



Opportunities and Challenges with Afghanistan's Transboundary Waters



A Review of Current and
Possible Future Relations in
Amu River Basin

Opportunities and Challenges with Afghanistan's Transboundary Waters

A Review of current and possible future relations

In

Amu River Basin

By Sediqa Hassani

Edited by

Dr. Glen Hearn

Duran Research & Analysis

October 2017

Duran Publications, 2017
Kabul, Afghanistan

Duran Research & Analysis
Gulai Fatima Khan Mina, Kabul, Afghanistan
Telephone: +93 202 212 152
Website: www.duran.af

Title: Opportunities and Challenges with Afghanistan's Transboundary Waters: A Review of current and possible future relations in Amu River Basin

Edited by: Dr. Glen Heams

Copyright ©2017, Duran

All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the publisher, except in the case of brief quotations embodied in critical reviews and certain other non-commercial uses permitted by copyright law. For permission requests, write to the publisher, Duran Research & Analysis by email: info@duran.af or by calling +93 (0) 202 212 152.

Acknowledgments

Duran acknowledges the financial support of United States Institute of Peace in the production and publication of this policy paper. The views and opinions forwarded in this paper are those of the authors based on a synthesis of literature reviews and key informant interviews. They do not necessarily reflect the views of the government of Afghanistan, Duran, the United States Institute of Peace, or any particular expert interviewed.

Front cover image: Panj River, Dushie Archi, Kunduz 2017, Image courtesy Jim Hujala/stock

About the Author

Sediqa Hassani is a Civil Engineer specialized in Hydrology and Water Resources Management. She is a Fulbright Scholar with a master's degree from Colorado State University, USA. Since 2014, Sediqa has been working as an instructor and researcher at Avicenna (Ibn-e-Sina) University in Kabul. She is interested in conducting research on climate change, water resources management, hydrology, and Afghanistan's transboundary waters.

Sediqa has conducted research with different organizations including, USAID, US National Academy of Science, Heinrich-Bell-Stiftung and Duran Research and Analysis. She has been one of the Principle Investigators and grant recipient of Partnerships for Enhanced Engagement in Research (PEER), the U.S National Academy of Science's research program funded by USAID around the world.

Sediqa Hassani has more than ten years of working experience with different national and international organizations on a variety of water projects in Afghanistan. She is currently working with Ministry of Agriculture, Irrigation and Livestock as a water expert.

About Duran

Duran Research & Analysis is an independent and non-governmental Afghan firm with background in research, strategic planning and program assessment. With the aim of integrating information and learning, providing alternative analytical frames and orienting policy and analysis processes, Duran works in partnership with national, regional and international organizations, and the government of Afghanistan, since its establishment in 2013 in Kabul. For more information on Duran's research activities please visit our website at www.duran.af



Table of Contents

List of Figures.....	iv
List of Tables.....	iv
Glossary and Abbreviations.....	v
Executive Summary.....	vii
Recommendations.....	ix
General Recommendations:.....	ix
Recommendations for the Panj-Amu Darya Basin.....	xii
Introduction.....	1
Scope and Context.....	3
The Importance of Transboundary Rivers.....	3
Afghanistan's Need to Develop its International Rivers.....	7
Steps Taken in the Water Sector.....	9
Existing Legal and Institutional Structures.....	12
Introduction and Context of The Panj-Amu Darya Basin.....	14
Hydrological Backgrounds/surface and Groundwater Transboundary Resources.....	15
Main Water Uses, Infrastructure and Potential for Development.....	18
Legal Considerations.....	23
Potential Challenges for WRM in the Panj-Amu Darya.....	27
A Need for Strong Political Will.....	28
Lack of Good Governance.....	29
Inefficient Infrastructure and Equipment.....	30
Climate Change, Extreme Water Events; Flood and Drought.....	31
Destructive Floods.....	32
Failure in River Bank Protection.....	32
Policy Gaps /Limited Implementation.....	33
Need for Skilled/ Experienced Human Resources.....	34
Data Gaps and Uncertainty in Knowledge of Water Resources/ Lack of Transparency in Sharing Hydrological Data.....	35
Legal Challenges.....	36
A Later Developed State.....	36
Limited Public Awareness.....	39
Population Increase and Demand Rise, and Economics.....	39
Opportunities in the Panj-Amu Darya Basin.....	40
Analysis and Discussion.....	44
Recommendations.....	46
General Recommendations:.....	46

Recommendations for the Panj-Amu Darya Basin	49
Conclusion.....	51
References	53

List of Figures

Figure 1: Major River Basins of Afghanistan (MEW, 2011)	5
Figure 2: Main Organizations Dealing with Water in Afghanistan	12
Figure 3: Transboundary Water Committee	13
Figure 4: Distribution of Area and Water Resources in Amu Darya Basin (FAO 2012).....	16
Figure 5: Main Water Sources of Afghanistan in the Amu Darya (Duran 2017)	18
Figure 6: Water Flow and Water Withdrawal in Central Asia (Victor Novikov and Philip Rabcewicz UNEP/GRID-Regional April 2005).....	20
Figure 7: Location of Proposed Upper Amu and Dushitjum Dam Sites (Panj Amu Investment Plan: 2013)	41

List of Tables

Table 1: Socio-Economic Development Indicators in the Region	8
Table 2: Average Annual Flow to Amu Darya from Each Riparian Country.....	17
Table 3: Irrigation Systems Mainly Managed by MEW & MAIL	21
Table 4: Existing Hydropower and Multi-purpose Dams in Panj-Amu Basin	22
Table 5: Proposed Large Multi-Purpose Projects	22
Table 6: Extraction Limits for Amu Darya as per Protocol 566	23

Glossary and Abbreviations

ADB	Asian Development Bank
ANPDF	Afghanistan National Peace and Development Framework
BVO	River Basin Organizations
CAR	Central Asian Republic
ECAFE	Economic Commission for Asia and Far East
ECIFAS	Executive Committee of IFAS
EU	European Union
UNFAO	United Nations Food and Agriculture Organization
GEF	Global Environment Facility
GWP	Global Water Partnership
ICWC	Interstate Coordinating Water Commission
IFAS	International Fund for Saving the Aral Sea
INBOV	International Net of Basin Organizations
IWRM	Integrated Water Resources Management
NATO	North Atlantic Treaty Organization
MAIL	Ministry of Agriculture, Irrigation, and Livestock
MEW	Ministry of Energy and Water
MFA	Ministry of Foreign Affairs
RBO	River Basin Organization
UNDP	United Nations Development Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific, and Cultural Organization
USAID	United States Agency for International Development
WB	World Bank
WMO	World Meteorological Organization
WUA	Water Users Association
WWC	World Water Council



Executive Summary

The aim of this paper is to familiarize the reader with the key elements associated with Transboundary Rivers in Afghanistan and their implications on policy development. The report synthesizes knowledge and different perspectives of many experts working in the area of Transboundary Rivers. In doing so, it attempts to advance the main points of convergence of opinions in the form of recommendations and highlights those areas where more work is needed to build a common vision.

As the pressures of increasing demand for water and climate change impact the region downstream, countries are becoming increasingly more interested in how development in Afghanistan may impact them. Likewise, over the last several years the government of Afghanistan has increased its awareness of the importance of engaging and discussing issues concerning international rivers with its downstream neighbours to ensure that the precious water resources in the region are used in the most effective way possible. This report helps to advance those discussions by reviewing the situation and developing some possible ways forward for promoting cooperation and water management in the Panj-Amu Darya Basin.

This paper begins by presenting a brief overview of Transboundary Rivers, their importance, and Afghanistan's need to develop its transboundary water resources. In addition, it highlights the achievements of the Afghan government since 2001 in regards to its water resource management. Also, the paper looks at the existing legal and institutional structure of Afghanistan's water sector – the Afghanistan Water Law (2009) and its reference to transboundary waters, the Supreme Council of Land and Water (SCoLW) and other key institutions responsible for water protection and management in Afghanistan.

The paper is focused on outlining the context for cooperative development in the Panj-Amu Darya Basin.¹ The Basin is home to more than 50 million people and is shared by Afghanistan, Tajikistan, Turkmenistan, and Uzbekistan. The Panj-Amu covers over 530,000 km² and generates approximately 67-70 bcm of water each year. The basin is extremely important for Afghanistan. It covers nearly 40% of Afghanistan's surface area, contributes approximately 30% to the country's annual water yield and holds nearly 25% of Afghanistan population. More importantly, there is a good deal of opportunity to develop water resources in the region for both agriculture and hydropower. While, unfortunately, the Panj-Amu Darya basin has not had the

¹ The Panj-Amu Darya Basin is located in the mountains of the Hindukush and Pamir ranges with an elevation range of 2000m to 8000m above mean sea level. The upper portion of the Basin is called the Panj River, which originates from the Pamir at the Afghan-Chinese border. After the confluence with the Vakhsh River, which flows from the Alai in Kyrgyzstan, the system is called the Amu Darya. This paper uses the term Panj-Amu Basin to describe the entire basin.

attention towards infrastructure development that other basins in Afghanistan have enjoyed over the last 15 years, this underscores the potential opportunities in the region.

In general Afghanistan uses approximately 20-25% of the surface water it generates in the Panj-Amu Darya Basin. The country has a very limited capacity for water storage - 100-110 m³/capita/year (one of the lowest in the world), and in particular in the Panj-Amu Darya Basin. The neighboring countries have been using the waters of the Panj-Amu Darya for their benefit for decades. The region of Central Asia is poised to be under water stress with the combined forces of increased demand and climate change. As Afghanistan begins to develop water resources to stimulate economic development, it is increasingly important to address transboundary water issues. Fortunately, there are opportunities and possibilities for improved relations and effective water use in the region, as shown in other areas such as transportation and energy development.

This paper elucidates the primary challenges should a developing country like Afghanistan anticipate dealing with its transboundary waters. The challenges range from political matters to technical issues. This research revealed two types of challenges: i) internal (national level) challenges, and ii) external (international or transboundary) challenges.

Internal issues include, lack of expertise (human capital), inadequate institutional capacity, unreliable data, security challenges, lack of public awareness on international water law and/or transboundary water matters, unavailability of budget (monetary limitations) and water quality (both surface and groundwater), amongst others. Transboundary issues include external challenges such as, lack of trust and lack of cooperation between Afghanistan and some Central Asian countries, population growth and increasing urbanization and industrialization on both sides, climate change, and the zero-sum mindset in the region with absolute winners and losers.

There are also positive opportunities for Afghanistan and its neighbors to cooperate on the Amu Darya River Basin in the future. These include:

- The existing political will and commitment to work together between the government of Afghanistan and Tajikistan;
- Growing informal activities such as joint studies and researches;
- Areas of potential mutual benefit such as flood control, erosion control (improving investment for downstream infrastructure maintenance) and joint power development;
- The possibility to link water development with other areas such as energy and transportation

Finally, the paper presents the conclusion and recommendations on the transboundary waters in the country as a whole, and on transboundary waters of the Panj-Amu Dary Basin in particular.

Recommendations

These recommendations, in addition to an analysis of both literature and reference materials, primarily stems from the thoughts and considerations of experts in advancing Afghanistan's position with respect to transboundary waters. The recommendations here provide a practical starting point to help assess policy on transboundary waters.

General Recommendations:

Issue 1:

There is a lack of a clear coordinated strategic plan for future developments in each basin which would allow Afghanistan to understand and dialogue with neighbours regarding future uses. At the national level, a comprehensive national water master plan is needed. This would highlight Afghanistan's future water resource growth and improvement in each river basin and each province. This would ensure that the whole country's benefits are considered, as opposed to a narrow focus on certain provinces or basins. Similarly, for the regional level, there is no clear mechanism in place, which addresses the concerns of downstream countries.

Recommendation 1:

- a. At the national level, develop clear, well coordinated and approved (official) basin plans which can be used as a basis for national water infrastructure development, as well as in discussions with neighbours on trans boundary water issues. These basin plans should include basin specific climate change adaptation strategies and articulate the role of international organizations such as UNEP or World Bank in the implementation process.
- b. At the transboundary level, an assessment should be carried out to examine potential benefit sharing with neighbors, as well as any potential negative effects of developments in Afghanistan. These assessments should be carried out for each basin and serve as the basis for strategic engagement with neighbors.

Issue 2:

There is a problem associated with data availability and accuracy that leads to a lack of confidence. Based on the feedback from most of the key informants interviewed, existing data is not accurate and reliable. Data availability and accuracy will play a big role in making basin plans, and in negotiations with co-riparian states.

Recommendation 2:

An assessment of data collection agencies/institutions and prioritization of data collection stations

- a. Creation of a comprehensive list of the existing priority issues and challenges in data collection agencies
- b. Assessment of Hydro-meteorological stations and prioritizing stations based on their degree of significance. Priority stations should receive most of the available resources, attention and incentives, particularly in locations where operation and maintenance is difficult, such as stations in border areas with less security or those at high altitudes with harsh climatic conditions.
- c. Improving hydro-meteorological data collection and the reliability of data and increasing the use of GIS and other remote sensing programs.

Issue 3:

Poor relations among transboundary water institutions including poor data and information sharing between these agencies.

Recommendation 3:

Strengthen the relations between transboundary water institutions:

- a. Regular meetings of the Transboundary Water Commission (TWC) in order to allow transboundary water institutions to discuss their related works. In addition, consistent discussion of transboundary water related issues at platforms such as Supreme Council of Land and Water (SCoLW).
- b. Improving data sharing mechanisms to make data available for key policy/decision making ministries, institutions and even the academia. Regular data and information sharing is needed, especially between MEW and the MFA. In addition, create a mechanism where MAI, and MEW can share hydrological data such as through a joint data base.

Issue 4:

Duplication and/or gaps in institutional roles and responsibilities associated with transboundary waters.

Recommendation 4:

Clearly define the roles and responsibilities of organizations related to transboundary waters, beyond what is described in the 2009 Water Law. This would best be achieved through the formalization of a transboundary water rational policy.

Issue 6:

Lack of Afghan led interventions

Recommendation 6:

Engage more Afghan experts, both at the centre and in provinces, to prepare the national and river basin master plans in an adequately contextualized manner. These plans will reflect the reality of the basins in terms of transboundary waters, the demands on uses in the basins, the economic benefits for the country as a whole and the level of impact on water availability to neighbouring countries.

Issue 6:

Lack of public awareness on transboundary waters issues.

Recommendation 6:

Focus on developing extensive knowledge base including material on international practices and regulations of shared water resources. It is important that the public is made aware of the significance of water in driving economic development and its role in improving standard of living.

- a. Involve media, social networks, and civil society organizations from Afghanistan, Pakistan as well as Central Asian republics, by conducting joint regional programs conferences.
- b. Provide research opportunities for the academia and research organizations to explore the global history of the management of transboundary waters and its lessons learned.

Issue 7:

Maintaining and enhancing donor support for transboundary water development.

Recommendation 7:

Strategically engage donors to assist with enhancing technical capacity and assessments, provide facilitation for dialogue, and eventually assist in supporting infrastructure development.

Issue 8:

Lack of local knowledge and expertise to deal with transboundary water issues.

