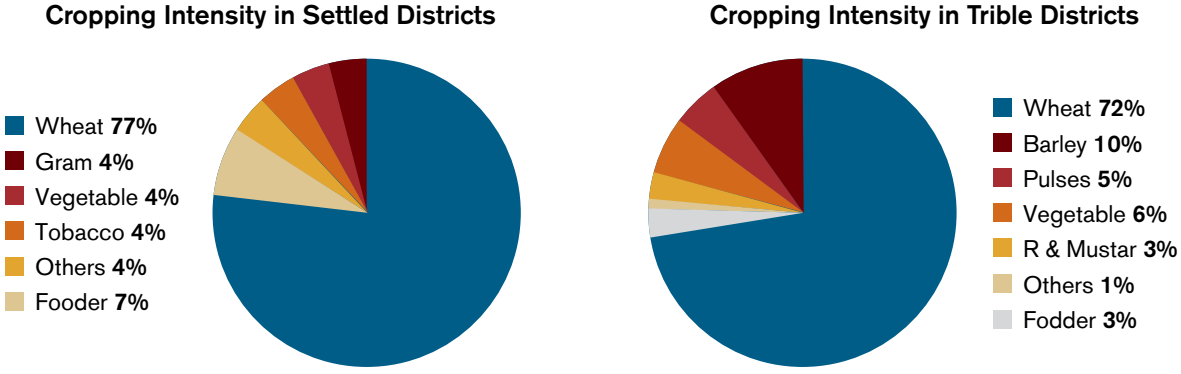


Figure: 4 Rabi Cropping Intensity in Khyber Pakhtunkhwa

[30]Groundwater study in Bajaur, Mohmand & Khyber Agencies 2017 (report is in progress)

Figure 5 shows agro-ecological zones updated during 2017-2019. These zones suggest that agricultural planning is very complex and challenging in KP due to scattered prevalence of agro-ecological zones. Besides, most of the KP falls in low and medium rainfall zone and congruently drier agro-ecological zones demanding highly responsible agriculture with adoption of water efficient farming techniques.

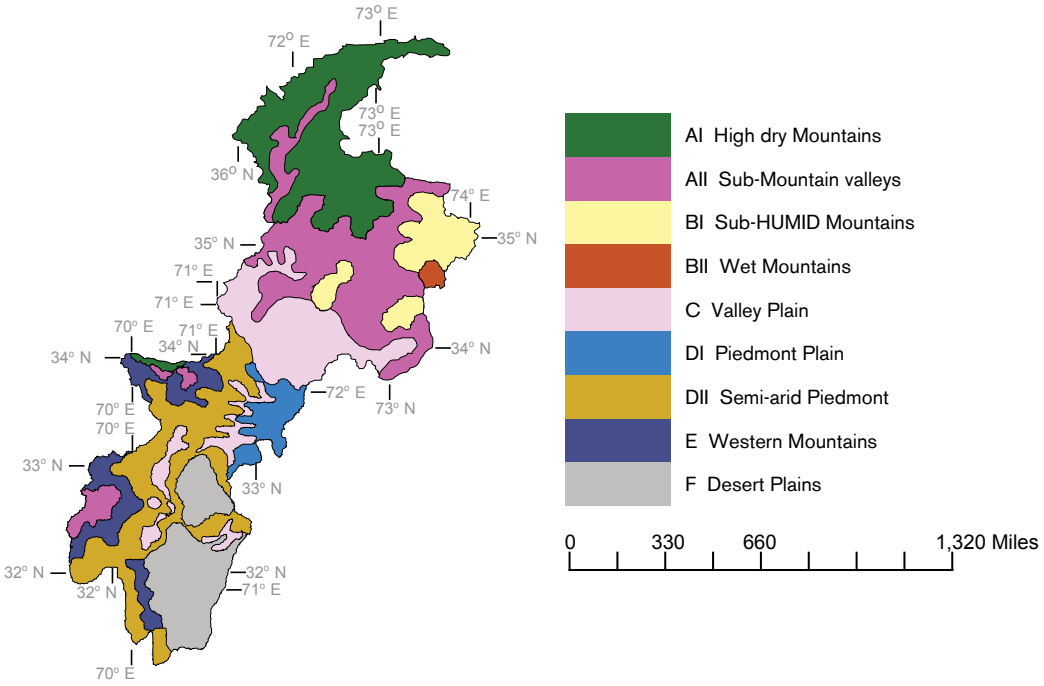


Figure: 5: Agro-Ecological Zones of KP

Water Productivity in Agriculture

The total reported area[31] of KP including the tribal districts is 8.352 million hectares out of which cultivable area is 1.868 whereas 6.484 is uncultivable. Out of the total cultivated area only 0.957 million hectares is irrigated from various sources including 774,233 hectares from government managed canal system. The remaining 0.911 million hectares are rainfed. The total estimated annual available surface and groundwater is about 12.090 MAF out of which about 50-60% are being lost in application and conveyance and the rest of 40-50% is actually available for crop use. The fact that a high proportion of cultivable land is rainfed or uncultivated due to lack of water, it is highly necessary to use irrigation water judiciously so that more areas may be brought under cultivation.

There are huge gaps between some of the average figures in the country and in KP. For example, KP requires 1,351 liters of water to produce one Kg wheat as opposed to 1,085 liters country average. Similarly, 1,136 liters of water for one kg Maize as opposed to 710 liters in Pakistan. Hence there is a huge potential to improve the water use efficiency and water productivity in KP (Figure6).

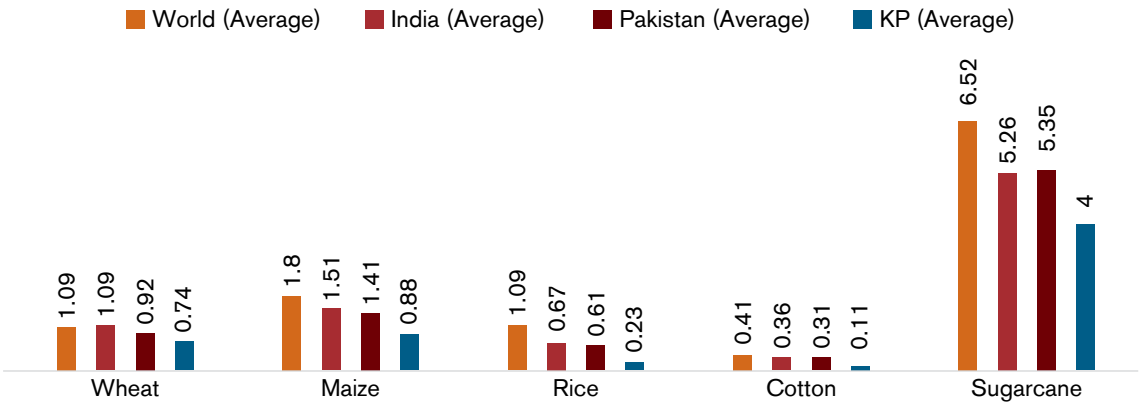


Figure: 6 Water Productivity (WP) Gap

[31] Crop Reporting Services (CRS) Khyber Pakhtunkhwa (2015-16)

