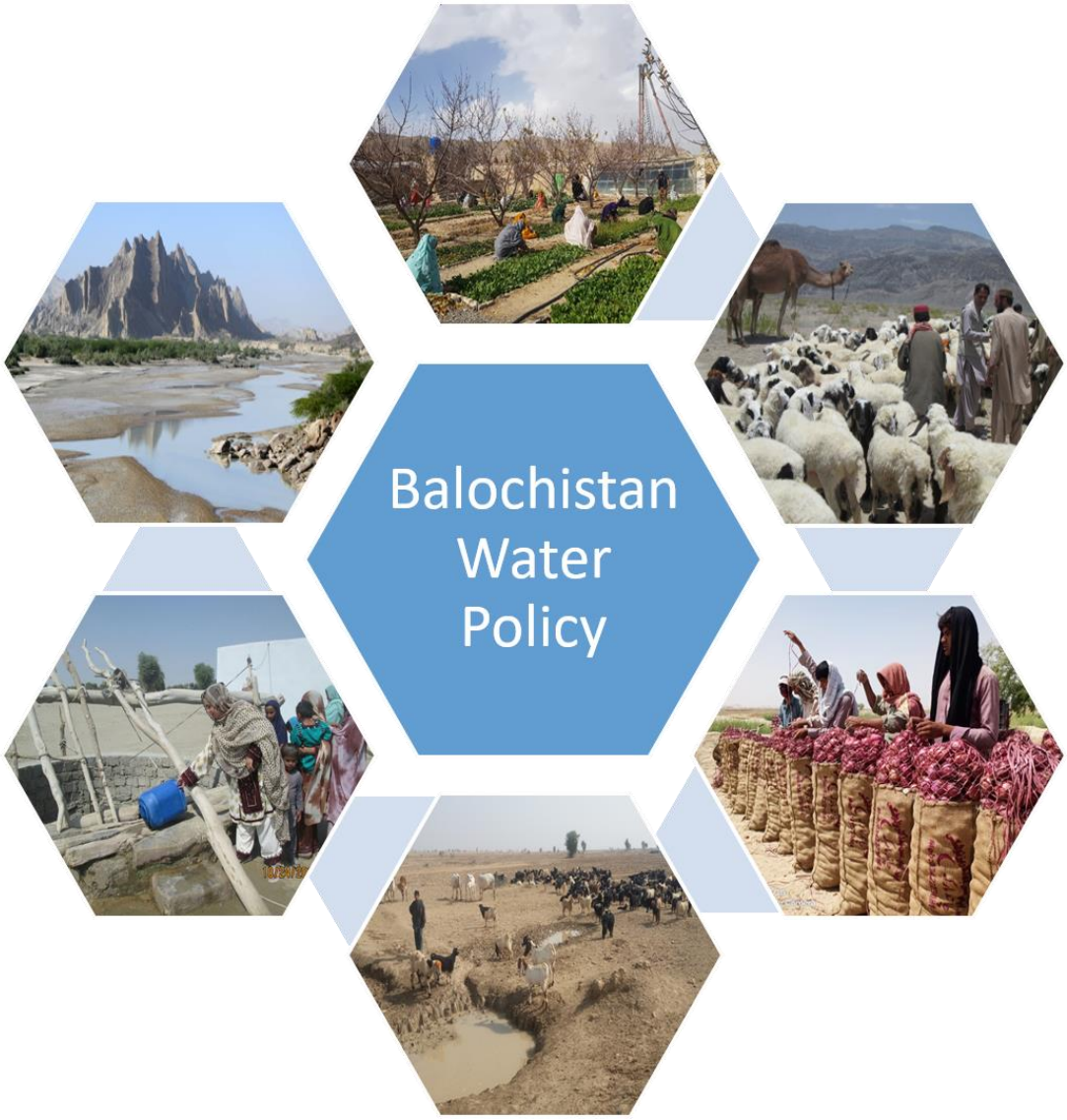
Balochistan Integrated Water Resources Management Policy 2024



Foreword

Balochistan's Integrated Water Resources Management (IWRM) Policy is an urgent call to action and a roadmap for addressing one of our highest priorities: the sustainable management of water resources. The past, present and future of Balochistan is deeply connected to its water. The province has rich experience in the development of irrigation systems and the management of floodwater for productive use: the Upper and Lower Nari are the largest spate irrigation systems in the world. There is much we can be proud of.

Yet in recent decades, we have allowed water catchments to deteriorate and groundwater tables to decline in many parts of Balochistan. Urgent action is needed to ensure that drinking water remains available to Quetta and other cities. At the same time, there is underutilized potential in the province, particularly in the utilization of runoff and floodwater and the development and management of the Indus-based canal system.

Climate change has made the need to manage our water resources more pressing. We must be prepared to contend with more severe droughts and more violent floods.

The IWRM Policy provides strategic directions on how to safeguard our water. It not only instructs us how to use water resources wisely and equitably, but also how to harness and protect them. The success of the policy depends on the involvement of government and communities, civil society and the private sector, this includes stakeholders in water management, water supply and irrigation, as well as in agriculture, forestry, livestock management, disaster response, environmental protection, and the development of roads, as these affect the hydrology in the watersheds.

This policy is the result of lengthy consultation and discussions. However, we recognize the fact that policies are only as good as their implementation. This is how we will be judged by the generations to come – not by how well we crafted our ideas, but by our legacy in terms of long-term water security.

Chief Minister, Balochistan

Overview

The Balochistan Integrated Water Resource Management (IWRM) Policy epitomizes the fundamental principles of IWRM, reflecting a holistic approach to water resource management. Initiated in early 2022, this policy has been meticulously crafted through an inclusive and participatory process, incorporating feedback from the Interdepartmental Technical Committee (IDTC) and a drafting group established by the Irrigation Department. From December 2022 to January 2024, extensive reviews and consultations with key stakeholders, including national and international organizations, have shaped its development.

Aligned with the National Water Policy (NWP) of 2018, the IWRM Policy is firmly rooted in the recognition of water as a finite and vulnerable resource, susceptible to the impacts of climate change. Embracing the principles of sustainability, equity, and integration, the policy advocates for urgent actions to address groundwater depletion, saline intrusion in irrigated areas, and the adoption of nature-based solutions for water management.

Furthermore, the IWRM Policy aligns with national policies such as the National Climate Change Policy (2012), the National Disaster Risk Reduction Policy (2014), and the National Flood Protection Plan (2015-2025), ensuring coherence and synergy in addressing water-related challenges. By promoting community engagement, gender mainstreaming, and the establishment of robust data systems, the policy underscores the importance of inclusive decision-making processes and evidence-based interventions.

Guided by the principles of subsidiarity and decentralization, the policy empowers local communities and institutions to play a proactive role in water governance, recognizing their intimate knowledge of local water resources and needs. Emphasizing the importance of adaptive management and continuous learning, the policy advocates for a flexible and iterative approach to implementation, enabling timely adjustments in response to evolving circumstances and emerging challenges.

In summary, the Balochistan Integrated Water Resource Management Policy embodies the core principles of IWRM, serving as a comprehensive framework for sustainable water management in the province. Through its inclusive development process and adherence to key principles, the policy seeks to foster resilience, equity, and sustainability in Balochistan's water sector, ensuring the long-term well-being of both present and future generations.

Minister, Irrigation Department

Preface

The Irrigation Department of the Government of Balochistan is thrilled to unveil the new IWRM Policy – a roadmap to unlocking the boundless potential for water resources management in the province. This comprehensive document examines one of Balochistan's most pressing challenges: water scarcity. Our venture into the realm of IWRM policy began with a profound concern for the mismanagement of water resources. Over the years, we've witnessed the far-reaching implications of water scarcity, along with extreme climate events like floods and droughts, which impact communities, the economy and the environment.

This document is the result of rigorous consultations, research and discussions aiming to spotlight the urgent need for a robust, realistic and implementable IWRM policy. Following the approval of the National Water Plan in April 2018, the necessity for an IWRM policy that was specific to Balochistan became apparent.

The IWRM Policy provides a vision and ambitious goals for steering, managing and monitoring our water resources in anticipation of future challenges.

In this document, we collectively endeavour to unravel the complex web of factors influencing water resources – from climate change to population growth, agricultural demands, industrial and mining needs to environmental concerns. A comprehensive understanding of the challenges we face is crucial to crafting effective solutions with clear policy actions and directions. The document explores the chronological context of water management, the current state of global water affairs and innovative approaches to shaping a more sustainable and resilient water future.

The IWRM Policy emphasizes the interconnectedness of water-related issues and underscores the importance of collaboration at all levels. We must address water scarcity and the climate change crisis together, recognizing water as a fundamental human right and working to ensure equitable access and distribution. I trust this document will serve as a guiding beacon, inspiring policymakers, stakeholders, and concerned citizens to make informed decisions that safeguard our finite and precious water resources. Let us begin this journey together to ensure a sustainable and prosperous future for Balochistan.

Secretary, Irrigation Department

Acknowledgements

The National Water Policy, formulated in 2018, requires provinces to formulate water policies, a crucial step toward sustainable development and effective water resource management. The Balochistan IWRM Policy builds upon the foundation laid by the 2006 Balochistan IWRM policy, which was ahead of its time in embracing IWRM principles. Nevertheless, the 2006 IWRM Policy faced implementation challenges, chiefly because a central provision – the removal of subsidies on groundwater pumping – was unable to gain endorsement from the provincial cabinet, impeding its effectiveness. The new IWRM Policy is guided by a set of principles, including the need to transition to a prosperous, low-water economy, to tackle challenges posed by population growth, to prioritize community engagement and subsidiarity, to mainstream gender considerations and to emphasize evidence-based decision-making. The policy underscores the significance of actionability and implementability, emphasizing the need for swift and effective execution of policy actions without unnecessary delays or complications.

I would like to express my heartfelt appreciation to the drafting team and esteemed experts at FAO, Dr Robina Wahaj, Engr Talal Naseer, Dr Frank Van Steenbergen[1] and Mr Stephen Hodgson; at Landell-Mills, Mr Jelle Beekma, Dr Akhtar Bhatti and Mr Bart Teeuwen and Asian Development Bank consultants Dr. Asif Khan and Mr Paolo Reggiani. The dedication of the drafting team was exemplary. Special acknowledgment is due to the members of the Interdepartmental Technical Committee and the relevant stakeholder departments for their invaluable contributions, inputs and collaborative efforts. I express my gratitude to stakeholders, including the chairperson of the Balochistan Commission on the Status of Women (BCSW), community leaders and civil society members, who actively participated in consultations and provided vital feedback, ensuring that diverse perspectives were considered in the development of the IWRM Policy.

Finally, sincere appreciation goes to the Project Director of BIWRMDP Engr. Barkatullah Khan Kakar, and Project Director BWDRSP Engr. Sufyan Durrani of Irrigation Department, whose tireless efforts in supporting and reviewing the IWRM Policy have been extremely valuable. This policy is a testament to their collaborative spirit. To everyone involved, your commitment to safeguarding our water resources and ensuring a better future is deeply appreciated. Together, we embark on a journey to implement this policy, fostering a more resilient and water-secure society.

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[1] Support of the RVO NEWARBI Program on Spate Irrigation in Balochistan for this input is acknowledged.

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Abbreviations and acronyms

ADB	Asian Development Bank
ADP	Annual Development Plan
IBIS	Indus Basin irrigation system
BCM	Billion cubic metres
BCWS	Balochistan Commission on the Status of Women
BIWRMDP	Balochistan Integrated Water Resource Management Development Project
BWRDSP	Balochistan Water Resources Development Sector Project
BWRIS	Balochistan Water Resources Information System
CLLG	Community-led Local Governance Policy Framework
CPEC	China-Pakistan Economic Corridor
EPA	Environmental Protection Agency
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GIS	Geographic information system
GoB	Government of Balochistan
GWP	Global Water Partnership
HEIS	High efficiency irrigation systems
IDTC	Interdepartmental Technical Committee
IWRM	Integrated water resource management
NbS	Nature-based solutions
NEQs	National Environmental Quality Standards
NWP	National Water Policy
PDMA	Provincial Disaster Management Authority
PFM	Public financial management
PHED	Public health engineering department
PLL	Precision land levelling
PPP	Public–private partnership
PLNs	Personal learning networks
PSDP	Public Sector Development Programme

PWB	Provincial Water Board
QESCO	Quetta Electric Supply Company
Q-WASA	Quetta Water and Sanitation Authority
RBP	Raised bed planting
RCTs	Resource conservation technologies
RBWRP	Revival of Balochistan Water Resources Programme
RS	Remote sensing
TA	Technical assistance
WAPDA	Water and Power Development Authority
WB	World Bank
WRPD&M	Water resources planning, development and monitoring
WASH	Water, sanitation and hygiene

The Balochistan Integrated Water Management Policy

1. Background

1.1 Introduction

The Integrated Water Resource Management (IWRM) Policy for Balochistan aims to steer the province towards a water-secure future that ensures basic prosperity and safety for its inhabitants. The policy is based on a vision in which inclusive growth in Balochistan is embedded in sustainable water management.

The policy is grounded in the principles of IWRM, whose central elements are the provision of water resources, balanced use in different sectors, supported by broad and inclusive participation, effective institutions, sound legal bases, adequate financing and appropriate skills, knowledge and capacity. Such elements are much needed in Balochistan where, during the last twenty years, actions in water management have not been sufficient to meet the challenges. This is manifest in the province's exposure to floods and droughts, insufficient attention to mountain catchments, the uncertain water future of main urban centres and the disappearance of groundwater in some areas.

