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This paper is proposing an initial framework for the transboundary water resources management in Afghanistan. The current issues with the neighbouring countries are mentioned here so that to solve these shared water conflicts through peaceful talks in a specific framework. [View project](#)

## Adopting a Strategic Framework for Transboundary Water Resources Management in Afghanistan

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**ABSTRACT:** This article first reviews the water resources potential and transboundary rivers of Afghanistan with current endeavors that have been taken for transboundary water resources management. The reasons why Afghanistan is in need of controlling its transboundary waters and resolving current disputes with the neighboring countries over transboundary waters are stated and some examples of successful international water treaties are presented as well those might be considered as references by Afghanistan. Then, concerns about the global warming resulting in rapid snowmelts that makes 80% of the country's precipitation and the consequent possible flooding that may result not only in some disasters and deterioration of the ecosystem, but also a serious scarcity of water resources in such a landlocked country are discussed. Moreover, challenges and concerns in terms of hydro-hegemony for such a late developing upstream country that is suffering decades of war are also stated in this paper. Finally, an initial strategy framework is proposed that how Afghanistan in current situation, can survive from conflicts with its neighbors related to transboundary waters. Also, how the country may continue its hydraulic mission without any concerns and disruptions, which are significant challenges for the time being.

**Key words:** Afghanistan, Amu Darya, climate change, international water treaties, transboundary waters, water treaties negotiations strategy

### 1. INTRODUCTION:

In today's hydropolitics, dispute over transboundary water resources is one of the international issues among the countries who share waters are not a new topic. Transboundary water issues are unavoidable and the international conflicts are hard to resolve due to sovereignty that implies a degree of exclusivity in the internal affairs management [Matthews and Germain, 2007]. Some examples of conflicts on transboundary waters between Israel and Jordan on the Jordan River, among the countries Sudan, Ethiopia, and Egypt in the Nile River Basin, among Turkey, Syria and Iraq in the Tigris-Euphrates Basin, between India and Bangladesh on the Ganges River, between Peru and Ecuador on the Cenepa River, the Aral Sea conflict among Uzbekistan, Tajikistan, Turkmenistan, and Kazakhstan are reported [Uprety and Salman, 2011; Draper, 2012]. Furthermore, Bilen [2000] states that many countries are suffering water related problems in various forms due to the rapid population growth, industrialization, and urbanization where water disputes are routine matters of life between countries those share waters. Concerns about the climate change have compelled the upstream state to manage and control waters within its territory, but the downstream state is in the effort of getting enough water in order to satisfy its requirements. However, it is not just about the climate change, it is about a sustainable livelihood and a stable economy as a whole, especially for Afghanistan.

Literature search indicated that there are more than 260 rivers shared by two or more countries in the world [Wolf *et al.*, 1999; Cooley *et al.*, 2009; Cooley and Gleick, 2011; Paisley and Henshaw, 2013; Sivakumar, 2013]. Since these shared waters create disputes between riparian states frequently, there are solutions at this end, generally via diplomatic negotiations such as agreements and treaties. About 300 agreements have been established between riparian states [Cooley *et al.*, 2009], but in the year 2000, there existed 217 water related agreements including regional cooperation and water distributions as admitted by Bilen [2000]. In Asia, there exist 41 transboundary treaties for shared water supply [Draper and Kundell, 2007]. All these statistics about transboundary water agreements indicate that how important water resources are. The necessity of guidance and procedures those can enable the development of treaties providing a base for apportionment of available water between sovereign states is recognized by Draper [2006]; Wolf [2006]; and Draper [2012]. Therefore, the transboundary water issues of Afghanistan with her neighbors, especially Iran and Pakistan will be reviewed in this paper including analysis of Afghanistan's current situation. Strategies are also proposed for dispute mitigation taking aspects of climate change, environment, economy, politics and international laws and conventions into account for maintaining sound relations with neighboring countries.

Afghanistan, a landlocked country with a total area of 652.000 km<sup>2</sup> and 30 million population is suffering lack of management of its water resources, especially transboundary waters due to war and instability for more than three decades. Based on the geography of the country, water of four river basins out of a total five, flows into neighboring countries whilst Thomas *et al.* [2016] state that 90% of Afghanistan's surface water is shared with downstream neighboring countries. Water from Amu Darya basin flows into Uzbekistan, Tajikistan, and Turkmenistan, Kabul river basin's water flows into Pakistan, Helmand river basin's water flows into Iran, and Harirud-Murghab river basin's water flows into Turkmenistan and Iran. Indeed, the sources of these four rivers are in the high altitudes of Hindu Kush and Pamir mountains inside Afghanistan. In recent years, Afghanistan has started some efforts for the management of the country's water resources in order to generate hydropower energy, expand agriculture, improve economy, flood and drought control, and control its transboundary waters. The Afghanistan National Development Strategy [ANDS, 2008] emphasizes to “*manage and develop water resources so as to reduce poverty, increase sustainable economic and social development, and improve quality of life for all Afghans and ensure an adequate supply of water for future generations*”. The Afghan vision is about long term and a sustainable development after waters are managed and used efficiently. On other hand, neighbor countries, especially Iran and Pakistan are worried about the infrastructures activities for water resources that may limit their access to water that they receive at the moment. Currently, the only international transboundary water treaty that Afghanistan has entered into is the 1973 Helmand river water sharing treaty with Iran [Palau, 2013; Goes *et al.*, 2015; Thomas and Varzi, 2015]. Therefore, Afghanistan has to establish and maintain a balance between its transboundary water resources management and the settlement of disputes with all the riparian states, which obviously needs the establishment of a framework to be followed in order to achieve the goals.

