
TRANSFORMATION IN COMMON-POOL RESOURCES MANAGEMENT IN CENTRAL ASIA

Benefit Sharing for Solving Transboundary Commons Dilemma in Central Asia

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Transboundary water governance often represents challenges specific to the commons dilemma. Use of water in one country affects use in another country, yet dynamic and diverse political and socioeconomic factors coupled with relatively large size of a resource system that links not only other sectors such as land and energy but also crosses national jurisdictions make it particularly challenging for interested and affected actors to self-organize. Central Asia represents a typical case of this commons dilemma, where more than 60 million people depend on transboundary waters shared by five independent republics that suffer from vicious cycle of historical rivalry and complexity. We explore whether and how benefit sharing, where the focus is on benefits and not quantities of water, can help solve the transboundary commons dilemma. Further, we suggest distinguishing three priorities in benefit-sharing solutions: economic-development; egalitarian-social; and environmental. Investigating various configurations of prioritization, we discuss selected expressions of it available in the literature in general and from our transboundary waters case study in Central Asia in particular. Based on our findings we stress the importance of setting environmental preservation (restoration) and equitability of sharing as the joint top priority for benefit sharing to be sustainable in the long run, in contrast to a short-term perspective with prevailing economic-development emphasis. In the context of historical distrust conditions and interdependencies, we highlight the mutually important causal relationship between benefit sharing and trust building. For making the new arrangements resilient, particularly in case of large-scale commons, benefit sharing also requires a strong civil society.

Keywords: appropriation; provision; prioritization; trust building; civil society

1 Introduction

The aim of this article is to explore whether and how benefit sharing as a governance approach can offer ways to solve the transboundary commons dilemma, and discuss the conditions under which it can do so in the context of transboundary water governance in Central Asia.

The prominent feature of the commons dilemma is explained by the difficulty of preventing any single user from overusing a shared resource, which then leads to collapse of the resource system (Ostrom 2005). To facilitate understanding of the commons dilemma, the common-pool resources can be contrasted with the characteristics of private and public goods, highlighting that the traditional approaches through privatization or state regulation often fail in leading to desired sustainable outcomes of resource use (e.g., Anderies and Janssen 2016). The commons require that users agree and follow rules under which the resource system can be managed collectively. The commons that involve resources and rules to govern these resources crossing jurisdictional boundaries are the transboundary commons. Particularly due to this quality of crossing jurisdictions, the transboundary common-pool resources are generally neither private, as they do not belong to a single private individual or entity, nor public, since no single state has full authority over the shared resources. When it comes to transboundary water resources, the principles of international water law—equitable and reasonable use—first established in the 1966 Helsinki Rules and most recently codified in the 1997 United Nations (UN) Convention on the Law of the Non-Navigable

Uses of International Watercourses—help guide the states. Yet their interpretation can be broad enough to leave room for unilateral and opportunistic deviation from these principles in the absence or weakness of commitment to adhere to these principles by the states themselves (e.g., Salman 2010; Wegerich and Olsson 2010). These qualities, as can be observed particularly well in transboundary water governance—the focus of this paper—make the transboundary resources prone to the commons dilemma practically at all times, and call for self-governance among actors, in this case states, as an additional option to resolving the tragedy (Sarker and Blomquist 2019). Searching for solutions that can facilitate and maintain cooperation under conditions when privatization or state regulation is not possible is therefore central in research on transboundary commons.

Here, we explore whether benefit sharing as a governance approach can facilitate the much-needed cooperation and thus help overcome the commons dilemma, particularly in the context of transboundary water resources. Yet, it should be noted that, as stressed in the literature, “not all cooperation is pretty” (Zeitoun and Mirumachi 2008: 305), and interaction between the states should not be seen on a binary scale of *either* cooperation *or* conflict but rather through the lens of a matrix where states simultaneously experience both some degree of cooperation and some degree of conflict (Mirumachi and Alan 2007; Zeitoun and Mirumachi 2008). Therefore, it is appropriate to clarify here that by much-needed cooperation we mean actions and commitments towards “true” or improved cooperation, which aims at and leads to more equitable and sustainable use of shared resources, commonly identified as the key challenges across many transboundary water basins around the world, particularly in Asia, the Middle East, and North Africa. The role of coercive cooperation that might lead to exploitation of the weaker states or communities, as well as unsustainable resource use practices should be distinguished (e.g. Zeitoun 2008). In this sense, much-needed cooperation should be seen first, from the perspective of improvement in the prevalence of cooperation intensity over conflict intensity (Mirumachi and Alan 2007), and second, from the perspective whether it actually leads to better outcomes (e.g., Zeitoun 2008).