Drivers of the Balochistan IWRM Policy include:

- the ongoing rapid increase in population and growing urbanization, leading to a greater demand for food, fibre, livestock, economic opportunities and environmental services, business inputs and recreational spaces, all of which depend on sufficient good quality water;
- the precarious availability of water and related resources (rangeland, forests, wetlands) due to indiscriminate and weakly regulated use, generally passive attitudes and lack of awareness;
- climate change challenges
- the need to correct inequities in society, in particular mainstreaming gender needs and priorities.

1.2 Stakeholder consultation and policy preparation

The IWRM Policy has been under development since the beginning of 2022 and has gone through several draft versions, which were circulated and commented upon. An Interdepartmental Technical Committee (IDTC) was established at the initiative of the Irrigation Department to provide feedback and help with the formulation of the policy. Draft versions of the policy were presented to the IDTC in a series of meetings between December 2022 and February 2024. In addition, meetings were held with key informants to capture managerial and technical insights. These informants included professionals from relevant national and international organizations. In addition, physical and virtual consultation workshops were organized for each subsector of water use, with strict attention to ensuring the participation of women and key stakeholder groups including farmers associations, provincial and district government, academia, private sector, non-governmental organizations, donors and civil society. The consultation workshops sought to generate a common understanding of challenges and threats and to receive useful input on proposed policy measures. The sub-sectoral groups included agriculture and livestock; irrigation and public health engineering; forests and wildlife; and environment and climate change.

The final draft of the policy saw the collective effort by the World Bank-funded Balochistan Integrated Water Resource Management Development Project (BIWRMDP), the Asian Development Bank (ADB)-

funded Balochistan Water Resources Development Sector Project (BWDRSP), the European Union (EU)-funded Revival of the Balochistan Water Resources Programme (RBWRP) and the Food and Agriculture Organization (FAO) of United Nations.

1.3 Alignment with other policies and main principles

This policy aligns with the Pakistan National Water Policy (NWP) of 2018, which emphasizes the finite nature of freshwater resources. As the NWP explains, Pakistan is in a heat surplus zone globally, making the entire country vulnerable to extreme weather events and driving the need for effective water action. In addition, there is an urgent need to combat groundwater depletion and address negative salt balances in irrigated areas. It is imperative to rebalance water use, including through the reuse of wastewater. The IWRM Policy is also aligned with the National Climate Change Policy of 2012, the National Disaster Risk Reduction Policy of 2014 and the National Flood Protection Plan (2015-2015).

This policy builds on the IWRM Policy of 2006. Balochistan was ahead of the time in endorsing IWRM principles in 2006. However, while it was formulated in close consultation with key stakeholders, the earlier policy was never seriously implemented and one of its central provisions, the removal of subsidies on groundwater pumping was not endorsed by the provincial cabinet, undermining its effectiveness. The current Balochistan IWRM Policy is also connected to several other provincial policies: the Clean Drinking Water Policy 2017, the Balochistan Agricultural Policy 2020-2030, the Sustainable Development Policy 2011, the Poverty Alleviation Policy, the Groundwater Management Action Plan, the Balochistan Community-led Local Government Policy 2023, and the Gender Equality and Women Empowerment Policy (2020-2024) among others.

A number of guiding principles underpin the new IWRM Policy:

- Balochistan must move to a prosperous, low-water economy whereby the province can achieve prosperity within the reality of its arid nature.
- Balochistan must address the challenges of a growing population, a more unpredictable climate and a resource base that has become ever more fragile.
- Successful implementation of the policy should promote community engagement and rely on local organizations where possible to bolster water management.
- The policy must aim to rebalance the disadvantaged position of many women in Balochistan.
- The province requires better and more available information systems.
- The policy must be actionable and implementable, based on policy actions that can be put on the ground quickly and effectively without delay and complication.

1.4 Outline of the document

Chapter 2 presents the current challenges in water management in Balochistan. These challenges call for a number of policy action themes, which are elaborated in Chapter 3. Chapter 4 describes the improved institutional performance, enhanced legal framework, adequate finance and capacity building and knowledge needed to support the policy actions. Chapter 5 discusses implementation mechanisms for the IWRM Policy.

2. Water resources in Balochistan: overview and main challenges

Aridity is a defining feature of Balochistan and the water resources in the province are precarious. The fragile situation has been aggravated by poor management and neglect, and some potential opportunities to secure water resources have not been utilized.

Balochistan is Pakistan's least water-endowed province, magnifying the impacts of climate change. Three primary water sources are available in the province: groundwater and minor surface water resources, internally-generated floodwater, and water imported from the Indus Basin irrigation system (IBIS). Surface water sources, i.e. the Indus Basin canal water (39 percent), and floodwater and run-off (57 percent)[2] constitute the bulk (96 percent) of the total water resources available per annum; the remaining 4 percent is available from groundwater resources. Most groundwater resources have already been intensely exploited, therefore, the potential for future development lies in the development of available surface water resources. Particularly, the development of runoff and floodwater must be given the highest priority in future investment projects. A basin approach is essential for implementing coordinated and balanced water resources development and could be accomplished by developing basin and aquifer-based IWRM plans.

Groundwater has historically been an important water resource for Balochistan, utilized sustainably for centuries through shallow wells and the karez[3] system. The scenario changed with the introduction of deep tube wells in the 1980s, facilitated by the expansion of the national electricity grid system and energy subsidies. High rates of extraction caused declines in groundwater levels and put shallow wells and karezes out of commission. Currently, the Pishin-Lora, Zhob, and Nari basins are severely overdrawn, with water operations in several areas completely suspended. The immense pressure on groundwater has accelerated in recent years with the introduction of solar pumping. The availability of groundwater depends on aquifer recharge and storage; this varies during wet and dry years, with a 46 percent increase in recharge during wet years and a 37 percent decrease during dry years, compared to average annual recharge. Most recharge in Balochistan is unmanaged except for a number of delay action dams[4], which were installed starting in the 1970s; however these have not made an effective contribution to groundwater replenishment.

Runoff and floodwater are resources of immense variability, offering significant potential to enhance agricultural activities and improve rangelands. On average, nearly 11.0 billion cubic metre (BCM) of floodwater is available annually, of which a substantial proportion remains untapped. Opportunities for floodwater development and water harvesting exist throughout Balochistan's eighteen basins. Extensive land can be designated for *sailaba* (channelled floodwater) and *khushkaba* (localized runoff) cultivation, covering a combined area of 1.8 million hectares, more than half of the cultivated land in Balochistan.

Over the past two decades, the Irrigation Department and Water and Power Development Authority (WAPDA) have constructed several large dams to conserve runoff. Nevertheless, there is still untapped

[2] https://pdf.usaid.gov/pdf_docs/PA00Z3HK.pdf
[3] Karezes are tunnel systems that capture underground water either at the foothills of mountain ranges or from the seepage of ephemeral river and convey this water to a daylight point at the surface, from where it can be utilized.
[4] Delay action dams are reservoirs built on ephemeral streams, that store the floodwater and run-off with the purpose of this water recharging nearby groundwater systems.

potential and also a need for effective planning and management to optimize the use of water within the command areas from the existing dam systems.

The Indus Basin irrigation system (IBIS) is regulated by the 1991 Water Apportionment Accord, which allocates shares of Indus water among the provinces. Balochistan's perennial share stands at 5.22 BCM annually, with only 4.21 BCM in use. This will be increased by 0.44 BCM with the completion of the Kacchi Canal, which covers the Jhal Magsi, Dera Bugti and Bolan districts. The water from IBIS is limited to the Naseerabad, Sohbatpur, Usta Muhammad and Jaffarabad districts. Balochistan is unable to utilize 5.7 BCM of its non-perennial share due to the unrealistic assumption that the province has sufficient canal capacity to receive the non-perennial as well as perennial shares during the monsoon season.

Balochistan faces significant challenges in ensuring adequate **access to safe drinking water**, primarily due to its remote geography and hyper arid desert terrain. With a population of 14.9 million, the province is predominantly rural with around 69 percent (Pakistan Bureau of Statistics)[5]. The population is sparsely distributed across Balochistan's vast 347,190 square kilometres. The geographic challenges are just one reason why the province incurs three to five times higher per capita costs for water and sanitation services than other provinces in Pakistan. As a result, Balochistan lags significantly behind other provinces in delivering safe drinking water to its residents; coverage is particularly low in rural areas (69 percent compared to 91 percent in urban areas) as well as for the poorest people (51 percent coverage compared to 92 percent for the richest). Furthermore, the challenging terrain and climate in Balochistan make water collection and transport burdensome, in particular for women. Only 51 percent of households have a water source on their premises, while the rest must make daily trips to fetch water. Women are often responsible for water collection, which may take up to 4 hours of their time during a day (1260 hours a year)[6], preventing them from carrying out other activities. Added to these are labour-demanding chores, such as doing laundry.

Threats to the long-term provision of drinking water are particularly critical in Balochistan's fast growing cities. Quetta, with a population of more than 2.2 million, has grappled with severe domestic water shortages for over two decades. The Quetta Water and Sanitation Authority (Q-WASA) is currently the most underperforming – in terms of service delivery and tariff recovery – of the major water and sanitation agencies in Pakistan. The city has other major water challenges, such as the inability to deal with urban floods and the public health risks associated with poor water management.

The water-related challenges in Balochistan are not just the result of limited water availability and increased population pressure. They stem just as much from inadequate planning, inadequate institutional coordination, and a lack of effective land and water governance mechanisms. The incomplete availability of reliable hydro-meteorological data hinders water resources planning. Weak enforcement of legislation has led to aquifer depletion and water quality degradation in many parts of the province. Historically, the water sector has received little serious attention from decision-makers in Balochistan. Another huge drawback is the absence of awareness and community engagement in water resources management: farmer and livestock keepers rarely take part in enforcing rules. At present, for example, farmers can extract as much groundwater as they want without any real limits

[5] https://www.pbs.gov.pk/sites/default/files/population/2023/Balochistan.pdf

[6] https://www.undp.org/sites/g/files/zskgke326/files/migration/pk/CLIMATE-EQUITY-Women-as-Agent-of-Change.pdf

nor are they expected to invest in water retention or recharge, unlike in other parts of the world. There is a pressing need to comprehensively address these issues.

A major shift is needed to achieve effective water management and productive use, involving strong institutions, whether government, private sector, or community. The productive use of water in existing systems – be it canal irrigation, spate irrigation or groundwater systems – requires significant attention. A better use of runoff and floodwater requires improved means of capture through water harvesting, spate irrigation, subsurface dams[7], infiltration galleries, off-stream storage, sand dams and mini-barrages. A more systematic use of runoff and floodwater can play a role in i) uplifting flood-based agriculture and livelihoods; ii) drought mitigation through groundwater recharge; iii) flood risk management; and iv) the improvement of rangelands and the sourcing of additional sources of fodder. Additionally, the management and use of water at farm levels should be enhanced and wasteful practices reduced.

As noted, Balochistan has many misalignments and unresolved issues in the water sector, including persistent electric power subsidies for irrigation wells in spite of on-going groundwater depletion. A strategic and integrated approach is essential for meeting the present and future water needs of the province against the backdrop of climate change, population growth and new investments in economic growth. In summary, there is an urgent need for a transition to a vibrant low-water economy that will provide water on sustainable basis, ensure service delivery, achieve usage efficiencies, and foster equities in water availability to meet targets for agricultural production, the livestock economy, public health, climate-compatible development and environmental management.

In addition to ensuring a balance between availability and use in groundwater, floodwater and water allocated from the Indus system, we need to secure vital water services throughout Balochistan, including the province's rapidly growing cities.

The Balochistan IWRM Policy has seven key policy objectives:

Ensuring that water resource planning provides the basis for sound water resource protection and demand management

- Harnessing water resources from water provisioning catchment and or the multi-functional wetlands, while safeguarding the quality of the water resources;
- Making efficient use of available surface water resources, including the water allocated from the Indus system;
- Making productive use of floods and runoff;
- Managing and protecting groundwater;
- Securing vital water services, in particular drinking water and water provisioning throughout the economy;
- Providing a sound financial basis aligned with the objectives of sustainable water resource management;

The policy objectives are discussed in detail in the following chapter.

[7] Subsurface dams are structures placed in the bedload of an ephemeral river causing water from the subsurface flow to be stored by it for it to be accessed by a well. Infiltration galleries are perforated drainage system that capture the subsurface flow in the river bed and through a conveyance system lead it to the earth surface. In in off-stream water floodwater is diverted to a reservoir that is not located on the ephemeral river from which the water is diverted – this prevents siltation of the reservoir itself. Sand dams are built in ephemeral rivers in such a way that sand accumulates behind these low height structures and local aquifers are created. Finally, mini-barrages are placed on ephemeral rivers, diverting part of the flood water when the river is in flood.

3. Policy objectives

This chapter presents the seven policy objectives for the Balochistan Integrated Water Management Policy:

- Planning and managing based on IWRM principles
- Harnessing Balochistan's water resources
- Making efficient use of available surface water resources
- Making productive use of floods and runoff
- Managing groundwater
- Securing vital water services
- Providing a sound financial framework

The chapter describes the background and urgency of each policy objective, the main policy directions in support of the objective and the policy actions required.