### **Afghanistan's Water Resources:**

Afghanistan has an average annual precipitation of 227 mm [Ahamd and Wasiq, 2004], but according to the Afghanistan's Water Sector Strategy [2008], it is 250 mm ranging from 1.200 mm in the higher altitudes of the northeast to 60 mm in the southwest. The annual

potential of available renewable water resources are 75 billion m<sup>3</sup>, of which 57 billion m<sup>3</sup> is surface water and 18 billion m<sup>3</sup> is groundwater [Ahmad and Wasiq, 2004; Saffi and Kohistani, 2013; Habib, 2014]. However, recent figures reported are higher than 75 billion m<sup>3</sup> by authorities from Ministry of Energy and Water (MEW) of Afghanistan and Shroder and Ahmadzai [2016]. In terms of use, Afghanistan only uses about 33% of its available surface water for the time being [ANDS, 2008] with per capita availability of more than 2.000 m<sup>3</sup> per year [Ragab and Prudhomme, 2002], where more than 80% of the country's water resources come from snowmelt in the Hindu Kush [Ahmad and Wasiq, 2004; UNEP, 2009]. Data about annual water discharge by basin with its percentage and the area covered by each river basin is briefly presented in (Table 1).

After the year 2001, the Afghan government has commenced some fundamental efforts toward water resources management mainly for providing irrigation water and energy generation to its population through the development of water resources infrastructures. The Water Sector Strategy of Afghanistan [2008] explains its strategic vision as “*To manage the Nation's water resources so as to reduce poverty, increase sustainable economic and social development, and improve the quality of life for all Afghans and to ensure an adequate supply of water for future generations.*” as well. Therefore, an important step has been taken for management of water resources, which is a critical factor for the future development and sustainability of the country, especially at the time when the international community stops its economic support. Considering all these needs, the Afghan government has announced commencement of 21 large scale infrastructure projects for water resources management of the country just in 2016, which is a significant figure for such a country.

**Table 1:** Annual Discharge of Afghanistan's River Basins [modified from Favre and Kamal, 2004; and Shroder and Ahmadzai, 2016].

River Basin	Land Area (%)	Total Annual Discharge	Total Annual Flow
Amy Darya	14	45.4 - 48.1	57
Harirud-Murghab	18	2.3 - 3.06	4
Helmand	43	9.13 - 17.66	11
Kabul (Indus)	12	18.2 - 20.9	26
Northern	13	1.67 - 1.81	2
<b>Grand Total</b>	<b>100</b>	<b>80.3 - 87.93</b>	<b>100</b>

### Afghanistan's Transboundary Rivers:

Afghanistan has five river basins, which are: Amu Darya River Basin, Harirud-Murghab River Basin, Helmand River Basin, Kabul (Indus) River Basin, and the Northern River Basin. The first four river basins are transboundary river basins and shared with the neighboring countries. Favre and Kamal [2004], and Thomas *et al.* [2016] assert that 90% of the Afghanistan's surface water resources are transboundary, and in most cases, it is the upstream country. Some tensions on these transboundary rivers have been reported by Favre and Kamal [2004] and King and Sturtewagen [2010] between Afghanistan and its neighbors. Besides, due to lack of infrastructures on the rivers, about two-thirds of Afghan rivers flow into Pakistan, Iran, Turkmenistan, and other neighbor countries as cited by Dehgan *et al.* [2014]. Table 2 provides information about the transboundary basins that Afghanistan is located in.

**Amu Darya River:** This river is about 2.574 km long with a total drainage area of 1.327.000 km<sup>2</sup> [McKinney 2004; Rahaman 2012], with 1.100 km length in Afghanistan [Yıldız, 2015]. The Amu Darya River is shared among Afghanistan, Uzbekistan, Tajikistan, Turkmenistan and Kyrgyzstan [McKinney, 2004; King and Sturtewagen, 2010; Yıldız, 2015]. Afghanistan is the second largest source of water for the Amu Darya River [Palau, 2013; Habib, 2014], where this river is one of the major contributors to the Aral Sea in Central Asia. McKinney [2004] confirms 10% of the inflow to the Aral Sea Basin is Afghanistan's contribution, but it is not a party to the Aral Sea Basin management and has not participated in any of the basin management discussions yet due to its political instability [Favre and Kamal, 2004; McKinney, 2004; Horsman, 2008]. Amu Darya covers 14% of the Afghan territory [Favre and Kamal, 2004] and irrigates 23% of the total agricultural land with an estimated annual discharge of about 20,76 billion m<sup>3</sup> [DURAN, 2015]. As per Ahmad and Wasiq [2004], about 17 billion m<sup>3</sup> of Afghanistan's water is flowing into Amu Daray. Covering relatively less land, the Amu Darya with a large potential of hydropower, extracts about 57% of the total annual flow of Afghanistan [Favre and Kamal, 2004]. This is believed that once Afghanistan undertakes its major infrastructure projects that will affect central Asia's water supplies significantly [Habib, 2014].