The idea of the benefit sharing approach is to focus on potential benefits of a resource rather than its limited quantities (Sadoff and Grey 2002, 2005). Focusing on benefits of improved cooperation and searching for possible cooperative opportunities, according to many proponents of the approach (e.g. Phillips et al. 2006; Sadoff and Grey 2002, 2005; Teasley and McKinney 2011; UNECE 2015), and particularly according to how Phillips (2009: 14) puts it, helps “in defusing any pre-existing tendencies of riparians in relation to conflict” and can serve as a driver to move from a status quo. Naturally, there is a specific commons dilemma when it comes to transboundary water resources—change in water use in one state often affects water use in another and might lead to disagreements with various intensities, generally around rights of use and responsibilities to maintain the resource. Specific sources of such disagreements may vary; the most commonly identified case is when upstream uses are in conflict with downstream uses. For example, the need to store water upstream in winter and use of it for irrigation in summer downstream can be in conflict with the need to generate hydropower or maintain fisheries upstream, both of which might require storage in summer (e.g., Zeitoun and Warner 2006; Theesfeld 2008).

The potential to solve such disagreements is often affected by the nature of existing relations among riparian states. Trust in relations, power asymmetry, riparian position and exploitation potential, physical and institutional interdependencies, as well as path dependencies are among those factors that can create both incentives and disincentives to find and implement cooperative solutions (e.g., Zeitoun and Warner 2006; Heinmiller 2009; Soliev et al. 2017). A strand of literature focusing on the hydropolitics in transboundary water governance increasingly stresses power as key to unpack and understand how water is allocated, and as detrimental to how far the rationale of solution-oriented approaches such as benefit sharing might work in practice (e.g., Cascão 2009; Hussein and Grandi 2017; Hussein 2018; Warner et al. 2017). In this sense, benefit sharing in itself is clearly not an ultimate solution, and it is questionable whether there is such a solution at all. However, provided there is political will and room for improved cooperation, the advantages that the approach provides could serve as an additional option for possible transformation towards more equitable sharing and more sustainable resource use (Soliev and Theesfeld 2017). In this case, possible adverse effects associated with the approach that can result from neglecting long-term consequences of decisions made with the purpose to yield short-term benefits need to be kept in mind (Hensengerth et al. 2012; Soliev et al. 2015; Soliev et al. 2018; Tarlock and Wouters 2007). The question will be then whether and how one could take advantage of the conflict-defusing potential of the benefit sharing approach without losing sight of social and environmental vulnerabilities of the approach that can be neglected when focus is on immediate benefits. It is one of the central questions of the commons dilemma too—how can a group of actors sharing a resource ensure that the resource use benefits all relevant actors, while ensuring actors make sufficient effort towards sustaining the resource?

Although in the context of transboundary water governance nation states have been traditionally seen as the central unit of analysis (e.g., Zeitoun and Warner 2006), more recent literature highlights the importance of looking beyond state as the only unit of analysis (e.g., Budds et al. 2014; Da Silva and Hussein 2019; Menga 2016; Swyngedouw 2009; Zeitoun et al. 2013a). From the perspective of the commons dilemma, too, transboundary commons often constitutes a large resource system with highly heterogeneous set of actors nested across multiple policy levels (e.g., Schoon 2013; Garrick 2018). On the one hand, it creates an assignment challenge (Marshall 2005), that is “the challenge of assigning and coordinating governance responsibilities across nested levels of social organization” on various—from international to national, sub-national, and individual user—levels of governance (Garrick 2018: 301). On the other hand, governance and coordination in such large common-pool resource systems require significant social and technical capacities. Therefore, in the context of developing countries and countries in transition, such as the case in Central Asia (e.g., Menga and Mirumachi 2016; Soliev et al. 2017), it further creates the challenge of prioritization among various economic, social, and environmental objectives. While economic development is often seen as a more urgent need in these countries, in this paper we demonstrate that institutionalization of the short-term economic focus might also lead to irreversible systemic failures in ensuring equitable sharing of benefits and sustainability of natural resource use. Further, as a subject of foreign relations, transboundary water interaction might also have spillover effects in other areas of international relations and vice versa, thus enlarging the pool of actors and resource system to be governed. What unites these various perspectives is the growing agreement among scholars on the importance of taking into account these complexities. With mounting pressure to utilize more on the one hand and available supplies approaching their limits on the other hand, competition and disagreements over transboundary resources are likely to increase, making search for innovative approaches increasingly relevant.