3.1 Planning and managing based on IWRM principles

As defined in 2000 by the Technical Committee of the Global Water Partnership (GWP)[8], IWRM is:

> *"a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems"*

Operationally, IWRM involves the coordinated development, management and the application of knowledge from different disciplines and stakeholders. It is a comprehensive, participatory planning and implementation approach for managing water resources.

Water resources management in Balochistan is highly fragmented. There are many examples of water uses that do not employ IWRM principles:

- Most canals receiving water from IBIS also provide water for use by domestic, livestock, and local enterprises – but are managed almost exclusively for irrigation – neglecting the other important uses.
- Drainage is primarily seen as a means to dispose of excess water. Yet it can be transformed for the safe use of effluents in the production of salt-tolerant crops, grasses and fuelwood while avoiding negative impacts on surrounding areas.
- Similarly, groundwater is being used up for commercial agriculture, even in areas where there is no alternative source and the long-term needs for drinking water supply are ignored.
- Floods and runoff can be better intercepted and retained for productive use; this will also reduce the risk of devastating floods.

[8] Global Water Partnership (2000), Integrated Water Resource Management. TAC Paper 4.

3.1.1 IWRM principles

IWRM is based on three principles: social equity, economic efficiency and environmental sustainability.

Social equity aims to ensure proper access for all users (particularly women, the marginalized and the poorest people) to an adequate quantity and quality of water and to provide effective protection from floods. In Balochistan, it is particularly important to protect the rights of the weak, such as the hereditary tenants who are *de facto* co-owners of the land together with the formally registered land-owners, but whose land and water rights are often ignored. Social equity also calls for fair allocation of the right to use water, forest and grazing areas to communities that have managed and used these resources over decades. A key function of IWRM is to ensure equitable allocation of water resources among different sectors (water supply, agriculture, industry, mining and environment) and individual users based on fair water tenure arrangements. Existing common law arrangements are no longer fit for purpose and new mechanisms are necessary to protect customary water tenure arrangements, while ensuring equitable access.

Economic efficiency aims to bring the greatest benefit to the greatest number of people within available resources. Economic efficiency is not only about financial cost – it should consider current and future social and environmental costs and benefits as well.

Ecological sustainability values aquatic ecosystems, environmental flows and healthy resource systems. Land and water uses with negative impacts need to be avoided. In Balochistan, this requires greater attention to retaining water and recharging groundwater. This will create better water buffers and more conducive agro-ecological conditions and stronger local climates.

3.1.2 Good water governance

Good water governance is based on a number of building blocks:

i. A clear, adaptive, and comprehensive legal framework

A clear and comprehensive legal framework that can be effectively implemented in an adaptive and coordinated manner is an essential component of good water governance. Different aspects of water management in Balochistan are currently addressed through a range of different acts and ordinances, none of which create an effective basis for IWRM. The Balochistan Canal and Drainage Ordinance of 1980 (updated in 2001 and 2006) is only operational in large canal systems and pays no attention to efficient water management. The Balochistan Groundwater Rights Administration Ordinance (1978) provides the basis for the Provincial Water Board (PWB) to establish policies for groundwater resources conservation and development, but only partial rules were devised in 2015 related to the permission for new wells, ignoring many other elements in groundwater management. A strategic plan moreover was proposed. The Groundwater Ordinance states that the PWB shall identify aquifers designated as groundwater basins – this did not happen. Similarly, the Q-WASA 2004 lacks clear planning and enforcement arrangements. Most important an overall integrated Water Act is missing, encompassing the current fragmented and unenforced arrangements. This is further addressed in Sections 4.1 and 4.2.

ii. Adequate financing system

Good water management requires adequate financial resources to cover investments and the day-to-day costs of management, maintenance and governance. Water service fees are nominal and do not

contribute much towards these costs. Counterproductive subsidies and outstanding payments place a tremendous burden on provincial and federal governments and organizations. Further details are provided in Sections 3.7 and 4.3.

iii. Systematic adaptive planning and implementation

Systematic adaptive planning, based on accurate data and responsive to dynamics in population, climate and evolving land use, is an important step towards achieving the objective of inclusive development through sustainable water management. Strategic IWRM plans at the provincial level and implementation plans will be prepared and implemented at the basin and aquifer levels, starting with the most critical basins and aquifer systems. The basin and aquifer-based planning should be firmly aligned with the new overall Water Act and should indicate the main principles for water allocation and safe aquifer extraction limits. Allocation should prioritize drinking water over all other water uses. The application of IWRM principles requires that water resources development be coordinated among various sectors and users and balanced with the availability of water in basins and aquifers.

iv. Participation of stakeholders

The participation of stakeholders in deciding how water is used, protected, managed and allocated is a critical aspect of water governance. The current participation of water users, especially women, in water planning and decision-making is very limited. Women perform many tasks that depend on irrigated agriculture and water supply and sanitation. Many female-headed households are fully dependent on irrigation systems, yet they are rarely involved in planning and decision-making.

Policy actions

Within these parameters Balochistan needs a balanced planning and management of all water subsectors to maximize economic benefits and guarantee social equity and environmental sustainability. The following policy actions are indicated:

i. Create an institutional structure and effective systems for participation for IWRM

An effective coordination mechanism will be established, building on existing structures such as the Provincial Water Board (PWB) and the district water committees. These arrangements are relatively dormant at present and have a limited remit of groundwater regulation. Institutional restructuring is necessary, as described further in Section 4.1. What is needed is to restructure and strengthen current institutional arrangements to operationalize management based on the principles of IWRM. This will require improving the performance of all departments operating in this space as well as better coordination and tracking of progress. A Balochistan Water Resources Commission based on the existing PWB would serve as the chief coordination organization, expanding its remit to include both surface and groundwater management. The Directorate General of Water Resources Planning, Development and Monitoring (WRPD&M) of the Irrigation Department could be transformed to assist water sector institutions in planning, design, implementing and monitoring water programmes in the province, while the Planning and Development (P&D) Department would monitor the implementation of the IWRM Policy.

ii. Create awareness and capacity around IWRM principles and approaches among all concerned parties

The larger picture on water resource management needs to be ingrained in senior, middle and field level officials of key institutions, including the district administration, community organizations, private sector and non-government organizations, service providers and marketing organizations. The IWRM policy and its ramifications should be shared widely using seminars, training workshops, field visits.

iii. Set in place basin and aquifer planning

A new Water Resources Management Act – expected to come into effect in the very foreseeable future – will create the basis for legally-binding basin/aquifer planning.

Because Balochistan has 18 river basins, it is impractical to manage each basin separately, at least initially. The plan is to adopt and periodically update a list of the "main river basins" together with their boundaries. The main basins may include several smaller basins or basins with smaller populations managed according to a common basin or watershed plan. The main basin plans will address all water and land uses: runoff and spate irrigation, groundwater, surface water and rangelands and catchments. In hot spot areas, specific plans for particularly important/vulnerable aquifers may be created. Special committees may be created to help prepare the basin management plans, although this task could also be carried out by district water committees. Certain water uses, such as for rangelands, may exceed the catchment level and require multi-catchment planning that includes pastoralists. Road planning should be included in the basin plans. Roads can be obstacles to natural drainage and cause unwarranted flooding although they can, in principle, also be used to harvest water, as is common in some parts of the world. The basin plans should guide all investments in the basin.

iv. Develop improved and shared data systems

Currently, data is only partially available, and monitoring is irregular. The Balochistan Water Resources Information System (BWRIS) will be strengthened and data collection and sharing procedures for different stakeholders and users will be improved. The BWRIS will be open access and easy to use. It will be used for real time monitoring of progress in integrated water resource management.

3.2 Harnessing water resources

As Balochistan's water resources are precarious, all needs to be done to effectively harnessing Balochistan's fragile and finite water resources. This will require:

- enhancing rainwater capture and water retention;
- effective wetland management;

3.2.1 Rainwater capture and water retention

The discourse on water management in Balochistan has typically revolved around the intensive exploitation of groundwater and the declining water tables in several basins in the province. Groundwater has been exhausted in several areas, leaving the aquifers empty. At the same time, surface water – both from the Indus apportionment and from the capture of rain runoff – is greatly underutilized. Investments have tended to favour large-scale infrastructure and ignore water

retention. Yet better land and water resource use and better water resource enhancement, for example in rangeland management and flood utilization, could have a significant impact.

The pressure on groundwater has prompted the urge to recharge Balochistan's aquifers. The main intervention has been the publicly funded development of recharge reservoirs, so-called "delay actions dams." These dams have been constructed in Balochistan since the 1970s and now exceed 400. Their aim is to intercept flood runoff and retain it for recharge. While the first-generation of delay action dams in Balochistan was unsuccessful, the new generation has fared somehow better because of better location and because the impounded water has been recharged through a downstream riverbed by means of water released out of a storage reservoir. However, delay action dams are costly, limiting the number can be built, as compared to the intense groundwater use by more than 47,000 (2017-2018) deep tube wells.[9] Moreover, the delay action dams cannot be built everywhere. Another drawback is that the stored runoff has high silt loads, which reduce storage capacity and seal the bottom of the reservoirs, preventing effective recharge.

There is a need for a totally new approach, based on many small intervention that retain water and make it available of soil moisture or (shallow) groundwater.. Unlike in other countries, there has been almost no community or private investment in such small-scale recharge structures in Balochistan. There is need to recast the entire recharge programme, at a minimum to introduce more localized and lower cost options for groundwater recharge in watershed management. The priority is for a watershed approach complementary to basin management, subarea by subarea. The contribution of improved recharge and better water buffering to groundwater security and climate change adaptation could be significant. Working at an intensive scale with many interventions that retain runoff taking place in the same area is the most effective because it allows one to see a significant effect on the water tables, changing moisture levels in the landscape and even changes in microclimate and vegetation.

Given the arid nature of Balochistan point recharge may be most appropriate. Point recharge focuses on areas where runoff collects and is suited to Balochistan's limited rainfall. Various options for point recharge, aside from delay action dams, exist without the sedimentation risk and these have proven effective in replenishing groundwater in arid areas. Such options include subsurface dams, leaky dams, cascade dams, sand dams and riverbed stabilizers. On highly permeable gravel fans in the piedmont zones, infiltration is high and runoff easily available. Here, a large range of so-called 3R measures (recharge, retention, and reuse) can be introduced using infiltration trenches, recharge pits, stone bunds, and half-moons. However, despite their success elsewhere, these techniques have not yet been explored in Balochistan. There is a distance to cover in capacity building in this field. Alternative runoff capture and storage techniques should be introduced near groundwater-irrigated areas in critical basins. Additionally, local groundwater management is crucial to achieving balance by increasing supply and reducing overuse (see Section 3.5).

[9] https://pdf.usaid.gov/pdf_docs/PA00Z3HK.pdf

Policy actions

What is needed here is to get going on programs that use a range of small interventions to restore landscape and the local water buffers. In Zhob this approach was already tested with ADB-funding but it now needs to be validated and spread. The following policy actions are required:

i. Initiate intense watershed management and landscape restoration in selected areas

For selected high need and high potential watershed intense landscape restoration and water retention programs should be initiated. Local planning is important for identifying the best interventions and practices that are relatively low-cost. Water harvesting and retention should be done throughout an entire landscape and should include, for example, the protection of gravelly riverbeds or the use of roads and rooftops for water harvesting. Watershed management should include a large range of options, from improved soil moisture conservation to groundwater recharge to surface water storage. There is a lot to learn here: how to do the local planning, how to support local investment, how do we work on public and private land, how to connect with the management of rangelands and forests, as this is within the remit of the Forestry Department and the new legislation, yet even so still a 'terra incognita' for the Department. The plans should also identify and prioritize investments in the construction and restoration of flood dispersal and defence structures linking, insofar as possible, flood defence/diversion structures with groundwater recharge structures. They should include information on the effect of public infrastructure on flood runoff and provide for adequate storm water management as well as flood prediction and flood warning mechanisms, which will of necessity be linked to the disaster risk management framework.

ii. Create the implementation capacity and knowledge on different water retention techniques

There is a large body of global practice of small water retention measures[10]. Unfortunately this knowledge is far from common place in Balochistan – not in departments, social organizations or communities. There is a need to build up this capacity throughout the Province, including research and training institutes and to carefully learn from the dispersed experiences that took place. It is proposed that within the Government, the renamed position of Chief Engineer Design and Water Systems in the Irrigation and Water Department would have a stimulating role.

iii. Connect to basin plans

Water retention and recharge activities should also be included in new basin and aquifer plans (see Section 3.1). Water naturally drains from catchments and consequently all water users are interdependent. For example, activities in the rangelands and forests have a direct impact on intensity of runoff flows and water quality (including silt content). The plans should also identify and prioritize investments in the construction and restoration of flood dispersal and defence structures linking, insofar as possible, flood defence/diversion structures with groundwater recharge structures. They should include information on the effect of public infrastructure on flood runoff and provide for adequate storm water management as well as flood prediction and flood warning mechanisms, which will of necessity be linked to the disaster risk management framework.