Hydropower

Pakistan is endowed with hydropower resources of about 60,000 MW of which 24,736 MW (41%) exists in KP. The total installed capacity of the hydropower projects in the country is about 7,000 MW, out of which 4,129 MW (59%) is in KP (Figure 7). An estimated current national energy demand is over 30,000 MW. Against this, the present total installed capacity is 23,200 MW, comprising 15,300 MW thermal, 7,000 MW hydro, and 750 MW nuclear. In KP alone, about 142 hydropower project sites, with a total capacity of about 24,000 MW have been identified with high, medium and small heads. Out of these, 19 projects are already in operation, 27 projects are under implementation in the public sector by WAPDA and PEDO, and 11 are under implementation by the private sector. The projects under implementation in the private sector are mainly run-off-river schemes with small poundings for peaking. The prevailing energy mix of the country is dominantly dependent on high cost imported fuel which has led to chronic circular debt issue. The government of KP recognises this issue and encourages a big shift in energy mix towards hydroelectricity and other indigenous resources of renewable energy.

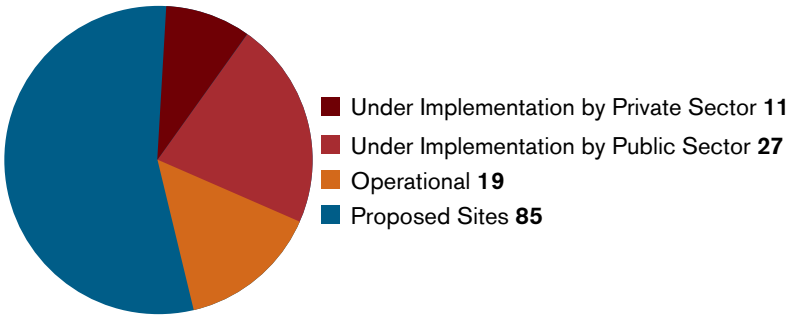


Figure: 7 Hydropower Projects in KP

Forests

Forest area under the management of the Forest department is 841,517 ha. Of this, 7.6% (63,915 ha) are state-owned Reserved forests, 29.7% (250,106 ha) are Guzara[32] forests owned either by community or private individuals and 62.7% (527,496 ha) are Protected forests. In addition, former FATA have 529,282 hectares managed by the Forest department. It is believed that the natural forest in the province have deteriorated. Loss of forests has been directly attributed to weakening of the watershed function of the forests in hilly areas contributing to severity of natural disasters including the 1992 and 2010 floods. Changes in forest cover and density are correlated with other environmental changes that may affect precipitation and runoff. Vegetation influences distribution of rainfall, the effect of air turbulence and potential to modify atmospheric coupling of forest plantations. The high-altitude forests are key to conserve water towers of the country and hence hold a high significance for the province. With continuous deterioration in forests, water flows are irregulated and forest grounds are not ready to intercept precipitation pressures resulting in floods as witnessed through a number of disasters since 1990s. The Status report on Forests indicate the need to address remaining issues in high altitude watersheds. It recognises that lots of efforts have already gone into plugging mid hills and southern watersheds with vegetative cover by the Forest Department and its partners under the Bonn Challenge in 2015 to restore 384,000 hectares forest area till June 2020. Taking the entire history of events since 1970s and the recent measures – a massive progress has been made in recent years to rise from a deep decline to increase forest cover and reduce denudation by strengthening the system of enclosures. Forest governance and continuous leakage of trees from natural forests for timber and firewood, especially from high altitude forests, needs a continuous attention to prevent what was reported in 1996 and 2008 (PFRI 1996 and Helvetas 2008).

Water Users' participation

KP has been a forerunner in introducing participatory approach in development sector. These efforts by the government, international donor financed initiatives, and non-governmental organisations for the promotion of participatory approaches however have been random. With over sixty years history of government led support for water through several highly organised and largely staffed departments, the

[32]Guzara means subsistence. The Guzara forest means, protected wasteland of the villages set aside at the time of regular settlement for meeting the requirements of landowners and right holders.

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 infrastructural schemes is a challenge faced in KP. 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 operation and maintenance of infrastructural schemes. This strategy therefore strongly urges the inclusion of communities in IWRM by providing an institutional infrastructure and systematic planning mechanism to maximise benefit sharing from limited water and financial resources in KP.

Planning and financing mechanism in water sector

Planning and budgeting of water and related schemes are handled by designated departments and institutions. There is no holistic water resource assessment (supply and demand) and therefore no subsequent water management plans are prepared (at the moment) for integrated planning at any level. The planning and budgeting process of water sector in KP is governed by multiple sources within the government including local government, provincial departments (through annual development planning), MPA's and MNA's funds and Non-Governmental Organisations (NGOs). Fee for provision of water by the government is not paid by the majority of users[33]. Therefore, water is virtually free for users and all costs of provision are borne by the government.

3. Goal and Objectives of the IWRM Strategy

The government of Khyber Pakhtunkhwa aims to achieve the following overall Goal and Objective from the strategy:

Overall Goal

To strive for coordinated development and management of water and land resources in a sustainable and equitable manner for the greater provincial interest and welfare of the people of Khyber Pakhtunkhwa.

Overall Objective

To optimise the economic, social and environmental returns on water resources, ensure equitable allocation among its competing demands as well as judicious use by consumers and safe disposal of post-use effluents.

[33]According to Urban Planning Unit (UPU), there are 300,000 water connections in Peshawar, whereas, only 70,000 households pay their water bills. Additionally, in WSSC Kohat only 7,000 are paying their water bills out of about 79,000 connections.

4. Strategic Framework and the Main Pillars

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[34].

The strategic framework is based on three key dimensions including **economic efficiency, ecological sustainability and social equity**. This strategy is built on four main pillars identified from a range of actions proposed in this document **namely sustainable water resource management, improved water governance, effective public private partnership and improved knowledge on water sector.**

The proposed strategic actions aim to strike a balance between improved access, productivity and conservation to cater for effective supply and demand equilibrium in a cost-efficient manner. In an ambitious undertaking, the government of KP desires to instill improved water governance by ensuring establishment of necessary structures, encouraging inter-departmental coordination and ensuring allocation of responsibilities to respective departments for improved accountability.

The strategy takes cognizance of external factors such as climate change and extremes, pressures from swelling population and expanding urban demands in integrated water management. It identifies KP as a hydrological-cum-administrative boundary with districts and tehsils as sub-basins for effective decision making, accountability, and improved service delivery. It chooses administrative boundaries for benefiting from existing planning and financing mechanisms prevalent in all the development sectors and efficient use of financial and human resources. The strategy is aware that some water related decisions may not take place administratively but at hydrological boundaries. There is an ample flexibility to govern and address such needs at required levels and remain within the IWRM framework with effective coordination and multi-use of water.