**Harirud-Murghab River:** Harirud Basin is shared between Afghanistan, Turkmenistan and Iran that originates in the Koh-i-Baba located in central Afghanistan. The length of the river in Afghanistan is 1.300 km, which represents 12% of Afghanistan's available water resources [Yıldız, 2015]. However, as per Thomas *et al.* [2015], the length of Harirud is 1.124 km in the location where it is shared by Afghanistan, Iran and Turkmenistan, and the annual water flow represents 4% of the country's total annual flow [Favre and Kamal, 2004]. Afghanistan recommenced construction of the Salma Dam on Harirud river basin in 2004 [Thomas and Warner, 2015], which had been started in 1976 while the Soviet invasion interrupted its construction at a very early stage [Favre and Kamal, 2004]. Construction of the Salam Dam is completed now where its inauguration ceremony took place on June 4, 2016 as reported by Kohistani [2016]. According to Thomas and Warner [2015], the distribution of Harirud water at the moment is around 40% for Afghanistan, 30% each for Turkmenistan and Iran, but completion of Salma Dam will change the amount of water to 74% for Afghanistan, 13% each for Turkmenistan and Iran. Hence, Iran has tried to disrupt the construction of any water diversion project including the Salma Dam that controls water flow into Iran because Iran thinks that these projects will cause water scarcity in the eastern part of the country [Dehgan *et al.*, 2014]. Currently, there is no treaty between Afghanistan and Iran or Afghanistan and Turkmenistan on the mechanism of water distribution and cooperation on the basin. In 2005, Iran and Turkmenistan constructed the Doosti Dam on Harirude river close to their borders without any consultation or involvement of Afghanistan that created concerns in Kabul [King and Sturtewagen, 2010].

**Helmand River:** Also known as Hirmand River, is 1.300 km long [King and Sturtewagen, 2010; Thomas and Varzi, 2015; Yıldız, 2015; Thomas *et al.*, 2016], one of the longest rivers in Afghanistan that originates from Hindu Kush mountains in the North-East of the country. The river then ends at the Sistan depression or Delta in Iran, largely dependent on Afghanistan's surface water [Meijer and Hajiamiri, 2007; Thomas and Varzi, 2015]. The 1973 Helmand River Water Treaty (HRWT) that was signed in 13<sup>th</sup> of March 1973 is the only valid transboundary agreement that Afghanistan has with Iran on the apportionment of Helmand river's water. However, the Iran side has always complained about the treaty

arguing the amount of water specified in treaty is not enough for its needs, which is 22 m<sup>3</sup> per second in average, with an additional amount of 4 m<sup>3</sup> per second as an illustration of friendliness between these two countries with a total amount of 820 million m<sup>3</sup> water per year. Still, these two countries have a long history of disputes over the Helmand River water sharing since the nineteenth century [Thomas and Varzi, 2015]. But this is very surprising that Meijer and Hajiamiri [2007] confirm the amount of water to be around 5.000 million m<sup>3</sup> per year that reaches to Iran via Hirmand (Helmand) river. Also, Meijer and Hajiamiri acknowledge that in addition to Helmand river's water, another 2.500 million m<sup>3</sup> per year reaches to Iran from Afghanistan's other rivers. The amount of water just from Helmand river is 6 times more than what the 1973 treaty stipulates, which is 820 million m<sup>3</sup> per year at maximum. In addition to all these, Iran has not stopped its efforts to destabilize the western provinces of Afghanistan even supporting insurgents in order to prevent water resources activities as reported by Dehgan *et al.* [2014]. Dehgan *et al.* study the transboundary water relations and hydropolitics between Afghanistan and Iran in a book chapter where the authors further explain the political and economic interest of Iran in the Afghan water resources infrastructures in details advising that these disputes can be mitigated through negotiations and agreements under the circumstances of international water law and international supports in order to create transboundary commission between the two countries. Still, with the support of the United Nations Environment Program, between 2003 and 2005, Iran and Afghanistan had exchanged information on the Sistan; most recently, from at least 2010 to 2013, a joint Afghani-Iranian Helmand River Commission has met quarterly to share information on flood control of the Helmand River [Shroder and Ahmadzai, 2016].

**Kabul (Indus) River:** The main tributaries of the Kabul River are the glaciers and snow of the Hindu Kush mountains that are a part of the Himalayas [Vick, 2014]. The river represents 26% of Afghanistan's water resources [Favre and Kamal, 2004; Yıldız, 2015]. The Kabul river is about 560 km long inside Afghanistan [King and Sturtewagen, 2010; Yıldız, 2015] to which, the Kunar River is a tributary that flows in the eastern part of Afghanistan and the northwestern part of Pakistan. Talking about the total length of this river that ends in the Indus River in Pakistan is stated to be 700 km long as per Ahmadullah and Dongshik [2015] and Lashkaripour and Hussaini [2008]. Afghanistan and Pakistan are the riparian states of this river in such a way that both are upstream and downstream of each other [Vick, 2014]. Moreover, the Kabul River is the only river in Afghanistan that joins the Indus system in Pakistan and which leads to the sea in Karachi [Yıldız, 2015]. The water inflow to the Indus river in Pakistan from Afghanistan is about 20,07 million m<sup>3</sup>, while 19,81 million m<sup>3</sup> of that come from the Kabul and Kunar rivers [Thomas *et al.*, 2016]. Currently, the Kabul river basin with a 35% population density that largely depends on agriculture [Ahmadullah and Dongshik, 2015] and making remarkable percentage of the country's water resources, its undetermined amount of water still flows into Pakistan without any agreement or treaty, which directly affects livelihood in the basin in many ways, especially the eastern provinces. Although a technical committee was established in 2003 by Afghanistan and Pakistan, its efforts failed due to lack of river flow data that was provided by Afghanistan [Yıldız, 2015]. However, government of Afghanistan has begun some efforts to construct some dams along the Kabul river for the water control, which may cause concerns downstream.