3.2.2 Wetlands management

Balochistan's wetlands play a critical role in maintaining ecological balance and supporting the livelihoods of local communities. Protecting and conserving these wetlands should be high priority,

[10] See for instance: https://www.wocat.net/library/media/25/

particularly is these hotspots serve the biodiversity of very large areas. Balochistan has several RAMSAR wetland sites, particularly along the coast. These include Astola Island, Jiwani Coastal Wetland, Maini Hor, Ormara Turtle Beaches and Hub Dam. In addition, there are several other less-documented wetlands throughout the province: Akara Dam (Makran), Band Khushdil Khan (Pishin), Boji Point (Lasbela), Chakhon (Zhob), Dasht Khor (Gwadar), Hanna Lake (Quetta), Kalmat Khor (Makran), Marav Lake (Dera Bugti), Pasni Bay (Gwadar), Qamardin Karez (Qila Saifullah), Ras Malan (Lasbela), Siranda Lake (Lasbela), Spin Karez (Quetta), Wasta Dam (Zhob), Zangi Nawar (Chagai). These wetlands are biodiversity hotspots, harbouring a rich array of flora and fauna. They provide breeding grounds and habitats for a myriad of bird (373), amphibian (7), fish, reptile (120) and aquatic plant species. They are a critical haven for migratory birds. Furthermore, the wetlands are critical to the livelihoods of local communities, especially those that rely on fishing, agriculture, and traditional crafts. They also act as natural filtration systems, purifying water by capturing pollutants and sediments. Moreover, they can serve as a natural and cost-effective means of wastewater treatment. Safeguarding the wetlands is imperative to preserving unique ecosystems and protecting the diverse wildlife that calls them home.

Policy actions

The policy action concern a better understanding of the most important wetland system in Balochistan and to set up the system to protect these;

i. Assessment of most important wetlands

A comprehensive assessments would need to be made of the RAMSAR sites in Balochistan, with a focus on the role of wetlands and mangroves in mitigating flash floods and storm surge. Binding plans would need to be made that promote the sustainable use of the most important wetlands in Balochistan. Buffer zones would need to be demarcated to control the inflow of pollutants and ensure wetland health. Part of the plans would be the regular assessment and monitoring of wetland health with a focus on water quality, quantity, climatic conditions, vegetation rehabilitation, and the control of invasive species.

ii. Develop wetland regulation

On the basis of the overall new Balochistan Water Act, wetland protection regulations would need to be developed agreed with the surrounding and benefitting communities, emphasizing sustainable land use, with binding seasonal environmental flows linked to water use permits and arrangement for benefit sharing.

3.3 Making efficient use of available surface water resources

Balochistan province is partly canal-irrigated by the Pat Feeder, Kirthar Branch, Uch, Manuthi and Khan Wah and Faizabad canals, supplied from both the Guddu and Sukkur Barrages. Through these canals, Balochistan uses currently 80 percent of the 5.22 BCM perennial flow, which was allocated under the 1991 Water Apportionment Accord and its updates. Utilization will increase once the Kacchi Canal is commissioned but the full quota will not be used. In addition, Balochistan is entitled to another 5.70 BCM of non-perennial supplies from the Indus annually; this is available only during flood years and the monsoon season.

None of the current canal systems in Balochistan have balanced irrigation supplies. The means of water distribution leads to excessive use in some places, as evidenced by widespread waterlogging, while other areas are deprived of irrigation water completely. This results in low efficiency, undermines productivity and gives rise to public health and environmental problems. The canal infrastructure itself also needs rethinking, as in the current arrangements also blocks flood runoff. During the 2022 floods, for example, a lot of floodwater was ponded up against the canal embankments and, in some places, overtopped the cross passages.

There is considerable scope to enhance productivity and improve water management in the canal areas. Improving the management of the canal irrigation systems will help meet the needs of a growing population and agricultural demand and remove some negative impacts of inefficient irrigation management, such as the unhealthy living environment that comes with waterlogging and the damage to property from high water tables. It may also set the standard for a well-managed new Kacchi Canal and further investments in water management.

Policy Actions

There are several policy actions to make better use of the canal water in Balochistan.

i. Improve water productivity through efficient water management
ii. Reduce waterlogging
iii. Improve financial performance
iv. Promote social justice

i. Improve water productivity

- To improve water productivity in the canal areas, three main actions are required: a) rationalize irrigation duties/water allocations; b) improve field water use efficiency; and c) adjust to saline conditions in areas where it is unavoidable.
- Irrigation duties (the volumes of water applied per surface area) and water allocation need to be rationalized, considering actual water demand, groundwater availability and quality in the canal command areas. In the canals, where fresh useable groundwater is available, water allocation may be adjusted to encourage supplementary groundwater use.
- Rationalizing and settling irrigation duties will reduce the risk of waterlogging and will introduce demand control in the irrigation systems, since shallow groundwater can be used when needed. Where groundwater is of marginal quality, surface water should be mixed with pumped groundwater. This leads to better buffer management and will save enough water to consider expanding the command areas.
- It is important to improve field water management practices. Methodologies, such as precision land levelling and mechanized operation, can boost agriculture production and achieve significant water savings of as much as 50 percent. Direct seeding, the introduction system of rice intensification[11] and other methods of alternate drying and wetting, the use of ridge farming and the application of different mulches have the potential to save water and increase yields at the same time. Such practices should be promoted under intense command area development.

[11] Under SRI (System of Rice Intensification) rice seeds are broadcast and irrigation is provided intermittently, causing so-called alternative wetting and drying. This allows the root system of the rice plants to develop more strongly and creates stronger plants with higher yields against lower water consumption. The main drawback is that more efforts are to be invested in weed control as the land is not constantly inundated as in conventional rice cultivation.

- Finally, to improve water productivity an effort should be made to adapt to saline conditions in the canal areas of Balochistan. This can be done though the introduction of bio saline agriculture (using special crops and appropriate varieties of common crops or better agronomy) and brackish pond fisheries.

ii. Reduce waterlogging in the canal irrigated areas

Waterlogging is common in the canal areas of Balochistan. In a province characterized by water scarcity, this is an embarrassment that should be overcome at any cost, not to mention the public health risks it brings. One important action is to promote the combined use of surface and groundwater in the canal commands where possible. Where this is not possible, priority should be given to identifying tailored drainage investments, such as unblocking surface drains obstructed by roads or residential areas and making adequate cross drainage on new and old infrastructure compulsory. In some cases, local dugouts may serve to lower groundwater tables and act as local freshwater storage. In addition, in saline groundwater areas, root zone drainage may be used to create enough storage space in the upper soil layers to ensure adequate soil aeration for crop growth. In addition, root zone aeration would help to avoid rainfall flooding. Finally, biological drainage – the promotion of eucalyptus tree stands – needs to be more systematically promoted. It is understood that farmers often do not replant their eucalyptus trees because of the effect of the trees/leaves on soil fertility. This requires the introduction of other eucalyptus varieties and the promotion of local concentrated eucalyptus forests rather than isolated stands.

iii. Improve financial performance

A new system of financing the irrigation system needs to be introduced based on better water charges and introducing additional form of revenue generation. The public return from Balochistan's canal irrigation system is shockingly low. Rates have not been adjusted with inflation and recovery is minimal. The *abiana* (the tax charged on the basis of the area cultivated) is collected by the provincial revenue department based on an assessment of irrigated cropped area and crop types. However, the rates do not reflect the amount of water consumed by different crops and much of the cropped land (belonging in many cases to large landowners) is not accounted for in the assessment. For example, in 2003-2004, the collected fee value was 27 percent of the assessed value and 10 percent of the potential value of cropped land, well below operational and maintenance costs. Today, low rates and a constant decline in assessments make it less and less worth the effort to collect abiana. The abiana system needs to be vastly simplified and based on land and irrigation duties, rather than the cumbersome and ineffective system of crop assessment that is now in place. For collection deposits in local banks is the way forward rather than payment to revenue officials. The rates need to gradually rise to the level of real values. Any change in the process should be discussed with farmer representatives to gain their acceptance. The proceedings moreover need to be connected to improved system performance. The new process should be monitored and the results shared in a transparent manner through publicly available records, as well as enforced, for example by blocking water supplies to defaulting users.

It is likely that – for the foreseeable future – the abiana will only compensate a portion of the running costs of the canal and drainage system. Other possible sources of income from the canal system could derive from tree planting on canal banks, fishery rights and realistic water

pricing for non-irrigation systems. A financial task force is proposed, as detailed in Section 3.7.6. This will require revisions of the existing Balochistan Canal and Drainage Ordinance.

iv. Promote social justice

There is a risk that the land in new canal commands may end being registered to powerful landholding families, who take *de facto* control of previously unallocated land or who take ownership of land that was originally shared between landholders and hereditary tenants. It is thus proposed to create an open and transparent process of land titling – at minimum in new investment programs - that recognizes co-ownership arrangements and is overseen by cadastral staff.

3.4 Making productive use of floods and runoff

The use of runoff and floods provides livelihoods for large, often remotely situated communities, yet it has the potential to sustain higher yields of staple crops, support livestock production and provide more ecosystem services. There is scope for developing new runoff and flood-based systems and to restore abandoned systems by developing basic infrastructure such as reinforced soil dykes or small regulators.

Floods and runoff are among the most promising water resources in Balochistan. It is estimated that, on average, more than a BCM of floodwater are available annually, and the amount is increasing as Balochistan becomes wetter and more flood-prone with the changing climate.

Khuskaba (run-off dependent) and sailaba (flood-water dependent) are time-tested water-harvesting practices with a promising future. Some systems date back 5000 years. Floodwater from the mountain catchments is diverted from the dry riverbeds and guided over large areas for irrigation, to improve grazing areas, to fill drinking water ponds, groundwater recharge, or a combination of all these functions. The unpredictable seasonal floodwaters, which can persist from a few hours to several days, are routed to adjacent land through free intakes or diversion structures and guided gently to the command area. The practices require local cooperation and agreement on how to distribute an uncertain and uneven common good. Local ingenuity is needed to deal with the strong floodwaters and the high sediment loads, calling for a special set of interventions, improved soil structures, mini-barrages, special deflectors, retention dikes and bed stabilizers. Conventional irrigation infrastructure, such as weirs and dams, have had a high rate of failure.

Policy actions

The following are the policy actions needed to harness opportunities in sailaba and khuskaba farming:

- **i.** understanding the potential of spate irrigation (sailaba) and runoff farming (khuskaba)
- **ii.** expanding the area under spate irrigation and khuskaba farming
- **iii.** improving performance of the systems by developing tailored packages
- **iv.** integrating the runoff and flood-based systems into the water economy

i. Understanding the potential of spate irrigation and runoff farming

Several publications have argued that the area under spate irrigation should be increased considerably in Balochistan since much flood runoff is not utilized. One assessment suggested that more than

400,000 ha could be developed under spate irrigation – up from the current 400,000 ha. Though this figure is unrealistic, there is definitely scope for expansion of the current area under sailable and khuskaba system.

There is a need to map the existing sailaba and khuskaba in Balochistan and to quantify the potential. The techniques in use are partly documented but, particularly for the khuskaba runoff systems, are not well-known. The mapping exercise should assess the techniques for capturing water and retaining moisture, the appropriate farming systems and livelihood activities involved and the support that is needed. At present, sailaba and khuskaba farming are not supported by the government nor are they covered in training and educational programmes. It will be very important to develop a cadre of people with the necessary skills.

ii. Expanding spate irrigation and khuskaba farming

The area under spate irrigation and khuskaba farming should be expanded to capture the opportunities that come with changing weather patterns in Balochistan. The availability of heavy tractors and subsidized bulldozers has been instrumental in developing farmer-managed spate irrigation and khuskaba systems and should continue, whereas appropriate investments should be made that do respect to the special nature of the systems[12] (high sediment load, risk of channels breaching in new directions, dealing with peak flow and moderate flows). As local ingenuity is key and community management of runoff and floodwater supply is essential in these systems, the development of local associations needs to be stimulated and made part of overall water governance.

The rights of water users in spate irrigation and khuskaba systems need to be recognized and supported by legislation. Specifically, a long-term water use permit should be issued to the relevant body responsible for the spate irrigation scheme in accordance with the new water act.

iii. Improving performance: developing tailored packages

The expansion of the spate and khuskaba systems should also increase their productivity. Yields in spate irrigation systems in Balochistan are often 40 percent below those in comparable systems elsewhere. Productivity can be increased in a number of ways:

- **Field water and soil moisture management.** Field water and soil moisture management are crucial for maximizing productivity in spate irrigation systems. When floods arrive before the cropping season, the moisture is stored to be available for use later in the season. There are several techniques to conserve moisture and improve field water management: deep ploughing, planking, and mulching, controlled overflow structure, bund spillovers, gated field intakes and drop structures. All of these can result in higher water productivity.
- **Improved water distribution.** In many spate irrigation systems, crops only get a single round of irrigation. This is one of the reasons for low productivity in Pakistan, since not enough moisture is stored for a vigorous crop. Water distribution systems should be revisited to introduce better flow divisions and controlled intakes.
- **Groundwater use.** In several areas, the spate water systems recharge fresh shallow aquifers and this provides farmers with huge opportunities to introduce high value crops. In other areas – notably the Kacchi Plains – groundwater is only available at great depth and is saline – hence there is no scope for complementary groundwater use.

[12] See www.floodbased.org for overview of effective, time-tested measures and techniques in spate irrigation.

- **Drinking water.** In many spate irrigated areas, floodwater is used as a source of drinking water since there is no other option. Several measures can be taken to better store floodwater, to manage the water ponds and to treat and improve water quality.
- **Agronomic and livestock practices.** There is a need to introduce new crops that are adapted to climate change and different rainfall patterns. These could be new varieties of major crops or minor crops that have promise for spate irrigation, such as wild vegetables, mushrooms or tree crops. There is also scope for better pre- and post-harvest operations in processing, rodent management (affecting bunds) and storage.