The guiding principles of the strategic framework of IWRM are as follows:

i. Developing close partnership with all water actors and stakeholders (Provincial Government, entrepreneurs, research scientists, corporate actors, academia, farmers, water users, civil society actors, women and men) for achieving integrated water resource management.
ii. Shifting the current emphasis of the public sector policies from management of water solely by public sector to an integrated governance where other actors participate to achieve IWRM goals and objectives.
iii. Reducing cost of water management and increasing revenues by introducing paradigms that influence rational and efficient use of water resources.
iv. Recognise that fresh water is finite, vulnerable to climate induced factors, and (man-made) mismanagement. Therefore, even when KP has relatively rich water resource base in the North, it is a fact that water stress may increase if appropriate steps for its integrated management are not taken.
v. Water has an economic value in all its competing uses and is to be recognised as an economic good. Citizens' and managers awareness in this regard needs to be enhanced.

There are four strategic pillars of the strategy, which are explaind in this chapter.

[34]Global Water Partnership, 2000.

4.1 Sustainable Water Resource Management

Water is a vital resource for sustainable development. Conflicting and competing uses often result in affecting water security for people, food production, ecosystems and gender parities. This strategic pillar pertains to the resource itself for its multiple uses, sources, types[35] and handling.

Several steps have been taken towards improved **Water and Sanitation** in the province:
KP Local Government Act 2013 and KP Drinking Water Policy 2015 provide effective institutional framework for effective Drinking Water and Sanitation Services.

Multiple government agencies are rendering WASH services in KP alongside private and community-based initiatives. Public Health Engineering Department (PHED) is entrusted with the responsibility to manage and deliver WASH services in rural areas whereas Tehsil Municipal Administrations (TMAs) are mandated within their areas of jurisdiction. The first public sector company on Water and Sanitation Services Peshawar (WSSP), was established in 2014 to deliver improved and sustained water, sanitation and solid waste management services. This model is being replicated in the province.

Improving water balance is about effectively using water that enters the system. Due to its geography KP is a system of several hydrological domains including rivers, groundwater, flood plains, natural springs and lakes. This strategy encourages to build new storages to optimise maximum water potential in the province ranging from micro-catchments for rainwater harvesting to large scale dams. It also proposes to allocate finances to improve efficiency of existing infrastructures and manage groundwater in an optimal way within sustainable use and recharge limits. KP is home to several lakes, water bodies and large flood plains inundated by five seasonal streams in the South which are included in the equation of sustainable water balance due to their significance for the livelihoods of people living in these hydrological districts.

Water productivity in agriculture is also a crucial strategic priority because this sector uses nearly 90% freshwater resources. A better crop per drop approach will lead to improved food security and optimal economic use of water.

[35]Blue, Green and Brown waters.

Loss of forests has been directly attributed to weakening of the **watershed function** of hilly areas. Given the environmental value of the forests for their water regulation and soil conservation functions, it is pertinent to manage critical watersheds through social, biological and structural means (including drylands in the South of KP).

This strategy strives to address the **following issues** while ensuring sustainable management of water:

- Lack of infrastructure to absorb full provincial share allocated by the Water Accord 1991.
- Inadequate WASH infrastructure to fulfil the need of 100% population.
- Shortcomings in the system of infrastructure inventory management and inadequate maintenance of irrigation infrastructure.
- Unhealthy watersheds with limited capacity to retain precipitation and aquifer recharge.
- Low tendency of using new, and more appropriate technologies and approaches to boost water productivity and foster water conservation in agriculture, WASH and other sectors.
- Reactive approach regarding Rudh Kohi management (measures are taken mostly during flood).
- Inadequate maintenance funds and limited participation for irrigation infrastructure.

Strategic objectives – sustainable water resource management:

1. Appropriate and functional infrastructure to provide adequate services to the population and channelise full water potential to achieve multi-sectoral development.
2. The water resource management and conservation infrastructure is further developed and maintained applying adapted (incl. innovative) approaches and technologies.
3. Overall water balance is improved in favour of maximised access to water by multi-users.

Strategic priorities

Ensure 100% coverage of population for WASH

The Government of KP is committed to provide potable water to the community at the doorstep and at an affordable cost in equitable, efficient and sustainable manner. Mitigating 21% rural and 2% urban gap ensuring 100% coverage in KP for WASH services is the foremost strategic priority of the government. Following actions are proposed in the strategy to achieve this priority:

1. Clarify roles, jurisdiction, TORs and mandates and ensure effective coordination to avoid overlap (LGE&RDD, Local Council Board, TMA, WSSCs, PHED and private sector).
2. Prioritise rural access to drinking water, sanitation, waste management and hygiene services for women, men and children.
3. Urban water management, sanitation and solid waste management.
4. Upgrade existing drinking water infrastructure and improve maintenance system.
5. Ensure compliance to acquire minimum quality standards for drinking water by all providers.
6. Promote decentralised waste-water treatment, reuse, and safe disposal in domestic and commercial sectors.
7. Citizens' awareness raising on making efforts in waste reduction and recycling.
8. Introduce state of the art solid waste management systems.
9. Promote Open-Defecation- Free (ODF) environment.
10. Introduce domestic water metering, pricing and monitoring (start with urban / WSSC areas).

Improved water balance for KP

This priority area aims at improving water balance in three ways. One, by building new and maintaining infrastructure for efficient delivery, two, by maximising conservation of groundwater, and three, by maximising water potential from rainwater harvesting. Following actions are proposed in the strategy to achieve this priority area:

11. Build new water storages (small, medium, large).
12. Integrate rainwater harvesting techniques in district IWRM plans and development schemes where feasible.
13. Upgrade existing water infrastructure and improve maintenance system.
14. Improve conveyance efficiency of irrigation system (including lining of channels, remove leakages due to wear and tear).

15. Improve farm irrigation efficiency through introduction of high efficiency technologies.
16. Define and ensure minimum quality standards for irrigation water.
17. Conduct groundwater study for KP, maintain groundwater atlas and database for planning finances and strict monitoring on abstraction trends.
18. Regulate groundwater mining through creating a centralised system of license, water metering and pricing.
19. Further quantify spate potential in KP as a contribution to water account.
20. Equitable distribution of Rudh Kohi water (western hill torrent) based on proven experiences in DI Khan.
21. Deploy all structural and non-structural means to improve aquifer recharge of groundwater.

Enhance water productivity through infrastructure development and adoption of improved technology

This strategy promotes the concept of water productivity for sustainable agriculture and food security in KP by acquiring increased agriculture output per unit of water consumed. KP's water productivity figures are often lower than the national averages. At the same time, overall efficiency of irrigation system will be improved by minimising conveyance losses to farmers' fields. Following actions are proposed in this direction:

22. Conduct research on new and appropriate technology and approaches at farm level.
23. Promote new water efficient technology in agriculture including precision land levelling, tunnel farming, furrow irrigation.
24. Raise farmers' awareness on the need to follow crop per drop approach.
25. Make arrangement for disseminating climate related information to the farmers for early preparedness through mobile phones.
26. Extend existing irrigation facilities to new cultivable command areas.
27. Develop agro-ecological and crop zones based on land and water suitability.
28. Prioritise water consumptive crops for rigorous promotion of water productivity campaign and support.
29. Promote small dams, development of infiltration galleries and sub-surface dams for irrigation in rainfed areas for low delta crops.
30. Improve farmers-led Rudh Kohi water distribution system for up, mid and downstream irrigation efficiency.
31. Study power generation potential from small dams on perennial flow besides other uses of water.
32. Devise a system of water supply, based on crop-water demand as opposed to standard warabandi[36] system in irrigated areas.

