



Benefit-sharing framework in transboundary river basins: the case of the Eastern Kabul River Basin-Afghanistan

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Abstract

This research explores the benefit of collaboration between the littoral countries beyond water allocation and sharing as a theoretical framework that would be a useful tool for extending Afghanistan and Pakistan cooperation for a sustainable improvement and development of the Kabul River Basin (KRB). The main goal is to highlight the concept of benefit sharing and its framework in general terms as well as in the context of KRB. The basin planning and water transboundary issues could greatly be changed in accordance with this theoretical framework, leading the game from a zero sum to a positive sum. In addition to that, it potentially results in avoidance of conflicts and pave the ground for a motivated cooperation. Mutual cooperation can bring more water for sustainable use in the basin, reducing soil erosion, mitigating drought, and ensuring food security. The findings of this study have shown that the benefits of water sharing in transboundary river basins are, mainly, due to co-riparian states' collaborative efforts to decrease the expenses and increase the outcomes. The impacts of joint investments in both states can yield a bundle of benefits including, but not limited to, flood control, reduction of sedimentation, availability of more water and hydropower production. The points mentioned above, in turn, can also ensure food security, mitigate drought, and avail renewable energy. In transboundary rivers all attempts and efforts should be geared towards identifying the typologies of benefits, aspects of benefits, scenarios of benefits, and the optimization/maximization of benefits.

Keywords: benefit sharing, cooperation, framework, transboundary, Afghanistan and Pakistan.

Paper type: Research paper

1. Introduction

In recent years attention has been focused on how Afghanistan and Pakistan have been cooperating for achieving socio-economic development during on-going tensions related with hydropower development in Kabul River Basin (KRB). A benefit sharing approach is proposed as an analytical framework to evaluate such complexity of bilateral interactions over sustainable development in the river basin.

A legal framework is important at all stages of design, planning, and implementation of water management systems. Applying a suitable legal framework helps avoid, or settle, conflicts between competing water users and their interests, in addition to promoting efficient management. A legal aspect of water might already be challenging on the national scale. When it crosses the national borders expanding to international scale, it becomes even more complex. When a water resource is transboundary, it is necessary to jointly develop a management system and not just follow the rules of each individual state (Sadoff et al. 2008). Some of the earlier international agreements focused largely on navigational uses. Later agreements included regulation of the management of water resources for other specified purposes such as irrigation, flood control or industrial production. Most recent agreements attempt to apply a holistic approach that includes equity and environmental concerns (Sadoff et al. 2008).

Cooperation between hydropower, agricultural or environmental development projects within a single country can certainly result in new and additional benefits. For example, the projects might decide to share knowledge, expertise and equipment, and as a result it can reduce their costs and increase their outputs.

Similarly, projects based in two different countries could also cooperate in new ways to achieve greater benefits. For example, combining approaches to watershed management can not only reduce investment costs, but can also result in more effective management of the shared environment and resources.

The nature and importance of water resources also suggest opportunities for cooperation and benefit sharing across the sectors. For example, hydropower generation in one country can benefit industries in another. Benefit sharing is defined as “the process where riparian states cooperate in optimising and equitably dividing the goods, products, and services connected directly or indirectly to the watercourse, or arising from the use of its waters” (Sadoff & Grey 2002; Phillips & Woodhouse 2009). Benefit sharing can take place between riparian states, different sectors, society and environment, and social groups. When water leaves the national territory of one state and crosses over the border to another, it becomes a transboundary resource, and, therefore, becomes considerably more complicated to manage. These water-related activities in one nation are likely to impact the water situation in another. Consequently, water-related problems can often only be solved through transboundary cooperation (Vollmer et al. 2009). Transboundary water can be defined as “freshwater resources shared by two or more states and comprising rivers, lakes and aquifers” (Vollmer et al. 2009). To put in different words, it is water that crosses national boundaries.

When benefit sharing is considered at the level of an entire basin – additional layers of sharing become possible across the sectors. For example, where agriculture is intensified as a result of more efficient and intensive farming practices in areas of productive soils and favourable climate, this can result in greater overall regional food production and security. As a result, water, which was used in less efficient forms for food production could be released for use in new productive ways such as the development of industry.

Benefit sharing in the context of an entire basin considers how using and managing water more effectively across all sectors in combination can yield new additional benefits. That is, it would allow to explore how a joint approach to power generation or watershed management could provide a new perspective on water use for food production. The approach aims to investigate what new opportunities can emerge as a result of considering the combined effects of water resource management across sectors and countries. This approach is based on an argument that if water use in one sector is optimised, than it can lead to and enable the optimisation of water use in other sectors, potentially increasing the net benefit to the basin as a whole. This concept is well understood at the national level and has been the basis for water resource master planning for many years around the world. But applying this optimisation and conjunctive use thinking across the whole river basin is an entirely new challenge. The main goal of this study is to highlight the concept of benefit sharing and its framework in general terms as well as in the context of the KRB.