Recommendation 8:

Enhance local knowledge and skills to deal with transboundary waters. For example, work with Afghan Universities to teach transboundary waters at the higher education level. In addition, take advantage of local knowledge that exists in Afghanistan regarding water resources, including engagement of recent Afghan graduates of this field from abroad.

Issue 9:

Groundwater has not been discussed in relation to transboundary water at almost any level.

Recommendation 9:

Enhance understanding and knowledge regarding the key importance of groundwater resources that may exist and be shared with neighboring countries. In discussions with neighbors, effort should be made to identify and understand potential transboundary water resources and develop provisions for their future management.

Recommendations for the Panj-Amu Darya Basin

Issue 10:

There is a lack of concrete dialogue with northern neighbours on water allocation issues, and Afghanistan risks being sidelined if it does not actively engage.

Recommendation 10

Start dialog and trust building by data sharing, joint technical studies, technical assistance and academic exchange

- a. In the case of the Panj-Amu Darya, conduct joint studies between Afghanistan and Central Asian Countries over the flood control and riverbank protection. The joint studies, for example, can be started with Tajikistan, which already has a signed MUO with Afghanistan on data sharing.
- b. The government should take advantage of projects like SMART WATERS and PEER project, USAID funded projects for Afghanistan and Central Asian Countries, to promote and support knowledge exchange and joint research initiatives between academic institutions in Afghanistan and the Central Asian countries

Issue 11:

The Panj-Amu Darya basin has great potential for hydropower generation and has the largest potential for increased agricultural production in Afghanistan. However, its development

has not received enough internal attention and its role in contributing to national economic development in Afghanistan remains highly under-explored.

Recommendation 11

- a. Take advantage of the favorable transboundary situation in the Panj-Amu Darya basin to invest in water resource development. It will be beneficial for balancing population density across the country, preventing internal migration to large cities, and boosting country's food productivity.
- b. Intensify work on implementing the signed MoU with Tajikistan and expand that to cooperation on joint Afghan-Tajik projects including the Upper Panj-Amu Darya and Dashjrum dams. Promote the potential benefit sharing of a more regulated river with downstream countries regarding flood control, minimizing bank erosion, and reducing sediment transport issues.
- c. Promote the development of internal hydropower generating capacity on the major tributaries of the Amu Darya.

Issue 12:

Afghanistan is not a member of any regional organisations in the Amu Darya that are dealing with water management.

Recommendation 12

Afghanistan should strongly consider joining, or becoming an observer, to the regional water organisations, such as IFAS, to ensure its presence and secure its interests in future regional water deals.

Actively take part in existing regional programs initiated by international organizations such as the "Central Asia Energy and Water Development Program" by the World Bank.

Issue 13:

More emphasis is needed to link water related issues, such as Afghan water development, with other economic drivers in the region.

Recommendation 13

Expand the economic development initiatives, such as TAPI, CASA 1000, and the rail-road transport project with Turkmenistan/other Central Asian Countries to create joint water projects including hydropower generation and flood protection in Panj- Amu Darya Basin with support of international donors and organizations



Introduction

The purpose of this paper is to familiarize the reader with the key elements associated with Transboundary Rivers in Afghanistan and their implications on policy development. The paper synthesizes knowledge and different perspectives of many experts working in the area of transboundary waters. In doing so, it attempts to advance the main points of convergence of opinions in the form of recommendations and highlights those areas where more work is needed to build a common vision. The paper builds on the work of Duran's previous report entitled "Afghanistan's Transboundary Waters: An Overview" which was published in 2015, and focuses on advancing discussions and ideas for policy development in transboundary waters.

Afghanistan is blessed with being the source of several important river basins in the region. The average per capita internal surface water resource availability is approximately 2200 liters/cap/year.² However, the distribution is not even throughout the country. In the Amu-Panj system, the surface water availability is over 6000 liters/cap/year while in the Northern Basin it is only 600 liters/cap/year. In the Kabul River Basin, it is estimated to be in the order of 1160 liters/cap/year. These water resources are set to be harnessed as key drivers of the economy through agricultural, industrial and energy development. Agricultural development is particularly important in Afghanistan where it is responsible for some 30% of the GDP and 78% of the labour force³ and increased irrigation, and hence storage. Agricultural development is one of the key goals in the Afghanistan National Development Strategy to stimulate the economy (ANDS, 2008). "Investment in irrigation and in agriculture provides a unique opportunity in Afghanistan to facilitate economic growth, increase rural employment and enhance food security especially in rural areas".⁴

The government is increasingly interested in addressing transboundary water issues with its neighbours. Afghanistan currently has one water agreement with Iran on the Helmand River, which was negotiated in 1973. Under that agreement, Iran is to get 26 m³/sec water in normal and wet years. Ingeniously, the treaty provides for drought conditions by reducing the amount Iran can use in proportion to the decrease in available water due to the drought. Since

² This is based on averaging a number of studies. It accounts for only surface water generated in Afghanistan. It does not take into account water flowing from Pakistan into the Kunar system.

³ CIA (2015) The World Factbook - Afghanistan Retrieved 27 June from www.cia.gov/library/publications/the-world-factbook/docs/geoa/af.html

⁴ National Comprehensive Agricultural Development Priority Plan 2016-2020, Ministry of Agriculture, Irrigation and Livestock, August 2016 available at <http://policy.mof.gov.af/wp-content/uploads/2016/07/Comprehensive-Agricultural-Development-Program.pdf>

developing that advantageous agreement with Iran, Afghanistan has not entered into any significant dialogue with other neighbours. This situation is changing, however, as the effects of increased demand for water in the region collide with the impacts of climate change.

Countries in the region now realise the importance of efficiently developing their water resources to stimulate economic development, particularly in the agricultural sector. This was noted at the recent 4th National Water Conference held in March 2017. President Ghani stressed the importance of discussing water issues with Afghanistan's neighbours to help ensure stability and certainty in water resource management. Moreover, at the "Water for Life" 2005-2015 Conference in Dushanbe, Chief Executive Abdullah Abdullah noted that "water can and should become a resource for friendship, growth and economic integration" and added that "Afghanistan is now in a position to engage more constructively at the regional and bilateral levels to address win-win solutions with our friends and neighbors, based on international legal guidelines and prior experiences, taking into account the legitimate interests of all stakeholders" (Tolo news, 2013).⁵

As water resources become increasingly important as a mechanism for economic growth, it will also become more and more important to use them effectively and efficiently within countries and within the region. Global experience shows that when countries are faced with possible water scarcity over an international river there will either be increased tensions, or increased cooperation in addressing areas of mutual interest, such as sustainable water management. Giordano et al. (2005) argue that conflict is most likely to emerge in those areas where existing institutional regimes are destroyed by political changes and/or rapid changes in resources and environments, outpacing the capacity of institutions to deal with the change.

Communication, interaction and effective institutions help ensure that water scarce situations lead to greater cooperation. Cooperation is always more cost effective and economically beneficial than conflict, yet institutionally more difficult to manage at the beginning as it requires communication and trust (Giordano et al., 2005; Wolf et al. 2003).

As the pressures of increasing demand for water and climate change impact the region, downstream countries are becoming increasingly more interested in how development in Afghanistan may impact them. Likewise, over the last several years the government of Afghanistan has increased its awareness of the importance of engaging and discussing issues concerning international rivers with its downstream neighbours to ensure that the precious water

⁵ See Abdullah Urges Regional Cooperation at High Level Water Conference, Tolo News June 2015, <http://www.tolonews.com/afghanistan/abdullah-urges-regional-cooperation-high-level-water-conference>

resources in the region are used in the most effective way possible. This paper helps to advance those discussions by reviewing the situation and developing some possible ways forward in the Amu River Basin.

This paper also presents a brief overview of transboundary waters, their importance, and Afghanistan's need to develop its transboundary water resources. In addition, it highlights the achievements of the Afghan government since 2001 in regard to its water resource management. The paper looks at the existing legal and institutional structure of Afghanistan's water sector –the Afghanistan Water Law (2009) and its reference to transboundary waters, the Supreme Council of Land and Water (SCoLW) and other key institutions responsible for water protection and management in Afghanistan.

Moreover, this paper discusses the Amu River Basin, the existing challenges, opportunities and institutional needs in the basin. Finally, the paper presents the conclusion and recommendations on the transboundary waters in the country as a whole, and on transboundary waters of the Amu River Basin in particular.

Scope and Context

Water is a crosscutting resource affecting many sectors including agriculture, mining, municipal water use, and industry. At a fundamental level, sufficient water is needed with appropriate quality for healthy populations. At a more advanced level, it is a powerful driver of the economy. This paper acknowledges the importance of integrated water resources management and developing effective policies at the national basin and sub-basin levels (Duran, 2015). However, this paper only looks at the issues as they pertain to transboundary and international rivers. It does not comment on the applicability or effectiveness of integrated water resources management in Afghanistan, climate change mitigation strategies, national policies associated with poverty reduction and improving agriculture, amongst others.

The substantive input into this paper comes from two main sources. The first being a literature review of reports, publications and documents that relate to Afghanistan's transboundary rivers. The second, and more important source, is from interviews conducted with key experts who have insight and knowledge that extend far beyond anything that can be found in documents and publications. In total, some 20 experts were interviewed from a variety of ministries, academia, NGOs, and intergovernmental organisations. They were chosen to represent the breadth of views associated with transboundary waters.

The Importance of Transboundary Rivers

Transboundary rivers are those rivers that either cross between one country into the next, such as the Kabul River crossing from Afghanistan to Pakistan, or forms the border between the countries, such as the Amu Darya in Afghanistan's north which it shares with Tajikistan, Uzbekistan, and Turkmenistan. The Murghab River in the north flows into Turkmenistan, the Harirud to the west forms the border with Iran before flowing into that country, and the waters of the Helmand River flow into the *Karoun* system and eventually into Iran. In fact, it has been estimated that 90% of the surface water resources in Afghanistan are found in international river basins (Favre & Kamal, 2004) (Figure 1).

However, Afghanistan is not alone in having to deal with international rivers. Across the globe there are 276 confirmed transboundary rivers⁴ covering almost half of the total land surface of the globe (Odom & Wolf, 2011; Wolf et al., 2005; UN-Water, 2013) and over 600 shared aquifers, constituting the primary source of water for more than two billion people around the globe (Eckstein, 2015; Puri & Struckmeyer, 2010). Most of these basins have some form of agreement concerning various aspects of managing the river on an international basis. Some agreements address hydropower, others flood and drought, some focus on pollution, and about 117 have some component dealing with water sharing (Odom & Wolf, 2011).

⁴From those, 64 transboundary river basins are in Africa, 60 in Asia, 68 in Europe, 45 in North America and 39 in South America.

Figure 1: Major River Basins of Afghanistan (MHW, 2011)

The way that countries deal with each other has evolved through different rules and procedures that we term as "international law". In general, countries have evolved to respect each other's resource use and national sovereignty providing they are not negatively affected in a significant way. Water, however, is special in international resource law and there are two specific reasons for this. One is that water is highly mobile and moves across boundaries through the hydrological cycle. It evaporates in one place – perhaps the ocean, falls as rain or snow in another and may flow downhill to end up in another place. Secondly, water is "sine qua non" for life and has no substitutes for most of its uses. While oil for heating might be replaced by electrical power from hydro-generation, there is nothing that can replace water for drinking or for use in agriculture, which is the bulk of its use. Thus, it is highly mobile and essential for our survival.

Over the years there have been different perspectives on how to deal with international rivers, which range from "believing that a country has the right to develop its transboundary water resources anyway it likes" to "believing that a country should expect in the future the same inflow of water resources it has had in the past". The former, is often referred to as the principle of "absolute territorial sovereignty" where countries, usually upstream, can do anything

they would like with an international river within their own country regardless of the effects to other countries (usually downstream). This has been rejected as a principle of international water law as it places too much control in the hands of some players at the expense of others – usually downstream states. Also, in environmental international law there is a principle of “no significant harm” under which states should avoid conducting activities in their territory, which have significant negative impact on other states.

The “believing that a country should expect in the future the same inflow of water resources it has had in the past” is often referred to as the principle of “absolute territorial integrity” where the anticipation of countries, usually downstream, is that they can expect to experience the same amount of water resources that they have had in the past. This essentially means that a later developing upstream country cannot develop its resources as it would diminish or negatively affect a downstream country. This has been rejected as a principle of international water law as it places a virtual “veto” on upstream development in the hands of the downstream country. Similar, but slightly different, is the principle of “historical rights” or “prior appropriation”. This is where a country with a transboundary river develops faster than its neighbours and thus begins to use water so that when another country, usually upstream, starts to develop, the downstream country claims that it has previously used the water and has a “right” to do so in the future; thus, limiting the development of the upstream country. While there are some parts of certain countries where this is allowed, the western states of the USA for example, it has been rejected as a principle of international water law as it sets a status quo of water use that cannot be altered. International water law, however, acknowledges that changes in water use over time may occur. In fact, it specifically talks about considering “present and future use” and leaves out “past use”.

International law has evolved to balance both these extreme perspectives and there are currently two global conventions which countries may become signatory to regarding transboundary rivers. These are the 1992 Convention on the “Protection and Use of Transboundary Watercourses and International Lakes”, which was initially an agreement designed for Europe, but was extended to become a global agreement in 2013; and the 1997 “Convention on the Law of Non-navigational Uses of International Watercourses”, which entered into force in August 2014. Both conventions emphasise key elements of international law. These include: the duty to cooperate with other countries and make the best use of international water resources, and to make use of the water in an “equitable and reasonable” manner. “Equitable use” does not mean that water should be shared equally but rather many uses such as economic needs, population, alternative sources, and geography, should be considered. Also, “reasonable use” does not mean that “no harm” can occur to another state in using the water, but rather the use of the water in any one country should consider the impacts on other

countries using a transboundary river and that the use should be reasonable in the specific context of that basin.⁷

International law of water promotes the idea that countries sharing a transboundary river should come to an agreement on how they will manage the river. Fundamental to coming to agreement on water use is cooperation and dialogue. Developing agreements on water use and river management are particularly important as we face the challenges of climate change and population growth.

Afghanistan's Need to Develop Its International Rivers

Compared to the neighboring countries, Afghanistan is highly under developed. Table 1 shows comparisons between some development indicators as related to population. While the indicators do not necessarily relate the specifics in any one basin, they give an overall picture of the country as a whole. One helpful indicator is the Human Development Indicator (HDI), which is an assessment of the general socio-economic status of a particular country based on variables like literacy, life expectancy, nutrition, and other indicators. Within the region, Afghanistan has the lowest HDI measurement and is the only Middle Eastern and Asian country to have an HDI less than 0.5 (UNDP, 2015). Its Gross National Income (GNI) /capita is a measure of a nation's domestic production and income generated by nationals outside the country. Afghanistan has the lowest in the region, less than half of Pakistan and nearly 11 times less than Kazakhstan. It also has the lowest access to urban and rural water supply, which affects the health of its population (FAO, 2016). In terms of life expectancy, people can be expected to live 10% longer in Pakistan and as much as 20% longer in Iran.