Manage critical watersheds to regulate water flow and recharge aquifer

This strategic priority entails managing critical watersheds to regulate water flow and recharge aquifer in all precipitation zones from North to the South of KP. There is a direct relationship between good management of watersheds and reduced disaster risks. Intention of this strategic priority is to ensure that the precipitation received in KP is optimally absorbed and converted into an opportunity and not as a disaster risk as noticed in the past. Following actions have been proposed to be augmented through IWRM strategy:

33. Improve vegetative cover in all the watersheds including state and private lands.
34. Support and augment integrated watershed management initiatives especially in high altitude areas (including tree plantation, grazing management, encouraging natural growth).
35. Promote appropriate measures and techniques for enhancing groundwater recharge.
36. Remove encroachments of streams, riverbeds, and drains to ensure safe disposal of water.
37. Implement a network of small dams in the south to support rainfed areas.
38. Harness KP's full potential to generate power through small and micro-hydel power projects.
39. Integrate watershed management costs into water storage infrastructure projects and ensure initiation of action before physical work begins.

[36] A system of irrigating agricultural lands by farmers in rotational turns defined by Irrigation department.

Indicators	Concerned agencies	Benchmark	Targets
Ensure access of population to drinking water	Public Health Engineering department Water, Sanitation and Solid waste management Companies (WSSCs)	Existing gap: Urban: 2% Rural: 21%	- Ensure access of 100% population to drinking water - Strive to achieve national quality standard for drinking water
Adoption of safe sanitation by population (latrines)	-Do-	Currently 98% urban population has safe sanitation facilities. 74% rural population has sanitation facilities of which 33% are in poor condition – hence only 41% have access to good/ average facilities	100% urban and 80% rural population have good or at least average quality safe sanitation facilities.
Decentralised system of wastewater treatment	Housing department	Currently non-existent	All new housing societies (public and private) will be obliged to ensure inclusion of systems in their schemes. Licenses for new housing societies will be granted subject to clearance of schemes based on decentralised solid waste and wastewater treatment arrangement.
Solid waste management and disposal system	Water, Sanitation and Solid Waste management Companies (WSSCs), Media, Environmental Protection Agency	Black plastic bags have been banned in the province	- 75% of solid waste collection and disposal` in 7 major cities - 5 landfill sites for safe disposal - Consumers' behavioral change to minimise waste and advocate for sustainable enforcement against littering - Ban on use of black plastic bags strictly enforced - Manufacturing of plastic bags less than 40 micron will be gradually prohibited and banned - Maximum effort made to make urban centers plastic bag free
Tapping potential for generating hydropower from micro-hydel and small dams	PEDO	142 MW projects installed. 251 MW under construction	Additional 3000 MW electricity generated using micro-hydel potential
Utilise maximum water share assigned to the province by Provincial Water Accord	Irrigation department KP	Currently 65% provincial water share utilised	At least 80% of KP's water share utilised through new and improved infrastructure. Most promising potential means to this end: CRBC and Pehure Extension Canal (total 1.1 MAF)
Increased hectares command area under irrigation by extending existing and establish new systems	Irrigation department KP	Current commanded area: 594,887 hectares Civil canals: 331,842 hectares Small dams: 120,976 hectares	Total target: 140,425 hectares CRBC – 115,740 hectares Pehure – 10,117 hectares Small Dams: 14,568 hectares[37]

[37] Each small dam irrigates about 2000 – 3000 acres (about 810 – 1215 hectares).

Increase actual vegetative cover by 4% in 100 critical watersheds especially on altitudes 2,000 meters above sea level and in southern districts	Forest department	11.47% of the total area of the province	- 6,250 enclosures on high altitudes - Plantations on 100,000 hectares - Direct sowing on 25,000 hectares - Supporting farm forestry and private tree planting campaigns
Enhanced water productivity in agriculture in all canal irrigated areas to ensure reduction in water application as a result of water productive techniques	Agriculture department	At least 3.54 MAF lost in the field (30%)	Enhance water use efficiency by 30% in agriculture by reducing losses through the following measures: - Reduce 35% conveyance losses - Transforming at least 115,296 hectares from flood irrigation to improved water application using furrow and basin system etc. This is doubling the exiting 115,296 hectares under improved irrigation. - 25-30% water saving in the field through promoting precision land leveling - Reduce 15-20% losses through channel improvement - Introduce high efficiency irrigation system in high value horticulture projects to reduce 20% water application on 10,000 acres (about 4,047 hectares). - Replace high delta crops with economically viable option in a phased manner
Reduce groundwater abstraction from the benchmark abstraction noted in 2019	Groundwater Authority	3.7 MAF	- Establishment of groundwater authority - Ban excessive use of groundwater in water scarce areas (only condition to water efficient practices) - Documented database on GW wells - GW recharge through biological and structural means
Enhanced storage capacity through rainwater harvesting	Irrigation department	0.28 MAF storage capacity through 31 small dams 6.4% rainwater harvesting capacity	Increase the existing rainwater harvesting capacity[38] to 0.62 MAF 15% rain harvesting potential achieved
Increase water sector investment in annual development plans	Planning and Development department		Increase water sector investment by 10% during 10 years within priority areas and action lines
Informed decision making in water sector	Planning and Development department	No centralised knowledge hub available for water sector	Develop central data repository and knowledge hub at P&DD level

[38]Construction of 12 additional Small Dams in the pipeline with 14,569 hectares new command area (cumulative 0.32 MAF storage capacity).

4.2 Improved Water Governance

This strategy aims to improve the overall water governance in the province. KP will follow standard international definitions to put a good water governance in place. *"Water governance refers to the political, social, economic and administrative systems in place that influence water use and management"*[39]. It provides a frame to look at the use and management of water in a holistic way. Good water governance will provide answers to questions like:

- Who has access to what kind of water, when and how?
- Who has the right to water, water-related services, and their benefits?

The governance structure will fix responsibilities of multiple actors that have stakes in water sector, and balances water use between socio-economic activities and ecosystems. Following the above definition, the governance structure will ensure that five fundamental dimensions of water governance are addressed (1) **Social** to ensure equitable distribution of water resources among different stakeholders and social groups (2) **Administrative** to look at institutions, their capacities and their interactions to administer water resources by applying good governance principles (3) **Political** to ensure that required regulatory framework such as laws and regulations that govern the water sector are in place (4) **Economic** to ensure efficient use and effective management of water resources and (5) **Ecological** to ensure sustainable use of water resources and related ecosystems.