2. Literature review and theoretical framework

There are 276 transboundary river basins in the world, accounting for roughly 60% of the global river flow (UN-Water 2013). These river basins are being shared by 148 countries and are home to some 40% of the world's population (UN-Water 2008). These rivers are fundamental for the planets ecology. Without them, many ecosystems would have perished. Rivers shape the terrain and create wide basins and steep mountains. These landscapes are also home to a wide variety of animals and plants. For thousands of years, areas near rivers have attracted human settlements. Thus, where water is found, basis for life is formed and eventually, it flourishes (Sadoff & Grey 2002).

Transboundary water issues are well discussed in numerous research outcomes such as Carius et al. (2004), Wolf (2007), Qaddumi (2008), MacQuarrie et al. (2008), Turton (2000), GWP (2013) and UN-Water (2008). The possibility of cooperation in transboundary rivers is agreed by MacQuarrie et al. (2011). According to Wolf et al. (2003), cooperative incidents outnumbered conflicts by more than two to one from 1945 to 1999. The UN-Water Report (2008) maintains that since 1948, history shows only 37 incidents of acute conflict over water, while approximately 295 international water agreements were negotiated and signed.

The benefit sharing approach sheds light on the possibility of cooperation in a transboundary river basin. Sharing benefits provide riparian states with flexibility by allocating costs and benefits. This paper refers to four key readings: Sadoff and Grey (2002, 2005), Qaddumi (2008), and Lee (2015), World Bank (2016). The important thing is to select right types of benefits and cooperation for each nation. Lee (2015) highlights the significance of economic benefits shared between the riparian countries in the Mekong River Basin.

The Senegal River and the Orange River offer good practices for benefit sharing. The Senegal River is shared by Mali, Mauritania, Guinea and Senegal. The riparian states established hydropower plants and dams to regulate the river flows and generate hydropower, resulting in sharing equitable benefits. As for the Orange River, Lesotho and South Africa took advantage

of a geological factor and established canals and dams. The Lesotho Highlands Water Project on the Orange River is aimed at generating hydropower and redirecting the river flows, distributing water to South Africa and power and royalties to Lesotho (Haas 2009; Lee 2013; Taffesse 2009).

Frameworks like religious, government and customary laws, as well as local unwritten norms, may play a part in deciding who will receive water for what purpose, and from which source. Especially, in rural areas of many developing countries, customary or local laws continue to play an important role in water allocation (Hodgson 2006). In contrast, these elements are rather poorly defined at the transboundary level. There are not many legal or normative frameworks to guide riparian states in how to share their shared water resource. Thus, the sovereignty of states is one of the most important aspects of transboundary water management (UNDP 2006). Both governments and people tend to think that water, which flows through their countries, is something that belongs to them. In some legal and constitutional ways this might be true. However, since it is shared with other transboundary riparian states, they might also have similar view on water right (Phillips et al. 2009). Thus, water priorities might look different depending on from which side of the border one is observing. In this way, the management of water claimed by several actors requires a well-organized political leadership (UNDP 2006). Access to water is an essential factor for human development as well as the development of nations. Having this thought in mind it is clear that every country has its own agenda for using shared water. Naturally, the starting point of any cooperation would be to acknowledge that sovereign countries have legitimate, rational as well as obvious agendas for deriving as many benefits as possible from water (Sadoff & Grey 2005).

At present, there is a rapidly growing body of theoretical literature on benefit sharing, which mainly describes and classifies what is meant by benefit sharing. Literature introduces many new terms and approaches, but often falls short of providing a methodology for developing an approach itself. One notable exception is the Transboundary Water Opportunity or TWO, the analysis developed by Phillips and his colleagues for the Swedish Ministry of Foreign Affairs (Phillips et al. 2008). The TWO Analysis builds upon previous approaches including the Comparative Regional Assessment (Sadoff & Grey 2005) and the Transboundary Diagnostic Assessment developed under the Global Environment Facility. A list of "Emerging Principles for transboundary benefit sharing is shown in Table I.

Table I. Emerging principles of transboundary benefit sharing in river basins.

1	Where the river basin is not yet being used optimally, improving its use and management can release new benefits for the riparian states. This condition can also apply in a "closed" basin where all of the available waters are already allocated to the riparian states, because their use of water could still be optimized (Phillips et al. 2006).
2	Transboundary cooperation can release greater benefits than those benefits which are realized through unilateral country actions (Phillips et al. 2006).
3	Transboundary benefit sharing means that the effects and impacts of an activity are felt in more than one country.