Such approaches are mostly unknown to major service providers, such as the Agricultural Department. Capacity needs to be strengthened and farmers need to be facilitated through horizontal exchange and peer-to-peer learning by farmers and officials.

iv. Integrate the spate and khuskaba systems into the larger economy

The khuskaba and spate systems need to be integrated into the larger economy. To do so, three important opportunities need to be addressed:

- The systems produce crops that are in short supply nationally, such as oilseeds and leguminous crops, which could reduce import of these essentials.
- Since no agrochemicals are used in spate irrigation, the products could be marketed as organic produce, including important crops such as chickpeas, cluster bean and sorghum flour.
- The system could be a major resource for the livestock economy as a source of fodder and stubbles. This needs to be further strengthened by value addition.

3.5 Managing groundwater

Uncontrolled groundwater use is at the heart of Balochistan's water crisis. Though groundwater constitutes a relatively small portion of the water available, it is vital for the supply of drinking water and for high-value agriculture (and hence the economic prosperity of some rural areas). A large part of Balochistan has no reliable surface water resources due to the aridity of the province and all water uses depend almost entirely on groundwater.

According to Halcrow (2007), groundwater use exceeds recharge in Balochistan by 22 percent; groundwater is overused in 10 out of 19 sub-basins[13]. The situation has only worsened in the last fifteen years and is both non-sustainable and partly beyond salvation. The Pishin Lora river basin accounts for the largest imbalance, with groundwater consumption a factor 4 higher than replenishment with almost all uses being for agriculture[14]. In several areas, the aquifer has been depleted and the area is literally running dry. First the karezes and shallow wells ran out of water, and now the same is happening to the deep tube wells.

The response to aquifer depletion tends to be adaptation to the declining groundwater tables rather than an attempt to reverse the falling trend. Adaptation typically involves drilling deeper into the earth or, in the case of those who cannot afford to do so, searching for alternative livelihoods or purchasing water from others.

[13] Halcrow (2007). Supporting public resource management in Balochistan. Basin-wide water resources availability and use. Asian Development Bank: Supporting public resource management in Balochistan

[14] van Steenbergen, Frank,, Allah Bakhsh Kaisarani,,Niamat Ullah Khan, Mohammed Shamshad Gohar (2014) A case of groundwater depletion in Balochistan,Pakistan: Enter into the void. Journal of Hydrology: Regional Studies. _

The tragedy is that there has been no effective action in regulating groundwater use, no effective approach to groundwater recharge and that instead groundwater pumping even continued to be subsidized from public sources, benefitting a few well-to-do and hurting all. An estimated currently more the 47,000 (2017-2018), registered tube wells are operational throughout the province, supplemented by many unauthorized installations.[15] About 70% of these tube-wells are electric and subsidized by the federal and provincial government at a flat rate amounting to PKR 23 billion per annum (USD 82.69) [15]. This subsidized electricity for tube wells has led to the excessive extraction of groundwater and a decline in the water table, raising concerns around economic disparities, since the subsidy predominantly benefits a mere 15 percent of Balochistan's farmers.[15] Farmers in Balochistan pay a fixed rate of 6,000 to 10,000 (USD 21 to 36) per month for tube well electricity consumption[16], with the remainder subsidized by the federal (60 percent) and provincial governments (40 percent). This places a heavy burden on the government's water financing, leaving little for investments and efficiency financing. The situation is made worse by the fact that farmers are often not able to pay even the subsidized rates (see Section 3.7).

Policy actions

There is widespread consensus that the top-down regulation of groundwater use is not sufficient, particularly not in areas such as Balochistan where there is strong local autonomy. The following policy directions combine government regulation with local management:

- **i.** Intense work in hot spot areas; consisting of local regulation, active community management and reduction in water consumption
- **ii.** phasing out groundwater pumping subsidies
- **iii.** promotion of groundwater recharge
- **iv.** groundwater monitoring and sharing of data

i. Intense efforts to manage groundwater in hotspot areas

Groundwater is vital for the medium-term survival of many areas of Balochistan, including Quetta Valley, where new well development and orchard development still occur (in the southern section), but where the urban water supply needs protection, particularly as a large part of the alluvial aquifer is exhausted and the hard rock aquifer has very limited potential.

Balochistan's proposed new water act calls for the designation of critical aquifer management zones where the use of groundwater will be restricted to those who hold water use permits under the Groundwater Management Regulation Ordinance. The drilling of new boreholes in such zones will be prohibited except for public uses. The ban may be combined with selective buying out of farmers. Priority plans for harnessing water resources in the management zones (see Section 3.2 and below) should aligned with the basin plans (see Section 3.1).

The new water act will require well-drillers to be licensed and to have the necessary qualifications. The drilling of boreholes will require licenses that specify, among other things, the area in which the wells may be drilled, the number of wells that may be drilled, the use of a registered well drilling rig, reporting requirements, measures to seal off failed wells to prevent groundwater contamination.

[15] https://pdf.usaid.gov/pdf_docs/PA00Z3HK.pdf

[16] Rana, Abdul & Davies, Stephen & Saad Moeen, Muhammad & Shikoh, Sania & Rizwan, Noormah. (2020). Solarization of electric tube-wells for agriculture in Balochistan: Economic and environmental viability. 10.2499/p15738coll2.134030.

In the critical areas regulation should be combined with community groundwater management with the involvement of women. This is also formally facilitated under the new Water Act. The Act may call for the establishment of co-management committees in the aquifer management zones. These will comprise mainly water users who hold water use permits and shareholders in the karez systems. Co-management arrangements offer the best chance of creating rules that water users can support while ensuring the security of the rights conferred upon them. Community management will be supported by several principles and recognizing local norms and rules, such drilling free zones, minimum distances or bans on certain water uses. . Establishing local groundwater management systems requires the facilitation of local governance processes and the creation of a better understanding of the local groundwater potential. Much more can be done to make information from existing studies and monitoring programmes available to water users, and to synthesize local knowledge and experience for improved water management.

As well as controlling groundwater use, it is necessary to promote more efficient water use on farms. A number of techniques – some of which have been introduced in Balochistan – are known to increase water productivity by maintaining yields while using less water. They include drip irrigation systems, land levelling and greenhouses. Such techniques should be made readily available through the private sector, much like other farm inputs. This will create jobs and ensure the longevity of supply and services. Smart subsidies – whereby local companies are the main supplier of equipment and subsidies are routed through them – could be used to encourage the private sector to find customers and conduct demonstrations.

A number of promising water productivity techniques have yet to be explored: low cost mini-sprinklers and mini-pivots (for vegetable crops), dowsers (for subsurface irrigation), biodegradable mulches (to reduce soil evaporation and regulate soil temperature) bio fertilizers and vermi-compost (to build up organic material and hence water-holding capacity), and rock dust soil amendments such as lassenite and zeolite, which improve retention of fertilizer and water. There is also scope for more widespread use of low-water consuming crops and varieties. In addition to saving water, these measures usually save labour, increase fertility, and create better yields as well. They should be added to the repertoire of techniques in use and promoted through dry crop value chains.

ii. Phase out groundwater pumping subsidies

- Energy subsidies for groundwater pumping are outdated and wasteful. Farmers pay a fixed monthly tariff for electricity regardless of the volume of water they extract.
- Electricity for tube wells should no longer be subsidized and the flat rates should be abolished with immediate effect. The finances that are freed up as a result can be used to promote efficient water use and effective groundwater recharge supported by legislation. This will cushion the change and help farmers transition to more balanced groundwater farming.
- Off-grid solar pumps should be discouraged as the pumps make use of a groundwater source that is under severe threat.

iii. Promote groundwater recharge

There have been no systematic landscape-level efforts to promote groundwater recharge in Balochistan, with the exception of the delay action dams were found to make no significant contribution. Groundwater recharge should be intensely promoted at the landscape level, utilizing

promising techniques such as point recharge, the use of roads as instruments for water harvesting and the effective management of rangelands, as discussed in 3.2 as well.

iv. Groundwater monitoring

Groundwater monitoring will be the responsibility of the water monitoring and information system under the proposed water act. At present, groundwater data is available in analogue format and rather patchy. The groundwater monitoring network is to be expanded, and this should continue especially in hotspot areas, where the effect of demand management and recharge should be measured and shared with all stakeholders. It is most important that insights from groundwater monitoring are made publicly available, first and foremost to groundwater-using communities as the basis for local management and regulation.

3.6 Secure vital water services

3.6.1 Water for growing cities

Balochistan grapples with water management challenges due to its arid climate and limited freshwater resources, intensifying the difficulty of meeting growing urban water demands. Aging infrastructure overseen by entities like Q-WASA and the Public Health Engineering Department (PHED) contributes to pipeline decay and insufficient storage, causing significant water losses. Q-WASA struggles to cover less than 70 percent of the drinking water supply and 12.5 percent of sewerage needs in Quetta, providing the lowest water supply among major Pakistani cities at 59 litres per person per day. Inadequate sewage and treatment facilities, coupled with other water, sanitation and hygiene (WASH) challenges, lead to improper wastewater disposal and health risks. A 2022 Balochistan Environmental Protection Agency report revealed that 60 percent of water samples from urban areas fall short of safe drinking water standards, resulting in a rise in waterborne diseases. Q-WASA's lapse in water quality testing since 2010 has led to non-compliance with the National Environmental Quality Standards (NEQs) for water quality.

The revenue collected for water services is insufficient, hampering Q-WASA's ability to cover operational costs and staff expenses. Most consumers are not billed or pay less than 20 percent of their bills. The government provides subsidies to offset Q-WASA's financial deficit, however unsustainable structures and water shortages contribute to poor service delivery. A management deficit in the water utility sector further impairs operations, long-term service, and source supply.

Urbanization, expanded agriculture, and a sizable Afghan refugee population have significantly increased water demand in Quetta, where the supply gap is 30 million gallons per day. The overexploitation of aquifers raises more concerns about future water supply to Quetta. Semi-urban and rural areas also experience water scarcity due to inefficient planning, poor service delivery and reliance on private sector water tanker services. An estimated 72 percent of the rural population relies on dug wells and streams for drinking water, indicating deficient service provision. Resource constraints in the public sector hinder new system expansion, widening supply and demand gaps in Quetta and other areas with outdated municipal water supply infrastructure and insufficient operation and maintenance.

Policy actions

Given population growth and urbanization trends, it will be important to develop short- and long-term water resource plans for urban areas to ensure the sustainability of water services. Keeping in mind the importance and urbanization trends in Quetta and other cities, including Khuzdar, Hub, Gwadar, Zhob and Loralai, specific plans are needed to secure the water supply in unserved and underserved areas on a priority basis.

Integrated water supply and management and WASH considerations should be built into urban planning to accommodate the water needs of growing urban populations. These plans should include the following actions:

- Diversify water sources, keeping in mind the need to narrow service level gaps and the anticipated development of urban areas. In coastal cities like Gwadar, desalinization should be explored as an option to supplement the limited freshwater resources. The China-Pakistan Economic Corridor (CPEC) plays a key role in supporting and advancing desalination initiatives to address the region's water security needs and could create practice for other areas.
- Introduce strategies and stringent pollution control measures to ensure water quality, such as zero tolerance for dumping untreated domestic sewage and industry wastewater into waterbodies. The sewage and wastewater of all cities should be treated, recycled and reused for agricultural purposes and by industries and factories at accepted total dissolved solids (TDS) levels Municipal entities, industrial units and housing societies should be required to treat effluents and hazardous discharge before disposal. It will be important to promote the use of *Johkasou* (a decentralized wastewater treatment system) in suburban and rural areas lacking proper sewage systems rather than dumping waste into pits, which leads to the contamination of groundwater.
- Invest in the modernization and expansion of water infrastructure, with a specific focus on replacing outdated pipelines, constructing storage facilities and sewage systems and enhancing the distribution network to reduce water losses and enhance reliability. The PHED and Q-WASA should establish advanced water treatment facilities to ensure that all available water sources are able to meet high-quality standards for safe consumption.
- Create an urban environment that is free from the risks of flooding or waterlogging by integrating urban planning and urban infrastructure development with water resource management. Urban water resource plans need to be integrated with the Balochistan water plan and should involve a range of stakeholders with an interest in investment and service delivery.
- Strengthen the regulatory frameworks for water quality monitoring and environmental standards enforcement, while fostering collaborative governance through public-private partnerships for enhanced water service efficiency and WASH standards, ensuring compliance with international benchmarks, with PHED and Q-WASA at the forefront. To effectively tackle water quality challenges, critical investments are needed in wastewater treatment facilities, stringent pollution control, advanced and public health awareness campaigns.
- Engaging and educating local communities, especially women about the importance of flood risks but also clean water, the sources of contamination and the health risks associated with poor water quality will be vital to addressing water quality issues in Balochistan's urban centres and rural areas. Communities should be empowered to take ownership of their water resources, to hold authorities accountable and to collaborate with government agencies, non-governmental organizations, and private sector entities in efforts to improve water quality.

- Such plans and investments should be supported by legal and regulatory measures. The proposed new water act should provide for ambient water quality standards to be set in consultation with the Environmental Protection Agency (EPA), as determined by the Environmental Protection Act of 2012. A difference needs to be made between water quality standards as such and emission/effluent standards (of waste water).