Against this background, the underlying debate explored in this paper can be grouped into three fundamental questions: (i) Whether and how benefit sharing can facilitate improved cooperation in a transboundary commons context?; (ii) How to set priorities within benefit sharing solutions for overall sustainability of these solutions?; and (iii) How benefit sharing can help with solving the transboundary commons dilemma particularly in Central Asia? The paper applies a discourse analysis and theory-building using examples from in-depth empirical case studies. The paper continues with a more detailed review of the conceptual development towards a constructive benefit-sharing approach, also by contrasting it to the traditional “water-sharing” approach in solving the commons dilemma of transboundary water governance. We then explain three options in benefit sharing arrangements with economic-development, egalitarian-social, and environmental prioritization respectively. Then based on exemplary cases from the literature and lessons learned through own research in the context of transboundary water governance in Central Asia, we examine how benefit sharing could help solve particularly the Central Asian commons dilemma. We conclude with a summary of our key findings.

2 Commons dilemma of transboundary water governance and development of constructive benefit sharing

The commons dilemma occurs when the resource held in common is subtractable, that is one’s use diminishes another’s, yet it is not possible or very difficult to exclude anyone from using, and therefore overusing, the resource (Ostrom 2005). In transboundary water governance, when two or more countries share water resources, the resource is often highly subtractable as using the water resources in one country affects water use in another. At the same time, excluding any country from using, or more specifically preventing any country from overusing, is extremely difficult due to lack of overarching authority that could enforce such an arrangement. Although basin organizations and other international organizations could play a role, their authority is highly diminished by sovereignty of states.

The conventional approach to solving such dilemmas has been applying the principles of international water law. Disentangling these principles from the bundles of rights perspective offers a useful lesson (Schlager and Ostrom 1992). Attempts to apply the principle of equitable and reasonable use tend to focus on assigning the appropriation-oriented bundles of rights—access and withdrawal rights—to water by each riparian country. Provision-oriented bundles of rights—management, exclusion, and alienation rights—that focus on how to manage and sustain the resource collectively are not emphasized proportionately. It is indeed important, first, to understand which exact combination of bundles of rights and duties each state formally holds or de-facto makes use of in order to share or exchange some of these rights. However, insisting purely on these initial entitlements is not helpful for solving the commons dilemma. Second, if we aim to share surplus of benefits, we first need to provide and build them and thus experiment with management, exclusion, and alienation rights.

Following the international water law, transboundary waters should be used “equitably and reasonably”, while inducing “no significant harm” to any riparian party (see for example Article 6 of the 1997 UN Convention in ILC 1997). However, the literature suggests that there are at least three systematic challenges with application of these principles leading to persistence of disagreements.

First is the challenge of agreed interpretation, when riparian parties disagree as to what an “equitable and reasonable use” constitutes and what “no significant harm” means. Here, also a newly emerging interpretation of “significant harm” as “foreclosure of future use” (Salman 2010) can intervene, which refers to a situation when a riparian party, for example, an early developer, insisting on the principle of “no significant harm” might prevent late developers from using the resource for their development, thus itself causing significant harm to the late developer (Wegerich and Olsson 2010). The challenge of agreed interpretation can also create room for what Zeitoun et al. (2011: 159) describe as “[...] ‘soft’ power to be used by the basin hegemon to frame inequitable forms of cooperation in a cooperative light, such that unfair and ultimately unsustainable transboundary arrangements are replicated by the international donor community”. Closely linked to this is, second, the challenge when development needs of a riparian party push towards change in water use requiring renegotiation of existing agreements with other riparian parties. Addressing this challenge with the traditional water-sharing approach, which focuses primarily on access and withdrawal rights, once again results in the appropriation problem—assigning the property rights to water. Third is the adaptation challenge, when financial and climatic shocks pressure the riparian parties, often disproportionately affecting different parts of the river basins, to deviate from existing agreements, whereby negotiations with water-sharing approach might not lead to solutions to absorb these shocks in a timely manner. Overall, the dynamism and the asymmetry of interpretations, needs, and pressures, while always present, make it extremely difficult for water-sharing approach that insists on initial entitlements of access and withdrawal rights to overcome either subtractability or excludability problem of the commons dilemma.