4	Water Resources Management is directly linked to stability, integration, and economic growth (Phillips et al. 2006; Sadoff & Grey 2002).
5	Analyzing and identifying transboundary water benefit sharing potential requires both a process to build cooperation as well as a mechanism to examine benefits.
6	The nature of benefits which might be shared is an open debate and includes inter alia environmental, economic, and political benefits. The process of cooperation to determine benefits is in itself also a benefit. Not all benefits can be assigned a financial value.
7	Successful transboundary benefit sharing depends upon identifying Positive Sum Outcomes (or win-win scenarios) in which all countries recognize a benefit, rather than a Zero Sum Outcome (win – lose or lose-lose scenarios) in which the benefit for one country can represent a loss to another.
8	Successful transboundary benefit sharing depends upon the consideration of the hydrological cycle as whole and not only “blue” water presence in a river system.
9	Cooperation lies at the heart of realizing Positive Sum Outcomes (win-win), whereas competition over benefits results in (win- lose) Zero Sum Outcomes
10	A cooperative approach to benefit sharing scenarios is likely to be successful when based on negotiating a “basket of benefits” rather than negotiating a single benefit. The “basket of benefits” approach puts more opportunities for trade-offs and developments on the negotiating table (Phillips et al. 2006).
11	Benefit sharing should not create future conditions for conflict or competition
12	Benefit sharing should be environmentally, politically, and economically sustainable.
13	Benefit sharing should not aggravate equity and result in a situation, when those who have more getting more – or those who have less getting less.

The literature is consistent in the view that for benefit sharing opportunities to be realized, there must first be cooperation between the parties. Consequently, it makes good sense to engage the riparian states in agreeing upon the methodology before they apply it; and this should be a first stage in a benefit sharing framework.

Significant new terms introduced in the benefit sharing literature are “Positive Sum Outcomes” or PSO’s and the “basket of benefits” approach.

Positive Sum Outcomes (PSO) will have result, when all of the parties believe they have increased the benefits they gain from sharing water (Phillips et al. 2006; McCaffery et al. 2016). So rather than “robbing Peter to pay Paul” by transferring existing benefits from one party to another, (which is a zero sum output or win lose situation), a PSO is a result of finding new ways to use water in which there are greater levels of benefits to be shared. It is the art of making 5 + 5 equal more than 10. PSOs are important to effective benefit sharing because they change the perceptions of the parties towards water allocation. As the benefits from sharing the resource become increasingly available, so a competitive approach to water allocation softens and can be replaced by more pragmatic and cooperative forms of sharing. PSOs become especially important as the availability of water resources diminishes. PSOs then become an approach enabling what water is available to be used to the maximum benefit

of all – rather than the approach of “a race to the bottom of the barrel” (Phillips et al. 2006; McCaffery et al. 2016).

The basket of benefits approach is introduced by the TWO analyses and provides a more equitable and systematic means to negotiate the use of water resources than a project by project approach. A wide range of potential activities concerning different countries and sectors are identified and considered as a whole when negotiating. This means that additional and spin off benefits are also considered as these can have a significant effect on the success of negotiations. A simple example is where one country wishes to increase its allocation of water for hydropower, while another riparian state wants to use the same water to develop agriculture. Considered separately, these could emerge as all or nothing – win-lose outcomes, where a benefit is simply transferred from one party to another. But when considered together, hydropower and food production could lead to a win-win outcome because additional benefits can be shared. Clearly, the more the scenarios are being negotiated the greater the possibility to find a positive sum outcome. Negotiating on a project by project basis can easily result in a stalemate – whereas the basket of benefits approach means opportunities can be modified and changed until an acceptable outcome is agreed by all (Phillips et al. 2006; McCaffery et al. 2016).

3. Kabul River Basin: a case study

The Kabul River Basin (KRB) is located in the border region of northeastern Afghanistan and northwestern Pakistan. It lies between 33° 37'N latitude and 67° 74'E longitude with a drainage area of 76,908 km² (Mahmoudi 2017b). This basin is divided into 12 sub-basins and 10 provinces, including Kabul. (Mahmoudi 2017a). The upper catchment of the Kabul River Basin consists of steep mountain valleys in the Hindukush mountain range, which reaches over 7,500 meters above the sea level and remains snow covered throughout the year and the downstream catchment consists of agriculture land and residential area and elevation reaches to 300 meters above the sea level. Nearly 70 percent of the about 460 km main river (named Chitral River in Pakistan and Kunar River in Afghanistan) originates in the Chitral area of Khyber Pakhtunkhwa (KPK) province in Pakistan. Then the river flows into Afghanistan (Kunar Province) and returns to KPK's Peshawar Valley via the Kabul River, an important tributary of the basin. Both Pakistan and Afghanistan are upper and lower riparian states as shown in Figure 1. The KRB plays a significant role in regional water security and provides irrigation to both the countries. The KRB annual peak flows occur in July and August, with historic flows of up to 4,500 million cubic meters per year as the Kabul River enters Pakistan (World Bank 2016). Due to the high contribution of snowpack/glacier-covered areas to its flow regime, the KRB is highly sensitive to impacts of climate change via changes in precipitation and temperature (World Bank 2016). The mean annual precipitation of the catchment area is estimated at 330 mm (Tunnemeier & Houbert 2005). The climate of the basin is arid and semi-arid, with cold weather in the winter and hot weather in the summer.