3.6.2 Water for industries and mining

Balochistan's path to economic development requires securing reliable access to water resources. To address the challenges faced in critical economic areas – including industry, and mining – realistic and impactful policy actions are imperative. In industry, adopting efficient water management practices, upgrading aging infrastructure, and strictly monitoring and controlling industrial pollution are essential to safeguarding water supply and quality. In the mining sector, promoting water recycling, introducing water licensing mechanisms, and mandating robust environmental mitigation measures can ensure responsible water use. Effective collaboration among government bodies, private sector stakeholders and local communities, coupled with a commitment to transparency, accountability and research, will be important for realizing these objectives. By addressing its water-related challenges in a pragmatic fashion, Balochistan can unlock its economic potential, generate employment opportunities, and improve living standards for its population. Balochistan's mining sector, in particular, faces a crucial challenge in maintaining its growth due to an unstable water supply. An aging and inadequate water infrastructure, rapid groundwater depletion, compounded by competing demands for water from the industrial sector, pose a significant threat to water availability for mining. Additionally, the risk of water pollution due to mining further jeopardizes the environment. Balochistan has abundant mineral resources and the mining sector plays a key role in the region's economy, a role which is expected to increase. However, mining operations rely heavily on substantial water resources for extraction, processing and dust suppression, making them vulnerable to water scarcity. To address these concerns, the new water act will classify the use of water for mining as a regulated activity.

*(*The proposed Balochistan water resources management act (*Section: 3.1.2 under Policy actions*) will require that new industrial, commercial, military, and residential developments that involve the use of water from a supply other than a water utility, must obtain a clearance, requiring the safe sourcing and processing and disposal of water).

Policy actions

- Implement efficient water management practices in industry, including recycling and treating industrial wastewater to reduce freshwater consumption.
- Require thorough environmental impact assessments (EIAs) for new industrial and mining projects to determine their likely water-related environmental impacts and implement measures to mitigate them.
- Collaborate with industrial stakeholders to develop and implement water management plans and practices and develop mechanisms for mining companies to contribute to local water infrastructure development and community water access.
- Introduce water licensing for mining activities, ensuring responsible water use and compliance with environmental regulations.

- Establish transparent reporting and accountability mechanisms for water use in mining, ensuring compliance with regulations and sustainability standards.

3.7 Sound financing in the water sector

Good water management requires adequate financial mechanisms and ample resources for investments in infrastructure and the day-to-day costs of management, maintenance and governance. At present funding is not sufficient to cover water sector needs. While precise information on investment needs and other related costs is not available, significant funding is required to achieve the targets of SDG 6. This is an issue worldwide but especially in Pakistan (see Section 4.3) and Balochistan with its widely dispersed population and scarce water resources.

It is challenging for government departments to access various available national and international sources of financing due to the absence of a systematic mechanism for planning the financing and funding of projects. The Balochistan Composite Schedule of Rates is an exception.[17] Nor is there a well-defined mechanism for prioritizing projects and ensuring the optimal use of funds allocated through federal and provincial Public Sector Development Programmes (PSDPs). Due to lack of the capacity to spend effectively and efficiently and slow progress on projects, actual spending can be much lower than authorized and budgeted expenditures. In addition, a lack of provision for the sustainability of investments makes potential financiers reluctant to invest.

According to a World Bank, the rate of completion of PSDP from 2014 to 2019 on a three- year moving average was 14 percent of the total PSDP. The main reason for the low completion rate was that budget is allocated to new schemes without giving weightage to the completion ongoing schemes. Consequently, schemes have been stalled for five to ten years. There is a clear need for much better programme management.

Another area of improvement concerns the operational costs of existing water systems. These are very high, particularly those relying on groundwater. A considerable proportion is due to perverse subsidies that incentivize the overexploitation of groundwater and a low rate of payment of bills, even at the subsidized rates. According to the office of the auditor general of Pakistan, outstanding bills to the Quetta Electric Supply Company (QESCO) in December 2023 totalled more than 1.6 billion USD,[18] with an extremely meagre 1.7 percent recovery rate,[5] causing a significant financial strain.[19,20] This is bad practice from every angle: subsidizing the exhaustion of long-term groundwater resources, countenancing indiscipline and corruption in the payment of public charges and risking the collapse of the QESCO, a major service provider.

Additional subsidies support non-sustainable high intensity farming in Balochistan, which is the province of only a few farmers. Apart from the subsidized groundwater pumping, these come in the shape of subsidized farm loans, fertilizer subsidies, subsidies on equipment and relief packages. Most of the incentives go to large land owners. Furthermore, the existing income tax rates, listed in the 1996 Balochistan Agricultural Income Tax Bill, are outdated and require requiring urgent revision. Farmers

[17] (BCRS, 2023 https://pnd.balochistan.gov.pk/csr-2023/)
[18] As per data from July 2023 to December 2023 obtained from the office of the Director Commercial of QESCO.
[19] Audit Report on the Accounts of Power Division and Its Attached Entities Audit Year 2021-22 by Auditor General of Pakistan.
[20] https://www.app.com.pk/domestic/qesco-directed-to-restore-electricity-to-agriculture-sector/

are currently required to pay a nominal PKR 2 (USD 0,005) per produce index unit, an outdated amount that is not aligned with modern agricultural practices.[21]

There has been a substantial financial commitment to strategic subsidies in Balochistan's agriculture sector, but the benefits of these subsidies are questionable and some clearly incentivize undesirable practices. Balochistan urgently requires a thorough restructuring of financial and agricultural support frameworks, including a clear policy and guiding principles to ensure that subsidies result in sustainable outputs and efficiency, optimizing the use of public funds. Additionally, the Agricultural Income Tax Bill of 1996 must be brought into line with current market practices.

The last policy challenge under this heading concerns cost recovery. The Water and Sanitation Authority Act (1980) and the Q-WASA Act (2004) include provisions to charge users for services. The provisions are only valid for urban areas. The charges are based on a flat rate and do not compensate for operations and maintenance costs. Users are willing to pay for reliable services, as may be concluded from the far higher rates paid to tanker services.

Rules for cost recovery according to the Canal and Drainage Act 1873 and the Canal and Drainage Ordinance 1980 (amended 2001 and 2006) can be specifically developed. The collection rate for irrigation services charges (*abiana*) is extremely low while the assessment of these irrigation services charges is expensive, with the result that revenues are less than assessment costs – as also discussed in section 3.3. Abiana does not relate to the water consumption of the crops nor the volume of water delivered. There is a need to develop a yardstick for water services payments for various user categories.

Policy actions

The policy action for this theme concern:

i. Mobilize financial resources

- Identify the actual investment, operational and management, and replacement and capacity building costs for water infrastructure, water services and water governance in Balochistan.
- Formulate comprehensive guidelines and policies to identify which projects should be financed by PSDP, which are suitable for PPP and which can be supported through alternative financing methods. A Water Master Plan is to be prepared following this policy to attract systematic funding, and move away from solely project-based funding.

ii. Improve financing procedures and proposals

- Align public sector investments in water with the Public Finance Management Act of 2020. Guidelines for effective command area development, catchment protection and ephemeral stream harvesting, and protection should be elaborated as well.
- Procedures are needed to support water-related departments in developing project planning tools (see also Section 4.3). This would include guidelines to identify which projects can be financed through public-private partnerships and which can be supported through the Community-Led Local Governance policy framework (CLLG) of 2023.

[21] The Balochistan Agricultural Income Tax Act, 1996

- Efforts should be made to attract private financing and to increase opportunities for community-based projects with the involvement of small and medium enterprises. This can be done by developing procedures and mechanisms to implement public-private partnerships under the 2021 PPP act and de-risking private and community investments using blended financing mechanisms.

iii. Reduce costs of water services

- Study the various activities and costs needed to operate and manage water services, including water supply, irrigation, flood protection and governance. Identify duplication and inefficiencies in the systems and propose activities for rationalization. The study should include costs of using electric, diesel and solar tube wells and their comparative benefits in terms of water productivity. The study should investigate various irrigation applications, flood, furrow, high efficiency irrigation systems, and fully circular water use in green houses and identify the economic and financial costs of subsidies.
- The study should be used to rationalize costs and change the emphasis of subsidies from encouraging water use by pumping to providing incentives for water conservation, including elements of demand management.

iv. Revisit cost recovery methods

- Far greater awareness is needed – at all levels of society – of the true value of water. Parliamentarians must be made to understand that water is not a free commodity, and its cost must be reflected in suitable water pricing.
- The sustainable financing of water services should be based on the principles that users and polluters pay. Start a transition to cost recovery in all sectors, starting with operations and maintenance and eventually claiming full recovery of services, replacements and new infrastructure. In the long term, water metering and marginal cost pricing should provide the basis for cost recovery. Cost recovery should consider the affordability principle and fundamental right to water and could include transparent subsidies and transfers.

v. Develop legal Instruments to control water use and enforce cost recovery

- The new water act will include an important section on water financing. This will comprise regulations for water-related projects under the PFM and PPP Acts for better prioritization, monitoring and alignment with private sector interests. A review is needed to determine the financial risks of private involvement in water or multi-purpose water investments and to propose changes.
- Identify what measures are needed to increase the attractiveness and likeliness of return on investment, such as long-term revenue guarantees and currency matching.
- For cost recovery, prescribe initial water service fees on a metered basis, gradually moving to full recovery of actual costs according to the impact of the water use or disposal on the source or receiving water body. More details are provided in Section 4.2.

4. Supporting frameworks

A number of supporting frameworks are needed to make this policy a reality. Foremost are institutional restructuring and legal reforms, combined with changes in the financial system. Knowledge development and capacity building will also be critical to implementation. These are discussed in Sections 4.1 to 4.5 of this chapter.

4.1 Institutional restructuring

The aim of institutional restructuring is to bring about effective and integrated water resource management that enables institutions to address current and future challenges, and to make the most of opportunities for productive use of Balochistan's water resources.

Water governance in Balochistan remains biased against balanced water use. There is no effective management of rangeland or forestry, although they are vital to conserving upland water sources. There is little effort to effectively conserve the water resource base, with the exception of some externally-funded programmes. There are no programmes for groundwater recharges other than the failed effort to invest in delay action dams. There has been no significant response to falling groundwater tables; indeed substantial financial resources are spent to subsidize groundwater overuse. There are no financial incentives for farmers to adjust their farming practices to the water scarcity in the province. The Agricultural Department does little to promote sailaba and khuskaba farming. There is little or no coordination at the district level around water management. Importantly, there is no outreach to communities. IWRM is not part of the planning process at the P&D Department. Environmental licensing is reactive and does not relate specifically to water resource management. Based on all these parameters, Balochistan performs far below other water-stressed areas.

To move forward, institutional restructuring is needed urgently, with an emphasis on changes that can produce immediate wins. The institutional restructuring to support the integrated water resources management policy has three main components:

1. Strengthen and gender sensitize the organizations responsible for water and land management in Balochistan.
    - Strengthen the role of main organizations.
    - Strengthen the role of the Irrigation Department.
2. Ensure effective cooperation between these organizations based on agreed policies and planning.
    - Strengthen the Provincial Water Board through the creation of a Balochistan Water Resources Commission.
    - Strengthen the district water committees.
3. Forge strong connections with the communities that use the resources.

Water management is tied to the mandates of many organizations in Balochistan: the Irrigation and Power Department; the Agricultural Department; the Livestock Department; the Forest Department; the P&D Department; PHED; Q-WASA; EPA; local government; the Provincial Disaster Management Authority (PDMA) and the Roads and Highways Department. Yet most organizations tend to focus on their core functions (for instance construction of irrigation infrastructure, crop extension, coordinating disaster relief) and pay little attention to water resources management or to forging cooperation with

others. In the Balochistan Government Rules of Business 2012 several of the water management related task are described yet they are not seriously executed). There is moreover a bias towards operational tasks rather than strategic activities such as networking, innovating, gender mainstreaming and joint programming. Another important shortcoming is a lack of staff and limited orientation and skills in water management.

A priority for this policy is to strengthen the effectiveness of organizations with responsibility for water management in Balochistan. The Irrigation Department should, in the short term, focus on improving water management and sustainable use and command area development. It should work on a broad range of water retention and recharge measures to improve water resource availability through better watershed/basin management. Over time, it should aim to become a pre-eminent centre on basin-level water resource data, making information available to all stakeholders (see Section 3.1), and to monitor and evaluate water-related investments. The Agricultural Department should develop programmes on crop diversification and higher water productivity and promote khuskaba and sailaba farming. It should provide its massive work force with better tools for engaging with farmers. The Livestock Department should seek to increase livestock productivity in the contest of a low-water economy and collaborate with the Forest department on rangeland management, including stock water provisioning. The Forest department should develop a broader range of regreening strategies, such as farmer-managed natural revegetation, in catchments to support drought and flood resilience. The Commissioner should also lead the development of integrated catchment plans. The P&D Department should coordinate the activities of key programmes on IWRM to ensure their coherence and compare all proposed projects to IWRM Master Plans. The Public Health Engineering Department should strengthen rural water supply programmes, emphasizing source protection and developing new and less conventional water resources. Q-WASA should implement strict urban water management plans, including, the requisition of private wells for urban water supply and other drastic measures as needed. The Environmental Protection Agency should take on the major regulatory and provisioning role in water resource management, including minimizing effluents and promoting wastewater reuse. The PDMA should improve disaster preparedness and resilience actions and undertake hazard vulnerability risk assessments and hazard mapping. The Roads and Highways Department should introduce water harvesting and groundwater recharge structures alongside existing roads. Local Government could take a large role in initiating actions to manage water resources at local level.

The Irrigation Department is well established, with a strong engineering unit. This qualifies the Irrigation Department to be the “first among equals,” taking the lead in IWRM in the province and, as the Water Resources and Irrigation Department, serving as focal point for major water initiatives and investments.