**Table 2:** International River Basins of Afghanistan and the Riparian Countries

Basin Name	Total Area of	Riparian	Area (km <sup>2</sup> )	% of Basin Area in a
Aral Sea (includes both Amu Darya and Northern river basins)	12322000	Kazakhstan	424000	34.4
		Uzbekistan	383000	31.1
		Tajikistan	136000	11.04
		Kyrgyzstan	112000	9.1
		Afghanistan	105000	8.5
		Turkmenistan	70000	5.68
		China	2000	0.16
		Pakistan	200	0.02
Harirud-Murghab	92600	Afghanistan	41100	44.38
		Iran	35400	38.22
		Turkmenistan	16200	17.49
Helmand	353000	Afghanistan	288000	81.59
		Iran	55000	15.58
		Pakistan	10000	2.83
Indus (Kabul river basin)	1128	Pakistan	598000	53.01
		India	382000	33.86
		China	76000	6.74
		Afghanistan	72000	6.38

### Attempts for Management of Transboundary Water Resources:

The Ministry of Energy and Water (MEW) of Afghanistan has recently declared the demand to control the country's water in any case. Additionally, the President's office and the MEW has announced the construction or repairing of 29 water related projects including dams/reservoirs and canals to be started in the country in 2016, which shows seriousness of the government for controlling and managing its water resources after decades. These projects include Salma and Pashdan dams in the Harirud basin, Bakshabad and Kamal Khan dams in the Helmand basin. The Salma Dam project on Harirud with capacity of 1.015 million m<sup>3</sup> [Thomas and Warner, 2015] completed in June 2016. These projects are clear indicators of the government's strong intentions for development of its water resources. Besides, Afghanistan is pushing for unilateral resource capture adopting hegemonic mechanisms [Thomas and Warner, 2015]. According to Thomas *et al.* [2016], many of the Afghan parliament members who play important role in transboundary waters decision-making, think that delaying negotiations with neighbors and continuing constructions of dams for water resources development would be in the best interest of Afghanistan until the country come to the table with a hydro-hegemony status. Thus, it can be said that the country is reluctant to make negotiations due to its current position.

Furthermore, the Water Sector Strategy of Afghanistan [2008] insists on the storage and control of water so that the country can be prepared for the periods of drought due to the climate change. Also, Afghanistan thinks that managing water resources will significantly help poverty reduction in the country as well, which is the biggest challenge for the country at the time being. Thus, Afghanistan is in a serious need of managing its water resources whether it is for irrigation, hydropower generation, poverty reduction, sustainability, future needs during drought or even drinking water. Currently, the MEW has prepared a draft of the Trans-Boundary Water Policy as well, which is at the Ministry

of Foreign Affairs (MFA) at the moment [DURAN, 2015]. The draft of the policy was not accessible during the preparation of this article.

### An Overview of the Afghan Constitution Related to Water Resources Management:

The diagram in (Figure 1), explains the relation of Afghan Constitution, Water Law, and public institutions to the transboundary water management. The influence diagram shows how the constitution is framed for the water resources management strategy in the country.

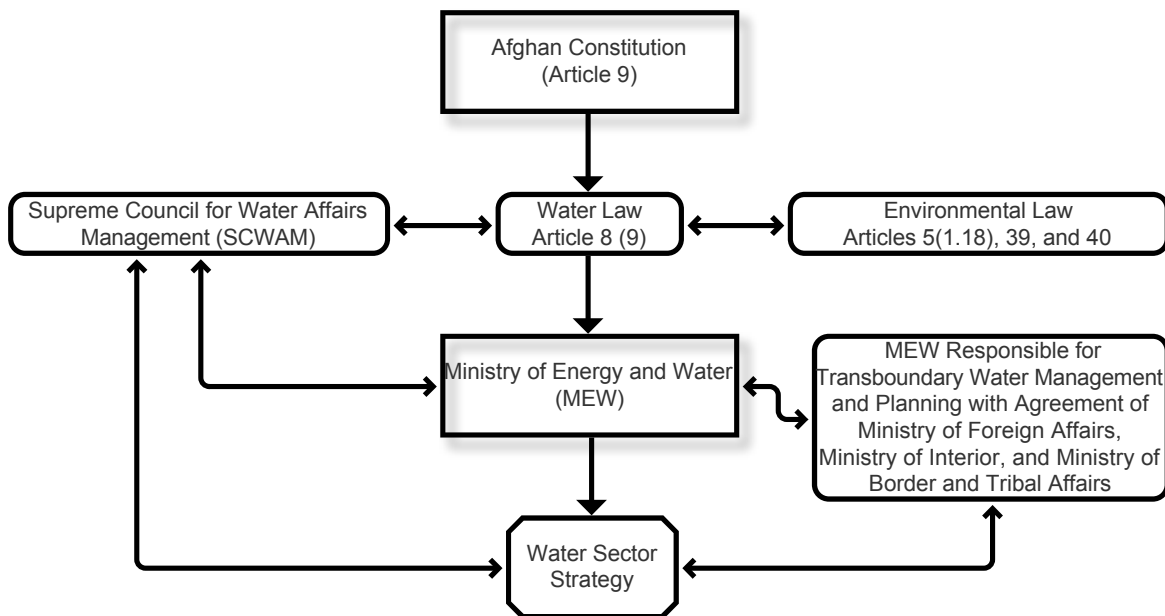


Figure 1: A diagram of the Afghan Constitution related to transboundary water resources management.