The air temperature shows a high variability in different seasons, with an annual average of 9.5°C. The mean annual wind speed (1979-2012) all over the basin is estimated at 3.71 msec⁻¹. This basin has a population of approximately 12,115 million people. Rapid assessment of the impact of climate change shows that the KRB will likely face reduced runoff in wet seasons and experience increased runoff flows in dry seasons. Initial results at one of the KRB's downstream gage sites indicate that the peak flow of the basin will shift to earlier in the spring season (World Bank 2016).

The KRB is a complicated environment, affected by conflict and layered in a complex network of natural, social and political systems. The boundary between Afghanistan and Pakistan is porous; tribal groups, extended families, and insurgent factions live in both countries. Historical tribal relations complicate societal processes in the region. The Kunar River is the largest tributary of the Kabul River. The average annual flow of the Kabul River as it enters Pakistan is 22 billion cubic meters (BCM) (Mahmoudi 2017a). Almost 70 percent of the Kunar River flows originate in Pakistan territories. The winter season flow are 7 , 16 and 20 percent of the summer flow at three locations at the Kunar River as it enters Afghanistan (KA), as the Kunar River joins the Kabul River (KK), and as the Kabul River enters Pakistan (KP), respectively (World Bank 2016).



Figure 1. A location map of Kabul River Basin showing neighbouring countries.

4. Limitations of the study

In recent years both Afghanistan and Pakistan have hostile political relations. So, because of political instability, the officials from both sides are not interested to share important information in order to avoid any problematic disturbances. Therefore, it was difficult to conduct a field work to get accurate relevant information. Due to the shortage of time and political instability between Afghanistan and Pakistan, a part of the study had to be undertaken based on the secondary information.

5. Methodology

The KRB Benefit Sharing Framework in this study proposes a methodology comprising of three stages of activities, These three stages, application of which is time dependent may require to reconsider the earlier stage when the negotiations and cooperation is unsuccessful are given below:

1. **Common Understanding:** The purpose of this stage is to enable the riparian states to reach agreement on what they expect from the framework and how they intend to apply it.
2. **Scoping and Significance of Benefit Sharing Scenarios:** The purpose of this stage is to show the significance of a broad range of benefit sharing scenarios in a visual format such that the PSO can be identified and potential “baskets of benefits” proposed. It represents complex possibilities in a simple visual format so that they can be compared and synergies identified. It is more qualitative rather than quantitative.
3. **Determine Magnitude of Baskets of Benefits:** The purpose of Stage 3 is to show the quantitative magnitude of “baskets of benefit scenarios” under a range of modeled situations. This refines the understanding of scenarios such that their potential benefits and implications to water resource management can be seen at a general qualitative level. Stage 3 does not engage in a detailed quantitative analysis, and is based just upon pre-feasibility studies and Comparative Regional Assessment data. It should, however, aim to provide an explicit determination in numerical terms of those benefits, which can be quantified and also present a qualitative determination of benefits which cannot be quantified. In this respect, Stage 3 ought to collaborate closely with existing and emerging tools such as a Decision Support System. The logic behind considering “baskets of benefits” is two-fold. First, it is the way to identify a positive sum outcome such that the benefits of using waters cooperatively are greater than using them separately. Secondly, there is a chance to engage with an agreement that is more likely to be realized when negotiating several opportunities rather than single opportunity; consequently, the role of the Benefit Sharing Framework in setting up “baskets of benefits” critically prepares the ground for a successful outcome. In broad scoping terms, baskets established in stage 2 and stage 3 provide an opportunity to modify them in the light of a general analysis of the magnitude of benefits. This enables the

contents of the baskets to be adapted such that a balance might be achieved between the potential for successful cooperation and the optimization of benefits.

Also the secondary sources of data are used in this study to understand and analyze the water issues amongst the KRB riparian countries. In general, implementation of the benefit sharing framework does not appear to create any conflicts or require any significant modifications to established future plans.