The predecessor of the idea of the benefit sharing approach is what has been known as “mutual gains” approach in the negotiation research since 1980s (Fisher et al. 2011). Sewell and Utton (1986: 201) contrasted mutually gainful cooperation with “a great deal to lose from intransigence” on the examples of United States – Canadian water disputes (Krutilla 1967). They stated that focusing on the status quo entitlements prevented from mutually beneficial cooperation and that “some major changes in attitude, accompanied by modifications in institutions” were needed for facilitating cooperation. Scholarship on water diplomacy (e.g., Islam and Susskind 2013) similarly promotes solution-oriented approaches that could improve cooperation despite conflicting interests, although without particular emphasis on the commons dilemma of transboundary water governance.

Historically, different manifestations of the benefit sharing approach helped to find mutually beneficial solutions among riparian parties in a number of shared water basins around the world. With the 1961 Columbia River Treaty (referred to as a successful example by many authors including Sewell and Utton 1986), the US succeeded to negotiate changes in Canada’s hydropower projects, where US would benefit from flood control while Canada would receive payments and additional rights for diversions between the Columbia and Kootenai for hydropower (Giordano and Wolf 2003). On the Senegal River, Senegal, Mali and Mauritania agreed to share the development costs and benefits of joint infrastructure using a burden-sharing formula (Hensengerth et al. 2012). The Lesotho Highlands Project on the Orange-Senqu River Basin involves direct payments for water, purchase agreements and financing arrangements. Through cooperation on the Aswan High Dam on the Nile, Egypt and Sudan succeeded to increase the water allocated to both countries. On the Zambezi, ownership, costs, and benefits of the Kariba Dam are equally shared between Zambia and Zimbabwe. India’s agreement with Nepal on the Mahakali River includes cost sharing and a power purchase arrangement; while India-Bhutan agreement on the Chukha hydropower project includes payments made by India to Bhutan for power exports (Klaphake 2005). Some non-dam centered examples include benefit sharing cases when riparian parties improved cooperation by making mutual concessions on several shared rivers (US and Mexico; South Africa, Swaziland and Mozambique) or while connecting water-related issues with issues outside the water sector (e.g., Klaphake 2005; Phillips et al. 2008; Dombrowsky 2010).

Looking at theoretical discussion and emerging empirical evidence in literature, benefit sharing can be seen from two different perspectives. First, what we call as a status-quo benefit sharing; and second, what we herewith propose to define as constructive benefit sharing. Status-quo benefit sharing revolves around the *sharing* of existing benefits, mainly interpreted as the quantities of water. It stems largely from other, non-water, domains of environmental governance, primarily biodiversity, where ensuring fair access to environmental resources and equitable sharing of benefits from their utilization have been a prominent

topic of scholarly and policy debate in the last decades (e.g., Morgera 2016). Thus, ensuring access and withdrawal rights to water remains as the primary focus here. It is the second perspective of benefit sharing, what we define as constructive benefit sharing, which dominates the debate in the context of transboundary water governance. It matches the definition of benefit sharing suggested by Sadoff and Grey (2005: 3) as “any action designed to change the allocation of costs and benefits associated with cooperation”. The focus of the benefit-sharing approach here is the benefits derivable from use and allocation of water and not the shares or quantities of water (e.g., Klaphake 2005; Dombrowsky 2007; Turton 2008; Qaddumi 2008; Phillips et al. 2006; Phillips et al. 2008; Phillips 2009; Hensengerth et al. 2012; Soliev and Theesfeld 2017). This includes also units of new resource to be accessed, as well as alternative forms of withdrawal of these newly available combinations of resource units. As has been noted earlier, there is evidence that shifting the focus from quantities of water to benefits from its use and allocation helps to diffuse the pre-existing tensions among riparian parties. The rationale is that once riparian parties are engaged in terms of what could be the benefits of improved cooperation, there is room for constructive dialogue which encourages identification of underused potential and calls for action to materialize that potential.