### Examples of Successful Transboundary Water Treaties:

The Indus Water Treaty (IWT) is a good example of settling transboundary water disputes, which can be referred to, for a detailed study. The treaty was signed between India and Pakistan in 1960 after years of negotiations where the World Bank played an important role as a mediator between these two countries. The IWT is evaluated by some authors such as Kirmani and Moigne [1997]; Nakayama [1997]; Wolf [1997]; Bilen [2000]; Wescoat *et al.* [2000]; Zawahri [2008]; Sinha [2010]; Biswas [2011]; Rahaman [2012]; Sarfraz [2013]; and Gander [2014] to be relatively a successful treaty that has lasted for more than 50 years despite some concerns and complains from both states. Although India and Pakistan have history of wars with each other and still some serious political tensions exist between these two countries, the IWT has proven to be one of the successful cases of water sharing treaties in its context. IWT case worths discussing and provides a benchmark since Afghanistan is the upstream state for Pakistan in the Kabul-Indus river likewise India in the Indus river.

The case of Orontes river shared by Turkey, Lebanon, and Syria analyzed by Comair *et al.* [2013] is another example of a good cooperation in international rivers among the copriarians to be considered. The new agreement of 2002 between the two states (Syria and Lebanon) was based on the principles of the 1997 UN Watercourse Convention. Even there exists just a bilateral agreement between Syria and Lebanon, the agreement is said to be the way for disputes resolutions, which's purpose is not just the water, but security as well that



can be framed as the same case for Afghanistan. Thus, settling the disputes between Afghanistan and Iran over the waters of Helmand and Harirud rivers may play a substantial role in providing security of Helamd and Harirud river basins. Comair *et al.* [2013] explain that the 1994 agreement between Syria and Lebanon on the water distribution of the Orontes river shows the hegemony of Syria. Based on negotiations that happened between Syria and Lebanon, a new agreement comprised of the 1994 agreement, 1997 addendum and the approved minutes of the joint Syrian-Lebanese meeting was signed in 2002. Furthermore, Paisley and Henshaw [2013] insist that the large part of the literature confirms avoidance of conflicts over transboundary waters through international treaties among the riparian states, which gives a signal that a treaty in any scenario is better than the absence of any bilateral agreement or official discussions between or among the states sharing waters.

Wolf [1997] offers lessons learned from transboundary freshwater treaty negotiations through 14 case studies of 140 transboundary water treaties around the world, which were collected at the three Forums of the International Water Resources Association (IWRA) Committee on International Waters and on the University of Alabama Transboundary Freshwater Dispute Database. In this study, the lower Mekong river basin agreement among Thailand, Lao PDR, Vietnam and Cambodia is evaluated as a “good example of resilience of agreement”, which was re-ratified in 1995 by the 1957 Mekong Committee as 1995 Mekong Commission. Likewise, Biswas [1999] has also accepted the Mekong river basin agreement among the four lower co-riparian states (Thailand, Lao PDR, Vietnam and Cambodia) as a good example of a transboundary water treaty.

Model Agreements for the shared use of transboundary water resources are prepared by the American Society of Civil Engineers [ASCE, 2004], as guidelines and procedures for focusing on how to establish agreements for shared transboundary waters in order to assure that all applicable factors are considered by sovereign parties in their negotiations [Phelps, 2007]. These are based on four guiding principles; a) negotiations must be conducted with a commitment to coordination and cooperation; b) the agreement should provide for management on the basis of watersheds and/or river basins; c) adaptive management and flexible provisions should be included in the agreement, to overcome the inherent obstacles facing effective water sharing; and d) an interdisciplinary approach to water allocation among parties must be used, which grant a strong base for countries to start from. This might also be beneficial that Afghanistan scrutinize these guidelines for the initial startup of its transboundary water sharing negotiations with its neighbors. This is also important to harmonize water sharing accords based on political, functional, environmental, hydrological, and geographical concerns from which, political issues are the important ones [Draper, 2012]. Hence, Draper further concludes that in addition to the need of a formal water sharing agreement, the participation of state and non-state actors is also important and is one of the major factors for a successful water distribution treaty. Considering the involvement international community by assisting riparian states in the development of cooperative management networks, Wolf [2006] states that international community might assess the specific institutional needs that take into account the key factors such as: adaptable management structure, clear and flexible criteria for water allocations and water quality management, equitable distribution of benefits, concrete mechanisms to enforce treaty provisions, and detailed conflict resolution mechanisms. Moreover, the best way for disputes resolution over transboundary water sharing is described as involvement of international community or organizations as a third party [Nakayama, 1997; Sinha, 2010; Tanzi and Milano, 2013] and via entering into treaties

[Wescoat *et al.*, 2000; Matthews and Germain, 2007; Zawahri, 2008; Rieu-Clarke, 2010; Brochmann, 2012; Rahaman, 2012; Paisley and Henshaw, 2013; Sarfraz, 2013].