While it is not a standard measure of development, it is important to look at the relative capacity to store water for agriculture in a region such as Afghanistan and its neighbors. Afghanistan significantly lags behind the rest of the region including Pakistan. The figure of 135 m³/cap is almost certainly inflated as it is based on installed capacity back in the 1960s and does not take into account sedimentation. While this is true for all the other nations, they have been able to maintain and upgrade their facilities to a greater extent than Afghanistan. Since the building of the Salma dam in July 2015, the potential storage capacity has increased a further

⁷ The concept of "no harm" to other states in international water law is often quoted as meaning that a state cannot develop if in doing so it harms another state. " Rather "all possible effort will be made to avoid causing significant harm", including exchanging information and dialoguing, among others. Where it is unavoidable, states should work together to mitigate it and discuss the extent to which it is "reasonable and equitable" to cause the harm.

22 m³/cap.⁸ The Ministry of Energy and Water (MEW) indicated that the 'real' storage capacity is likely between 100-110 m³/cap. Also, there is a project underway to raise the height of Kajaki dam so as to have a similar storage volume as when it was built.

Table 1: Socio-Economic Development Indicators in the Region

Country	Population (million) ⁹	HDI ¹⁰	GNI ¹¹	Life Expectancy ¹²	Storage ¹³ m ³ /cap
		2011	\$/cap		
Afghanistan	33	0.46	1885	60.4	135
Iran	80	0.78	15439	75.4	386
Kazakhstan	17.8	0.78	20867	69.7	5895
Kyrgyzstan	6	0.66	3044	70.6	4352
Pakistan	192	0.52	4866	66.2	150
Tajikistan	8.6	0.62	2517	69.4	4232
Turkmenista n	5.4	0.68	13066	65.6	1240
Uzbekistan	30	0.67	5567	68.8	801

In short, Afghanistan has every reason to need to build water infrastructure to enhance its agricultural production in order to stimulate greater development and improve its socio-economic development. This seems to be consistent with international water law and the principle of equitable and reasonable use, where one of the factors to be considered is the socio-economic condition of the populations in the basin.

⁸ The Salma Dam was completed in July 2015 with financing and engineering assistance from the Indian government. It was officially opened on 4 June 2016 by Afghan President Ashraf Ghani and India's Prime Minister Narendra Modi. The dam has a capacity of 620 MCM (of which 560 MCM is active storage). See WAPCOS (2016) Afghan-Indian Friendship Dam (Salma Dam), Water and Power Consultancy Services (India) Ltd. Retrieved 23 May 2016 from http://www.wapcos.gov.in/SalmaDam.aspx; TOLNews (2016, 4 June 2016) Ghani, Modi Inaugurate Salma Dam, TOLNews, Retrieved 4 June 2016 from <http://www.tolnews.com/links/salma-dam-project/25637-ghani-modi-inaugurate-salma-dam/>.

⁹ UNdata (2016) Country Profile –Afghanistan, Retrieved 2 August 2016 from <http://data.un.org/CountryProfile.aspx>

¹⁰ Human Development Index, See UNDP (2016) Human Development Report 2015: Work for Human Development, United Nations Development Programme, 2013.

¹¹ Gross National Income, See UNDP (2013) Human Development Report 2013: Work for Human Development, United Nations Development Programme, 2013.

¹² Human Development Index, See UNDP (2015) Human Development Report 2015 available at http://hdr.undp.org/sites/default/files/2015_human_development_report.pdf

¹³ Storage capacity from FAO (2016) Aqsaal calculated with current population figures. With updated storage figures as available.

Steps Taken in the Water Sector

Since 2001 Afghanistan has achieved a great deal with respect to managing its water resources in general. Much of the advances made on transboundary water related issues have been in recent years under the current administration (See Box 1). While building on the work of the previous administration, the openness and commitment of the current administration in addressing transboundary waters with its neighbors has advanced fair and reasonable discussions within the region.

Box 1: Key Points of Progress on Transboundary Water Issues

Policy:

- Approval of a draft transboundary water policy - awaits final approval of the Supreme Council

Legal:

- Finalization of the Afghanistan Water Law in 2008. Article 8 (5) of which states: "Planning and management of Afghanistan's transboundary waters is included in the mandate of Ministry of Energy and Water and is to be consulted with Ministries of Foreign Affairs, Interior, and Border and Tribal Affairs."

Institutional:

- Significant institutional adjustments – in 2016 the Transboundary Water Commission, headed by the President, and a Transboundary Water Management Unit was established at the MEW.

Infrastructure:

- Completion of Salma Dam on the Harirod River and beginning of reservoir filling in July 2015, marking a potential new era in the Afghan water development
- Improvements at the "on-farm" level water management since 2004 where improved efficiencies in the application of water for irrigation has been achieved by both the World Bank and the Asian Development Bank.

Human Capital Development:

- The government has undertaken efforts to build its capacity in transboundary water resource knowledge. International donors such as the World Bank and the EU are undertaking trainings and knowledge development in key ministries.
-

Regional Cooperation:

- The 2013 agreement between Finance Ministers of Afghanistan and Pakistan, on exploring the development of the Kunar River for joint benefit of hydro-electrical production (Thomas et al., 2016).
- 2010 and 2014 MoU on Cooperation in the Development and Management of Water Resources of the Panj-Amu Darya River Basin with Tajikistan, which involve exchanging data and information.
- January 7, 2016 MoU with Iran, which amongst others, includes committing to address transboundary water issues.

One of the themes that continued to emerge from the interviews was the improved political will and openness of the current administration to address transboundary waters. This was seen as one of the problems, which existed under the previous administration where either through lack of understanding or commitment, building transboundary water relationships was not viewed as a priority.

This openness and commitment has resulted in training and capacity building programs on transboundary waters, provided by donors such as the World Bank, USAID, and the EU. Many of those interviewed considered these efforts a solid step forward in dealing with neighbours to address transboundary water issues. For example, the government now has sufficient confidence to be considering its inclusion in regional water management organisations (such the International Fund for Saving the Aral Sea (IFAS)) as a means of ensuring its water needs and interests are considered in the region.

In addition, after a hiatus of nearly 30 years, construction recommenced with support from India, on the Salma dam in the Harimud river basin. It was completed and began filling in July 2015 marking the first major storage infrastructure to be developed in this new era. Early in 2016, the government took a step forward and signed a Memorandum of Understanding (MoU) with Iran.¹⁴ While the MoU addresses a number of issues, including trade, transport and security, it also notes the importance of addressing water interests:

"Given the significance of the Harimud river for both countries, the Parties agreed that in addition to forming a relevant joint taskforce, they will conduct studies with regard to water condition and capacity of Harimud, based on which, reasonable and just water

¹⁴ The agreement was signed by Chief Executive Dr. Abdullah Abdullah and Vice President of Iran Eshagh Jahangiri in Iran on 7 January 2016.

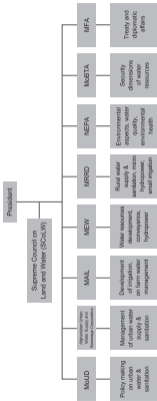
distribution will be negotiated consistent with international laws and regulations, and within the framework of economic, transit and trade package agreed upon between Iran and Afghanistan." (MoU between Afghanistan and Iran, 2016).

However, despite the achievements and advances made, some interviewees felt that more could have been done to promote transboundary waters, particularly under the previous administration. It was noted that the current administration needs to make transboundary water a priority as Afghanistan depends on agriculture, and climate change is likely to make water resources increasingly difficult to manage unless more infrastructure is developed.

Existing Legal and Institutional Structures

As water is such a cross cutting issue used by different sectors, there are different water institutions in Afghanistan which are responsible for protection and management of water resources. Figure 2 shows the major institutions and their relation with water in Afghanistan.

Figure 2: Main Organizations Dealing with Water in Afghanistan



Under the 2009 Afghan Water Law, "management and planning for the transboundary waters between Afghanistan and its neighboring countries and changes of watercourses are the responsibility of the Ministry of Energy and Water (MEW) with agreements from the Ministry of Foreign Affairs (MFA), Ministry of Interior (MoI) and the Ministry of Border and Tribal Affairs (MoBTA)" (Article 8 (B)). However, in practice different scenarios for dealing with transboundary waters emerged depending on circumstances. For example, it was during the "economic cooperation forum" where the Ministers of Finance (MoF) of Pakistan and Afghanistan announced the interest in pursuing the Kunar Cascade projects. In general, the Ministry of Energy and Water (MEW) has been central to issues pertaining to transboundary waters. Also, there is an understanding that the international nature of any dialogue with neighboring countries would necessitate the involvement of Foreign Affairs. Moreover, as many of the issues related to transboundary waters will involve infrastructure and economic development, the Ministry of Finance (MoF), with its relationship to international organizations such as the World Bank (WB) and Asian Development Bank (ADB), is also a key institution in transboundary water dialogues. Consequently, in May of 2018 the president created an inter-ministerial transboundary water commission (Figure 3). The president's office (the President) chairs the three key executive members. Associate members include other ministries related to water and the National Security Council.

Figure 3: Transboundary Water Committee



Associate Members: Ministry of Agriculture, Irrigation and Livestock; Parliamentarians, Ministry of Justice, National Security Council, National Environmental Protection Agency, DWBS, and Ministry of Economy

Each of the executive ministries has dedicated technical-staff working on transboundary water issues. These staff have worked together and have undergone capacity building together through an extended program supported by the World Bank (WB). There is a Technical Unit for Transboundary Waters Management in the Ministry of Energy and Water (MEW), dedicated staff in the Ministry of Finance (MoF), and increased focus on the issue in the Ministry of

Foreign Affairs (MFA) under the Directorate for Border Affairs and Security Cooperation. They have recently hired several transboundary waters and international water law experts to help them on the topic. In addition to these units in ministries, there is an Inter-Ministerial Committee (IMC) established, which brings together all the ministries involved in transboundary water issues and improves collaboration at the technical level between ministries. Additionally, there have been changes in the Supreme Council of Land and Water (SCoLW) – the Land portion was added in 2015, and notably it is now led by the President Ashraf Ghani himself, demonstrating importance given to the topic. Perhaps most importantly, the Afghan government prepared and approved its first National Transboundary Waters Policy in 2016, with a clear vision to cooperate and collaborate with its co-riparian states in order to tackle the existing problems on transboundary waters.

Introduction and Context of The Panj-Amu Darya Basin

Of the five major rivers flowing in Afghanistan, Panj-Amu Darya holds its place as one of the most important rivers based on geographical area covered, average annual flow, settled population, and its potential for agricultural growth. Panj-Amu Darya basin covers nearly 40% of Afghanistan's surface area, contributes approximately 30% to the country's annual water yield and holds nearly 25% of the Afghan population (Klemm, 2010).

The greater Amu Darya Basin is part of the larger Aral Sea Basin. The Aral Sea Basin's area is more than 1.7 million square kilometers (UNFAO, 2012); and is home to more than 100 million people in six countries: Afghanistan, Tajikistan, Kyrgyzstan, Uzbekistan, Turkmenistan and Kazakhstan (Figure 4). More than 84% of the Basin's population lives in Afghanistan and Turkmenistan. It is projected that the basin's population will increase to more than 120 million by 2020.

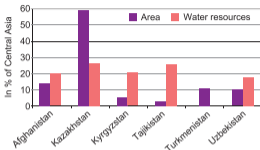
With the exception of Kazakhstan, the other countries are generally poor and vulnerable to water, energy and food insecurities (Statistics on GDP and HDI – See table 1). Agriculture plays a key role in the regional economy - 77% of Afghanistan's, 74% of Tajikistan's and 64% of Uzbekistan's populations live in rural areas. It is likewise a major employer - it accounts for some 59% of Afghanistan's, 46% of Kyrgyzstan's, 27% of Tajikistan's, 21% of Uzbekistan's, and 5% of Kazakhstan's workforces. In terms of GDP, agriculture accounts for 30% of the GDP in Afghanistan, 12% in Turkmenistan, 21% in the Kyrgyz Republic, 21% in Tajikistan, and 20% in Uzbekistan (UNFAO, 2012). Therefore, fertile land and water use for irrigation is of utmost importance for economic growth, political stability and food security in the region.

The available arable land in Central Asia is geo-politically significant. There are more than 59 million ha of arable land, of which 32.6 million ha are pertinent for irrigation (UNFAO, 2012). Uzbekistan and Kazakhstan, which are located in Turan plain of Aral Sea Basin, have the

highest land availability for agriculture and irrigation. The situation is limited for Tajikistan and Kyrgyzstan since their geography is in the mountainous part of Aral Sea Basin. Nearly 70% of Kazakhstan's total area, 60% of Uzbekistan's, 14% of Turkmenistan's, 12% of Afghanistan's, and 10% each of Tajikistan's and Kyrgyzstan's are arable (UNFAO, 2012). While there is great interest in the expansion of agriculture land, water may be a limiting factor (Figure 5). As a consequence of the region's arid climate, irrigation is very important for crop production and agriculture productivity (Babow, 2012).

Hydrological Backgrounds/surface and Groundwater Transboundary Resources

The Panj-Amu Darya Basin is located in the mountains of the Hindukush and Pamir ranges with an elevation range of 2000m to 6000m above mean sea level. The upper portion of the Basin is called the Panj River, which originates from the Pamir at the Afghan-Chinese border. After the confluence with the Yakkoh River, which flows from the Alai in Kyrgyzstan, the system is called the Amu Darya. This paper uses the term Panj-Amu Basin to describe the entire basin. The Basin has freezing winters and very hot summers (Favre&Kamal, 2004). The average precipitation in Panj-Amu Darya's plain area is reported to be 336 mm per year, which is more than Afghanistan's other river basins (ADB, 2015). In high altitudes, about 5000m near Pakistan borders, the average precipitation is more than 2000 mm per year. Most of the water of the Panj-Amu Darya derives from the high mountain glaciers of the Hindukush and Pamir-Alai-System, while the desert plains that cover about two thirds of the basin do not contribute significant amounts of water (Babow, 2012). In the contrast, the evaporation rate is very high in the plains and the river loses most of its water through evaporation, infiltration and withdrawal for irrigation. High water levels occur twice a year, the first in April/May after the snowmelt, which is quite short; the second is in June/July after the glacial melt (Kranz, 2005).

Figure 4: Distribution of Area and Water Resources in Amu Darya Basin (FAO 2012)

Being the longest river in the region, the Panj-Amu Darya travels 2,540 km, of which 1,250 km is on Afghanistan's border with Tajikistan, Uzbekistan, and Turkmenistan, until it reaches its final destination, the Aral Sea in Uzbekistan (Favre&Kamal, 2004). The catchment area of the Panj-Amu Basin, from its origin to where it leaves the mountains and flows to the downstream plain area, is approximately 534,740 km² (Klemm, 2010) and includes the Zarafshan River, which no longer joins the Panj-Amu Darya due to increased consumption (UNEP, 2011). The Afghan part of the total drainage area of Panj-Amu Darya is about one third of the total drainage area (90,693 km²) of surface area and contributes about 27% to the mean annual discharge of the Panj-Amu Darya Basin in total.

