



Overview of Afghanistan's Water Basins

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Abstract

Afghanistan is a rich country in terms of water resources. However, the main issue in that regard is that the water resources of the country have not been properly identified, and no comprehensive and concrete policies have been adopted to manage these water resources. Similarly, a lack of sufficient consideration to the water resources of the country, has caused wastage of the water resources and the neighbors' abuse of the said resources. This work is focused on analyzing the water resources of Afghanistan. The information for this paper has been obtained through library research and were processed through the Descriptive Analysis method. The paper came to the conclusion that, Afghanistan is blessed with countless number of water basins and water resources. The water basins of Afghanistan include small and large rivers that become transboundary by crossing the borders and reinforce Afghanistan's position vis-à-vis its neighbors and beyond. The Oxus (Amu), Kabul, Hilmand, North, and Harirod are considered the major water basins of Afghanistan. The basins not only respond to Afghanistan's water needs but also those of the neighbors, either directly or indirectly.

Keywords: Afghanistan, Amu (Oxus), Harirod, Helmand, Kabul, Water Basins.

Introduction

Water is the most significant of vital resources of nature. All life such as human life, plants, and animals depend on water. Therefore, water is also an important determinant of countries' political and economic standing. It is for this reason that there are often widespread disputes both within and outside the borders over the usage rights of this vital

substance. Fortunately, Afghanistan is considered a resource-rich country when it comes to water. Despite this, the water resources of the country have not been precisely examined through scientific methods and no codified policy documents have been adopted with the aim of managing the said resources. This has resulted in the wastage of Afghanistan's water resources and their free-of-charge consumption by the neighboring countries. What is the extent of water resources Afghanistan possesses and how does the country utilize them? These are the questions that this piece attempts to answer.

Water resources, river basins, are considered of the fundamental God given wealth of humanity. A blessing that the world and the human race depend upon. Each country is blessed with natural resources. These resources may include natural resources as well as valuable and professional human resources. Besides this, having access to sufficient water, which is the main source of energy and vitality for human, plant and animal life, are among the most valuable national wealth of the country. Afghanistan is one of the rich countries in this area. The main issue is that, so far, the water resources of the country have not been properly identified and examined. This issue has resulted in a lack of attention to the water resources of the country and a significant chunk of this water being utilized free of charge by the neighboring countries. This piece aims to analyze the water resources of the country and present the particulars of this issue in an academic manner with our compatriots.

The main question is, where does Afghanistan stand in terms of water resources? And the secondary questions:

What are the biggest water resources of Afghanistan?

What is the method and extent of Afghanistan's usage of these resources?

What is the method and extent of neighboring countries' usage of these water resources?

The Need and Significance of the Research as explained, water is the most vital source of life for the inhabitants of nature. Having sufficient water resources results in the growth of economic cycle and progress of countries. The growth of the agriculture, gardening, livestock, energy generation and establishment of industrial centers are of the most important functions of water resources. Therefore, identification of water resources of Afghanistan in such situation shall be of some use. This work has attempted to comprehensively study the water basins of the country, which shall resultantly make the rulers to pave the way for further utilization of this vital substance. The Literature Review of the research; there are relatively plenty of books and articles written on Afghanistan's water resources by writers of the country. But these pieces discuss the geography of water resources of the country in a generalized and scattered manner and do not address the details of the water basins in a comprehensive and practical way. This paper not only introduces the water basins of the country but also attempts to reasonably explain the role of these water resources in the economic growth of Afghanistan as well as the country's mechanism of utilizing these resources.

Material and Method

The information in this paper has been collected via library research and processed through descriptive analysis method. First, the books and articles related to Afghanistan's water basins have been studied and the necessary information summarized. At the end, the said data has been analyzed through qualitative method and the results have been captured in this paper.