Zawahri [2008] argues that in addition to a signed treaty between states for water rights, there should be a permanent commission that can regularly oversee the full implementation of a treaty and whenever a conflict arises, the commissioners can settle conflicts via direct communications and negotiations. Zawahri mainly refers to the Permanent Indus Commission (PIC) that was established in 1960 by the IWT for observing the treaty's implementation, which is a good example that has succeeded in management and disputes elimination of the Indus River between India and Pakistan. Additionally, Bilen [2000] argues that the success of Indus Agreement is because of the technical approach adoption where these kind of methods have effective determinations in transboundary water disputes rather than a political approach. Furthermore, Grover and Krantzberg [2015] and Norman and Bakker [2015] also confirm the success of a commission in transboundary water treaties such as the International Joint Commission (IJC) created under 1909 Boundary Waters Treaty (BWT) between the United States and Canada, which has proved an effective way for settling water sharing, environmental, and ecosystem problems that is regarded as a good transboundary water governance. Still, some others insist that hydro-political approach is one of significant factors playing central role in water conflicts resolutions among countries as examined by Sivakumar [2013] and Zeitoun and Warner [2006].

#### **Effects of the Possible Climate Change:**

Afghanistan's climate is arid to semi-arid, with cold winters and hot summers [Broshears *et al.*, 2005]. However, Uhl [2006] defines Afghanistan's climate as a dry continental climate with most precipitation in snow form. Temperature in Hindu Kush mountains reaches  $-50^{\circ}\text{C}$  in winter, in the desert areas, especially in Dasht-e-Margo, it reaches to more than  $+50^{\circ}\text{C}$  in summer [Ahmad and Wasiq 2004], while Banks and Soldal [2002] use a range of  $-10^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  for Afghanistan's temperature. A reasonable range of  $-20^{\circ}\text{C}$  to  $+45^{\circ}\text{C}$  is reported by Mahmoodi [2008], and by Water Sector Strategy of Afghanistan [2008].

Afghanistan experienced four sequential years of drought from 1998 to 2001 [Ahmad and Wasiq, 2004] raising concerns about the consequences of a possible climate change. Also, from the last five decades, a period of drought in every three years is reported by Afghanistan while the 2011 drought record was the worst one that plagued 14 provinces out of 34 of the country affecting 2,6 million people [Miyan, 2015]. Since 1960, the mean annual temperature in Afghanistan has been increased by  $0.6^{\circ}\text{C}$ , at a  $0.13^{\circ}\text{C}$  average rate in each decade, resulting changes in the amount of rainfall and snow that are the main sources of surface water [UNEP, 2013]. Moreover, Vining and Vecchia [2007] anticipate a 10% reduction in the total annual precipitation during the upcoming 50 years in Afghanistan. Also, snowmelts will happen earlier in the year because of reduction in the snowpack's in case of increase surface temperatures in mountainous regions [Mack *et al.*, 2010]. Furthermore, based on the suggestions of the regional climate models for arid regions in south and central Asia, the average annual precipitation would decrease whereas, the average annual temperature would increase [Ragab and Prudhomme, 2002; World Bank, 2010]. According to Afghanistan's Water Sector Strategy [2008], extreme flooding and droughts may happen in the forthcoming decades triggering social and environmental disasters. Hence, at the time whilst temperature increase and variation in precipitation's

time and amount may affect the potential and availability of water resources in the country, it is necessary for the country to take serious steps for preventing such events, especially in a country, where more than 80% of its population is just relied on Agriculture and livestock.

There is no doubt that a possible global warming will affect a country's hydrological cycle, temperature and environment, resulting some disasters such as droughts, floods, early ice melting, and water scarcity. Afghanistan is more vulnerable to water resources scarcity due to climate changes as far as Afghanistan's 80% of water resources come from the snowmelt. Thus, if the snowmelt occurs early, that means the country will not be able to provide required water resources to its population. According to Draper and Kundell [2007], water availability and runoff may decrease in arid and semiarid Asia due to the climate change, which means Afghanistan's water availability, even snowfall will likely decrease in the forthcoming years.

### **Challenges, Concerns and Disputes Related to Transboundary Waters:**

The water resources activities in Afghanistan have raised concerns among neighbors and international organizations such as UN, USAID, and the World Bank [Thomas *et al.*, 2016]. It is also well known that Afghanistan has problems with its neighboring countries about these activities. According to Dehgan *et al.* [2014] and Thomas *et al.* [2016], the country is experiencing threats from Iran related to its reconstruction of water related works. But the political reasons of the disputes between the country and its neighbors are out of scope of this article. Therefore, it is essential for Afghanistan to overcome the disputes through a sound and stable strategy in order to concentrate on the development of the country rather than involving in conflicts. Afghanistan's Water Sector Strategy [2008] has not mentioned anything about transboundary waters to be used as a reference for how to take further actions. However, the revised 2009 Water Law of Afghanistan in section 9 of article 8 explains that “*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 with agreements from the Ministry of Foreign Affairs, Ministry of Interior and the Ministry of Border and Tribal Affairs*”. Thus, it is clear that main and key responsible institution for the transboundary water resources management in the country is the MEW, which should be analyzing all the challenges and concerns that exist regarding transboundary waters.

The main concern of good transboundary water governance for Afghanistan may be the fact of being a late developer state due to wars and instability for more than three decades in the country. Obviously, the power status of Afghanistan over the control and management of its transboundary waters is under question as well, while Thomas *et al.* [2016] confirm that the power, trade dependence and capacity indicators, these all prove Afghanistan's weak position comparing it with its neighbors. Now, the question is that how Afghanistan, as a late upstream developer state, can convince its neighbors to develop its water resources with out their disruptions. According to Koff and Maganda [2012], Goulden, Tickner, and Zeitoun [2013] have recognized four particular challenges facing transboundary river basin management: (1) the politics of reconciling international political borders and basin boundaries; (2) the expanding pressure on governance from competing water uses and users; (3) the different states of management methods and policy that have not kept pace with evolving governance systems; and (4) the direct and indirect influence

of climate change. Thus, all these challenges should be analyzed carefully and one by one in order to adopt a better strategy for their solutions.