The main Panj-Amu Darya's discharge flow is from melting snow and high altitude glaciers from Afghanistan, Tajikistan, and Kyrgyzstan. The average total annual discharge of the Amu Darya is reported between 70 km³ (UNEP, 2011) to 80 km³ (Klemm, 2010). After Tajikistan, with discharge between 50 km³ per year, Afghanistan is the second largest water contributor to the Amu Darya Basin, with 22 km³ per year (Klemm, 2010) (Table 2). The main shared tributaries of Amu Darya are the Panj-Amu, between Afghanistan and Tajikistan, Vakhsh, between Kazakhstan and Tajikistan, Kalimgan, between Tajikistan and Uzbekistan, Surkh Darya, between Tajikistan and Uzbekistan, and Zarafshan, between Tajikistan and Uzbekistan, which, due to water withdrawals no longer reaches the Amu Darya. The Kokcha and Kundoz are the other two tributaries of Amu Darya generated within Afghanistan (Figure 5).

The Panj River, in the upper section of the basin is considered to account for between 32-36 km³ of which about 10 km³ are estimated to be generated in the Afghanistan portion. The Kamifaghan River, with 5.33 km³ in Tajikistan, and Surkh Darya with 5.1 km³ in Uzbekistan, are the right bank tributaries of the Amu Darya River. The Zarafshan River originating in Tajikistan is another tributary of the Amu Darya with 3.9 km³ discharge. The Afghan contribution to the Panj is estimated to be about 10 km³. The other major tributaries are the Kokcha and Kunduz, which contribute a further 6.2 and 4.2 km³ respectively (MEW, 2016) (Figure 5).

Table 2: Average Annual Flow to Amu Darya from Each Riparian Country

Country	Area of the country in the basin (km ²)	As % of the total area of the country	Average Total annual flow (km ³ /year)	Water withdraw (km ³ /year)	Water withdraw (%)
Afghanistan	167,473	25.4	22	5	6.25
Tajikistan	125,450	88	50	7.5	9.4
Kyrgyzstan	7,800	3.9	1.5	1.5	1.9
Uzbekistan	364,830	81.6	5	33	41.25
Turkmenistan	359,730	73.7	1.5	23	28.75
Total			80	70*	100

*The missing 10,000 million m³ is probably lost along Amu Darya and in its delta at the Aral Sea

Source: (Nemis, 2010)

The total groundwater resources of the Amu Darya basin excluding Afghanistan is estimated to be 14.7 km³ out of which 13.1 km³ annually is exploited (UNFAO, 2012). Afghanistan has significant groundwater resources, which are estimated to be around 18 km³ per year (Wassiq, 2004). The estimated groundwater recharge in northern Afghanistan basins is 74000 million m³ out of which 4500 million m³ belongs to Panj-Amu Basin and from this amount 100 million m³ is used annually (ADB, 2015).

Figure 8: Main Water Sources of Afghanistan in the Amu Darya Basin (Doran 2017)



Main Water Uses, Infrastructure and Potential for Development

Agricultural practices are one of the main sectors contributing towards economic growth and labor employment in Central Asia. There is more than 32.6 million ha land in Central Asia suitable for irrigation and agriculture expansion (UNFAO, 2012). Currently, the area which is equipped for irrigation in Amu Darya is 6 million ha out of which 2.3 million ha is in Uzbekistan, 1.8 million ha in Turkmenistan, 0.45 million ha in northern Afghanistan, and 0.5 million ha in Tajikistan (UNFAO, 2012). Nearly 95% of water withdrawal is for irrigation (Babow, 2012). Most of the irrigation network of the Central Asian countries were developed and equipped during the Soviet Union, from the 1950s to the 1980s (UNFAO, 2012).

The total irrigated area in Central Asia increased from 4.5 million ha in 1965 to 7 million ha in 1991. The expansion was facilitated by large infrastructure projects in the Amu Darya Basin. This included more than 80 water reservoirs and 45 hydropower plants in the Aral Sea Basin (UNFAO, 2012), of which 35 reservoirs with a capacity greater than 10 million m³ and total water storage of 29.8 km³ are within Amu Darya Basin (UNECE, 2006). The largest

hydropower plant is Nurek in Tajikistan on the Vakhsh river with a capacity of 2700 MW (Wegerich, 2008).

The construction of the Rogun Dam, with storage capacity of 13.3 km³ and hydroelectric capacity of 3,600MW, has recently been started (BBC NEWS, 2016). It will potentially be the largest dam in the region. However, the proposed operations of the dam indicate that there will be little change in flow on the lower sections of the Vakhsh River, and thus the Amu River. Its effects on Afghanistan appear to be very limited (Pöryy, 2012).

Irrigated agriculture products account for 85% of Afghanistan's national crop output. Based on satellite imagery, UNFAO estimates that the total irrigable land in Afghanistan is more than 3.8 million ha, out of which 2.4 million is reported by the Afghanistan Ministry of Energy and Water to be rehabilitated. Most of Afghanistan's irrigated land is within Helmand River Basin and Northern River Basin of Afghanistan. The Helmand Basin contains 48.9% of irrigated land, the Northern Basin contains 16.5%, the Kabul River Basin 14.4%, and the Panj-Amu contains 11.7% of total irrigated land (ADB, 2015).

Due to the arid climate, agricultural water use in Central Asia is estimated to be 11000 - 14000 m³/ha (UNFAO, 2012). More than 70% of the Amu Darya's annual flow is exploited by Turkmenistan and Uzbekistan, while Afghanistan and Tajikistan, the two largest water contributors, use a small percentage (Figure). Afghanistan's annual water withdrawal per person is less than 1000 m³, Tajikistan, Kyrgyzstan and Kazakhstan are between 1000 to 2000 m³, Uzbekistan is between 2000 to 3000 m³, and Turkmenistan between 3000 to 6000 m³ (UNFAO, 2012).

Figure 6: Water Flow and Water Withdrawal in Central Asia (Victor Hordkov and Philip Poloczek UNEP/GRID-Regional April 2006)



Based on state plans, water withdrawn from Amu Darya will increase from both Tajikistan and Turkmenistan, which intend to increase their irrigated land by 50,000 ha and 450,000 ha of land, respectively, for planting rice, cotton, and wheat (Babow, 2012).

More than 90% of Afghanistan's irrigated lands are traditional community managed irrigation systems, which are developed, managed, owned and operated by the local communities based on accepted societal norms. Nearly 10%, about 333,000 ha, of irrigable lands are under formal governmental irrigation systems. The formal irrigation systems include main canals, intakes, and regulators. Table 3 shows irrigation systems in Panj-Amu managed by MEW & MAL. The total irrigated land in Panj- Amu Darya is about 448, 288 ha out of which roughly 100,000 ha is managed by the government (ADB, 2015). There are plans to increase the irrigation area in the Panj- Amu Darya basin (Table 4 & 5).

Table 3: Irrigation Systems Mainly Managed by MEW & MAJ

No	Scheme	Province	Irrigable area (ha)	Main structures	Remarks
1	Sang-i Mehr	Badakhshan	3,000	Intake and main canal Q=2.5 m ³	Run by community; maintenance by community organizations
2	Kunduz-Khanabad	Kunduz	30,000	Diversion, left and right canal, regulators	Upgrading completed in 2010 with EU assistance
3	Shahrawan/ Lower Kokoha	Takhar	40,000	Intake, main canal	Water flow managed by government; maintenance by community organizations
4	Gawargan	Baghlan	8,000	Intake, main canal	8,000 ha out of 20,000 ha currently cultivated; water flow managed by government; maintenance by community organizations
5	Kilgay	Baghlan	20,000	Intake, main canal	Water flow managed by government; maintenance by community organizations
	Total		101,000		

Source: Favre & Kamal (2004), *Watershed Atlas of Afghanistan: Vol II, Parts I-IV*. Updated by MEW.

Afghanistan has 240 MW of operational hydropower capacity and currently only 1% of its potential production of around 23 GW has been developed. Table 4 illustrates the existing hydropower, run-of-river, dams in Panj-Amu Darya Basin in Afghanistan. Only two of the existing dams in Pull Khumli are over 4 MW in capacity, the rest are mini-hydropower schemes with 0.1 to 0.5 MW ability (ADB, 2015). However, there are plans to exploit the large generating potential the region has to offer (Table 5). The majority of the planned measures are on Afghan tributaries and would be run-of-river schemes having limited impacts for transboundary waters. The largest schemes, the Doshitjum and Upper Amu hydropower projects, would require joint development with Tajikistan (Table 5). These two projects alone would produce 5 GW when constructed.

Table 4: Existing Hydropower and Multi-purpose Dams in Panj-Amu Basin

Name	Province	Main use	Installed capacity (MW)	Current capacity	Irrigable area
Puli Khumri 1	Baghlan	HP&IR	4.8	4.8	14787
Puli Khumri 2	Baghlan	HP&IR	9	9	13420
Jerm	Badakhshan	HP	0.5		
Chata	Badakhshan	HP	0.1		
Nalan	Badakhshan	HP	0.1		
Farghanbol	Badakhshan	HP	0.3		
Sang Aab	Badakhshan	HP	0.1		
Faizabad	Badakhshan	HP	0.25		
Baharak	Badakhshan	HP	2.2		
Yarsaj	Takhar	HP	0.5		
Khesham	Badakhshan	HP	0.1		
Total Panj-Amu			17.96	13.8	28207

Table 5: Proposed Large Multi-Purpose Projects

Scheme	River	Main use	Power (MW)	Storage (km ³)		Irrigation (ha)	
				Total	Live	Existing	New
Kelagai	Kunduz	IR/HP	54	416	129	38,899	12,165
Hasantal	Nahrin	IR		18.9		4,100	5,170
Yarsaj	Talqan	IR/HP	45	320	214	63,110	10,000
Khanabad RO	Talqan	IR/HP	10.5			36,226	0
Qalai Mamay	Kokcha	HP	445	1815	136		
Lower Kokcha	Kokcha	IR/HP	30	1.4		106,355	25,547
Upper Amu*	Amu Darya		1000				
Dashjhum*	Panj		4000				

HP = hydropower, IR = irrigation, MW = megawatt

Source: Landell Mills Investment plan 2013, *Source: Fichtner 2013 p246.

Legal Considerations

During the Soviet Union's regime, the Central Asian countries' water resources were managed by a centralized administration in Moscow. Based on the centralized system, the downstream riparian states, Turkmenistan and Uzbekistan, were developed to produce cotton while upstream Tajikistan was utilized to store water for irrigation and hydropower generation during the summer. Tajikistan would then receive oil and gas generated electricity from the downstream states during the winter months when it needed it most (Babow, 2012). During the Soviet era, Afghanistan and Kyrgyzstan were viewed as simple sources of water without having a real right to it (Wegerich, 2008).

In September 1967, the Scientific-Technical Council of the Soviet Ministry of Land Reclamation and Water Management decided on the annual water distribution limits for the Union Republics of the Amu Darya Basin and at the same time created River Basin Organizations (Bassoynoe Vodnoe Ob'edinenie(BVOs)). In the same year, Protocol 566 of the Scientific-Technical Council, established withdrawal limits for four Central Asian republics of the Amu Darya (Wegerich, 2008). It should be emphasized that Afghanistan was not involved in the development of the Protocol. The allocation limits laid out under Protocol No. 566 are in Table 6: Extraction Limits for Amu Darya as per Protocol 566.¹⁵

Table 6: Extraction Limits for Amu Darya as per Protocol 566

Country	Billion m ³ /yr.	%
Kyrgyzstan	0.40	0.6
Tajikistan	9.50	15.4
Turkmenistan	22.0	35.8
Uzbekistan	29.60	48.20
Total allocation	61.50	100.0

Under Protocol 566, the total annual volume of the Amu Darya was estimated at 70.23 bcm/yr. Beyond the 61.50 bcm/yr, the Council estimated for 8.73 bcm/yr in losses, including 3.48 bcm/yr of losses in the reservoirs; 3.15 bcm/yr in sanitary flows for the Amu Darya; and 2.1 bcm/yr in extraction from Afghanistan.¹⁶

¹⁵ Protocol 566 of the meeting of the scientific technical council of Ministry Land Reclamation and Water Management of USSR, 16, Sept 1967, Regulation #6.

¹⁶ Table 1 Protocol 566.

After the collapse of the Soviet Union, all five Central Asian states signed the Cooperation in the Field of Joint Water Resources Management and Conservation of the Interstate Sources Agreement (1992 Almaty Agreement) on 18 September 1992 in Almaty. Under the agreement, "the existing pattern and principles of water allocation" were respected, which is understood to mean the same water use allocations proscribed in Protocol 666. The "energy for water" exchange, which was set up and administered by the former Soviet Union, has been difficult to maintain for a variety of reasons, including economics and the socio-political attitudes of the different governments. Significantly, in the latter part of the 90s, the increasing price of energy was such that it favored exporting energy resources to outside the region by downstream states. At the same time, upstream states continued to supply energy to its populations for prices that were below regional market prices as an economic stimulant. This led to increased discord whereby energy was not supplied in adequate amounts by downstream states and upstream states held back summer flow water for winter generation. Declining precipitation further played havoc with the water resources, particularly in 2011 and 2012 when reservoir levels in upstream states were at all-time lows (World Bank, 2004). Consequently, despite interventions from the international community, including USAID helping to broker the 1998 Long-Term Framework Agreement, tensions over the energy water exchange emerged and led to a collapse of the exchange system (Paisley, 2017). The international community, including the United Nations and World Bank, has been working for over a decade to help establish a new more effective water-energy agreement, but so far, a functional agreement on water sharing and allocations has remained elusive (Paisley, 2017).

Afghanistan had previously made several border related treaties with the USSR that dealt with water. However, none of them specified any allocation of the shared waters of the Panj-Amu Darya River. The 1946 agreement focused on setting the boundary of the countries as the mid-point of navigation (thalweg) of the river where the river is navigable and the half-way point thereafter. The 1958 agreement elaborated the regime along the border (shared river) as it concerns navigation, fisheries, and agriculture. Article 7 defined the term boundary (or frontier) waters and in paragraph 3 noted that the agreement does not apply to internal waters:

Article 7

1. *The term boundary (or frontier) waters in the Treaty means those waters along which the frontier line runs in accordance with the Soviet Afghan frontier demarcation and re-demarcation documents of 1947-1948.*
2. *The contracting parties shall take measures to ensure that in the use of frontier waters, and the waters of the rivers which flow to the frontier or into frontier waters, the provisions of this treaty and the special agreements between the Government of the*

USSR and the Government of Afghanistan are observed and the mutual rights and interest of both Contracting Parties are respected.

- In accordance with the general principles of international law, paragraph 2 of this article shall not apply to those waters of the Contracting Parties which are national internal waters and which are covered by the national legislation of the Contracting Parties.*

Article 8 (1) stated: "Both Contracting Parties shall be allowed the use of frontier waters up to the frontier line".¹⁷ However, this does not mean 'use' as generally thought of in terms of water extraction. It must be interpreted with the remainder of Article 8, which is entirely devoted to issues of navigation. Hence, "use" in this term refers to using the water for boats.

Other interesting articles include:

Article 16

Questions concerning the use of boundary waters shall be governed by special agreements between the contracting parties.