Afghanistan's Water Basins

Afghanistan has trans-boundary Rivers that spillover from the country to other countries. Such that the Kabul river spills into Pakistan, the Oxus (Amu) river in the northern border of Afghanistan is shared with Tajikistan, Uzbekistan and Turkmenistan, the Murghab river in the north of the country spills to Turkmenistan, Harirod river in the west of the country makes up the border with Iran before flowing into that country, the water of the Helmand river spills to the wetland and finally to Iran. Actually, it is estimated that 90% of Afghanistan's surface water flows are located in the river basins that are considered international river basins. (Hasani, 3:1396) Among the five basins of the country (Amu 'Oxus', Kabul, Hilmand, North and Harirod-Murghab) four of them are open, meaning their water spill into the downstream neighboring countries. Although Afghanistan is located in the upstream for these basins and it produces most of the water of these basins, but due to years of war and lack of control of these water resources, Afghanistan has used the minimum amount of these waters. On the contrary, Afghanistan experiences enormous losses due to the massive floods and extensive droughts that are caused by the climate change. (Ahmadi, 287:1396). Therefore it is necessary to develop and implement a national program for development of water resources in the water basins so that the path for dialogue between Afghanistan and neighboring countries is paved. The history of negotiations on the Hirmand River between Afghanistan and Iran demonstrates that, had Afghanistan not started building infrastructure for the development of the Hilmand and Arghandab valley, the Iranian side would never be willing to sign the Hirmand River Treaty. Therefore, in order to embark on negotiations with the neighboring countries aimed at reaching international agreements, it is necessary to speed up the national program and development of water resources so that the neighboring countries are motivated for negotiations in order to reach agreements between Afghanistan and its neighboring countries. (Ahmadi, 1396: 280-281)

The Panj-Amu (Oxus) Basin

Originating from Pamir and flowing downstream until the Ural Sea, the Oxus River is 2500 km long, of which 1200 km make up the border between Tajikistan, Uzbekistan and Turkmenistan. (Salih, 214: 1342-1343) This river whose old name is Oxus (greek) is considered an independent water basin due to its importance in Afghanistan's hydrological classifications. The Amu River that originates from Pamir and Wakhan glaciers, spills into the Ural Lake after streaming a long distance in the border between Afghanistan and Tajikistan, Uzbekistan, and Turkmenistan. The Zarkol water that spill from a 125 meters high glaciers, and is called the Pamir River in its origins, is another water resource of Afghanistan. The Wakhan River that originates from the Wakhjir heights and Qole Chaqmaqteen (Chaq Maq Teen) is another source for the Amu River. These tributaries of the Amu river join each other in the west of Gazkhan and the west if Qale

Panja and then join the Panj river. The Panj River is called with this name until the Ai Khanom area, where Kokcha River joins, after which the river is called Amu. The Amu River makes up 1200 km common border between Afghanistan and its northern neighbors. The width of the Amu River is variable, as in the beginning its width is small and going further, the width increases. This width reaches 2000 meters in the Darqad area, 2500 meters in the Gozar area and in some areas it reaches 5000 meters. The tributaries of Amu River in Afghanistan namely Pamir, Wakhan, Shewa, Kokcha and Kunduz make up around 20-30 percent of its water.

The tributaries that spill into Amu from the north (Tajikistan and Uzbekistan) are Zarafshan, Gunt, Qezel Su, Wakhsh, Kafern Han, and Sarkhan. The Amu River is very steep from Zarkol to Dashte Qala, making it unsuitable for sailing. After Dashte Qala and Ai Khanom, the width of the river increases and the speed of water flow decreases, thus making the other 900 km long distance suitable for sailing of boats and ships. A water gauging equipment is installed in the Kirki area where all tributaries of Amu meet. According to its accounting, the flow of water is 2050 m³/s (cubic meter per second) (Fahim, 84:1393).

Afghanistan and Central Asia possess abundant land, water and energy resources. The countries making catchment basin for Amu River, depend on this water catchment for various livelihood and economic needs. Of the most important characteristics of the Amu River is its multi boundary nature, and thus its distribution for irrigation and energy is very important. A lack of legally binding agreements among the countries surrounding the Amu River, raise challenges in the share of water used for irrigation and energy generation both in the origin as well as downstream (Fahim 123:1393). The Geology of the Amu River is divided into three separate parts:

1. The Upstream of the Amu from Qole Chaqmaqteen (Chaq Maq Teen) to Darqad
2. The Mid-Stream of Amu from Darqad to Kham Aab.
3. The Down Stream of Amu from Kham Aab to Ural Lake (Ali Ahmad, 70:1387)

The Panj Amu River is considered as one of the five major rivers of Afghanistan, considering the geographical area it covers, provision of the average annual water consumption of the population dwelling in its coastal areas and its capacity in the growth of the agriculture sector. The Amu river basin covers around 40% of the area of Afghanistan, its share of the annual water in the country is 30%, and it covers about 35% of the country's population. (Hasani, 3:1396)

Central Asian countries share the basin of the Ural sea and are dependent on each other in a hydrological system within the national borders. In its medium flow, the Amu River produces an annual flow of 79.3 billion m³ (68% of the whole basin) originating from Tajikistan and Afghanistan, passing beside Uzbekistan and Turkmenistan, finally spilling into Ural Lake. (Ahmadian & Mahdi, 1:1392)