Further, once the focus shifts from a narrow view of quantities of water to a broader view of benefits derivable from its use and allocation, it becomes possible to take advantage of the full range of what can be defined as benefits. In transboundary water governance, Sadoff and Grey (2002, 2005) suggest distinguishing environmental (benefits to the river), economic (benefits from the river), political (costs reduced because of the river), and catalytic benefits (benefits beyond the water sector due to improved cooperation among riparian parties). The argument is in part that the thinking along the lines of benefits makes actors take distance from the narrow view of water as an input to produce certain crops or as a pure source of profit, and recognize broader non-monetary values of water. To implement various arrangements of benefit sharing, the literature on the application of the approach also documents clear mechanisms of benefit sharing. Klaphake (2005), for example, suggests grouping these mechanisms into compensations and issue linkages. Compensations can be particularly relevant in the context of new infrastructure development where parties making concessions for a new development with greater net benefits can be compensated for their loss. This can be in the form of monetary (e.g., one-time payment for loss of land due to new dam construction) or non-monetary compensations (e.g., provision of new housing). Yet, we stress that compensation of loss alone cannot be considered as benefit sharing. The development, proposed as benefit sharing, must have total surplus of benefits that need to be shared as well (e.g., those resettled due to dam construction must benefit from the new developments and be better-off overall). The second type of benefit sharing mechanism is the issue linkages, where actors simultaneously negotiate the shared use of several resource systems. Issue linkages can be within water sector, for example, riparian parties can link developments on two or more shared rivers (e.g., Dombrowsky 2010) or consider them in conjunction with transboundary groundwater resources (e.g., Blomquist and Ingram 2003). Issue linkages can be also outside the water sector, for example, riparian parties can link the water sector with other sectors such as forestry, energy, transport, tourism, and other, to maximize benefits from the use and allocation of water and other resources across sectors (e.g. Klaphake 2005; Qaddumi 2008).

The origins of the so-called positive sum could be traced back to game theoretical concepts such as Pareto improvement when, in an interaction with a set of actors, utility is improved at least for one actor without harming any other actor. Assuming status quo allocation is contested or reallocation is needed for coping with water stress in general, the benefit sharing approach transforms the appropriation problem of the commons dilemma or the question “Who gets how much?” to a provision problem or the question “How to improve it for all?” It therefore circumvents the very conflict of the appropriation problem (**Table 1**)—the question becomes not the subtractability of resource units (access and withdrawal) but the development or provision of a system that would bring additional benefits to all.

3 Typology of benefit sharing and the challenge of prioritization

It should be noted that in the context of transboundary water governance, benefit sharing can be considered at various levels. Phillips (2009), for example, suggested three levels, distinguishing conceptual, stakeholder-facilitative, and implementation levels of analysis (somewhat equivalent to constitutional-to-operational levels of analysis by Ostrom (1986)). Based on Phillips (2009), benefit sharing can be seen as a conceptual approach to understanding the problems related to development in broad terms, where the general worldview, or vision, of how water resources should be shared is at the center of analysis (similar to our discussion in the previous section). It is on this level, where broader environmental, social,

Table 1: How benefit-sharing approach can transform the appropriation problem.

Approach	Traditional water-sharing	Constructive benefit-sharing
Overall focus	On water quantities	On benefits from water use and allocation
Main question	What should be the shares?	What could increase total net benefits?
Debate focus	Why certain shares? <ul style="list-style-type: none"> · Due to existing agreements and/or principles of international water law (interpretation of principles) · Due to (development) needs and pressures (e.g., financial, climatic shocks) 	What are the options? <ul style="list-style-type: none"> · New infrastructure · Rearranging agreements · Issue linkages: <ul style="list-style-type: none"> - with other basins - with other sectors (e.g., forestry, energy, transport, tourism)
Likely outcome	Commons dilemma (appropriation problem); zero-sum	Agreements; collective action towards common goal (provision problem); positive sum