Article 17

The competent authorities of the contracting parties shall exchange as regularly as possible such information concerning the level and volume of water in boundary rivers and also concerning precipitation in the interior of the territory of the two parties as might avert danger or damage from flooding. The competent authorities shall as necessary also agree on a mutual system of signals during periods of high water.

Under the agreement "bridges, dams, and other similar structures likely to hinder navigation or influence the flow of water shall not be erected on frontier watercourses except by agreement between the two Parties".¹⁸ Concerning the issue of bank erosion, such that dykes or walls being built on the Tajik or Turkmen side of the river that are exacerbating erosion problems on the Afghan side, are also dealt with in Article 19.

¹⁷ 1988 Frontier Agreement, Art.8 (1).

¹⁸ 1988 Frontier Agreement, Art. 20 (2); this is also supported by Art. 20 (1) which calls for special agreements to be developed for roads (bridges) and waterways intersecting the frontier line.

"New dykes which might affect the flow of water and the state of the banks, and also cause damage thereto, may not be erected on frontier watercourses except by agreement between the two Parties".¹⁹

This unequivocally states that such bank protection and construction, as is currently being done, without Afghan consent, would be in breach of this treaty.

A subsequent protocol to the treaty of 25 June, 1958 on the Joint Execution of Works clearly outlines joint development of infrastructure to utilize waters in the section of the river at Kelif.²⁰ "Use" in this sense means hydro-power and irrigation. Joint surveys were to have been conducted in the years 1958-1959 on the Afghan side of the river.²¹ The envisioned work is not specified, however the protocol indicates that after joint technical studies, the parties will additionally agree to "principles, volumes and terms and conditions for design and construction aimed at the integrated utilization of the Panj-Amu Darya River water resources".²²

Although the 1958 Treaty is almost 60 years old, its provisions are still relevant in that Turkmenistan, Uzbekistan and Tajikistan, which are affected by the 1958 Treaty, have acted as though they are implementing the treaty, or at least have not denounced the Treaty once they gained independence following the collapse of the Soviet Union. As these treaties and protocols form the basis of formal water related issues between Afghanistan and Central Asian countries, it is worthwhile to review their applicability in 2017.

Under the Afghanistan post-Taliban era, the Afghanistan government has made efforts to cooperate with neighboring countries on transboundary waters. Several Memoranda of Understanding (MoUs) on data and information exchange have been developed with Tajikistan including:²³

- I. Agreement between the Government of Tajikistan and the Government of the Islamic Republic of Afghanistan on Cooperation in the Area of Development and Management of Water Resources in the Panj and the Amu Darya Rivers (25 Oct 2010, Kabul)

¹⁹ 1958 Frontier Agreement, Art 19 (3).

²⁰ Protocol Between the USSR and Afghanistan on the Joint Execution of Works for the Integrated Utilization of the Water Resources in the Frontier Section of the Amu Darya, 25 June, 1958, Art 1.

²¹ Protocol Between the USSR and Afghanistan on the Joint Execution of Works for the Integrated Utilization of the Water Resources in the Frontier Section of the Amu Darya, 25 June, 1958 Art 1 & 2.

²² Protocol Between the USSR and Afghanistan on the Joint Execution of Works for the Integrated Utilization of the Water Resources in the Frontier Section of the Amu Darya, 25 June, 1958 Art 3.

²³ See Aldo Tomo, Margja Halimova, and Naim Espar (2013) DRAFT REPORT - Improved Management of Water Resources in Central Asia, Asian Development Bank.

- i. Memorandum of Understanding (MoU, 2007)
- ii. Minutes of Meeting (Protocol) signed by the MEW, the MLRWR, the MoA and the CNP of Tajikistan (03 August 2007, Dushanbe)
- iv. Agreement between Governments on Mutual cooperation on Transboundary River Use and Protection (2007)
- v. Minutes of the Joint Meeting of Delegations from Tajikistan and Afghanistan concerning Bank Strengthening Works on the Panj River (March 2007), and Strengthening Transboundary Cooperation in Water Resources Management between Afghanistan and Tajikistan in the Upper Panj-Amu Darya River Basin (Northern Atlantic Treaty Organization-Environment and Security Initiative, April 2007).
- vi. MoU between the MEW and the MLRWR, (September 2006)
- vii. Cooperation Agreement on the Reclamation of Hydropower Resources of the Pyanj River (April 2005).

Following the 2010 Agreement, annual meetings between these two countries have been held, facilitated by UNECE. As result of these meetings, a new Memorandum of Understanding, Annex 1, was signed in 2014 between these two nations for the period of 2015-2017 and prospectively until 2020. The 2014 MoU on Exchange of Hydrological Data and Information Relating to the Panj-Amu Darya River Basin, aims that both governments will interact and cooperate in the exchange of hydrological data and information on a regular, mutually beneficial and free-of-charge basis. The MoU discusses the scope of notifications on hazardous and extreme hydro-meteorological events, format and coordination of hydrological data and information exchange, communication channels of data provision, and dispute resolution mechanisms.

Potential Challenges for WMmanagement in the Panj-Amu Darya

In most cases around the world, particularly in developing countries, water scarcity might not be the key problem; rather it is the institutional and managerial failure that result in serious situations (Grigg, 1996). This might be very true about the Aral Sea Basin. For decades, the basin has been under poor management and imbalanced water use conditions. Massive cultivation of water-intensive cash crops in the downstream regions of Amu Darya and Syr Darya, Uzbekistan and Turkmenistan, has changed the harmonious balance of the region to significant ecological and human catastrophe (Peachey, 2004). Water related critical issues in Central Asia undoubtedly have created an uneasy political environment between the riparian countries (Khamzayeva, 2009; Paisley, 2017). Years of political unrest in Afghanistan have

hindered the chances of improvement, including progress in infrastructure and non-infrastructure foundation of the country's water resources. The current stability of the last decade, has provided Afghanistan with opportunities to enter the competition over shared resources and take the most of its fresh water resources.

It is not only the Afghans' belief, but also the endorsement of comprehensive analysis, that without a sincere approach towards emerging water projects, Afghanistan will not reach its development goals. Considering the population growth rate, 2.4, and having more than 80% of people in rural areas (UNFAO, 2012), Afghanistan's water resources development should be measured as an essential pillar for its social and economic development (Kuoanqui, 2011). However, what have been the barriers in the way of stimulating the Afghanistan water sector, and how do those obstacles create challenges in transboundary waters? During this research, through discussions with key experts, a wide variety of perspectives have been solicited on the challenges and opportunities associated with managing water resources in the Panj-Amu Darya Basin. The following are some of the prominent areas where interviewees had greatest consensus.

A Need for Strong Political Will

Under the new Afghan administration, there has been increased political will for management and development of Afghanistan's water resources. Similarly, the atmosphere for Afghanistan's transboundary waters has also become more open. However, the majority of interviewees remarked the need for increased strong political will and transparent governance to address not only existing water sector challenges but to make the role of Afghans more active in the region so as to have progress over the management of shared waters. It is believed that the low level of desire within the last government in investing in Afghanistan's water sector, particularly in the Panj-Amu Darya River Basin, has caused the continuation of people's difficulties in meeting their minimum water needs. Interviewees made a note of this lack of attention paid to developing water resources. In referring to the lack of development in the northern areas, one participant noted that:

"Afghanistan is endowed with plenty of fresh water, though, we suffer from water scarcity, food insecurity, or water disasters because of the poor government leadership in managing and developing this resource."

Lack of interest in productive engagement with neighbours is also viewed as one of the major reasons for the lack of advancement on developing badly needed storage capacity in the country. As one interviewee put it:

"Afghanistan's capacity to use abundant water resources of Panj-Amu Darya is very low comparing to downstream Central Asian countries. The last decade has been the gone golden years in terms of gaining the international community's trust and accessing international funds for developing large-scale water projects including dams. However, alongside the neighbours' attitude in discouraging donors to fund building dams in Afghanistan, the lack of right leadership vision and management strategy in the sector has also resulted in the loss of this opportunity."

The interviewees believe that Afghanistan's inability to control its waters should be addressed in favour of its people. Almost all respondents believed that the government could reach a better water deal when it will be able to control its resources. One of the interviewees added:

"We cannot think of progress in transboundary waters with neighbours, without making progress at national level. As long as our waters flow out of borders without our controls, no one will care about our limitations in accessing water resources."

Lack of Good Governance

In addition to lack of political will, many interviewees felt that the decision-making with respect to dam location, construction and development, as well as contracting and engineering, was not sufficiently transparent. Many decisions made in the past may have been made for personal reasons and not necessarily with the aim of benefiting Afghanistan as a whole. For this reason, many felt that the Panj-Amu Darya Basin had not received the attention it deserved over other basins. One interviewee indicated that:

"Implementation of [a] water project is not based on a national water master plan and essential needs of the people, as no plan exists. Projects are prioritized and funded by government based on the political preference of the region and influence of powerful local authorities on [the] central administration."

From a transboundary point of view, lack of a comprehensive national water master plan was also pointed out by another interviewee, from one of the Central Asian countries, as a challenge. As he said:

"Having no information regarding Afghanistan's investment and water master plan of the Panj-Amu Darya to clarify the Afghans future water use expansion is a concern for the downstream countries."

Insufficient Infrastructure and Equipment

Afghanistan has the least developed water infrastructure in the region. Its internal renewable water availability is nearly 2200m³/capita/year,²⁴ comparing favourably with neighbouring countries, Iran (1430m³/capita/year) and Pakistan (1000m³/capita/year) (ADB, 2015). Unfortunately, Afghanistan has been able to exploit only one third of its total surface water (Water Resources Management Sector Strategy, 2008). With 80m³ per capita per year, Afghanistan has one of the minimum storage capacities in the world and the least in the region (ADB, 2015) (See Table 1). Majority of interviewees identified this matter as a key issue. There was also a consensus among interviewees regarding the insufficiency and ineffectiveness of existing water structures for solving water shortages during summers, preventing flood destructions or generating hydro-power in the country, and particularly in the Panj-Amu Darya.

Among five major Afghan river basins, Panj-Amu Darya is the least developed river basin. The Panj-Amu Darya contains approximately 30% of the country's water resources but the water utilization capacity in the basin is only 10 (UNFAD, 2012) to 20% (Klemm, 2010). In 1980, irrigated land in the Amu Darya basin was reported to be 385,000 ha with estimated water consumption of about 5 Billion cubic meter annually (Masood Ahmad, 2004). This is likely similar to today, although there have been projects to improve irrigation networks. Several interviewees shared their own observation of continuous water shortage in the area during the irrigation season. They noted that the lack of infrastructure to supply water is exacerbating tensions between Afghan farmers/users, mostly in rural areas. One of these interviewees said:

"Water conflict between Talaghan and Kunduz farmers is a serious problem during the irrigation seasons due to lack of enough stored water."

Another interviewee, mentioning the imbalanced water use in Panj-Amu Darya region, added:

"Our people in Panj-Amu Darya don't have enough water to drink or produce food for their families, while our country's waters flow out and gets used by the neighbours for cultivating water intensive crops like cotton."

The high available potential for development of Panj-Amu Darya has been assessed in proposed projects under the 2013 Panj-Amu Darya Investment Plan. After completion of three projects in Amu Darya including Kelagay, Upper Amu or Lower Panj, and Lower Kokcha Irrigation and hydropower projects, water withdrawal from Amu Darya will increase to 6,000 Billion cubic meter till 2020 (Klemm, 2010) and 570,000 ha land will access reliable water

²⁴ This does not include the contribution of the flow in the Kunar from Pakistan, which is about 16 bcm/yr.

resources, 277,000 ha of land will newly be irrigated and about 1100 MW electricity will be generated in Panj-Amu river basin. Large-scale hydropower projects are also included in the investment plan of the Panj-Amu Darya.

Climate Change, Extreme Water Events; Flood and Drought

Amu Darya is indicated to be under high stress for water resources (Mohammad Waheed Ibrahimzada, 2012). If the climate change adverse impacts are added to the growing demands and other stressful factors, the existing tension will increase on water resources in the region (Utemuratov, 2012). Based on field observations and climate change modeling, the environment in Central Asia has been warming for several decades (Dr. Mikko Punkari, 2014). The predictions for Afghanistan will be less water in the future as 80% of the country's water resources are from melting snow and high altitude glaciers (Water Resources Management Sector Strategy, 2008). A recent publication from the National Environmental Protection Agency and UNEP indicates that in a good case scenario, temperatures will increase on average by 1.5°C by 2050, and in the worst-case scenario by 3°C. Moreover, the regions most affected will be the higher elevations of the Hindu Kush and Pamir ranges which will disproportionately affect the water resources in the Panj-Amu Darya basin (UNEP, 2011).

The peak flows in the rivers, particularly in upstream Tajikistan, Kyrgyzstan, and Afghanistan, will decrease and will be shifted from summer to spring with a decrease in overall magnitude and more frequent floods as precipitation falls more as rain and less as snow. Additionally, increasing temperatures in the mountains will cause thawing of permafrost, which may mobilize massive landslides and mudflows. (Dr. Mikko Punkari, 2014).

It is not only scientists that are concerned with the consequences of climate change, but also the majority of interviewees believe that changes to the pattern and form of precipitation will be a serious threat to water availability in Afghanistan and as well as the entire region. Some of the responders even noted their own first-hand observations of shrinking snowpack on the high mountains of Panj-Amu Darya Basin:

"You might have read about climate change in books or journals but we have been feeling it in our neighbourhood in north Afghanistan and have noticed how much the amount of glaciers has shrunk. And in recent years we have measured less snow during winters. The flash flood events have also been more frequent. And this may indicate that we are beginning to lose our ancient glaciers."

The river volume will be reduced due to hotter and drier climate in the region (Dr. Mikko Punkari, 2014). The warmer climate has already melted much ice, and it is predicted that by 2050, 40 to 60% of glaciers on high mountains will have melted (Droogers, 2012). The implication of the changes will be more pressure on the shared water resources of the Amu Darya, which is already under stress caused by increasing demand and poor management.

Destructive Floods

Floods in Afghanistan have increased significantly due to deforestation and vegetation losses, which jointly decrease the water holding capacity of the lands. Afghanistan has lost around 34% of its forest cover between 1990 and 2005, totalling 442,000 ha (ADB, 2015). The climate, topographic, and land cover of Afghanistan has made it a country prone to flooding. Lack of enough flood control structures has allowed flooding to destroy farmland and houses (Habib, 2014). More than 300 flood incidents were recorded from 2012 to 2014, of which most occurred in the north and central provinces (ADB, 2015). Among the natural hazards, flooding is the most frequent event and drought the most economically destructive event in Afghanistan (UNISDR, 2014).

Failure in River Bank Protection

One of the other serious challenges facing the Panj-Amu Darya Basin is river bank widening. The reasons for widening includes the lack of flood control structures, such as dams for controlling floods and protecting river banks, intensive rainfall and flash flooding (probably exacerbated by climate change), clearing of vegetation on river banks, and destruction of the forest cover in catchments leading to erosion and downstream flooding and sedimentation (ADB, 2015).