To put a good governance system in place, the government will address the **following issues**:

- Lack of inter and intra-departmental coordination amongst water related departments at district and provincial levels
- Lack of two-way communication between provincial departments and districts
- Centralised approach in water sector planning
- Limited institutional capacity amongst actors to translate IWRM into practice
- Missing assignment of responsibilities related to regulating groundwater management
- No singular owner/ regulator of water/multiple custodians
- Absence of regulatory framework for IWRM

[39]Water charges levied by Irrigation department.

- Lack of legal pathways to engage water users and associations
- Lack of water pricing in different sub-sectors
- Continued trans boundary water issues with neighbouring countries
- Users do not fully assume their responsibilities as right holders
- Lack of capacities of water related associations and interest groups
- Community involvement is indicated in 15 different provincial laws, however implementation framework is missing
- Lack of capacity of farmers and their institutions

Strategic objectives – Water Governance

1. Effective actors' coordination and clear distribution of responsibilities based on adequately enhanced capacities.
2. Adequate regulatory framework established that guides IWRM; the existing regulatory framework is adapted towards IWRM and its implementation is enforced.
3. Ensure integration of tribal districts and civil rights to water.
4. Structured participation of all water users at local level in integrated planning and implementation.

Strategic priorities

Effective coordination and collaboration among actors

This priority is the main nerve system for the strategy since this leads the implementation of the strategy and ensures the integrated spirit of the water resource management. The action lines in this pillar are mandatory and provide an implementation framework for IWRM in the province:

40. Establish KP Water Council, KP Water Commission and Groundwater Authority[40]
41. Establish district Integrated Water Resource Management committees.
42. Formulate district Integrated Water Resource Management plans.
43. Update Rules of Business and regulations of individual departments with respect to IWRM functions.
44. Assign single authority for water and sanitation functions as per administrative jurisdiction for improved accountability.
45. Establish and strengthen water user associations at tehsil / town levels.
46. Clarify roles and mandates of actors for maintenance of spate irrigation systems including Rudh Kohi infrastructure development and management.
47. Enactment of KP Water Council, Commission and Authority, define procedures and rules of business.

Prepare / formulate missing policies and improve existing regulations

There is no doubt that the main challenge in Pakistan is not lack of policies but lack of implementation of the existing policies. The IWRM strategy formulation has deeply analysed this aspect and determined areas where policies need further strengthening in their implementation framework. At the same time, however, a few areas critically need policy making for effective management and conservation of water in the province:

48. Conduct groundwater mapping and identify hotspots of problem.
49. Prepare necessary regulation for independent GW monitoring through GW Authority.
50. Formulate KP water pricing policy.
51. Prepare necessary regulation for district IWRM committees.
52. Review and update Canal and Drainage Act 1873.
53. Review and update KP Water Users' Associations Ordinance 1981 for governing on-farm water management and a systemic community participation in improving water productivity.
54. Legislation on establishing urban settlement based on land and water suitability and conservation.
55. Review all subsidies in water sector and strategise stepwise reduction.
56. Review and regularise funds collection in Rudh Kohi areas for development and maintenance of the system.
57. Devising a system to check water theft from water bodies including streams, canals and illegal wells.
58. Reinforce implementation of EPA Act 2014 to regulate water and air quality in the province.

[40]Define self-sustained structure and procedures. These structures are established with legal reference. The commission will be approved through the Act of parliament. Groundwater Authority will report to Additional Chief Secretary (ACS), Planning and Development Department, Government of KP.

Build capacities of government departments

IWRM approach requires effective coordination among actors by anchoring the coordination at the highest apex level, creating coordination bodies, devolving responsibility and by developing human and institutional capacity. Under this priority area, different aspects of capacity development of government departments will be addressed:

59. Equip water departments with new technology for better monitoring of water (ICT tools and real time data simulators).
60. Build capacities of monitoring cells on water resource monitoring and data management.
61. Equip devolved administrative units with up to date operational equipment and machinery.
62. Enhance capacity on real time river flow monitoring using telemetric system.
63. Develop and install effective early warning system and communication based on hydrometric models and radars.
64. Strengthen capacities of EPA to regulate and enforce powers entrusted to them by EPA Act 2014.
65. Awareness regarding importance of citizens' participation in water management.
66. Harness recreational and reuse potential from water to generate funds for water sector.
67. Strengthen capacities of relevant universities to conduct proactive and demand-based research on water issues in the province.

Structured participation of water user women and men

This strategic priority is aimed at engaging water users in a structured manner through their associations for improved water governance at local level (districts and lower). IWRM planning manual guides the process of organising WUAs (With at least 30% membership from women) and their roles in detail. The associations will have an opportunity to improve their knowledge; awareness on supply and demand, quality and quantity and conservation aspect of water management and also to participate in IWRM planning process at district level:

68. Develop a system to establish and strengthen WUAs at tehsil and town levels.
69. Strengthen organizational capacities of water users and their associations.
70. Strengthen user specific capacity in water sector to manage water issues.
71. Provide legal legitimacy to WUAs for playing appropriate role in district level IWRM planning with other actors.
72. Include representatives from WUAs and amongst farmers in district IWRM committees.

Indicators	Concerned agencies	Benchmark	Targets
Increase in revenue collection from drinking / piped water and water and sanitation services	PHED WSSCs	Currently WSS services are being provided by PHED, WSSCs and TMAs	1. Revenue generation is directly proportional to services – therefore the main qualitative indicator is to improve services to a wider net of population 2. Four pilot projects for water metering sites in three major cities and one rural site (Peshawar, Mardan, Abbottabad, Batkhela).
Increase in revenue collection from irrigation water		70% - 350 million PKR	100% with PKR 600 million during the next 5 years. Collection will improve through modernised system of *abiana*[41] collection system linked with the modernised ICT based crop monitoring system
- Prepare IWRM plans for the districts - Enhance capacity of users and department in water sector - Rationalise annual development planning and expenditure in favour of IWRM activities	Planning and Development department	Pilot plans in districts of Karak, Tank, DI Khan, Chitral,	- All 34 districts will have a plan during the first three years of this strategy - All the rural districts will have organised water users' associations with at least 30% women as members - Urban areas will have citizens' organisations taking responsibility on water efficient use and awareness raising - The targets of the Integrated Water Resource Management Plans (IWRMP) will be reflected in annual development plans of the respective departments

[41] Water charges levied by Irrigation department.

4.3 Effective Public Private Partnership

Public-Private-Partnership (PPP) is crucial for sustainable resource management, especially to overcome financial constraints that the public sector institutions have traditionally faced. Absence of private sector participation and resource constraints have led to poor water supply and sanitation services. The reality of water risks stemming from un-sustainable water use practices of the domestic and private sectors as well as watershed conditions where the companies operate. It means that companies have an interest in ensuring the efficacy of water management in the watersheds in which they operate–an interest which governments, civil society, communities and others share. To overcome these challenges, the government will promote PPP approach which has been tested successfully in many sectors including power & renewable energy, transport, agribusiness, tourism, health, and education. The PPP however, will need enabling policies to encourage partnerships. The National Water Policy encourages PPP by stating, "an enabling environment shall be created for active stakeholders' consultation and participation at all levels and in all aspects of the water resource including irrigation, drainage, domestic water supply, flood protection, drought mitigation, waste water treatment and pollution control" (section 18.1).