and economic benefits from improved cooperation, rather than the quantity of water, serve as the basis of analysis. It is also the level where the question of what exactly an “equitable and reasonable use” means is analyzed. Benefit sharing can also be seen as an applied approach to facilitating stakeholder collaboration and revealing common opportunities and preferences for cooperation (see for example, the Transboundary Water Opportunity tool by Phillips et al. 2008). Finally, according to Phillips (2009), the identified opportunities and preferences can lead to more precise feasibility studies and implementation of preferred development options. In this paper, we focus on the conceptual-level approach, arguably a key for more fundamental societal transformations (e.g., Williamson 1998; Meadows 1999), such as one from seeing the transboundary water governance as an appropriation problem to perceiving it as a provision problem to ensure increased total net benefits.

Various typologies exist that describe differences in potential objectives of benefit sharing arrangements. Similar to the classification by Sadoff and Grey (2002) described in the previous section (environmental, economic, political, and catalytic benefits), Phillips et al. (2006) suggested that benefit sharing in transboundary water governance can be driven by benefits for security, economic development, and environment. Nkhata et al. (2012) proposed a more empirically-nuanced typology of benefit sharing arrangements based on emerging trends of benefit sharing in governance of social-ecological systems in developing countries. They identified three conceptual types of benefit sharing: co-management—designed to provide the means for local communities, to share power with governmental actors; market-oriented—designed to address market failures where the value of benefits cannot be captured in monetary terms; and egalitarian—designed to address social injustices related to equitable access to, and sharing of the benefits from, ecosystem services.

Multiple objectives and diversity of benefits create a prioritization challenge. Existing discussions on prioritization (e.g., Phillips et al. 2008; Al-Saidi and Hefny 2018) tend to focus on identifying national priorities in transboundary basins that can help facilitate cooperation but not on implications of setting certain priorities for the potential benefit sharing arrangements to be sustainable in the long run. We try to fill this gap. In classical terms, by prioritization we mean that countries make choices in a certain strategic order based on importance and urgency of issues at hand. As the existing typologies do not address the challenge of prioritization *within* benefit sharing, we propose distinguishing the following three prioritization options that can be found in benefit-sharing arrangements: economic-development priority, whereby the emphasis is on achieving surplus of economic return; egalitarian-social priority, where the focus is on equitability of sharing and social vulnerabilities; and environmental priority, where the underlying motivation is to ensure sustainability of shared environmental resources.

4 Transboundary water governance in Central Asia and benefit sharing

A prioritization challenge within benefit sharing is particularly relevant in the context of developing countries and countries in transition, such as those in Central Asia. These countries face insufficient capacities to direct necessary political and financial resources for achieving various objectives of development simultaneously. At the same time, path dependencies formed through historical arrangements make it difficult to reconsider priorities. These factors leave little room for discussion of prioritization

across various objectives and can easily set actors on unsustainable paths even when in search for new arrangements with shared benefits.

4.1 Background to case study area

Conventionally, transboundary water governance in Central Asia is discussed in the context of five independent states—upstream Kyrgyzstan and Tajikistan in the east and downstream Kazakhstan, Uzbekistan, and Turkmenistan in the west of what is commonly referred to as the Aral Sea Basin (**Figure 1**). In addition, Afghanistan is increasingly discussed as either a part of the basin or as a potential partner of Central Asian states on security and other areas of regional cooperation (e.g., EastWest Institute 2014). Until 1991 all five republics had been part of the Soviet Union, when overall vision for transboundary waters in Central Asia, although not without problems in practice, was to utilize water for irrigated agriculture downstream and for hydropower upstream. A complex system of interconnected hydrological control facilities (e.g., irrigation canals, reservoirs, pump-stations) were built over a century of reforms (Soliev et al. 2015). While hydropower generated in upstream republics from releasing water during the vegetation period in summer were meant to feed the common energy distribution system of the region, fossil rich downstream countries provided energy back to upstream in winter. The collapse of the Soviet Union, which in itself came after prolonged stagnation in many sectors of the Soviet economy, was followed by deepened financial and policy-institutional crises, as the central government in Moscow ceased to finance the republics, and independent states faced fundamental state-building challenges. The independence moved the countries on various development trajectories, each with very limited financial resources and very wide spectrum of development tasks. Yet the interdependent nature of the water resources, which had become very important for the economies of all these republics by then, meant that water-related decisions in any single country would still significantly affect available options in other countries.