Several interviewees noted that Afghanistan has never found a permanent and sustainable solution for river-bank protection of the Panj-Amu Darya to keep agricultural land and houses protected and to prevent soil erosion. Bank erosion is a natural phenomenon with a highly variable river like the Panj-Amu Darya. Agricultural practices, which may destabilize the bank, such as tree removal, exacerbate the problem. However, some water experts viewed that bank protection and construction on the opposite side of the river have had a particularly destructive effect on Afghanistan's banks by driving the water towards Afghanistan. As one the respondents put:

"We have no clear border signs/benchmarks over the borders alongside Panj-Amu Darya since they have all [been] washed out by floods and every day we see how river bank lining [on the] Tajikistan side affects negatively the Afghan agriculture lands since the water flow direction keeps heading towards Afghanistan land."

It is worth mentioning that Amu Darya is the river with the second highest sediment load in the world after the Huang He in China. Thus, the riverbed in the plains is not very stable and often shifts (UNFAO, Irrigation in Central Asia in figures, 2012). The Ministry of Agriculture, Irrigation, and Livestock in Afghanistan, estimates that in the past 14 years, nearly 15,000 ha of arable land has been lost by Amu River's relocation in four Northern provinces: Balkh, Jowzjan, Takhar and Kunduz. And nine villages have been completely destroyed in these provinces.

Currently, more than 54,800 ha of agricultural land are under serious future threat and 100,000 ha are under a moderate threat. And about 28 villages in the area are at risk of destruction (Stanikzai, 2015).

Following the Afghanistan National Strategy for Water Sector, the Ministry of Energy and Water has planned a riverbank protection program under which some projects have been designed but not yet implemented due to funding limitation. The total budget for Afghanistan bank projects in five river basins has been estimated to be \$ 0.62 billion (ADB, 2015) out of which about half is for the Panj-Amu Darya.

Policy Gaps /Limited Implementation

Unclear delineation of responsibility and lack of integration among line ministries over projects need to be addressed in water law revision (ADB, 2015). Some interviewees believe that the 2009 Water Law did not sufficiently and clearly define each line ministry's function and responsibilities, resulting in overlap and duplication in some areas, and gaps in developing projects in other areas. The problem of ministries competing for similar projects is also problematic. This extends even to some large projects. One interviewee noted:

"One example of having limited coordination is the Salma Dam in which its irrigation network has not been developed parallel with dam construction. Now it will take years to get the Salma water into irrigation works. We seem to practice NWRM approach but the work is divided in several administrations."

In addition to a review of the 2009 Afghanistan Water Law aiming at clarifying roles and responsibilities of the line ministries, those interviewed believe that there are challenges with implementation and application of the existing policies and transforming them to objectives and goals of national programs. Some of the key causes include limited institutional capacity, low availability of relevant data, and lack of coordination in data and sharing between ministries.

To address issues of policy gaps or overlapping roles in dealing with transboundary waters, the government has drafted a Draft National Transboundary Water Policy, which outlines specific roles and responsibilities, the process for addressing issues, and the general principles that will be applied when dealing with neighboring countries. The draft policy remains at a high "process" level. Details on how to address specific issues such as forging partnerships with private investment, or dealing with specific groundwater issues, will be addressed either through regulations or on a case by case basis as the need arises.

In relation to transboundary waters, in addition to improving the coordination and collaboration between MEW and MOFA, working on capacity building and institutional empowerment will be necessary to implement the Draft National Transboundary Policy.

Need for Skilled/ Experienced Human Resources

During the interviews, the majority of the respondents mentioned the gaps of skilled/experienced water professionals as one of the challenges for sector growth both at the national and transboundary level. While at the national level there is lack of qualified water experts, there is a dearth of capacity among Afghan diplomats, who understand water diplomacy and are able to deal with international transboundary waters practices.

Respondents identified the importance of the country's water resources and the necessity of government action to fill the human capacity gaps of the sector by designing special capacity building programs for educating both water experts and water diplomats. In close relation with this challenge, the old and out-dated curriculum currently available in universities should be updated. Water resources related studies in Afghanistan universities have not been updated with recent technologies, such as remote sensing. As noted by one national water expert:

"I have had a chance to pursue my master degree abroad, in one of the Central Asian countries. And I realised that our education system is not equipped with new technologies including remote sensing and other new engineering techniques while other countries use this technology to conduct research in the entire region."

The lack of resources, both financial and human, at the river basin level were also identified as key areas where there are opportunities for improvement:

"In our department, we don't have qualified water experts to help us with the accomplishment of our responsibilities, for example river basin planning, or doing engineering designs. The government should use the incentive approach to encourage qualified experts to come and work in remote areas besides providing more educational opportunities outside the country for Afghans in water sector."

Adding to the existing human resource challenge, some of interviewees criticized government's hiring process, which they feel has not been sufficiently transparent. It is mentioned that although there are younger skilled people who have been trained abroad, unfortunately they are often not recognized:

"The strategic positions are often filled based on political consideration as opposed to based on merit. A few people within ministries have all the power in their hands and they don't allow others to take role and responsibilities."

Also, there is often a belief with many developing nations that what is produced by international specialists is always better than what it produced by local experts. This is generally true for Afghanistan despite international experts often being in the country for a limited time

and not understanding the context well. Local nationals with expertise and younger professionals with qualifications are often overlooked. There is a need for the government to embrace its local experts and knowledge, as well as developing a strategy to build the local capacity. Namely:

- Assess the needs for specialization and availability of education for students,
- Assess opportunities for improved education both within the Afghan universities and abroad (fellowships, masters' programs, courses and training, etc.),
- Explore linkages between Afghan institutions and international institutions in water management, and in particular transboundary water management; and,
- Assess the need for increased capacity development and professional training opportunities for Afghan diplomats and officials.

Data Gaps and Uncertainty in Knowledge of Water Resources/ Lack of Transparency in Sharing Hydrological Data

Precise and accurate data is the most significant element for proper management of any resource. There are different figures and information or even lack of data, in the case of groundwater aquifers, regarding the shared water resources and actual water use in the region in different reports and literature. Solving these issues is another way cooperation over shared resources in the region can be advanced. Afghanistan has lost its entire historical hydro-meteorological network in past decades due to lack of operation and maintenance during the periods of instability. Interviewees, from water experts to politicians, confirmed that there is no accurate information or updated measurements regarding the quantity of water in each of Afghanistan's river basin. Though one of interviewees mentioned that:

"With new technologies like remote sensing the data gaps can be covered and we should not continue [to] see lack of data as an obstacle for starting negotiations and dialog over our shared waters."

It was further noted by some interviewees that the neighbours in the Panj- Amu Darya Basin are not aware of Afghanistan's water development program in northern of Afghanistan and this has caused concern as they do not know how this may change the water regime. If the countries have little to no idea what Afghanistan is planning or how they might be impacted, then they will likely be critical of any potential development out of a sense of fear. This is not a helpful way to enter into any dialogues.

The reality is that data sharing—notably hydrological and meteorological data used to forecast water availability and develop the respective water allocation and cropping plans among riparian countries—remains very limited. One expert noted that there is little to no historic data for the Panj-Amu Darya Basin. Moreover, the Central Asian countries are not transparent over sharing hydro-meteorological data or their real water use. Another interviewee noted that Central Asian Countries often show and use poor data regarding Afghanistan water discharges and water needs in Panj-Amu Darya, underestimating both the contribution and water use of Afghanistan.

Poor data is not limited to Afghanistan. Although there are institutions developed by Central Asian countries including Interstate Commission for Water Coordination (ICWC) and the respective Basin Water Organizations (BWOs), the transmission of poor and inaccurate data has been an obstacle for making suitable short and long-term decisions regarding transboundary water resource management and implementing relevant policies (Utemuratov, 2012).

Legal Challenges

The 2009 Afghanistan Water Law defines the management and planning for transboundary waters as the responsibility of the Ministry of Energy and Water in agreement with the Ministry of Foreign Affairs, the Ministry of Interior and the Ministry of Border and Tribal Affairs (GOA 2009, Water Law Article 8(9)). The approval of the 2009 Water Law and the draft Afghanistan National Transboundary Water Policy have been the main steps taken by the government to address the legal issues related to transboundary waters of Afghanistan. Regarding the Panj-Amu Darya, the Draft Afghan Transboundary Waters Policy acknowledges the historical agreements including the 1946 and 1958 agreements signed between USSR and Afghanistan, though they did not specifically deal with questions of water allocation. There are no water allocation agreements between Afghanistan and any Central Asian country.

The lack of a bilateral agreement over Panj-Amu Darya's shared waters between Afghanistan and Central Asian countries has been mentioned as a key obstacle in developing infrastructure in the Panj-Amu Darya region of Afghanistan. As noted in the section on Legal Issues above, the various agreements including the 1946 and 1958 pacts between Afghanistan and USSR over Panj-Amu Darya pertain more to frontier agreements and navigation as opposed to water rights. Also, as mentioned, it is clear that when only the two states, Afghanistan and USSR, were involved, both countries needed to agree to such structures that might hinder navigation under Article 19 of the 1958 Agreement. However, now that Afghanistan shares a river boundary with Tajikistan, Uzbekistan and Turkmenistan, it is less clear how some of the provisions of the 1958 Frontier Agreement should be dealt with. When there is a succession of one state from an older state the new state does not necessarily take

on all the responsibilities and agreements of the larger older state, but it does have to take on some responsibilities, for example those dealing with borders. These issues are dealt with in the 1978 *Vienna Convention on Succession of States in respect of Treaties*. One view is that Afghanistan must implement the relevant provisions bi-laterally with each of its new riparian neighbors and not as a collective. For example, if Afghanistan and Tajikistan agree to construct a hydro-power dam on the Panj-Amu River, then they would need to consult and notify downstream countries as per customary international law and not as part of Article 19 of the 1958 Frontier Agreement. However, the extent to which certain agreements and provisions of agreements entered into by older states need to be taken up by new states is a complex and evolving topic in international law and beyond the scope of this policy paper. Therefore, some consideration should be given in the future as to the implications of the 1958 Frontier Agreement on developments in the Panj- Amu Darya.

Virtually all interviewees noted that in drawing up their water use for the Aral Basin, the USSR marginalised the role of Afghanistan in Amu Darya's water resources. It is believed that the Central Asian countries have continued the same policy of discounting Afghanistan after their independence (Horsman, 2008). Indeed, the signing of the 1992 Almaty Agreement affirmed the allocations of Protocol 566, which assumed Afghan extraction would amount to only 2.1 bcm/yr of the estimated 70.25 bcm/yr flow of the Amu Darya. While the Central Asian states are continuing to try to develop a more comprehensive management regime for water in the region, it is likely it will further solidify the assumed allocations under Protocol 566. It will be a challenge, but an important one, to move away from the status quo of water consumption in the basin. And there is an opportunity for Afghanistan to be involved in asserting its rights while discussions are still ongoing in Central Asia.

Some of the interviewees believe that although Afghanistan water rights have not been recognized by any of the historical agreements between Afghanistan and USSR, those agreements identify USSR's consideration of Afghanistan as a state at the time:

"Afghanistan was consulted and negotiated over Panj- Amu Darya water resources even if it was on boundary and navigation issues. Afghanistan has a weight in the Basin which cannot be ignored."

The interviewees believe that without having an agreement over shared waters, attracting the support of international donors to invest in Afghanistan water projects will be an issue. In the words of one expert:

"At the beginning of the Karzai administration many donors were interested in funding and building large water storage infrastructure in Afghanistan but little was done, and as more transboundary issues arose donors began to lose interest as they realised

downstream states would be affected. And right now there is rarely any donor who wants to work on building dams in Afghanistan without there being an agreement first. ⁸

Indeed, one interviewee noted that the international donor community has long encouraged the development of a national transboundary policy and promoted dialogue with neighbouring states. The reasons behind Afghanistan's exclusion from Amu Darya's water management structure include political power asymmetry, disagreement over cooperation, institutional inertia and the self-interest of USSR and then Central Asian Countries, Afghanistan's political instability and its current limited water demand (Horsman, 2008). Nevertheless, it will be important to come out of isolation and engage with Central Asian countries over common water resource issues to ensure that Afghanistan's rightful use of the Panj-Amu Darya is sufficient to meet its development needs (and is not restricted by the archaic Protocol 586 of which Afghanistan was never a party to). Ensuring the rightful use of the waters will help open up opportunities for investment as it will create a more stable environment in which to invest in water resource infrastructure. Moreover, increased dialogue and exchange with Central Asian states will help advance understanding in water use and future needs, including groundwater use and aquifer recharge capacity, which will also be important to consider in addition to surface water usage.

A Later Developed State

Several experts interviewed mentioned the challenge of the traditional water use in downstream countries during past decades. As noted throughout this report, Afghanistan is late to develop its water resources for a number of reasons associated with the decades of instability and lack of good governance. As a result, its neighbours have all continued to develop and use water resources while Afghanistan has actually decreased its water infrastructure over the last 40 years. Now there is a situation where any increase in use by Afghanistan will be seen as "problematic" for its neighbours. One of the challenges that the region faces is for downstream water users, like those in Central Asia, to use water more efficiently so that increasing water use in Afghanistan as it develops will have little or no impact on them. As one expert noted:

It will be a demanding task and time consuming to adapt to changes and new water efficient approaches in downstream countries since they got used to it. The increased water use in Afghanistan might be a concern for other riparian countries in Amu Darya but it's inevitable for Afghanistan to use its resources for poverty reduction and development. ⁹

Increase in Afghanistan water use is mentioned to be a concern for downstream countries of Panj-Amu, though most interviewees from Central Asia emphasised the fulfilment of Afghan water needs. As one said:

"Due to the internal instability, Afghanistan didn't pay much attention to the management of transboundary rivers in Central Asia though now the successful management of water has become the factor of peace in relations between neighbouring states, especially when we talk about more than two states in one basin."

Limited Public Awareness

In the view of majority of the interviewees, there is limited knowledge among Afghan people regarding water's role in economic development. Most people do not have the perception of water as a national commodity, which needs to be invested on in the service of economic development. Also, there is less awareness regarding the necessity and less interest in negotiation and dialogue over Afghanistan transboundary waters.

However, some of the interviewees have a different perspective and believe that Afghan waters must be owned and used by Afghanistan alone. Also, they see a strong need for public awareness programs regarding international water law and international practices over shared water resources.

Population Increase and Demand Rise, and Economics

The Central Asian region, including Afghanistan, has one of the highest population growth rates in the world. The rise in population will undoubtedly increase the demand for water for food production and domestic uses. Since the majority of Afghans live in rural areas, water accessibility is vital for their livelihood, both for drinking water and irrigation.

Many of those interviewed believe that Afghanistan will face greater challenges in the future to provide income and employment for its young population. One of the interviewees from Central Asia mentioned:

"Despite last decade's complicated political and economic situation in Afghanistan, population growth has not been affected and the country's population has doubled since the 1980s."

The increased demand for water from increased population has ramifications for the economy and the influx of people to the cities. Several of those interviewed noted that with increased competition over water resources there are less employment opportunities for rural inhabitants who then choose to move to the cities. This situation is exacerbated by the increasing lack of security in rural areas. It has been suggested that improving the water infrastructure for improved irrigation and flood control of the major rivers would help improve the economy of the rural areas, not only taking pressure off the urban centers but also helping to create more stability.