The KP Public Private Partnership Act (2014) encourages *participation of the private sector in the financing, construction, development, operation, or maintenance of infrastructure or development projects or other related services of the Government through concession contracts in PPP mode and the establishment of institutions to regulate, monitor and supervise the implementation of PPP contracts.* The KP Industrial Policy (2016) recognises the importance of PPP for the growth of industry and suggests a number of incentives for investors. The policy also identifies substantial share of the industrial sector in environmental pollution and the need for action to improve environmental compliance with the participation of the private sector. The government of KP will further encourage PPP in water sector to improve access to water for domestic and commercial uses, water efficiency, water productivity and reducing water pollution.

A number of **challenges need to be addressed** to engage the private sector in public private partnership.

- The size of private sector is not fully known by typology (in terms of what is their business interest, size, outreach and demand for water resources).
- Institutional responsibility has not been fixed to collect, update, and maintain private sector data.
- Supply and demand of water in case of private sector is undocumented including magnitude and price.

- The level of contamination from industry is un quantified.
- No prior examples and culture of PPP water sector in KP.
- Trust deficit between public and private sectors.

Strategic objectives – effective public private partnership

1. Private sector with support and regulatory control of government acts responsibly as a user of water resource and contributes to provincial economy and employment generation
2. Private sector plays a constructive role in improved water resource development and management

Strategic priorities

Regulating use of water by private sector

The government of KP recognizes that solving water challenges is not a solitary endeavor. This awareness has led to increased interest in undertaking coordinated, collective action that leverages the technical strengths, resources, and convening power of the public and private sectors to achieve sustainable water management. The private sector (including agricultural processors, industry, services sector such as carwash houses, hotels, restaurants etc.) currently is a user of water resources with hardly any contribution to regulating the resource. The government will regulate and provide enabling environment for private sector to play a meaningful role by contributing but not limited to the following areas of resource management:

73. Update information regarding size and typology of private sector.
74. Maintain record of size and typology of private sector in the office of Secretary Industries.
75. Enforce rules for industries to ensure in-house waste-water treatment and reuse before disposal.
76. Develop systems for incentives to promote/ adopt clean technology.
77. Water charges from private sector through metering and revenue collection.
78. Develop easy-to-practice revenue collection system for private sector including online licensing and payment.
79. Facilitate and build capacity of private sector (including industry and services sector)on efficient use of water resources and quality management.
80. Enforce existing and new regulations through business associations.
81. A thorough study on demand and current use of water by private sector by typology:
    a. Map urban water management (including domestic and commercial)

b. Ascertain demand for water by private sector for their business
c. Ascertain quality and quantity of water released by private sector

Acquire knowledge of private sector in water sector promotion

The government of KP recognizes the private sector especially the industry as an important instrument of acquiring knowledge. Collaboration with the private sector can offer many advantages such as technical expertise, monetary resources, improved data and state-of-the-art technology. The PPP Act 2014 gives a favorable legislative framework to promote and facilitate the implementation of privately financed infrastructural Projects. This may be extended to PPP collaboration for technology development. The government will engage the private sector in the following areas:

82. Collaboration for identification, calibration, and promotion of clean technology (commercial and domestic):
    a. Water efficient technologies
    b. Minimise reliance on freshwater
    c. In-house technologies for water treatment and recycling
83. Motivate private sector to invest their Corporate Social Responsibility (CSR) resources on action lines given in the IWRM strategy.
84. Encourage corporate sector to finance research on demand-based topics in water sector.
85. Motivate private sector to raise awareness of citizens on water conservation through public interest advertisement e.g. on judicious use of water and conservation and responsible behaviour during tourism.
86. Ensure structured participation of private sector in IWRM decision making forums (e.g. KP Water Commission, district IWRM Committees) alongside regular inclusion in water related task forces.
87. Encourage PPP model in low head hydropower projects.
88. Promote sustainable tourism in natural environments (including wetlands) for all types of recreational use.

Indicators	Concerned agencies	Benchmark	Targets
Enforce culture of water conservation, recycling, and reuse in industries	Clarify concerned agency through a policy	No current regulation on water	- No license will be granted to a new industry till the wastewater treatment is included in the design - Serve notice to all the old industrial establishments to introduce wastewater treatment measures within sufficient time, with technical advice from the government - Car service stations to be immediately converted to modern system (automatic, reuse technology) - All marble units obliged to introduce water reuse method for marble grinding and cutting - Sustainable tourism will be encouraged through private sector investment and civic awareness
Reduce groundwater abstraction from the benchmark abstraction noted in 2019	Groundwater Authority	3.7 MAF	- Ban excessive use of groundwater in water scarce areas (only condition to water efficient practices) - Wastewater treatment and reuse compulsory in the industry

4.4 Improved Knowledge and Awareness on Water

Managing water resources effectively requires appropriate information on the resource and related areas. Despite availability of various scientific methods in the country, the attempts to regularly collect and analyse data on scientific basis and gain province-wide knowledge are still piecemeal. Quality-assured information comes from a myriad of actors covering domestic and commercial users, resource managers and operators, regulators and policy makers. It is important that all the components of the hydrological cycle be taken into account when developing provincial or local water management plans. For this purpose, knowledge on the entire hydrological cycle including total availability of water, water quantity and quality of various sources, including surface and ground, is imperative. The province does not have enough systematic data on these parameters. Water managers have so far struggled to put in place adequate water information systems in the province. The government will address a number of challenges related to water informatics in order to improve water management in the province. At the same time, this strategy aims to transfer water awareness and knowledge to common citizens in a non-technical manner to acquire their goodwill and support in efficient use of water and in effective implementation of the strategy:

- Lack of integrated data repository and limited data sharing amongst actors.
- Gaps in (long-term) data collection and (short-term) studies in different fields.
- Lack of capacity for data collection and analyses in departments and universities.
- Lack of adequate allocation for R&D in water sector.
- Lack of awareness amongst citizens on water conservation.

Strategic objectives - Improved water knowledge, quality and quantity

1. An in-depth understanding of the water resource status (including groundwater and water quality) and trends in KP developed and regularly updated.
2. Maintain water data repository in a reliable manner and ensure proper update system.
3. Inform and aware citizens to behave responsibly by using water in an efficient manner.

Strategic priorities

Improved database on water resources

Under this strategic priority the province will establish an electronic integrated information management system aimed at improved information collection, analysis, information management and sharing and dissemination of related water availability, supply and demand and other aspects relevant to water knowledge. At present such an integrated system does not exist. Different water related departments manage information in their own way in hard copies not systematically available for sharing and taking informed decisions. Following actions are proposed:

89. Estimate water demand by all sectors and update on regular basis.
90. Establish integrated data repository on water at provincial + district levels under the auspices and supervision of Water Commission.
91. Regularly update infrastructure data including inventory of channels, tube-wells, storage, water schemes, Operation and Maintenance).
92. Establish GIS and web-based infrastructure inventory and monitoring system.
93. Maintain hydrological data with reliable equipment (KP water account).
94. Install automated weather stations equipped with early warning system in all major geographical gaps.