The second component of institutional restructuring is to increase cooperation between water-related organizations based on agreed policy and planning. This has two main elements:

- Strengthen the largely dormant Provincial Water Board by upgrading it to a Water Resources Commission. Over the years, there have been efforts to create coordination mechanisms at the provincial level. These were either short-lived or ineffective. The proposed Balochistan Water Resources Commission would consider all major water-related investments and proposed projects for the province, ensuring that they explicitly contribute to the achievement of the

objectives and outcomes of this IWRM Policy. It would also feed the agenda to the district water committees, coordinating and initiating water-related programs in the districts. The Commission would also ensure that all departments make the transition to their new roles, as described above.

- Strengthen the district water committees. The district committees should complement their current limited regulatory roles by meeting regularly (once a month or quarter) to discuss all major investments as well as major challenges identified in the districts. The meetings should aim at synergy and complementarity of the efforts of departments and other players active at district level. The committee reports will be shared with the Balochistan Water Resources Commission.
- A third and very important part of the institutional restructuring is to forge strong connections with the communities that manage and use water resources. Community management of land and water has a long history in Balochistan. There are encouraging examples of communities managing forests, groundwater and rangelands. However, community management of these resources is fragmentary, poorly documented and not widely recognized. Local government outreach to communities is weak, leading to mistrust of government motives. There is a tendency to see communities as beneficiaries, rather than as partners.

There is an urgent need to strengthen the links between communities and water institutions represented at the district level and below: the local council, district commissioners and assistant district commissioners as well as field staff of the Agricultural Department, the Irrigation Department, the Forest Department, Livestock and Diary Department and the Environmental Protection Agency. This will require capacity building and re-profiling of job descriptions especially at the lowest level in the most important departments. A shared protocol on community engagement may be needed. Opportunities to provide administrative and legal support for local IWRM include inviting community leaders to district water committees and basin councils meeting; operationalizing the provisions in the new Forestry Act and the Groundwater Management Administration Ordinance; and enabling local resource management in the proposed new Balochistan Water Resource Management Act (see Section 4.2.1).

4.2 Legal reform

4.2.1 The Balochistan Water Resources Management Act

The different aspects of water management in Balochistan are addressed by a series of laws, including the Balochistan Groundwater Rights Administration Ordinance (1978), the Balochistan Canal and Drainage Ordinance (1980), the Balochistan Water Users' Association Ordinance (1981), the Balochistan Water and Sanitation Authority Act (1989), the Balochistan Irrigation and Drainage Authority Act (1997), the Balochistan Local Government Act (2010) and the Balochistan Environment Protection Act (2012). These laws are underpinned by common law rules on water allocation and use, including the riparian doctrine and the doctrine of capture. In rural areas, customary laws continue to have significant influence. The current legal framework does not provide a supportive foundation for IWRM in the province.

Following the adoption of this IWRM Policy, the Government of Balochistan will finalize and submit a Water Resources Management Bill to Parliament to be adopted as the Water Resources Management Act.

To create a legally robust and effective framework for IWRM, the new water act explicitly cites the role of the government as manager of the province's water resources (both surface water and groundwater).

Existing water rights under common law will gradually be converted into permit-based statutory water rights that specify the quantity of water that can be abstracted, conferring greater security of water tenure. The process of converting common law water rights to statutory water rights will be gradually rolled out across the province, focusing first on priority river basins and aquifers. Great care will be taken to acknowledge customary users, including hereditary tenants and community uses of rangelands and watersheds. The proposed new water act also seeks to grant legal protection to long-established water schemes that are based in customary or local law, such as traditional spate irrigation schemes and karezes.

Given the scope of the IWRM challenges facing Balochistan, it is expected that the water act will be rolled out in stages. The act will supersede the Groundwater Ordinance, which has never been fully implemented. However, the management of irrigation schemes in the Indus Valley will continue to be managed under the Balochistan Canal and Drainage Ordinance and the Balochistan Water Users' Association Ordinance. And water supply systems will continue to be managed pursuant to the Balochistan Water and Sanitation Authority Act and the Balochistan Local Government Act, with an increased emphasis on the regulation of the water services. Aspects of other items of primary legislation will be amended as necessary to give effect to this IWRM policy.

4.2.2 Implementing legislation

A set of draft implementing rules will be developed to support the Water Resources Management Act.

4.2.3 Implementation and enforcement

The government will prepare a detailed and costed implementation plan to enable the effective implementation and enforcement of the Water Act. Key elements will include public awareness around the Act, training for public officials on implementation, inspection and enforcement. The Act will contain provisions on penalties and sanctions and will set out a system for imposing fines for non-compliance with, for example, permit requirements or conditions. At the same time, key objectives of the Water Act will be to clearly identify and safeguard water rights such that water users can assert and defend their own interests.

4.3 Financial reform

4.3.1 General

The difference between necessary financing and actual expenditure is known as a "funding gap" and it is one of the greatest bottlenecks in water management. Without adequate funding, little can come of any water management plans. Fortunately, the importance of adequate financing for water management is now broadly recognized, and international treaties, guidelines and studies include numerous principles to improve water financing.

By rationalizing current subsidies for the water and agricultural sectors and, possibly, repurposing taxation (see Section 3.7), the funding gap can be reduced significantly. Cost recovery and the provision of water services are often carried out by different departments. More closely linking water services and service fees will help to improve both financing and the quality of water services. Licensing the commercial uses of water could also provide a source of income.

All available funding sources are not being used optimally. These should be explored and tapped as a means to expand the financial resources for sustainable water and agriculture investment. (see section 3.7). Considerable improvements can be made by developing rules, regulations and mechanisms to minimize the funding gap and make the water sector more attractive for funding.

4.3.2 Projected investment needs

The investment needed for most Asian countries to achieve the 2030 Sustainable Development Goals for water and sanitation services is estimated at USD 198 billion annually (OECD, 2021),[22] which greatly exceeds the available funding. For Pakistan, the required investment in domestic water and sanitation amounts to approximately USD 3 billion annually or 2.5 percent of GDP (OECD, 2021). This represents one of the highest per capita financing needs among Asian countries. The funding gap in Balochistan is likely to be relatively even higher than at the national level. Necessary investments in irrigation systems – estimated on a regional scale in the OECD report – would amount approximately 0.28 percent of Balochistan's annual GDP and flood protection and disaster reduction and management services would further add to this. Improved financing is a vital priority and requires a great deal of attention.

4.3.3 Aligning subsidies and incentives

While public awareness campaigns could raise support for the sustainable and efficient use of water, phasing out subsidies for pumping may be a long-term process that is necessary but needs to be carefully navigated. Subsidies for water-saving techniques might popular to implement, and the financing should ideally be sourced from (reduction in energy subsidies) the water sector.

The following measures are proposed:

- a comprehensive review of Balochistan's agricultural subsidies, focusing on optimizing allocation and ensuring measurable outcomes;
- establishment of a transparent policy framework for targeted subsidies in the agriculture sector that maximize efficiency and resource utilization;
- a thorough revision and update of the Agricultural Income Tax Act of 1996 to align with contemporary market practices and ensure fair taxation in the agricultural sector;
- implementation of transparent paying methods for resource use through metering and prepaid card systems.

[22] Leckie, H, Smythe and X Leflaivle, 2021: https://dx.doi.org/10.1787/3bc15c5b-en, financing water security for sustainable growth in Asia and the Pacific, 70pp.

4.3.4 Cost recovery for water services

Recovery of the full costs of water services should be undertaken gradually, starting with the recovery of operation and maintenance costs to eventually include replacement costs of existing aged systems and new investments. The programme should include affordability measures for the poorest members of society and could include innovative taxation mechanisms, for example, for flood protection measures.

The collected service fees should be used by the service provider and not disappear into government coffers to be replaced by a (generally insufficient) government budget allocation, as has been the case for abiana.

Current water service prices do not remotely cover actual expenses for the operation and maintenance of irrigation and urban water supply. The following steps are needed:

- Agree to a dedicated system in which fees are paid for certain water services.
- Define the actual operational and maintenance costs of the system.
- Identify step wise increases in cost recovery over time, for example 10-30-50-80 and 100 percent recovery over five two-year periods.

4.3.5 Public financing

The PFM Act of 2020 provides a structured process for planning and follow up under the PSDP, the process for irrigation projects. Project management is very important, particularly for provincial- and local government-funded projects.

It will be critical to establish comprehensive policies and regulations for the formulation of sectoral plans that ensure that schemes and projects align with departmental priorities under the PFM Act. The adoption of a balanced scorecard approach can be helpful for appraising, evaluating and prioritizing projects for inclusion in the Annual Development Plan (ADP) and PSDP. The scorecard may be used to assess projects against predetermined criteria, thereby facilitating the selection and appraisal of IWRM projects and programmes. Irrespective of the subsector, all projects should be linked to basin and catchment management plans.

Greater attention is needed to the development of feasible, smaller scale projects in line with basin and aquifer development and water allocation plans. Such projects should include innovative command area development and water distribution focusing on increased water productivity; spate irrigation and rainwater harvesting; flood diversion and, where feasible, groundwater recharge. Many of these projects can be implemented with communities playing a leading role.

4.3.6 Develop public-private partnerships

It is imperative to encourage private sector participation (including at the community level) through PPPs for the development, management and financing of water infrastructure projects. This can bring in private capital and expertise, leading to improved service delivery and infrastructure development.

Section 11(1) (a) of the PPP Act (2021) stipulates that government departments have the authority to identify prospective public-private projects and submit recommendations for evaluation and processing. A structured mechanism and procedures are needed for the selection of water-related

projects and initiatives suitable for financing through the PPP model. This approach will serve a dual purpose. First, it will enable the funding and execution of projects that could not be accommodated within the PSDP due to fiscal limitations. Second, it will enhance financial and operational transparency and efficiency by involving private stakeholders.

4.3.7 Develop other innovative financing mechanisms

There is a need to systematically, through commissioned studies, explore innovative financing mechanisms, such as green bonds, water bond, and impact investments, to attract private investment in sustainable water projects. These mechanisms can mobilize capital for water infrastructure development and conservation initiatives. Two examples are blended financing and performance-based contrasts. Appropriate regulations should be developed. Community-led projects could be part of this as well

4.4 Knowledge management

Knowledge management (KM) is the process of creating, organizing, using and sharing collective knowledge within an organization. Successful knowledge management involves maintaining information in a place where it is easy to access by all concerned parties.

4.4.1 Balochistan Water Resources Information System (BWRIS)

The Balochistan Water Resource Information System (BWRIS) is managed by the Department of Irrigation and the Directorate General of Planning, Development and Monitoring. The BWRIS was funded under the ADB BWRDSP. It is being further developed and strengthened under the EU-funded RBWRP technical assistance programme to include not only water data but also information from related sectors to serve as evidence-based decision support and monitoring and evaluation system. A backup of the system ensures that no data will be lost in the case of server or system failure.

The BWRIS is a spatial database platform designed to collect, manage, analyse, and disseminate water-related data and information. It offers various benefits for water management, planning, and decision-making. Following are the key functions of BWRIS:

- centralizes a wide range of water-related data, including hydrological data, water quality parameters, water use data, rainfall records, project reports and, through the cooperation with other departments, the water requirements of different sectors;
- provides real-time data and monitoring capabilities;
- provides the basis for fact-based monitoring and evaluation systems;
- helps optimize water management strategies by providing insights into water availability, demand, and consumption patterns;
- supports planning and policy development;
- helps in flood and drought forecasting, monitoring, and mitigation;
- facilitates integration of spatial data, including geographic information system (GIS) and remote sensing (RS)-based assessments and modelling applications;
- ensures long-term data storage and analysis;

The Bureau of Agriculture's large cadre of extension workers have been furnished with methods of farmer-learning, based on the BWRIS and on farmer-to-farmer exchanges through smart phones and social media (see Section 4.1). Personal Learning Networks (PLNs) are used to gather, collect, communicate, create, and share knowledge and experience with a group of connected people, anywhere at any time. PLNs are developed largely through social media, such as X/Twitter, LinkedIn, Facebook, and blogs, helping to improve the knowledge base and develop professionally through continual learning.

4.4.2 Mainstream the use of technologies and tools

A number of technologies and tools are helpful in knowledge management and are readily available at affordable costs. Some of these are described below.

- **GIS and RS**

Geographic information systems are used to obtain, store, control, examine, oversee and present spatial or geographic information, while remote sensing is the process of collecting information about an object or location without physical contact. Both are valuable tools for knowledge management and are being used extensively in water-related interventions, projects and programmes. Data based on GIS and RS are widely available and systems to handle large data effectively are needed in order to receive maximum benefit from their use.

Satellite imagery is available for a large number of different radiation spectra or spectral bands that provide information about different characteristics of the earth's surface and gravity. Major advances have been made in the scale at which satellite imagery and data are available as well as in analysis techniques. Satellite information can be collected in real time by base stations and is also widely available online. For example, information on water balances, such as precipitation and evapotranspiration, can be obtained using RS and processed in GIS.

On-the-ground verification of remote sensing is needed and good methods to do so need to be developed. Current methods are not satisfactory due to huge differences in scale, often by more than a factor of 1000. For example, a comparison of precipitation in large RS cells (in the order of 100s of square metres) with rainfall estimates of small rainfall gauges (in the order of tens of square centimetres) are not satisfactory.