The effects of climate change and security concerns shouldn't be underestimated at the same time because Afghanistan should be also concerned and make necessary preparations for the periods of droughts where Miyan [2015] indicates that in the last five decades, drought in Afghanistan is reported once in each three-year period. The climate effects on the water resources availability are explained in brief earlier. Therefore, most of the water resources projects in the country are delayed due to insecurity and inaccessibility to project sites or some projects can even not be started at the moment.

### **Framing an Initial Strategy:**

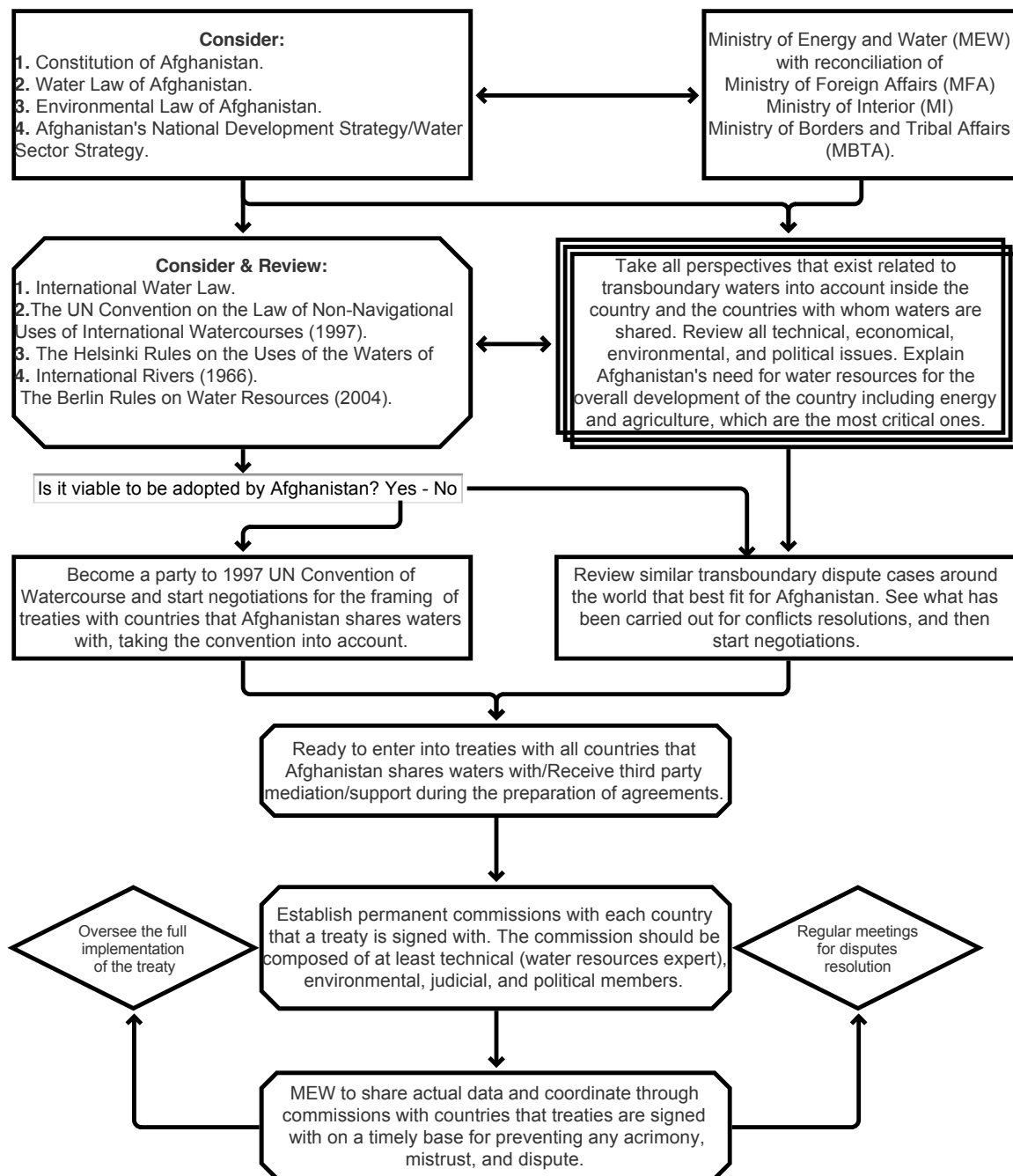
Instead of a unilateral strategy that might arise more problems to such a fragile country in terms of security, power, sustainability, and economy like Afghanistan, a sound and wise strategy achieving the same objective may eliminate the chances of acrimony and mistrust between Afghanistan and its neighbors over transboundary waters. So, this article proposes an initial strategic framework that may effective for disputes settlement rather than accelerating disputes and further acrimonies to a stage where there might be not any resolution to. In Figure 2, the diagram and the influence and relationships of the Afghan institutions together with the steps on how to proceed on a legal way for entering into transboundary water treaties with downstream countries is formulated in a very simple way. This initial strategic framework is recommended for the sake of ease to see that what are the options and processes to be considered in the existing legal framework of Afghanistan and the international community for solving transboundary water sharing issues.