Increased citizens' awareness

This strategic pillar is aimed at improving knowledge and awareness of common citizens on water challenges and their obligations towards achieving improved water governance in the province. An informed and aware population may contribute effectively to achieve objectives (of this strategy) in addition to supporting relevant authorities in implementation of regulations related to water quality, management and use efficiency.

95. Establish and update water related studies, data and easy to use information for generating mass awareness and interest.
96. In collaboration with private sector and donor-funded initiatives, create mass awareness on safe WASH and water conservation behaviour through:
    a. Using attractive visuals and messages
    b. Well-maintained website meant for citizens(with room for periodical citizens' perception survey)
    c. Dramatised messages / skits or animations
97. Acquire support from print and electronic media on awareness messages of public interest.
98. Create a system of (i) warning,(ii) fine, and (iii) disconnection on misuse of drinking water.
99. Encourage youth involvement in promoting water efficient practices.
100. Encourage private sector in funding awareness campaigns in the education institutions on efficient use of water and behavioural change

Indicators	Concerned agencies	Benchmark	Targets
Integrated data repository	KP water commission	Data are scattered	All water related data in one place with regular updates
Water knowledge repository	Groundwater Authority	Knowledge is scattered	All water relevant knowledge on one website along with awareness messages for water conservation
Increased citizens awareness on water conservation	Water companies Media Private sector	Citizens do not act as partners in water conservation	Reach out to masses to sensitise them to reduced wastage of water.
Establish automated weather stations in all essential locations	Pakistan Meteorology Department	14 automated stations in KP. 2 automated stations in former FATA	Establish 4 more stations in former FATA and 3 in KP at essential locations

5. Alignment with Sectoral Policies and Strategies within KP

This strategy reinforces measures recommended by some of the existing policy documents of KP. **KP Economic Growth Strategy 2015** was an important step towards setting policy vision to stimulate growth of high potential priority sectors of the economy through enhanced public investments and complementary sectoral policies including water and agriculture (among priorities). **KP Drinking Water Policy (2015)** aims at improved access to services by the population. **KP Local Government Act(2013)** provided effective institutional framework for improvement of drinking water and sanitation services. **Agriculture Policy 2015-2025** envisages to support and promote sustainable agriculture as an inclusive and dynamic source of economic growth and development and a producer of food, income and employment. It also aims to improve natural resource management, adaptation to climate change and disaster risk management. It supports multi-stakeholder approach, with clear roles and responsibilities. The irrigation system in the province is operated under **Canal & Drainage Act of 1873** and other related manuals. Though it is one of the oldest frame conditions still prevalent, the strategy takes into account the existing functioning of irrigation system and suggests improvements within broader parameters to increase its efficiency. **Khyber Pakhtunkhwa Hydropower Policy, 2016** highlights enormous hydropower potential in KP to be exploited in a systematic, planned and transparent manner for creating profitable business opportunities in an environmentally sustainable manner. IWRM strategy promotes the idea, that of harnessing this potential. **The KP Environmental Protection Act 2014** provides enormous powers to the KP Environmental Protection Agency to control pollution including water pollution by any user. It includes section 6(1)(vi) which is to 'ensure enforcement of the KP Environmental Quality Standards'. These powers will be important to exercise for judicious and responsible use of water by industry.

The IWRM strategy is in line with the objectives of the KP's **Sustainable Development Strategy (SDS) 2019-2023**. All the targets set in this strategy are aligned with the SDS. The SDS amply covers water sector and the need for integrated management of provincial water resources. The SDS is to provide strategic development framework for the KP government to guide public investment decisions. Two of the nine objectives of the SDS directly pertain to the IWRM strategy. These include:

- Consolidate and integrate public development spending to synergize sectoral development
- Establish policy coherence across tiers of government and sectors
- Identify and build inter sectoral synergies

Out of the nine Thematic Areas of the SDS, three are directly related to water resources: Thematic Area 4 on Energy Security, Thematic Area 6 on Agriculture, Food Security and Safe Environment and Thematic Area 8 on Adequate Water for Agriculture and domestic uses. The SDS identifies Food and Water Security as one of the six priority areas and Integrated Governance as one of the six pillars. The SDS considers water and electricity as important drivers of growth.

The Thematic Area 8 on adequate water for agriculture and domestic uses mentions 'ensuring long term sustainable use of water for agriculture and domestic uses, judicious management of surface and ground water resources of the province. By referring the Sustainable Development Goals, the SDS states that 'SDGs envision that by 2030, member states will achieve universal and equitable access to safe and affordable drinking water; access to adequate and equitable sanitation for all; improve water quality; increased water efficiency across sectors; implement integrated water resource management'.

6. Alignment with Federal Policies and Obligations

Most important and relevant national policy reference for IWRM strategy is the National Water Policy 2018 (NWP). This policy mentions the need for developing Integrated Water Management Strategies (e.g. Preamble page 2, Policy Objectives page 5, section 2.25, section 3.5, section 29.2). Section 3.5 of section 3 on Strategic Priorities and Planning Principles states "the management of water resources is shifting from sectoral to a more integrated approach in different parts of the world. Under IWRM, (i) the interests of all upstream and downstream stakeholders can be protected against mining and contamination. (ii) Watershed and catchment areas can be protected to prolong the life of water storage facilities. This revolutionary IWRM concept will however require strengthening institutional and management capacity at all levels".

National Climate Change Policy 2012 is another important reference to this strategy that addresses importance of water in future scenario. Objectives of the Climate Change Policy inter alia include; ensuring water security, food security and energy security of the country in the face of the challenges posed by climate change and to promote conservation of natural resources and long-term sustainability. The policy also provides a comprehensive implementation framework through provincial governments.

National Food Security Policy (2017) gives an elaborative account of land and water resources management challenges confronted by food security. Among others, groundwater depletion, rapid urbanisation, untapped potential of rainwater, increasing population pressure, dwindling land for agriculture, inadequate storage and sedimentation of reservoirs, water losses in irrigation system, low water and land productivity, energy shortage have all been identified as crucial challenges. The policy devotes several priority measures to water security for agriculture including promoting efficient use of water, encouraging small and mini dams, water ponds, on-farm storage in Rudh Kohi and water harvesting in rain-fed areas, high efficiency irrigation systems, laser land leveling and watercourse improvement, improve water availability and productivity, flood water management and groundwater regulatory control system. All these measures are highly relevant to reinforce the integration spirit and interdependency between agriculture and water management strategies.