- **Water conservation technologies and tools**

The use of different resource conservation technologies (RCTs), such as precision land levelling (PLL), raised bed planting (RBP), different high efficiency irrigation systems (HEIS) and circular water use in vertical agriculture offer more efficient and productive water use. It has been estimated that water savings up to 47 percent and yield increases up to 35 percent have been reported under PLL, while water savings up to 50 percent and about 10–33 percent yield increases were observed under RBP. Similarly, under different HEIS, water savings up to 80 percent and yield increases up to 53 percent have been reported compared with crops sown under conventional farming.[23] Closed circuit

[23] Shahid, Muhammad Adnan; Junaid Nawaz Chauhdary; Usman, Muhammad; Qamar, Muhammad Uzair; Shabbir, Abdul, Assessment of Water Productivity Enhancement and Sustainability Potential of Different Resource Conservation Technologies: A Review in the Context of Pakistan . Agriculture; Basel Vol. 12, Iss. 7, (2022): 1058. DOI:10.3390/agriculture12071058

greenhouse technologies coupled with the recycling of water used by evapotranspiration offer the highest water savings under water scarcity conditions such as found in Balochistan. Such technologies (applicable at different scales) can enable water savings of more than 95 percent,[24] a major benefit in highly water stressed areas. In areas, such as Quetta where water is very expensive due to the need to pump groundwater from more than 250 metres, using greenhouse technologies could even be considered economical.

4.4.3 Measures

- Strengthening and fully operationalizing BWRIS will ensure that knowledge and information about water resources management and IWRM interventions will be accessible to stakeholders at the right time, in the right place and the right format. Opportunities to capture knowledge and make it available to those who need it should be actively pursued. Monitoring and evaluation systems should be based on lessons learned reports, learning logs, templates, checklists, and uses of BWRIS knowledge.
- Promote the processes of creating, organizing, using, and sharing knowledge around IWRM within and among water organizations. All knowledge materials will be assigned to owners who will be responsible for maintaining them.
- Ensure continuous updates of BWRIS through data entry and processing.
- Promote knowledge management through partnerships with organizations specialized in knowledge research and generation, particularly universities and colleges in Balochistan.
- Encourage water organizations to identify, share and use best practices for planning and carrying out interventions, projects, and programmes on IWRM.

4.5 Capacity development

Growing pressure to improve the local delivery of water services suggests that institutional capacity should be demand-responsive and based on local needs. At present, there is little practical and general knowledge around the IWRM-related approaches that are essential to the future of water resources in Balochistan: water retention and recharge, dryland agriculture, flood-based farming, modern canal irrigation, effective rangeland management, community groundwater management, wastewater treatment and reuse, integrated urban planning, institutional restructuring, gender mainstreaming customary law, financial management of water-related investments and innovative financing systems. All of these topics and more deserve a foothold in the educational system in Balochistan province.

Better managing water resources and facilitating the allocation of water to all users require integrated planning at the provincial level. The critical institutional challenge will be to develop policies, rules, organizations and management skills that address both needs without constraining either. Operational strategies for water sector capacity building must be tailored to the special characteristics and requirements of the province. Such strategies should be long-term and focus on improving the quality of decision-making, and managerial performance in the planning and implementation of water sector programmes and projects.

[24] Campen, 2020 https://www.wur.nl/en/research-results/research-institutes/plant-research/greenhouse-horticulture/show-greenhouse/huge-increase-in-tomato-production-in-saudi-arabia-due-to-targeted-watering.htm

4.5.1 Rationale

Universities and colleges as well as departments, private sector and civil society and development partners have important roles to play in transforming water management in Balochistan. The concepts and principles of IWRM may be accepted by most stakeholders involved in water management in the province. However, translating them into practice will be a real challenge. Capacity building is a critical starting point.

The goal is to improve the delivery of integrated water resource management in Balochistan, based on IWRM principles and approaches. Specific objectives are to:

- Improve the capacity of stakeholders to manage water resources at all levels: individual, community, private sector, service providers, main departments, local administration and sector policymakers.
- Create an enabling environment for new initiatives, for learning and appreciating improvement, and for an unwavering commitment to change and water security.
- Support the overall structure of good water governance, effective institutions, appropriate law and enforcement and state-of-the art financial management.
- Gender Mainstreaming as per IWRM Principles.

4.5.2 Proposed approach

Balochistan is fortunate to have several special programmes that contribute to water security and effective IWRM in addition to its regular water sector activities. There is also an emerging pool of talented young people in search of meaningful jobs. The challenge is to create new capacities that will support the process of change to a productive low-water economy. Regular water sector operations, special programmes supported by international organizations, and communities will have to come together to realize the vision of the IWRM Policy.

4.5.3 Activities

The main organizations responsible for capacity building in Balochistan include educational institutes, media, community organizations, government, local administration, civil society, private service providers and support programmes. These organizations need to work together to conceive an educational vision and capacity building programme that creates the human resources and work environments needed to make this strategy a reality.

A first step is to assess the current level of knowledge, skills, and practices against the requirements of the IWRM Policy and related programmes. Based on these finding, the partners can formulate an effective programme of capacity building, including changes in education curricula, opportunities for in-service training in water organizations, gender sensitization, awareness building, programmes for interactive and practical learning, such as training of trainers, exchanges and workshops and the formulation of applied research programmes. The partners should have a common understanding of the roles and responsibilities of leaders, experts and frontline workers and the need for a learning system where capacity is under constant development and not dependent on occasional training efforts. In addition to engaging new talent, the partners need to consider the capacity of current field staff and communities as well. As described in Section 4.1, there is also a large contingent of underutilized field workers with different water-related departments that can be gainfully deployed at short notice.

5. Implementation: putting the IWRM Policy into practice

This section discusses the immediate actions needed to make the IWRM Policy a reality. Adopted in 2006, the previous IWRM Policy was recognized as valuable and transformative yet it was never implemented. The same might be said for other strategies and frameworks governing the water sector in Balochistan.

There is a new urgency around safeguarding water services that indicates that this time things might be different. As Balochistan's economy gives more space to industry and extraction, the pressure on water resources grows ever greater. Many experts have recognized the merit of moving to a low-water economy that is more productive and efficient and that contributes to the health of the ecosystem.

Changes that may once have been controversial, such as the need for institutional and legal restructuring, have now been endorsed across the spectrum of water stakeholders. There is a keen sense that we need to work together to better manage our limited water resources. Better water management promises a better quality of life, greater happiness, less insecurity, and lower exposure to avoidable risk. In the process, it creates jobs and establishes the basis for a stronger economy.

Making the Balochistan IWRM Policy a reality is within our grasp but it requires dedication and leadership.

5.1 Next steps

While amassing support for the policy will be critical, it is also important to manage the next steps carefully. A number of actions can be taken in the near term to get started on implementation. These are presented in the table below, grouped by the seven policy objectives.

1	**Planning and managing based on IWRM principles**	
1.1	Develop a clear, adaptive, and comprehensive legal framework	Drafting of new Water Act
1.2	Develop an adequate financing system	Make a strategic framework plan for water investments at same time reassess current subsidies and (dis)incentives
1.3	Undertake systematic adaptive planning and implementation	Create new way of cooperation in the District Water Committees and Balochistan Water Resources Commission with quarterly meetings, where results from the field and studies are shared
1.4	Ensure participation of stakeholders	Develop a binding protocol for engaging with communities and have this internalized in the main Departments
2	**Harnessing water resources in the province**	
2.1	Explore systematic rainwater capture and water retention	Introduce as part of basin plans watershed plans in key watersheds and learning from earlier programs doing so

2.2	Wetlands management	Earmark critical wetlands and make basic plans for their protection and management
3	**Making efficient use of available surface water**	
3.1	Improve water productivity	Develop dedicated package to improve water productivity (with farmers investment) for surface irrigation systems – combined with optimization of water allocation
3.2	Reduce waterlogging	Reassess the system of water allocation in the large Indus-based systems in Balochistan
3.3	Improve financial performance	Introduce revenue measures and strengthen the abiana systems with broad consultation
3.4	Promote social justice	In new investments and ongoing program recognize the claims of various group, in particular that of hereditary tenants
4	**Making productive use of floods and runoff**	
4.1	Understanding the potential of spate irrigation (sailaba) and runoff farming (khuskaba)	Update with remote sensing inventory of spate irrigation and run-off farming systems
4.2	Expand the area under spate irrigation and khuskaba farming	Incentivize the expansion of spate irrigation and khuskaba program through bulldozer schemes,
4.3	Improve performance of runoff and flood-based systems by developing tailored packages for better crop production	Introduce packages (with Agriculture Department) of controlled overflow and intakes, improved soil mulching and new crops
4.4	Integrating the runoff and flood-based systems into the larger water economy.	Explore opportunities to promote organic production from sailaba systems in Balochistan
5	**Managing groundwater**	
5.1	Intense work in hot spot areas; consisting of local regulation, active community management and reduction in water consumption	Select hot spots areas, and introduce bans and buy-outs of the pump owners
5.2	Phase out groundwater pumping subsidies	Highest level decision to phase out pumping subsidies with action in year 1 – avoiding the hide and seek of the past
5.3	Promote groundwater recharge	Systematically introduce at high intensity recharge and retention structures in selected critical and high potential watersheds
5.4	Monitor groundwater and sharing of data	Increase the network of piezometers, data to be shared locally
6	**Securing vital water services**	
6.1	Secure water for growing cities	Have water resource and flood management plans for three major cities in Balochistan

6.2	Secure water for industries and mining	Assess water needs for mining operations and start to regulate
7	**Sound financing for the water sector**	
7.1	Mobilize financial resources	Regular meeting with major national and international funder for future water resource investment
7.2	Improve procedures and proposals for public financing	Workshop for new generation of water resource projects
7.3	Change the subsidy system and abolish perverse incentives	Have a phase-out and redirect plans for energy subsidies agreed at highest level
7.4	Revisit cost recovery	Do study in broad range revenue generation option in the water sector
7.5	Improve legal instruments for water financing and to control water use and enforce cost recovery	Introduce with willing communities recovery and investment program related with planned investment

The implementation of the IWRM Policy is a joint responsibility, involving people and organizations at all levels of society. Water must be understood as "everybody's business." The cost of wasting water must become a source of common public concern. People must understand the risks of low-quality water, inadequate WASH services and pollution. Campaigns should promote wise water use and mobilize communities and schools to press for better water services. Rural households should be made aware of the scope for efficient water use and household water treatment. This will create a popular basis for better water management and quality water services.

5.2 Setting ambitious targets

The following ambitious targets have been set for the seven policy objectives.

1	Planning based on IWRM Principles	By 2027, basin plans will be developed, to be funded by realistic investments from national and international budgets and including appropriate governance measures.
2	Harnessing water resources in the province	By 2030, watershed improvement programmes will be underway in all critical basins.
3	Making efficient use of available surface water	By 2030, waterlogging will have disappeared from all canal areas and productivity will have increased by 20 percent.
4	Making productive use of floods and runoff	By 2030, the area prepared for sailaba and khushbaba cultivation will have increased by 20 percent and productivity in existing areas will have increased by 20 percent.
5	Managing groundwater	By 2030, effective local management measures will be in place in all critical groundwater areas.
6	Securing vital water services	By 2030, urban water services will have improved by 50 percent in terms of delivery and sustainability compared to the situation in 2020.

7	Sound financing for the water sector	By 2027, all perverse subsidies will be abolished and the funds made available for investments in water use efficiency and water resource enhancement.

The following targets have been set for the enabling framework.

1	Institutional restructuring	By 2027, the Balochistan Water Resources Commission will meet regularly and restructuring programmes will be in place in all main departments.
2	Legal reform	By 2027, the new Balochistan Water Act will be adopted and implementation arrangements will be in place.
3	Financial reform	By 2027, the financial system will provide adequate financing for necessary investments, with the capacity to plan and execute water programmes. Starting in 2027, all relevant investment in water-related sectors will be aligned with the IWRM Policy and the basin plans.
4	Knowledge management	By 2027, the Balochistan Water Resources Information System will be operational and routinely used by stakeholders for monitoring and evaluation.
5	Capacity Building	By 2027, a programme for IWRM capacity building will be operational and vested in local education providers.

5.3 Ensuring broad engagement

It will be important to keep the broad engagement that characterized the formulation of the IWRM Policy in the implementation of the policy as well. No single party is responsible for the IWRM Policy; it is the responsibility of political leaders and field staff alike. Capacity building will be key to motivating better water management and water services. The IWRM policy should be updated at least every ten years. The water resources assessment and management and development plans should be updated every five years.

Balochistan has many institutional strengths. It has a government that has been providing water services for many decades and has reasonably good experience in developing water systems. The province has an enterprising population; it boasts some of the world's largest farmer-managed irrigation systems and strong local communities that have deep connections to the resources around them.

Balochistan has had great success in addressing pernicious problems, such as reducing direct outlets in some canal sections and providing safe sanitation to urban slum areas. Over the past decade, a cadre of talented young people have been educated in various aspects of water management, although they are seriously underemployed. This must change. Finally, Balochistan has the support of external agencies that share its concerns around better water management, including FAO, the World Bank, ADB and the European Union.

It is proposed that the implementation of the IWRM Policy builds on the mechanisms that were created for its formulation, in particular the involvement of the Interdepartmental Technical Committee (IDTC). Several of the proposed actions will require the development of more detailed strategies and plans. It is recommended to establish a dedicated unit to track progress and facilitate the implementation of the first steps. The unit – preferably under the P&D department – would report on activities and impacts arising from the implementation of the policy.