Kabul River Basin

The Kabul River originates with the joining of water of the Sanglakh valley and Sarchashma valley, its source is the west part of Paghman Mountain at a height of 3670 meters. The upstream and mid-stream of this river is within Afghan soil, and its flow and movement is approximately towards the west and east. After running for 560 kilometers from the Kotal Oni to Attock, it joins the Sindh (Indus) River. The length of the Kabul River within Afghanistan is 360 km. (Amin, 18:1352) The water resources of each area

depend on its geological and morphological structure and the amount of its rainfall which all relate to the natural forces at work such as the height of the area, climate, humidity, evaporation etc. John Schroder, member of the Center for Afghanistan studies at the University of Omaha at Nebraska-US writes that the Kabul River covers 53,000 km² land in Afghanistan and 14,000 km² in Pakistan. He adds that the Kabul River irrigates 300,000 hectares of land in Afghan territory, and 50,000 hectares of land in Pakistan before it spills into the Sindh (Indus) river. (Safi, 250: 1401). Currently, the Kabul River which has 74 m³/s water in the Sorobi Area, has sufficient water for seven months in a year. In the remaining 5 months of (November – March) the least amount of water flows in it, therefore the capacity of the existing Sorobi Power Plant has been maintained at 220,000 KW. The construction work of the Sorobi Power Plant began in 1951 and finished in 1957 and subsequently started power generation. This plant has two turbines each with a capacity of 11,000 KW and powers Kabul city, Gulbahar Factory and other industrial plants in the Capital Kabul. (Taniwal, 94:1389)

The Kabul River originates from two watersheds of Sanglakh with a height of 3500 meters west of Paghman Mountain. The tributaries of the Kabul River are Logar River, Ghorband River, Panjsher River, Alisheng and Alingar River and Kunar River. (Safi, 252-254: 1401) Water available per capita in Pakistan is a little over 1000 m³ which makes the country as one of the water-scarce countries. As per UN estimates, in the coming 15 years water reserves shall be reduced by 40%. This can have undesirable effects over industrial activities and production of agricultural goods in Pakistan.

The Kabul River is the only river in Afghanistan which is a tributary to a larger basin, the Indus River that stretches all the way to the Indian Ocean. This river is located in the north east of Afghanistan, it is on the move from the west to the east and finally joins the Indus River in Pakistan. Its length is 700 KM, of which 560 KM runs in Afghanistan, before crossing the border to Pakistan. The Kabul River basin catches water from 76,906 km² land (12% of Afghanistan area) and is considered the third biggest river basin in terms of area, after Hilmand and Amu. (Idrees, Malyar: 13:1396)

Hilmand Water Basin

Hilmand River originates from Kohe Baba, it flows from the east to the west. It covers, the western borders of Maidan Wardak entering southern provinces of Bamyan and Uruzgan. This river flow furious from the Oni valley towards Kajaki District of Hilmand. The width of this river expands upon passing the Kajaki Dam and creates a conducive environment for power generation. After that, changing course the river flows north to Kamal Khan area and reaches Iranian border. Running along the border, the river splits into two parts. The Sistan River tends towards left and enters Iranian soil. The Nad Ali split of the river tends towards right and makes up the border with Iran. (Asadullah Shefayee, 9:1393)

The Hilmand river basin and its tributaries cumulatively cover 151,300 km² of land, of which the Hilmand basin covers 76,000 km² and the Arghandab, Tarnak, and its other tributaries, cover 75,300 km² of land. It is to be mentioned that other basins that are smaller and belong to the Wetland of Hilmand cover a total of 85,300 km². This is also worth noting that the flow of this river is fast in the mountainous areas and is hardly usable for agricultural purposes. The amount of water in this river depend on the amount of snowfall in that particular year. (Amin, 2-25:1352) The Hilmand River, along with its tributaries, makes the longest running water system in Afghanistan and covers about half of

Afghanistan. Generally, the flow of Hilmand water is messy, as its water originates from higher points thus it has a turbulent and chaotic flow. Its water is furious during the spring season and early summer, but in mid to late summer up until early fall, its water decreases. This river has experienced several subsequent floods and droughts along the years. In other words, in the last 80 years the flow of water in this river has faced 24 years of drought. Covering a total of 26,000 km², the Hilmand valley is located in the central areas and its highlands are in the Oni Cliff and west of Paghman area at a height of 3800 meters, while in the Kahak area, the height of the lands decrease to 480 meters. Besides irrigating the agricultural lands in its surrounding, the Hilmand River currently produces plenty of hydropower and provides livelihood for plenty of people, strengthening the industrial infrastructure in this area. This plays an effective role in economic development and is divided into the following parts:

1. Bughra Canal
2. Nad Ali Project
3. Marja Project
4. Shamalan Project
5. Darweshan Project
6. Nahre Saraj Project
7. Khan Nesheen Project (Farhad, 13-17:1380)

The area of water catchment of Helmand is 262,341 km² and includes rivers such as Farah Rod, Adraskan, Khaspas rod, Khashrod, Kaaj dood, Ghazni, Kajaki, Musa Qala, and Arghandab. The medium flow of water in this basin is billion 90.3 m³ which makes up 11% of country's surface water production. The water of tributaries of this basin responds to the needs of 5.8 million people of the population of the country.

Running 1400 km long, the Hilmand River is the largest river basin in the country. On the north and south of the basin huge deserts namely Margo, Dashte Zarim and Godazri are located. Sistan was once considered the stock of grains in the region and the flourishing cities of Bost, Zaranj and Nad Ali were like green citadels in it. These cities were shaped in the banks of the Hilmand River and were irrigated with waters from this river.

The Hilmand river bed is divided into two branches, one of which goes to the north and the other flows towards North West. The northern branch which makes up parts of the border between Afghanistan and Iran, spills into Hamoon Lake after irrigating Chakhansoor. Its second branch, which flows towards North West, enters Iran and is reserved in the artificial lakes of Zabul. Seasonal rainfalls and melting of snow reservoirs of highlands during late winter and early spring cause furious flow of water in the Helmand valley, which sometimes lead to destructions in Nimroz province. While in summer and fall, the water in this river gradually decreases and dries up in its low lands. (Ahmadi, 69:1394)

The Hilmand River is one of the largest rivers of Afghanistan. Its water level has decreased tremendously due to climate change and subsequent droughts facing the surrounding provinces and territories with shortage of water. Bart Kuz, an employee of Helmand River Basin Master Plan Project has conducted a comprehensive study of the conditions of Aqueducts, at the Hilmand river basin and published the report in the Hydrogeology Journal. The said writer used the findings of focus group discussions he had with local farmers and agriculture officials as well as water and energy experts in the Hilmand river

basin. In order to know the active and inactive number of Aqueducts in the Helmand river, the variation of current rainfall and rainfall of pre-war years have been compared, as the flow and amount of waters in the streams have a direct relationship with the amount of rain and snowfall. In order to determine the amount of rain along the years in the Helmand basin, figures and information have been used from the US National Centers for Environmental Prediction, which records such numbers for the whole world and is quite accurate and precise. The basin has variable topography and climate and is divided into six following zones:

1. Northern Helmand (Zone 1);
2. Northern Kandahar and Uruzgan (Zone 2)
3. Kandahar South (Zone 3)
4. Ghazni and Paktia (Zone 4)
5. Farah and South Herat (Zone 5)
6. North Nimroz (Zone 6).

Table 1. Shows the variation in rainfalls in the six zones of the Helmand river.

Years	Northern Helmand (Zone 1)	Northern Kandahar and Uruzgan (Zone 2)	Kandahar South (Zone 3)	Ghazni and Paktia (Zone 4)	Farah and South Herat (Zone 5)	North Nimroz (Zone 6).
1994-1997	431	398	410	379	166	205
1998-2014	304	246	292	184	102	138
Decreased Rainfall (%)	29	38	29	51	39	33

The results of the figures demonstrated in these sources show that Helmand river basin has faced severe droughts during the years 1948-2014. Particularly during the years 1998-2014, the drought seems to have been severe. It shows an average of 30-50 % decrease of rainfall in the Helmand river basin. The Ghazni province which is located in zone 4 according to this classification, as per the figures provided by Macpherson in another study conducted between the years 2010 and 2012 also demonstrate a similar scale of decline in rainfall. The droughts of the last decade, particularly after 1998, has decreased the amount of water in the low lands of Hilmand River in areas such as in Nimroz province and further in Iran. The droughts has led to decline in water level and drying of springs and aqueducts in the surroundings of Helmand River basin. Negative impacts of drop in ground water in all the provinces of this basin, varying in the abovementioned zones. In Ghazni and Paktia provinces, the rainfall has decreased from 379 mm in 1948 to 184 mm in 2014, which shows a 51% decline. Northern Hilmand and South Kandahar also experienced a 29% decline in the same period that is less than all other zones. Parallel to decline in rainfall in the relevant zones, number of active Aqueducts have also decreased which hints the dropping of ground water resources in the Hilmand river basin. In a year on average, 65% of the aqueducts have been deactivated in this basin, while the active