With continued population growth and demand for agricultural goods, one of the key issues in the future, particularly with regards to irrigation, will be the "efficiency" of water use. Many of the irrigated lands in Central Asia began accessing water resources over 50 years ago and remain to be relatively inefficient in water conveyance and application. Thus, Afghanistan has an advantage over other more established water users in the region as it develops new irrigation lands and rehabilitates older ones to showcase and promote water use efficiency.

Opportunities in the Panj-Amu Darya Basin

Nearly all interviewees emphasised Afghanistan's abundant water resources as the national wealth. Referring to the water scarce region of Central and South Asia, they valued Afghanistan's fresh water, which needs to be cherished and used for the country's economic growth. As one expert opined:

"No country can technically stop Afghanistan from using it[s] water resources for development and poverty reduction. Afghanistan needs to seriously look at its water resources as its main natural asset to meet the Sustainable Development Goals."

One of the interviewees from a Central Asian country stated:

"By hydrographic principle, Afghanistan is [an] essential part of the Aral Sea basin and Afghanistan should be considered as an important player in water-energy system in the region."

Afghanistan's extraordinary hydropower potential is felt to be another great opportunity for the country's growth and a means for cooperation with neighbours. As previously noted there is a large potential for hydropower development, particularly in the Panj-Amu region. A number of technical experts highlighted the strategic geographical position of Afghanistan, critical in helping it become the regional energy corridor for bridging energy-rich Central Asian countries to energy-poor South Asian states. The interviewees believed that there is ground for Afghanistan to closely work with Central Asian countries on shared hydropower projects, particularly with Tajikistan due to the two countries' similar interests and recent progress. Both countries are located upstream in the Amu Darya, have a relatively low GDP, and are interested in using their potential in hydropower generation for their economic growth and energy self-sufficiency (Horsman, 2008).

As discussed in the previous section, there is a good opportunity to further promote these common interests and pursue development of the Upper Amu and the Dашtjūm dams which could potentially have 5000 MW of installed capacity (Figure 7). These are reported to be high on Tajikistan's priority list as it sees itself as a major exporter of electricity. Provided Afghanistan can raise its share of funding, it should be able to participate up to a level of around

50% of the overall investment, providing options for supply to the national grid and export to China and, in particular, Pakistan and northern India (ADB, 2015).

Figure 7: Location of Proposed Upper Amu and Dushqum Dam Sites (Panj-Amu Investment Plan: 2015)



Other proposed dams, entirely within Afghanistan, could amount to some 585 MW of additional power (Table 5). Keeping in mind that the current production in the Panj-Amu Darya is 17.95 MW, this would be a significant increase in energy production. Also, there are clear areas of potential benefit sharing with downstream neighbours in constructing water storage infrastructure in Afghanistan. Encouragingly, there are several areas where cooperation over water can be developed and used as focal point for broader cooperation, including:

- Turkmenistan and Afghanistan have considered jointly developing the Panj-Amu Darya River for hydropower development to improve energy supply nationally as well as developing a source of foreign revenue from international sales.
- Upstream infrastructure in Afghanistan and jointly on the Panj-Amu Darya with Tajikistan could assist in reducing sediment transport and bank erosion issues, which are problematic in the basin. The Panj-Amu Darya transfers a huge amount of sediment loads, eroding and damaging riverbanks upstream and then settling sediment downstream which can negatively affect irrigation systems in Uzbekistan and Turkmenistan. By greater regulation of the river upstream, through reservoir storage,

high water levels and flooding can be mitigated. Greater regulation will mean that catastrophic bank erosion will be reduced and thus sediment deposited in the downstream areas can be controlled

- The two proposed joint projects mentioned above serve as a great opportunity for upstream and downstream states of the Panj-Amu Darya basin and could contribute to internationally backed joint management of shared water-courses

It was noted that:

"Water related disaster is very common in the region, or the problem of sedimentation and flood, and the riparian countries can work on joint projects to overcome these challenges."

Agriculture and trade were also seen as being points of mutual interest to possibly stimulate joint water development projects. The current existing mechanisms for regional cooperation between Afghanistan and Central Asia, including the United Nations Special Programme for the Economies of Central Asia, Regional Economic Cooperation Conference for Afghanistan and Central Asia Regional Economic Cooperation, have been used to facilitate and develop economic trade and connectivity between Afghanistan and Central Asian countries, through expansion of railroad networks, economic corridors and electricity transmission lines (Heal, 2016). Based on interviewee perspectives, cordial relationship between people on the two sides of Amu Darya particularly in Badakhshan should be used to increase the agricultural product export to Central Asian countries. It was noted that:

"There are joint local markets particularly for agricultural products between Afghanistan and Tajikistan. There are commercial agreements with Tajikistan and Turkmenistan. These are all the platforms that the Afghan government can use to develop agribusiness in the region."

One of the interviewees from Central Asia believes that Afghanistan should work closely with each Central Asian country to find common interest for cooperation besides participating in the existing energy-water nexus regional dialogues. Another expert also emphasised the good economic relations between Afghanistan and Turkmenistan as an opportunity, which can be extended to water-based cooperation:

"We have good economic relations with Turkmenistan which can be expanded to address water issues, and possibly engage other neighbours. I am totally positive that cooperation over shared waters with Central Asian Countries is possible."

The economic opportunity for Afghanistan with regards to regional trade should not be underestimated. If projections regarding the "new silk road" are realized, new transit routes and

trade routes will allow for greater flow of goods between the countries. Not only are electricity lines being envisioned, but increased transport through shipping and navigation connected to rail links are also being discussed. Afghanistan is part of the Central Asia Regional Economic Cooperation Program, which is initiating greater connectivity within the region. Water resources, hydro-power and agriculture can play a key role in helping Afghanistan to position itself in this evolving program.

The ongoing support of the international community for Afghanistan has also been seen as an opportunity for meeting the existing challenges that the country faces. Many interviewees felt that particularly in the Kabul and Panj- Amu Darya basins, there was strong support for Afghan development and encouragement to help arrive at fair arrangements with downstream neighbours. There were indications that more could be done to leverage the influence of the donors for technical and financial support as well as in assisting with transparent dialogues.

Finally, the increased activities of civil society groups within Afghanistan's communities in recent years has been mentioned as a great opportunity for the water sector to promote values related to water use including water efficiency, environment protection, and to increase public awareness regarding the importance of transboundary water practices. As one of the interviewees described, the complexity surrounding the management of transboundary waters could be explained to the public through social media and academia. Indeed, this will be necessary for making the public ready for any dialogue, which Afghanistan may engage with in the future. Increasing the awareness and understanding of transboundary water issues for the government, parliament and the public will be a key challenge in the future. It is critically important that the general public, as well as those engaged with policy development and implementation, to understand concepts and principles around integrated water management as it applies to international water basins. As an extension of integrated water management, transboundary waters also need to be understood by those affected by decision-making. And as noted, decision-makers need to engage with appropriate stakeholders to help inform the decision-making process. Increasing awareness in transboundary waters will require a variety of "scientific knowledge, applied engineering, and anthropology, coupled with astute political and legal understandings" (Shroder, 2016). In addition, an understanding of the issues by the media will be important to help build awareness within the public regarding transboundary water dialogue with neighbouring countries.

Analysis and Discussion

Unfortunately, few of the projects identified in Afghanistan's Water Resources Management documents have been implemented (Duran, 2015). In the last decade, water sector activities have been separated from the larger debates on environmental and climate change, poverty reduction, population control, revenue generation and employment creation, urbanization, and refugee deportation (Duran, 2015). Fortunately however, there is increasing consensus towards highlighting the connectivity and linkage of the water sector succeeding to the socio-economic standing of Afghans.

During this research, almost all interviewees were hopeful of this change in perspective. They also were encouraged by the level of the new government's attention towards transboundary water alongside its dedication to the internal issues associated with the water sector. However, many of those interviewed were concerned with the lack of investment directed to the Panj-Amu basin despite it having the greatest potential to develop agriculture products and hydropower generation for the Afghanistan (Landell Mills, 2013). They emphasised that the Panj-Amu is the greatest source of water in the country, and if combined with the amount of its arable land, it can once again be one of the main food producers for the country. In the 1930s, because of its warm climate combined with relatively high precipitation and abundant river flows as well as fertile floodplain soils, it was known as one of Afghanistan's "breadbaskets" (Landell Mills, 2013). Interviewees believe that investment in Panj-Amu Darya can decrease the pressures on key urban centers such as Kabul and Herat.

However, one of the key areas to address will be the lack of water management practices in the region. The main water management crisis of the Panj-Amu Darya basin is rooted in water intensive crops (cotton, amongst others) and as well as inefficiency in high water use (Peachey, 2004). On this note, it is worth mentioning that the founding states of the International Fund for Aral Sea have agreed to adhere to international water law, which promotes "efficiency of use". As noted by King and Sturtewagen (2010):

"The inherent commitment to equitable, reasonable, and mutually advantageous water resource use would imply recognition of Afghanistan's interests in the Amudarya ... (King & Sturtewagen, 2010)"

While it is true that even in the recent past Afghanistan has been left out of water dialogues in the Amu Basin, there is an opportunity for future engagement. More recently, it has been included in discussions and deals regarding electricity (Babow, 2012), Afghan government staff are attending more regional conferences and collaborating on international projects, and there are existing MoUs with Tajikistan on data exchange. However, despite this trajectory of improved relations, there is an ongoing concern regarding the inequitable and unreasonable

water allocation in the Panj- Amu Darya, based on old USSR systems. Due to limited technical capacity, reliable and updated hydro-meteorological data, and the regional political complexity, Afghanistan has not yet taken step to become member or even an observer of water related institutions including the OBV and IFAS. Fortunately, the ongoing efforts to develop a more comprehensive water and energy agreement in Central Asia and Afghanistan present an opportunity for Afghanistan to be a part of discussions leading to the establishment of its water rights. However, there is a real concern that if Afghanistan hesitates further from engagement in regional water dialogues, it may lose an important opportunity to establish its water rights in the basin. Almost all interviewees believe that with Afghanistan's strong will and assistance from international organizations, the country can take an active role in advocating not only for its own water rights but also for improving the existing regional water management schemes. As one of the Central Asian interviewees added:

"In recent years, we have noticed Afghanistan's reciprocal interest in water-related issues in Central Asia and stating its position as an observer, though we encourage them to participate persistently in all regional processes on water. It is obvious that Afghanistan in the near future will become part of the water-energy dialogue in Central Asia. And it will take much time to bring together all the actors' opinions, but it is the essential part of sustainable development in the future."

There are opportunities in which Afghanistan is increasing its involvement, for example the ongoing multi-lateral World Bank projects including the "Central Asia Energy and Water Development Program." This project has a core objective of promoting energy and water security at the regional and national level through informing policy, strengthening institutions and investments. Another example is the "Central Asia Water Resources Management Project", a joint USAID and World Bank funded project, which aims to increase accessibility, reliability and analytical capacity to use water resources information for improved water resources planning, monitoring, and management in selected Central Asian water institutions.

Finally, there is optimism regarding development on transboundary issues in Panj-Amu Darya with Central Asian countries, in comparison with the Kabul River Basin with Pakistan. The relationship between Afghanistan and Central Asian countries involving energy deals, such as TAPI, and joint economic projects, such as transport, are good indicators of a sound political and economic atmosphere in the Central Asian region. Afghanistan can make the most of its relationships in the region to advance its water rights.

Recommendations

These recommendations stem from an analysis of both literature and reference materials, but primarily from the thoughts and considerations of the experts in advancing Afghanistan's position with respect to transboundary waters. The recommendations here provide a practical starting point to help assess policy on transboundary water.

General Recommendations:

Issue 1:

There is a lack of a clear coordinated strategic plan for future developments in each basin which would allow Afghanistan to understand and dialogue with neighbours regarding future uses. At the national level, a comprehensive national water master plan is needed. This would highlight Afghanistan's future water resource growth and improvement in each river basin and each province. This would ensure that the whole country's benefits are considered, as opposed to a narrow focus on certain provinces or basins. Similarly, for the regional level, there is no clear mechanism in place, which addresses the concerns of downstream countries.

Recommendation 1:

- a. At the national level, develop clear, well coordinated and approved (official) basin plans which can be used as a basis for national water infrastructure development, as well as in discussions with neighbours on trans boundary water issues. These basin plans should include basin specific climate change adaptation strategies and articulate the role of international organizations such as UNEP or World Bank in the implementation process.
- b. At the transboundary level, an assessment should be carried out to examine potential benefit sharing with neighbors, as well as any potential negative effects of developments in Afghanistan. These assessments should be carried out for each basin and serve as the basis for strategic engagement with neighbors.

Issue 2:

There is a problem associated with data availability and accuracy that leads to a lack of confidence. Based on the feedback from most of the key informants interviewed, existing data is not accurate and reliable. Data availability and accuracy will play a big role in making basin plans, and in negotiations with co-riparian states.

Recommendation 2:

An assessment of data collection agencies/institutions and prioritization of data collection stations

- a. Creation of a comprehensive list of the existing priority issues and challenges in data collection agencies
- b. Assessment of Hydro-meteorological stations and prioritizing stations based on their degree of significance. Priority stations should receive most of the available resources, attention and incentives, particularly in locations where operation and maintenance is difficult, such as stations in border areas with less security or those at high altitudes with harsh climatic conditions.
- c. Improving hydro-meteorological data collection and the reliability of data and increasing the use of GIS and other remote sensing programs.

Issue 3:

Poor relations among transboundary water institutions including poor data and information sharing between these agencies.

Recommendation 3:

Strengthen the relations between transboundary water institutions:

- a. Regular meetings of the Transboundary Water Commission (TWC) in order to allow transboundary water institutions to discuss their related works. In addition, consistent discussion of transboundary water related issues at platforms such as Supreme Council of Land and Water (SCoLW).
- b. Improving data sharing mechanisms to make data available for key policy/decision making ministries, institutions and even the academia. Regular data and information sharing is needed, especially between MEW and the MFA. In addition, create a mechanism where MAL and MEW can share hydrological data such as through a joint data base.

Issue 4:

Duplication and/or gaps in institutional roles and responsibilities associated with transboundary waters.

Recommendation 4:

Clearly define the roles and responsibilities of organizations related to transboundary waters, beyond what is described in the 2009 Water Law. This would best be achieved through the formalization of a transboundary water national policy.

Issue 5:

Lack of Afghan led interventions

Recommendation 5:

Engage more Afghan experts, both at the centre and in provinces, to prepare the national and river basin master plans in an adequately contextualized manner. These plans will reflect the reality of the basins in terms of transboundary waters, the demands on uses in the basins, the economic benefits for the country as a whole and the level of impact on water availability to neighbouring countries.

Issue 6:

Lack of public awareness on transboundary waters issues.

Recommendation 6:

Focus on developing extensive knowledge base including material on international practices and regulations of shared water resources. It is important that the public is made aware of the significance of water in driving economic development and its role in improving standard of living.

- a. Involve media, social networks, and civil society organizations from Afghanistan, Pakistan as well as Central Asian republics, by conducting joint regional programs conferences.
- b. Provide research opportunities for the academia and research organizations to explore the global history of the management of transboundary waters and its lessons learned.