4.2 Commons dilemma and vicious cycle of appropriation problem

Although the newly independent countries quickly realized that the cooperation over the water resources was a necessity and signed an agreement to maintain their existing arrangements and commitment for further cooperation (discussions started right after independence in 1991 and the agreement was signed in February of 1992), implementing the agreement proved to be difficult (Dinar et al. 2007). For example, upstream Kyrgyzstan, suffering from energy shortages in winter, increasingly started to use its reservoirs on the Syr Darya to generate electricity, leaving less water for downstream needs in summer (Wegerich



Figure 1: Central Asia and its water resources within the Aral Sea Basin. Source: authors' own illustration based on UNEP et al. (2011).

et al. 2012). Downstream Uzbekistan and Kazakhstan, with their own financial turbulences, were not capable to provide upstream Kyrgyzstan with energy resources at acceptable prices in winter. Tajikistan, having suffered from a lengthy civil war, announced its plans to construct the potentially highest dam in the world on the Amu Darya to tackle its electricity deficit. Kyrgyzstan followed suit by announcing its plans to add capacities. The plans were perceived by downstream countries, particularly Uzbekistan, as a signal for change in the use of the transboundary water resources from the historical irrigation regime—water releases in summer and storage in winter, to a hydropower regime—water releases in winter to produce electricity in order to meet increased energy needs of the cold season.

All of the above clearly illustrate the key features of the commons dilemma—while excluding anyone from using the resource is extremely difficult, subtracting the resource units by one actor harms the chances of use by others. To deal with the dilemma, the representatives of the countries started to refer increasingly to what can be described, based on our previous section, as the traditional water sharing approach—attempting to assign the access and withdrawal water rights, each in their own favor (Dinar et al. 2007; Menga and Mirumachi 2016). Kyrgyzstan and Tajikistan, both upstream, introduced national laws declaring all water resources within their territories as property of the state (Law of the Kyrgyz Republic 2001; Law of the Republic of Tajikistan 2000). Downstream Uzbekistan, Kazakhstan, and Turkmenistan increasingly referred to the principle of “no significant harm”, stressing that changes upstream would threaten the centuries-long traditional use of water downstream, not to mention the violation of existing agreements (Dinar et al. 2007). In response, upstream Kyrgyzstan and Tajikistan claimed that the existing use of water resources was not equitable (referring to the “equitable and reasonable use” principle), as they arguably could not benefit from the resource proportionately to how much transboundary waters originated within their national territories (Bichsel 2011). In addition to this vicious cycle of arguments of “what should be the shares?” (the appropriation problem), countries increasingly used their leverage in other sectors such as trade, visa regime, and use of transport corridors to influence their respective riparian neighbors (Dinar et al. 2007; Soliev et al. 2015; Menga and Mirumachi 2016). In turn, retaliatory behavior in other sectors was not favorable to re-establish trust in the water sector, instead creating overall particularly strong and destructive rivalry relationships.

This shows that transboundary water governance is sufficiently complex to allow riparian parties, in the absence of trust, to take advantage of ambiguity of international water law principles. Every riparian party has sufficient room to insist on their arguments continuously, while upstream continues to suffer from energy deficits and downstream from unreliable water delivery for their agriculture. Yet, the principles of the international water law are not designed to be precise (Eckstein 2014, 2015). An intended way to understand these principles would be that they are designed to encourage riparian parties in transboundary basins to strive for equitable and reasonable use in ways that would not cause one another significant harm. However, “law” appears to be associated with the “legal” expectation that it is possible to delineate “what is right” in precise terms. With the attention on what is “legal”, possibilities for linkages in the water sector—connections between multiple water sources and their regulating facilities, and outside the water sector—primarily energy and food sectors, but also water’s connection to regional security and trade, all serve as means to inflict damage rather than a potential to derive new benefits. Furthermore, under these distrust conditions, additional pressures such as climate change or market shocks that might require collective action become virtually impossible to mitigate, as riparian parties are willing to weaken one another at any cost.