6. Results and discussion

The types of benefits resulting from cooperation on KRB can be classified into economic, environmental, political, and regional benefits. The KRB provides irrigation benefit to riparian communities in both Afghanistan and Pakistan, and has potential for flood control if storage reservoirs are developed. Since KRB hydroelectric power development can generate electricity and other benefits to both countries, a benefit sharing arrangement will likely be a critical aspect of project negotiations.

The direct benefit of hydroelectric power (HEP) development in the KRB is electricity generation, at least to meet rising demand peaks and ensure energy security in both countries. The KRB location is well positioned, with a close proximity to the main load centres in Afghanistan, and the Pakistan border, enabling power export. By virtue of their water storage potential, dams in the KRB can also provide irrigation and flood mitigation benefits for communities downstream in Afghanistan and Pakistan. Realizing the KRB's HEP potential could also increase socioeconomic development in the Kunar province (World Bank 2016).

Availability of low-cost energy can act as an important driver of bilateral cooperation for both countries. In August 2013, the two countries made a joint public announcement to engage in the development of a 1,500 MW HEP cascade on the Kunar River and work toward a bilateral formula of cooperation (Agreed Minutes of the Meeting between Finance Ministers of Pakistan and Afghanistan held on 25th August, 2013).

Joint development of the KRB would create a common objective, potentially increasing dialogue on other shared economic, social, environmental, and security interests, and hence, improving the relationship between the two countries. Promoting cooperation through the KRB hydroelectric power engagement could lead to long-term transformational activities in the region. Joint hydroelectric power development can serve as a catalyst for regional prosperity as sustained interactions between the countries can lead to additional joint ventures and projects that offer mutually beneficial development gains promoting greater market integration in the region. With improved energy access, the countries in the region can reap dividends in the form of greater economic growth. An initial transboundary water opportunity analysis relating to the Kabul River Basin, addressing the categories relating to primary production, hydropower generation, urban growth and industrial development, and ecosystem services (see Table II). As shown each benefit category is attributed to the respective riparian countries with brief narrative statements summarising how the various available water resources could potentially be related to benefit sharing.

Table II. Analysis relating to the Kabul River Basin, addressing the factors relating to primary production, hydropower generation, urban growth and industrial development, and ecosystem services.

Category	Riparian/ Activity	Efficiency of Use	Flow Management	Desalination	Wastewater Re-use	Inter-basin Transfers
Primary Production	Afghanistan	The efficiency of water use in the agricultural sector can be improved in all of the riparian countries. Catchment Area of Kabul River in Pakistan is 15,000 km ² and in Afghanistan is 53,000 km ² . Pakistan agriculture is mostly dependent on irrigation network because of little rainfall, low quality ground water etc.	Flow management can be improved in the upper riparian by considering Green Water and Blue Water in agreement. This will enhance Blue Water flows to the downstream riparian, improving equity in relation to Blue Water allocations.	The desalination of brackish or marine flows is not appropriate as an option to enhance Blue Water volumes for agricultural use, due to high cost and the inappropriate quality of the water produced.	it should be introduced after treatment levels are upgraded and expanded throughout the country.	Any scheme is likely to require the cooperative inclusion of two riparian countries. Both are already considering this option, but Afghanistan has the most urgent needs.
	Pakistan				It should be expanded throughout the country.	
Hydropower Potential	Afghanistan	Darunta, Sarobi, Naghlu, Mahipar, Maidan, Soorobi, Jabalsaraj, Chak-Wardak, Shahr, Asadabad Hydroelectric Plant, Qargha, Amir Gazi, Khawar, Charikar are important on Kabul River Basin. (Annual Flow within Afghanistan = 9.4 MAF) Afghanistan has a total installed electricity capacity of about 622 MW, while energy demand for the country is forecasted at 2,769 MW by 2020.	Economic benefits are the direct benefits that could be obtained from hydroelectric power development. The main benefit from the potential KRB projects is cheap hydroelectric power generation, which will help meet energy demand in both countries. Complementarities in energy demand profiles can be harnessed for mutual gain: hydroelectric power generation can provide power during periods of electricity shortages in Afghanistan (in winter) and Pakistan (in summer), and potentially provide irrigation water for Afghanistan and flood control for Pakistan.			
	Pakistan	Mirkhani: 410 MW, Khyber, Lawi, Shagosin Warsak*: 240 MW, Gomal Zam Dam 17.4 MW, Kurram Tangi : 53 MW, Mir Khani :150 MW (Annual Flow within Pakiistan = 25.4 MAF). Pakistan’s 22,928 MW of installed capacity (FY2015) cannot meet its estimated 7.6 percent annual increase in electricity use. Under the current assessment, technical feasibility under a range of operational and climate scenarios was studied for four proposed dam sites—Mirkhani, Shal, Sagi and Kama—and one existing dam, Warsak. Warsak and the proposed Mirkhani are located in Pakistan, and Shal, Sagi, and Kama are located in Afghanistan. Construction of the four new dams—three in Afghanistan and one in Pakistan—will provide the countries with much needed storage and low-cost HEP. Feasibility studies for two of the four proposed dams show significant gaps in preparation work, but confirm that the sites have potential for HEP generation. The Afghanistan Power Sector Master Plan from 2013 indicates a total investment requirement of USD 2.6 billion for Shal (at 158 m high), producing 798 MW, and Sagi (at 85 m high), producing 300 MW.				
Urban Growth and Industrial Development	Afghanistan	There is very considerable scope for inter-sectoral allocation of Blue Water away from agriculture to realize the higher economic returns from the industrial and services sectors. However, this will require a significant shift in Government policy.				
	Pakistan	Pakistan is a developed economy by comparison to the Afghanistan but rise in population growth needs high demand of limited water to meet the challenges of high food requirements. The specific types of industries and services to be introduced require additional consideration to minimize water demand and maximize revenue.				
Ecosystem Services	Fisheries	There is little scope for increased fishery production in the inland waters within the basin and limited scope externally (for any of the riparians). The offshore fisheries (which are affected by river inflows) are important in certain cases (e.g. Gaza), but the ecosystem management of these resources is poor.				
	Environmental	Environmental benefits, such as improved soil conservation and sediment management, will be realized if the KRB is managed jointly since more data and information will be available through which to designate performance and settings of the dams. Currently, Warsak Dam in Pakistan is operating below its potential due to sedimentation, and the Government of Pakistan is exploring options to improve its operation. Coordinated cascade operations will allow for better sediment management throughout the KRB.				