Issue 7:

Maintaining and enhancing donor support for transboundary water development.

Recommendation 7:

Strategically engage donors to assist with enhancing technical capacity and assessments, provide facilitation for dialogue, and eventually assist in supporting infrastructure development.

Issue 8:

Lack of local knowledge and expertise to deal with transboundary water issues.

Recommendation 8:

Enhance local knowledge and skills to deal with transboundary waters. For example, work with Afghan Universities to teach transboundary waters at the higher education level. In

addition, take advantage of local knowledge that exists in Afghanistan regarding water resources, including engagement of recent Afghan graduates of this field from abroad

Issue 9:

Groundwater has not been discussed in relation to transboundary water at almost any level

Recommendation 9:

Enhance understanding and knowledge regarding the key importance of groundwater resources that may exist and be shared with neighboring countries. In discussions with neighbors, effort should be made to identify and understand potential transboundary water resources and develop provisions for their future management.

Recommendations for the Panj-Amu Darya Basin

Issue 10:

There is a lack of concrete dialogue with northern neighbours on water allocation issues, and Afghanistan risks being sidelined if it does not actively engage.

Recommendation 10

Start dialog and trust building by data sharing, joint technical studies, technical assistance and academic exchange

- a. In the case of the Panj-Amu Darya, conduct joint studies between Afghanistan and Central Asian Countries over the flood control and riverbank protection. The joint studies, for example, can be started with Tajikistan, which already has a signed MUO with Afghanistan on data sharing.
- b. The government should take advantage of projects like SMART WATERS and PEER project, USAID funded projects for Afghanistan and Central Asian Countries, to promote and support knowledge exchange and joint research initiatives between academic institutions in Afghanistan and the Central Asian countries

Issue 11:

The Panj-Amu Darya basin has great potential for hydropower generation and has the largest potential for increased agricultural production in Afghanistan. However, its development has not received enough internal attention and its role in contributing to national economic development in Afghanistan remains highly under-explored.

Recommendation 11

- a. Take advantage of the favourable transboundary situation in the Panj-Amu Darya basin to invest in water resource development. It will be beneficial for balancing population density across the country, preventing internal migration to large cities, and boosting country's food productivity.
- b. Intensify work on implementing the signed MoU with Tajikistan and expand that to cooperation on joint Afghan-Tajik projects including the Upper Panj-Amu Darya and Dashijum dams. Promote the potential benefit sharing of a more regulated river with downstream countries regarding flood control, minimizing bank erosion, and reducing sediment transport issues.
- c. Promote the development of internal hydropower generating capacity on the major tributaries of the Amu Darya.

Issue 12:

Afghanistan is not a member of any regional organisations in the Amu Darya that are dealing with water management.

Recommendation 12

Afghanistan should strongly consider joining, or becoming an observer, to the regional water organisations, such as IFAS, to ensure its presence and secure its interests in future regional water deals.

Actively take part in existing regional programs initiated by international organizations such as the "Central Asia Energy and Water Development Program" by the World Bank.

Issue 13:

More emphasis is needed to link water related issues, such as Afghan water development, with other economic drivers in the region.

Recommendation 13

Expand the economic development initiatives, such as TAP1, CASA 1000, and the rail-road transport project with Turkmenistan/other Central Asian Countries to create joint water projects including hydropower generation and flood protection in Panj- Amu Darya Basin with support of international donors and organizations.

Conclusion

The main objective of this paper is to examine and focus on: i) Afghanistan's achievements in water sector overall, and in transboundary waters in particular (in the past 15 years); ii) major standing challenges for Afghanistan, and hurdles in regards to dealing with its neighbors on water issues; iii) the existing opportunities – where Afghanistan and its neighbors can relate in regards to the transboundary waters.

This study reveals that Afghanistan has achieved a lot in regards to its water resources management, including transboundary waters. Such as, finalizing the Afghanistan Water Law (2008), significant institutional arrangements - in 2016 the Transboundary Water Commission, headed by the president, and a Transboundary Water Management Unit established in MEW. As indicated by Salame & Van der Zaag (2010) effective water resources management and conflict prevention require developing both individuals and the institutions they comprise. Thus, these steps are important in dealing with its transboundary water resources.

In addition, a draft Transboundary Waters Policy has been approved in principle, which ties political will and commitment of the Afghan government in regards to working on transboundary waters. The 2010 and 2014 MoUs on Cooperation in the Development and Management of Water Resources of the Panj-Amu Darya River Basin with Tajikistan; the 2016 MoU with Iran, which includes committing to address transboundary water issues amongst others; and the 2013 agreement with Pakistan on exploring the development of the Kunar River for joint hydropower projects also indicate willingness to advance dialogue. The inauguration of Salma Dam in 2015 in the Harirud Basin and the second generator installed at Kajaki dam are major achievements in infrastructure development in Afghanistan. These steps are not insignificant in relation to the situation that existed prior to 2001, when there was little appetite for addressing transboundary water at all.

Nevertheless, there are many hurdles to cross before Afghanistan can adequately use water resources effectively to boost its economy and the livelihoods of its people. Key to this are the inter-related aspects of i) developing agreements and understandings with its neighbors in Central Asia on water development to create a situation of political hydro-stability, and ii) under this state of political hydro-stability entice donors and the private sector to invest in infrastructure development, particularly storage, in Afghanistan. There is a sense of urgency around this as the effects of climate change will increasingly make water management difficult and Afghanistan's neighbors, while better prepared to deal with this challenge than Afghanistan, are by no means immune to the potential impacts to come.

As discussed, the Panj-Amu basin offers an enormous potential for Afghanistan to develop both hydropower and agricultural resources. It has the greatest land and water

availability in the country. However, not as much attention has been given to this region as has been to other regions in the country over the past 15 years. With relations improving both with Tajikistan and Turkmenistan, and with the ongoing discussions of all Central Asian countries in developing an updated water management framework, there is a real opportunity for Afghanistan to engage positively in the region. This is important to help address issues of climate change on a regional level, and help ensure future water used in Afghanistan is secured for enhancing investment in badly needed water infrastructure.

The 13 recommendations are policy options for consideration to begin to address some of the important issues associated with transboundary waters and ultimately the economic wellbeing of the country. These recommendations are not meant as a form of criticism, but rather as opportunities with which the government can enhance its approach to transboundary waters in the Panj-Amu Darya basin.

References

- (n.d.). Water Resources Management Department, Ministry of Energy and Water.
- (n.d.). Retrieved from [http:// http://wapor.gov.jr/SalmaDam.aspx](http://http://wapor.gov.jr/SalmaDam.aspx)
- (2016, July 24). Retrieved from Notre Dame [Global Adaptation Index](http://index.gain.org) : <http://index.gain.org>
- ADB. (2016). *Afghanistan Water Resource Sector Development Strategy*. Kabul: Ministry of Energy and Water.
- Afghanistan. (2014). Retrieved from Prevention Web: <http://www.preventionweb.net/countries/afg/data/>
- ANPDF. (2017-2021). *AFGHANISTAN NATIONAL PEACE AND DEVELOPMENT FRAMEWORK* .
- Babow, S. (2012). *The Water-Energy Nexus in the Amu Darya River Basin: The Need for Sustainable Solutions to a Regional Problem*. Global Energy Network Institute .
- BBC NEWS (2016, 8 16). Retrieved from BBC: <http://www.bbc.com/persian/world-37013015>
- Christopher Kuenqui, V. T. (2011). *Afghanistan Human Development Report 2011, Chapter 2: Water security and human development*. Kabul: Centre for Policy and Human Development, Kabul University.
- CIA. (2011). *The World Factbook*. Washington, DC.: Central Intelligence Agency.
- CIA. (2015). *The world factbook*. Retrieved from CIA: www.cia.gov/library/publications/the-world-factbook/docs/tf.html
- D. Z. (2006). *The gendered politics of water: Stories of Afghan Widows* .
- Dr. Mikko Punkari, D. P. (2014). *Climate Change and Sustainable Water Management in Central Asia* . Asian Development Bank.
- Droogers, A. L. (2012). *Climate Change Impact and Adaptation on the Water Resources in the Amu Darya and Syr Darya River Basins* . Wageningen : Future Water .
- Duran. (2015). *Afghanistan's Transboundary Waters: An Overview*. Kabul, Duran Research & Analysis.
- FAO (2016) AQUASTAT factsheet 2015 Retrieved 27 May 2016 from <http://www.fao.org/nr/water/aquastat/data/query/results>
- Farms&Kamal. (2004). *Watershed Atlas of Afghanistan*. Kabul, Afghanistan.
- Farms, R. a. (2004). *Watershed Atlas of Afghanistan* . *Watershed Atlas of Afghanistan* . Kabul, Afghanistan: AIMS and Ministry of Irrigation, Water Resources and Environment .
- Farms&Kamal. (2004).
- GE. (2013). *National Water Master Plan*. Ministry of Energy and Water.
- Grigg, N. S. (1996). *Water Resources Management*. McGraw-Hill.

Habb, H. (2014). *WATER RELATED PROBLEMS IN AFGHANISTAN*. Kabul: [International Journal] of Educational Studies .

Hameez, P. (2011). *Afghanistan's Food and Water Security Challenges*. Future Direction International.

Heal, A. (2015). *AFGHANISTAN AND CENTRAL ASIA: Strengthening Trade and Economic Ties*. United Nations ESCAP.

Hearn, G. (2017). Dammed If You Do and Dammed If You Don't: Afghanistan's Water Woes. In D. Reed (Ed.), *Water, Security and U.S. Foreign Policy* (pp. 188-204). New York and London: Routledge Taylor and Francis Group

Horsman, S. (2008). *AFGHANISTAN AND TRANSBOUNDARY WATER MANAGEMENT ON THE AMU DARYA: A POLITICAL HISTORY*. London: Foreign and Commonwealth Office.

Horsman, S. (2008). *AFGHANISTAN AND TRANSBOUNDARY WATER MANAGEMENT ON THE AMU DARYA: A POLITICAL HISTORY*. London: Foreign and Commonwealth Office .

Khamzayeva, A. (2009). *Water resources management in Central Asia: security implications and prospects for regional cooperation*. Bonn: UfESS "Guido Carli" University .

Klemm, W. (2010). *The Afghan Part of Amu Darya Basin. Impact of Irrigation in Northern Afghanistan on Water Use in the Amu Darya Basin*. UNFAO.

Krenz, N. V. (2006). *TRANSBOUNDARY RIVER BASIN MANAGEMENT REGIMES: THE AMU DARYA BASIN CASE STUDY*. Berlin: Ecologic – Institute for International and European Environmental Policy.

Kuzmits, B. (2008). *Cross-bordering Water Management in Central Asia*. Bonn : Department of Political and Cultural Change Center for Development Research, University of Bonn.

Landell Mills. (2013). *INVESTMENT PLAN FOR THE PANJ-AMU BASIN*. Kabul: MEW.

Masood Ahmad, M. W. (2004). *Water Resource Development in Northern Afghanistan and its Implications for Amu Darya Basin*. NW, Washington, D.C, 20433, U.S.A.: The World Bank

MEW. (2011). *Procedure on the Framework for Water Resources Management in the River Basins*. Ministry of Energy and Water (Afghanistan).

MEW. (2016). MEW.

Mohammed Waheed Ibrahimzade, D. S. (2012). *Vulnerability assessment of water resources in Amu Darya river basin, Afghanistan*. [International Journal] of Environmental Sciences Volume 3 No.2.

Odom, O. W. (2011). *Institutional resilience and climate variability in international water treaties: the Jordan River Basin as 'proof-of-concept'*. *Hydrological Sciences Journal*.

© (n.d.).

Peachey, E. J. (2004). *THE ARAL SEA BASIN CRISIS AND SUSTAINABLE WATER RESOURCE MANAGEMENT IN CENTRAL ASIA*. *Journal of Public and International Affairs*, Volume 15, 1st.

- Pöry, (2012). *Environmental and Social Impact Assessment for Rogun Hydro Power Plant* World Bank.
- Puri, S., & Struckmeier, W. (2010). Aquifer Resources in a Transboundary Context: A Hidden Resource? – Enabling the Practitioner to ‘See It and Bank It’ for Good Use. *Transboundary water management: principles and practice*, 73-80.
- Saimadom. (2016). Retrieved from Wapoco: <http://http.wapoco.gov.in/SaimaDam.aspx>
- Stanikzai, N. (2010). *Amu River Migration: Arable Land Erosion in Northern Border of Afghanistan*. Kabul: MAIL.
- UN-Water (2013). Facts and figures. (n.d.). Retrieved April 08, 2017.
- UNDP. (2015). *Human Development Index*. Retrieved from UNDP: http://hdr.undp.org/sites/default/files/2015_human_development_report.pdf
- UNECE. (2006). *DRAINAGE BASIN OF THE ARAL SEA AND OTHER TRANSBOUNDARY WATERS IN CENTRAL ASIA*. UNECE.
- UNEP. (2008). *Afghanistan Environment 2008*.
- UNEP. (2011). *ENVIRONMENT AND SECURITY IN THE AMU DARYA BASIN*.
- UNFPA. (2012). *Migration in Central Asia in Figures*. UNFPA.
- UNFPA. (2016). *Aquasat*. Retrieved from fao: <http://www.fao.org/miwater/aquasat/statbase/index.shtm>
- Uzunov, J. R. (2012). *Balancing the use of water resources in the Amu Darya Basin*. EastWest Institute .
- Vincent Thomas, P. N. (2011). *AFGHANISTAN HUMAN DEVELOPMENT REPORT 2011, Chapter two: Managing water resources, scarcity and climate shocks*. Kabul: Centre for Policy and Human Development Kabul University.
- Wasiq, M. A. (2004). *Water Resource Development in Northern Afghanistan and its Implications for Amu Darya Basin*. World Bank.
- Water Resources Management Sector Strategy* . (2008). Kabul: Islamic Republic of Afghanistan .
- Wegetich, K. (2006). *Hydro-hegemony in the Amu Darya Basin*. Wageningen: Irrigation and Water Engineering Group, Wageningen University.
- World Bank. (2004) *Water and Energy Nexus in Central Asia: Improving Regional Cooperation in the Syr Darya Basin*. Europe and Central Asia Region. World Bank, Washington, D.C. 2004 at v
- Wolf, A., Yoffe, S., & Giordano, M. (2003). International Waters: Identifying Basins at Risk. *Water Policy*, 2(1), 20-30.



Afghanistan Waters Portal

www.afghanwaters.net 

Afghanistan Waters Portal is an unprecedented database of essays, papers, research studies, reports, policy and legal documents, maps, photos and audio and video files on Afghanistan's transboundary waters.

Afghanistan Waters Portal is an attempt aimed at facilitating access to knowledge, efforts, initiatives, resources and human capital on Afghanistan's transboundary waters, and by doing so, empowering researchers, scholars and policy makers through easy and transparent access to information.

Afghanistan Waters Portal, an initiative of Duran Research & Analysis, is an evolving medium enriched by everyone. We welcome intellectual contributions and submissions.

You can visit the Afghanistan Waters Portal at www.afghanwaters.net.
Please share your feedback with us at info@durandran.af