aqueducts reach to 45% which shows a variation of more than half. But these figures differ depending on the provinces, climate and topography. For example, in Nimroz a 100% of the aqueducts have dried up, while that is not the case in Daikundi. Also, in Paktika, Herat, Farah and Uruzgan more than 50% of the aqueducts are active and in Ghazni, Helmand, Kandahar and Zabul less than 50% of the aqueducts are active. Droughts and decline in rainfalls in this basin are varying across the years with the year 2001 experiencing the most severe shortage of water in the Helmand river as a result of a drought that lasted four years where the Helmand river water declined by 98% sparking severe objection by Iran. In that year, the Iranian Ambassador to the UN wrote a letter to the then UN Secretary General Kofi Annan complaining the shortage of flow of Helmand water towards Iran. The UN cited the decrease in rainfall and drought in Afghanistan as a reason for the shortage of water flow (Safi, 132-134:1401).

The Shamal (North) Water Basin

The Shamal Water Basin encompasses Balkhab, Khulm, Sare Pul and Shirin Tagab rivers. This basin covers 78,546 km² area that makes up around 12% percent of the country's area. This basin has the capacity of producing an annual average of billion 2.2 m³ water. According to measures by the hydro-meteorological stations, this basin makes up 4.47% of total annual water capacity of the country. In terms of arable land availability, this watershed basin is one of the important spots in the country. By expanding water resources in this watershed basin and channeling water from the Panj-Amu water basin to the Shamal Water basin, the area in question could be irrigated. In this case, not only shall the northern areas become self-sufficient in terms of food, but could also contribute to food supply in the central and other parts of the country (Mahmoodi, 90:1396). The Shamal Water catchment includes Balkh, Shirin Tagab & Maimana, Qaisar and Shibrghan rivers. Among them only Balkh river covers more than 25,200 km² area. In this basin, the ancient Arians have made eighteen huge canals for the purpose of irrigation and agriculture. These include, Shahi, Mushtaq, Qadr, Asfahan, Besghor, Yang Qala, Sayed Abad, Fateh Abad, Maqsum, Sia Gerd, Abdullah, Balkh, Balkh, Dawlat Abad, Arghandab, Faizabad, Chintal and Sel Bur canals, that had caused Mazar e Sharif to be green and flourishing, most of which now lacks irrigation water. (Ariz, 90-92:1387)

Harirod Murghab Water Basin

Harirod-Murghab is one of the five major water basins of the country, covering 77,604 m² area that makes 11.88% of the total area of the country. The annual average water capacity of this river is billion 2.53m³ making up 5.14% of total water capacity of watershed basins in the country. The main tributaries of this river are Harirod, Murghab and others. This water basin is made of the following tributaries: The Upper Harirod Watershed basin (Cheghcheran), The Lower Harirod Watershed basin (Herat) and the Murghab watershed basin (Qale Now). This watershed basin is good in terms of land but its water resources capacity is not sufficient for the needs of this basin in the present time and nor in the long run. This water basin is in good condition in terms of having ground water resources capacity, which means that with some development and proper management, the issue of shortage of water could be tackled.

This is to be mentioned that in addition to the five water basins in the country and their tributaries which cover a total area of 586,091 m², Afghanistan also has an area of closed basin of non-watershed that reach to an area of 67,356 m² which makes up 10.31% of the

total area of the country. This is to be mentioned that from among the irrigable areas in the country, around three million hectares of land were irrigated in the year 1357 (1978 AD) and 10% of it was irrigated through state engineering systems which cover an area of 330,000 hectares of land. (Mahmoodi, 91:1396) In the nineties, Iran and Turkmenistan constructed the Dosti (friendship) Dam in the Harirod River basin. Mr. Hamed Karzai who was the Afghan Deputy Foreign Minister at the time, wrote to Iran and Turkmenistan that the construction of the said dam may lead to misunderstandings in the future due to shortage of water as Afghanistan was determined to resume building the Salma dam and its construction was discontinued due to war in the country. But the foreign ministries of the said countries did not respond to this letter of the Afghan Foreign Ministry. (Spanta, 746-747:1395)