Due to the instable situation in Afghanistan and the position of the present government, it would be viable that Afghanistan becomes a party to the 1997 UN Watercourse Convention (UNWC) so that to get support from the international community because Uprety and Salman [2011] insist that the problem with the lack of cooperation in South Asian countries over transboundary waters is that none of these countries are a party to the UN Watercourse Convention, the only international “framework law” applicable to transboundary waters. The UNWC is discussed by many authors such as Biswas [1999]; Bilen [2000]; Salman [2007]; Wegerich and Olsson [2010]; Biswas [2011]; Rahaman [2012]; Sarfraz [2013] Gander [2014]; Zeitoun [2015]; and Salman [2015] that has come into force on 17 August 2014. The 1997 UN Convention on the Law of the Non-Navigational Uses of International Watercourses was firstly adopted by the General Assembly of the United Nations on 21 May 1997, which has 7 Parts, 37 Articles, and an annex of Arbitration having 14 Articles. It is also important to be mentioned that Afghanistan was an absent country during the convention. The most critical principles in the UNWC among the authors are the principles of “equitable and reasonable utilization and participation” (Article 5) and “obligation not to cause significant harm” (Article 7). Some of the authors say that these two principles have no much clear explanation and understanding as they are vague in interpretation because as per Salman [2015], the upstream states are complaining that the convention is biased in support of downstream riparians, especially while it comes to the principle of the “obligation not to cause significant harm”, and that is why Turkey, China, and Burundi voted against this convention. If Afghanistan accepts to ratify the UNWC, the above mentioned two articles should be overviewed carefully whether it will settle current disputes with neighbors or

not. Still, the UNWC is a global framework, which might be a reliable source for states entering into treaties on transboundary waters [Salman, 2015]. Furthermore, cooperation over water resources development on any transboundary river in Afghanistan is suggested by international organizations and community [Thomas *et al.*, 2016]. Afghanistan's position as an upstream state is what can be counted on. But it doesn't mean that the current strategy of resources capturing and not discussing with downstream states will work sufficiently because it will still pay the price somehow. Thus, reviewing and considering to ratify the UNWC may be a step forward for the current disputes resolution with downstream riparians as the country is not in the position of Turkey or China in order to be fully against the convention.

A very good article written by Zeitoun [2015] exploring the relevance of the hydraulic development projects of late developing upstream countries with the main tools of International Water Law (IWL) for a non-legal audience. In this paper, Zeitoun argues that the IWL is completely relevant to the later-developing, upstream states that undertake hydraulic development projects. While the upstream countries are incautious proceeding their own hydraulic missions, concerns are raised by the downstream countries for example: the planned or under construction dams in Turkey, Ethiopia, and Lebanon have raised concerns downstream in Iraq, Israel, and Egypt [Zeitoun, 2015]. This later-developing upstream case is the same for Afghanistan where its hydraulic mission has caused worries in downstream states, especially in Iran and Pakistan. Hence, Afghanistan, keeping distance from the IWL and UNWC might not be a long term solution while downstream states are trying to disrupt these projects with a reasonably high power and economy in comparison to Afghanistan.

Analyzing the challenges and concerns based on the current disputes with neighbors, especially Iran and Pakistan, this article offers an initial strategic framework (Figure 2) in order that Afghanistan can eliminate the acrimony that exists with these two countries in relation to transboundary waters, convincing them via formal discussion and negotiations and entering into legal treaties with a third party mediation. Just signing a treaty may not be sufficient in case if there isn't an oversee on the full implementation of the agreement. Establishment of commissions including at least one-one member from technical, environmental, judicial, and political area of expertise for each single treaty is essential so that these commissions can discuss any kind of dispute and mitigate them while arise. Sharing of data related to any activity that happens upstream or downstream with a prior notice and respect for concerns of the parties may convey to a peaceful environment where the needs of both upstream and downstream states will be satisfied rather than being doubtful on each other. Therefore, the key institutions, the MEW in particular, to embrace this initial strategic framework so that to overcome the current disputes that are escalating day by day with neighbors over transboundary waters in Afghanistan.



**Figure 2:** An initial strategic framework for Afghanistan on how to settle disputes over its transboundary waters.

## 2. CONCLUSIONS AND RECOMMENDATIONS:

The analysis of Afghanistan's transboundary water issues is still difficult and complicated due to the political situation of the region and the current instable status of the country. Yet, Afghanistan seems to be serious in the control and management of its transboundary water resources for the future prosperity of itself acting on a unilateral base. These strategies of downstream states trying to disturb the hydraulic mission in the upstream state, and the upstream state moving its hydraulic mission ahead without any discussion or consultation with its downstream states, have caused mistrusts and disputes, which should be treated based on a legitimate way because these problems on a long term will for sure

affect social, political, economical and even environmental facets in the region. Therefore, this article proposed an initial strategic framework for Afghanistan on how to proceed bilateral strategy to overcome the current disputes with its downstream riparian states and achieve its long term goals as well.

Hence, taking all political, environmental, and economical aspects into account, this article mentioned some popular and successful examples of transboundary water treaties as references for further review and analysis that might work as a baseline for the case in Afghanistan. Further, a primary strategic framework for current disputes settlement is proposed as a guidance showing where to start and end successfully. Becoming a party to the UNWC is recommended as Afghanistan may not be in the state as other upstream states in the world. Afghanistan in any case needs a third party facilitator for entering into water sharing treaties with its neighboring countries due to its weak and unstable position in the region. Still, everything depends on Afghanistan on how to present its concerns and needs for the water resources development and management so that to convince the states involved in water sharing treaties. Finally, the proposed strategic framework might work well for solving acrimonies and disputes once it is fully adopted.

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