Sources: Landell Mills Ltd 2013, “Investment plan for Kabul River Basin”, Afghanistan Water Resources Development (AWARD) Technical Assistance Project - Technical and Implementation Support Consultancy (TISC)

The identification of benefits may be an extended process. In order to capture the full potential for cooperation, it is helpful to map out as many benefits as possible from the start. However, in many cases, only some benefits will be identified in the first phase of negotiations. Sustained and enhanced cooperation may then lead to further efforts to identify additional benefits, because the parties are ready to invest in the identification process and also because some potential benefits may only be apparent (or appear feasible) after the basis for cooperation has been established.

Transboundary water cooperation can generate many benefits, but it may also involve some costs and risks. These represent the flip side of the benefits. Costs and risks may be of an economic nature, such as the cost of launching and sustaining the cooperation process and the cost of adopting measures required to generate the benefits. They may also be of a political nature. For example, the adoption of new water management measures will benefit some stakeholders more than others and discussions about water management can generate controversies within a country or among countries. Mitigation strategies to deal with such risks and costs range from better communication to the implementation of internal compensation measures.

Environmental benefits, for example, improved soil conservation and sediment management, will be realized if the KRB is managed jointly since more data and information will be available through which to designate performance and settings of the dams. Joint development of the KRB would create a common objective, potentially increasing dialogue on other shared economic, social, environmental, and security interests, and hence improving the relationship between the two countries. Accordingly, experts have highlighted the importance of fostering development in a manner which is sensitive to regional tensions over shared water resources (see Table III). It has been shown that improved technology and increased effort can help to address many of the challenges and significantly improve the transboundary water cooperation, but it may also involve some costs and risks. These represent the flip side of the benefits. Costs and risks may be of an economic nature such as the cost of launching and sustaining the cooperation process and the cost of adopting measures required to generate the benefits. They may also be of a political nature. For example, the adoption of new water management measures will benefit some stakeholders more than others and discussions about water management can generate controversies within a country or among countries. Mitigation strategies to deal with such risks and costs range from better communication to implementation of internal compensation measures.

Different stakeholders will have different knowledge and information about different aspects and impacts of transboundary water cooperation. Thus, the inclusion of different types of stakeholders should help ensure that benefits, that may otherwise go unidentified, are uncovered. A range of disciplines needs to be represented in the process of identification of benefits, including hydrology, engineering, microeconomics, macroeconomics, sociology, anthropology, military studies, and politics. An intersectoral approach to the benefits identification is, therefore, required. It is important that experts of a team responsible for leading the identification of benefits represent all involved countries and sectors, which can

recommend the basket of benefit effectively and direct the negotiations and cooperation regionally.

Table III. Mechanisms for Benefit Sharing.