The rivers of Afghanistan, continue to spill into neighboring countries and each of these countries continue to fuel instability and insecurity in Afghanistan and make the borders insecure so that the waters of the country is scattered and mismanaged, spilling into their soil so they could use those waters without panic and free of charge. Therefore, they continue their efforts to keep Afghanistan dependent on imported electricity, food and other commercial items, and prevent themselves from being dependent on Afghanistan, particularly waters of Afghanistan. The waters of Afghanistan that spill into the soil of neighboring countries are the following:

1. Rivers Spilling into the Pakistani Soil

The Panjsher River, the Kabul River, the waters of Ghorband valley, the Salang Jonobi river, Logar river, Kohistan, Laghman, Alisheng, Alingar, Kunarha, Darra - e Pech, Landay Seen, Kashghar, Almar and Surkh Rod.

2. Rivers Spilling Into Iranian Soil

The great Helmand river, Harirod, Khashrod, Farah rod, Asafzar and Arghandab rivers;

3. Rivers Spilling into the Northern Neighbors of Afghanistan into Tajikistan, Uzbekistan, Turkmenistan. Amu River (Oxus), Bamyan River, Do Ab River, Salang Shamali, Andarab River, Farkhar, Keshm, Kokcha, Alcheen and Bala Murghab river (Arzu, 46:1381)

It is to be mentioned that in the north of Afghanistan the Oxus River is located and our northern neighbors consume it, but Afghanistan itself has not been able to substantially utilize the water of this river for agriculture or energy. This is while the vast northern and north western plains of the country are very conducive for agriculture. However, due to insufficient management of water and the imposed wars of the last several decades, these plains and the territories are still unused. (Iqrar, 273:1399)

Table 2. The Water shortage in 5 river basins according to measures of 1980 and 2016. (Iqrar 282:1399)

Definition of the River Basin	River Basin	The Annual Amount of Water in Billion Cubic Meters according to figures from 1980	Annual Quantity of Water in Billion Cubic Meters according to 2016 figures
River Basin (an area with surface water and ground water) that has several small tributaries and finally turn into a big river and Spills into a huge lake or a sea.	Panj	22	18.7
	Shamal River	1.88	2.2
	Hilmand	9.3	8.4
	Harirod & Murghab	3.6	3.53
	Kabul	20.76	17.1

Table 3. Decrease of Accessible Water in the last several years in the five river basins

River Basin	Accessible Water in 1980 and 1969 in Billion Cubic Meters (m ³)	Accessible Water in 2016 and 2008 in Billion Cubic Meters (m ³)	Accessible Water in future (2030) in Billion Cubic Meters (m ³)	Accessible Water Up to Now (%)	Reduction in Accessible Water until (2030) (%)
Kabul	193	17.1	15.3	11.3	20
Panj	21.5	18.7	17.3	13.8	21
Helmand	10.4	8.4	7.1	19	32
Harirod & Murghab	34	2.35	1.6	25	52
Shamal	11	2.2	2	1.5	5
Total	57	49	43.3	13.5	26

(Iqrar, 282:1399)

Conclusion

Afghanistan's water basins are Kabul, Amu (Oxus), Hilmand, Norht (Shamal) and Harirod-Murghab. Considering these basins, Afghanistan is rated among the highest in terms of abundance of water resources. These water resources generally originate in Afghanistan and passing its territory, takes a trans-boundary aspect. However what is challenging in this subject, is the lack of a national strategy aimed at proper management of these capacities in the country. Additionally, the protracted conflict lasting several decades in Afghanistan has also barred the opportunity to come up with codified documents for sound utilization of these water resources. Therefore, considering the extent of these water resources, Afghanistan has not been able to sufficiently use them. Most of these water resources are being used by neighboring countries free of charge due to lack of administrative arrangements. For example, Kabul, Panjsher, Ghorband, Salange Jonobi, Logar, Laghman, Kunarha rivers and others are used by Pakistan. While Harirod, Arghandab, Helmand, Khashrod, Asafzar, and Farahrod spillover into Iran. Also Amu,

Bamyan, Do Ab, Salange Shamali, Andarab, Farkhar, Keshm, Kokcha, Balamurghab and Alcheen rivers spill into Tajikistan, Uzbekistan and Turkmenistan. Among the countries in the area, Afghanistan has least used the Amu river for irrigation or hydropower generation, while the three northern neighbors of Afghanistan have been significantly using the Amu river.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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