National DRM framework 2007 was formulated to guide the work of entire system in the area of disaster risk management. The Framework envisions, "To achieve sustainable social, economic and environmental development in Pakistan through reducing risks and vulnerabilities, particularly those of the poor and marginalised groups, and by effectively responding to and recovering from disaster impact". Nine priority areas have been identified within this framework to establish and strengthen policies, institutions and capacities over the next five years, namely institutional and legal arrangements for DRM, hazard and vulnerability assessment, training, education and awareness, disaster risk management planning, community and local level programming, multi-hazard early warning system, mainstreaming disaster risk reduction into development, emergency response system, and, capacity development for post disaster recovery. Directly or indirectly, availability or lack of water is a driver of vulnerability and therefore relevant for IWRM strategy to take these factors in the measures it has suggested.

7. Alignment with Global Concepts

Dublin Statement on Water and Sustainable Development (also known as Dublin Principles)[42] provide a basic frame for this strategy. These include (i) fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment (ii) water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels (iii) women play a central part in the provision, management and safeguarding of water, and (iv) Water has an economic value in all its competing uses and should be recognised as an economic good.

Pakistan is a signatory to UN Framework of Convention on Climate Change (UNFCCC). Pakistan is vulnerable to climate change because a large part of its economy is based on agriculture, which is climate sensitive. Climate change is expected to result in changes in land and water resources that may subsequently affect agricultural productivity. Climate change impacts in KP have been studied for this strategy for harnessing maximum potential of actions proposed for reinforcing adaptation to climate change in KP.

This strategy also closely aligns with UN Sustainable Development Goals 2015 agreed by countries as Agenda 2030 for sustainable development. The strategic pillars and measures align with Goals *1 (no poverty), Goal 2 (zero hunger), Goal 3 (good health and well-being), Goal 5 (gender equality), Goal 6 (clean water and sanitation), Goal 7 (affordable and clean energy), Goal 9 (industry and innovation), Goal 10 (reducing inequalities), Goal 11 (sustainable cities and communities), Goal 12 (responsible production and consumption), Goal 13 (climate action), Goal 14 (life below water), Goal 15 (life on land), Goal 16 (peace, justice, strong institutions) and Goal 17 (partnerships).* This reflects central position of water and its impact on multiple facets of sustainable development.

[42]The IWRM principles adopted at the International Conference on Water and the Environment in Dublin, Ireland, in 1992.

8. Implementation Framework

The National Water Policy suggests the need for strengthening provincial institutions in the wake of greater provincial responsibilities after the 18th amendment (section 29.5.6). 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 Planning and Development department.
3. Provincial Groundwater Authority, an independent structure to govern groundwater.
4. District IWRM Committees to steer IWRM planning at district level and implementation.
5. District/tehsil Water Users Associations to ensure integration of community / citizens' perspective into IWRM planning so as to play their role as duty bearers towards fellow community.

8.1 Khyber Pakhtunkhwa Water Council

In line with the NWP and in pursuance to achieving 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 the KP province	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 operationalising the IWRM strategy in the province.
2. Undertake informed decisions on major issues brought to the Council by KP Water Commission and any 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 on major provincial water issues for taking appropriate decisions.

8.2 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. 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 periodic update of the strategy.
- 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 integrated water resources management.
- 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 (connection and monthly fees) from all users in KP to shift from the current manual collection system.
- Demand data from relevant departments regarding demand, supply and use of water resources and acquire confidence on authenticity of data.
- 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 to implement them.
- Monitor the financial resource allocation to the water sector in the province

8.3 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 Planning and Development Department of the Government of Khyber Pakhtunkhwa reporting to the Additional Chief Secretary.

The authority will perform the following functions:

- Prepare a GW abstraction policy including connection and monthly fees to be endorsed by the KP Water Commission.
- Expeditious implementation of regulation mechanism and regimes to ensure sustainability and optimisation of groundwater abstraction.
- Issue, establish and enforce standards for the development and utilisation of groundwater.
- Raise alarms on deterioration of groundwater levels based on continuous monitoring.
- Issue permit for installing wells / tube-wells.
- Ensure collection of connection and monthly fees for abstraction as per KP GW 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 arriving thereof addressed.
- Any other issues assigned to the Authority by the office of the Additional Chief Secretary or KP Water Commission.

8.4 District IWRM Planning and Execution Committees

To further operationalise the strategy, IWRM Committees will be established at district level to steer the process of district IWRM planning and execution beside ensuring technical supervision of individual activities performed in IWRM spirit. These committees are proposed to be chaired by Deputy Commissioner of the district. Additional Deputy Commissioner Finance & Planning will serve as coordinator of the Committee. The Committee will have membership from all district representatives of line departments (representatives from relevant irrigation division, PHED, Agriculture, TMA, Social Welfare and Industry with co-opted members per specific nature of the district e.g. EAC Rudh Kohi in case of DI Khan and Tank), Chairpersons of Tehsil Councils and a member of registered water user association where in existence.

8.5 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 strategy 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 resources planning and management to the districts ensuring active participation of all users including communities, private sector, and other users. By doing so, it is ensured that water resources are used judiciously, shared equitably and efficiently by users in a sustainable way considering all 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, notified by government of KP, in a highly participatory way within the districts. This will help in better channelising 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 following sectors/ sub-sector priorities relevant for the 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, 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

IWRM planning is a participatory and inclusive methodology for integrated planning and management of water resources. It identifies the estimated water demand, supply, resource inventory and potential of water resources for development and multiple uses focusing on a district. 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 stages and 9 steps closely coordi-

nated 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 engage devolved administrative units as per Local Government Act (revised) 2019. Additional financial and human resources will be provided to facilitate participatory resource planning process. A provincial resource group has been trained to provide help in the district during the planning process and to advocate district IWRM plans in the province.

8.6 Monitoring and Review of the Strategy

This strategy has been devised for a period of 10 years. While the strategy should remain a living document with the possibility to make amendments, it is essential to let the strategy work in the field and to revisit it after five years, or earlier only after any critical change in the context.

It is assumed that a considerable part of the strategy will be financed by the Annual Development Plans. However, another part will require financing from development partners including international donors interested in water sector and good governance.

1. National Water Council has a task to monitor inter-provincial coordination and progress of the provinces towards the objectives of National Water Policy.
2. KP Water Council is the highest monitoring body to steer progress of the KP IWRM strategy and achievement of milestones.
3. KP Water Commission is the technical level for monitoring progress of KP IWRM strategy holding all the duty bearing departments and agencies accountable for achieving the targets.
4. Individual sectoral departments will perform respective duties indicated in the strategy and monitored within their rules of business and governing mechanism.
5. The district committees will monitor preparation of IWRM plans and its implementation, especially in the spirit of gender equitability, equity and conservation.
6. Water Users, Associations will be responsible for monitoring citizens' behaviour in compliance with IWRM strategy and water conservation. They will also monitor implementation of IWRM plans and act as partners of the districts in this regard.

Appendix I

Resource documents produced by Government of Khyber Pakhtunkhwa

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INTEGRATED WATER RESOURCE MANAGEMENT STRATEGY

Government of Khyber Pakhtunkhwa
Planning and Development Department