Sharing Water	Mechanisms for Sharing Benefits
Assigning Rights	Knowledge Sharing <ul style="list-style-type: none"> • Data and information sharing – hydro-climatology, climate change
	Project Design <ul style="list-style-type: none"> • Core project design, location, scale - irrigation, flood protection, ecosystems
	Ancillary Investments - ‘basket of benefits’ <ul style="list-style-type: none"> • Ancillary investments – additional to core infrastructure to broaden reach of benefits, e.g., rural electrification, local infrastructure, power trade
	Economic and Financial Arrangements <ul style="list-style-type: none"> • Payment for benefits – fisheries, watershed management, water delivery • Compensation for costs – inundated land • Purchase agreements – hydroelectric power • Financing and ownership arrangements – loans or joint ownership
	Institutional and Policy Development <ul style="list-style-type: none"> • River basin organization – coordination, transparency, fairness • Operating procedures – dam operations for flood, drought, fisheries • Public-private partnerships – potential to leverage funds

Source: Mrc Initiative On Sustainable Hydropower 2011, "Summary and guide to the knowledge base compendium, Version 1.

The analysis of the Kabul River Basin legal frameworks shows that in both Pakistan and Afghanistan, joint infrastructures are a primary driver of cooperation among states, encompassing benefit-sharing both at the intra-state and inter-state levels as shown in Figure 2. Moreover, water-based infrastructure provides both material and immaterial benefits. While the first category includes socio-economic benefits such as the production of electricity, expanded cultivable lands, immaterial benefits are connected to the broader needs of the local population such as the improvement of their living conditions and the protection of aquatic ecosystems such as wetlands.

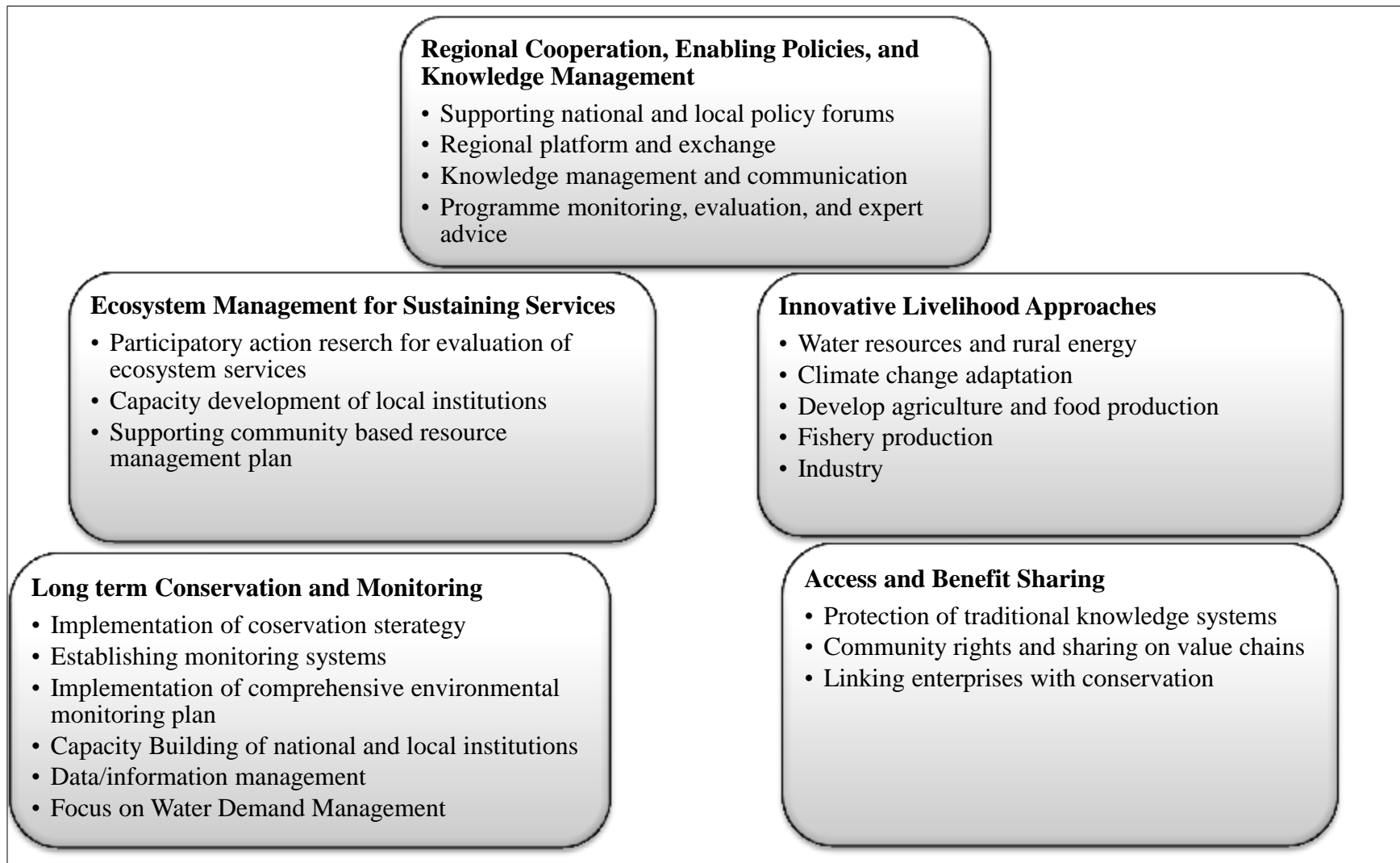


Figure 2. Transboundary Benefit Sharing Framework to share water in the Kabul River Basin.

7. Conclusion and recommendation

This paper on “Benefit Sharing Framework” considers possible legal and institutional implications. In general, implementation of the Benefit Sharing Framework does not appear to create any conflicts or require any significant modifications to future plans. The benefits of the water sharing in transboundary river basins are mainly due to co-riparian states’ collaboration efforts to decrease the expenses and increase the outcomes. It could also mean efficient and effective shared water management across all sectors, called as sectorial optimization. The impacts of joint investments in both upstream and downstream states can yield a bundle of benefits including, but not restricted to, flood control, reduction of sedimentation, availability of more water in the basin, hydropower production and other ecosystem functions. The points mentioned above, in turn, can also ensure food security, mitigate drought, and avail renewable energy. In transboundary rivers such as the KRB, all attempts and efforts should be geared towards identifying the typologies of benefits, aspects of benefit sharing, scenarios of benefit sharing, and the optimization/maximization of benefits. A systematic control and collaboration together with a better management of ecosystem could provide benefits to the river system with great positive benefits, potentially increasing the food and power production. However, the other significant component, beyond the rivers is the cooperation of riparian states leading to enormous integrated common economics.

The governments may wish to consider establishing stakeholder engagement processes, in which the positive and negative effects of different types of cooperation framework options are discussed and the suitable level of cooperative action is chosen. The appropriate engagement of concerned stakeholders in the process of designing the institutional framework and its implementation will be essential to build confidence, instil ownership, and establish institutional legitimacy and stability. There should also be a coordination with and among the national and provincial governments, military and security forces, and local communities to ensure project security

Stakeholder engagement can also help identify and quantify the benefits of HEP development in the KRB. The governments may wish to consider holding public meetings, workshops, trainings, and community consultations facilitated by provincial and district-level actors to determine benefit sharing mechanisms for KRB HEP development. Some of the public meetings should be conducted early on in the project development process. Local municipalities, communities, and tribal representatives should be involved in communicating different benefits (e.g., power, water supply, irrigation, and employment) and to integrate local customs in determining the benefit sharing mechanisms. The governments should communicate the social risks of the project to the local population and develop associated risk mitigation strategies for the success of the projects.

Thus, the establishment of the Local Coordination Committees, the National User Associations, and the Regional Coordination of Users within the study area authority indicates that water users participate in the definition of benefits to be shared at the intra-state level. Moreover, the traditional knowledge of water users may contribute to better management and

protection of transboundary waters at the inter-state level. The involvement of local communities at an early stage of the development of water infrastructure may also contribute to prevent international water disputes. Furthermore, the identification of the trade-offs in the distribution of the benefits to the riparian states may contribute to reduce negative transboundary impacts and enlarge the number of benefits from the uses of shared water resources. An equitable and fair distribution of costs and benefits plays a significant role in the application of equity. The needs and interests of states and local population, as well as the protection of the environment, must be considered in an equal manner. Also, in order to prevent negative externality for the downstream riparian, water allocation problems should be solved through a cooperative arrangement prior to any economic benefit exchange programme. Until such time when a joint basin-wide authority is formed in a transboundary river basin for its total planning and management, the issues of water property rights and benefit sharing must remain delinked.

The findings of this study with a limited data have shown that the benefits of the water sharing in transboundary river basins are, mainly, due to co-riparian states' collaborative efforts to decrease the expenses and increase the outcomes. It could also mean efficient and effective shared water management across all sectors, called as the sectorial optimization. There has to be much more focus and emphasis on the sharing of transboundary benefits rather than on physical water presence at the moment, while the former can bring a zero sum results, the later can show up a positive sum. Economic, environmental, social, and political benefits can be achieved through cooperation.

Cooperation in a transboundary river can take many forms, ranging from sharing data to joint management. Preliminary technical cooperation can help to create a conducive environment that could lead to broader cooperation. Achieving cooperation requires an effective national policy and regulatory framework, as well as supportive regional initiatives.

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