4.3 Historical evidence of unsustainable prioritization

There are many examples across the globe showing how prioritization of short-term economic benefits can lead to increased inequalities and degraded natural resources, but Central Asia’s own history makes the delineation of the appropriate priorities in benefit sharing on transboundary rivers all the more relevant here. Our analysis of the empirical evidence from Central Asia on inter-republican water governance for the period from 1917 to 2014 (Soliev et al. 2015) reveal clearly unsustainable ways of delineation among the three priorities in benefit-sharing arrangements (as discussed, these are economic-development (towards achieving surplus of economic return), egalitarian-social (towards equitability of sharing), and environmental (towards sustainability of shared environmental resources) priorities).

During the last century, the integrated irrigation-hydropower approach, however counter-intuitive, was at the core of the Soviet vision on inter-republican water governance, particularly with the start of the hydraulic mission in the 1950–60s. Yet, setting economic return as the top priority in a wide range of benefit-sharing arrangements neglected the environmental costs, as can be seen in complete degradation of the Aral Sea, once the forth-largest lake in the world. Full use of water resources and maximizing their

productivity for agricultural crops with insufficient consideration of environmental needs likewise led to degradation of land resources (e.g., Saiko and Zonn 2000)—an example of rebound effect when maximizing resource use efficiency leads to more consumption and pressure on the resource.

The critical role of politics and power can be also seen in how arrangements framed as “benefit sharing” and its theoretical benefits were imposed from Moscow while in practice Central Asian countries and their local populations remained as a resource and labor base. The economic-development emphasis over egalitarian concerns also resulted in (perhaps less commonly appreciated) inter-republican disputes and exclusion of relevant actors such as affected local populations from the decision-making processes (Soliev et al. 2018).

Sporadic and isolated attempts of setting environmental conservation as the top priority after independence made it even more challenging to safeguard the interests of most vulnerable, especially in cases where livelihoods directly depend on natural resource use. For instance, several transboundary agreements with strong environmental emphasis were a good start in the Aral Sea Basin (Dinar et al. 2007; Tarlock and Wouters 2007). Yet, setting up a governance system that ensures equitable allocation of the costs and benefits that come from implementation of these agreements would be crucial for protecting the vulnerable and shifting towards more systemic, balanced, and sustainable transformations. Instead, none of the lower level arrangements known to date (correspondence and agreements on the province and district levels) addressed these concerns (Wegerich et al. 2012; Soliev et al. 2015). In this case, assuming there is sufficient attention to environmental prioritization on the highest level, the role of aid might be critical to ensure the compensation of the temporary losses that come with fundamental transformations until the environmentally sustainable arrangements could generate sufficient livelihood sources for the local resource users.

Setting equitability as the top priority in various instances of inter-republican water governance, both between republics and locally (Soliev et al. 2018), also aimed to benefit the local populations. But these measures remained largely on paper, in part, because solutions to make these reforms economically viable were not discussed. Sharing equitably was vulnerable environmentally too, as parties preoccupied with increasing their shares did not consider the state of natural resources, in this case of land and water resources, altogether.

There is also a large body of historical evidence from other regions of the world where priority given to economic development has similarly led to disastrous inattention to environmental and social conditions. For example, Zeitoun et al. (2013b) describe how in the Euphrates and Nile river basins focusing on maximum economic benefit within states led to considerable disregard of ecological and social consequences. Tarlock and Wouters (2007) document that even in the case of the Columbia River Treaty, often referred to as a successful case of benefit sharing, equitability of sharing in the long run is questionable due to prioritization of short-term benefits and not engaging with the larger issues of justice and ecosystem management. Looking at these different configurations of prioritization, it seems reasonable to set environmental conservation and social equitability as the joint top priority within benefit-sharing solutions. Actors need to discuss these issues continuously and look for economic options that can make improvements in these very areas. It would be also reasonable to assume that parties seeking benefit sharing will not ignore economic return, and that economically viable solutions will follow. The opposite is however not true—once the top priority is economic return, the other two might be easily neglected at least for the lack of their representation.

Further, building on Nkhata et al. (2012) and Nkhata (2018), we suggest that virtually all benefit-sharing arrangements in governance of social-ecological systems will exhibit some elements from the three different types of benefit sharing. Therefore, we do not distinguish benefit-sharing arrangements as clear-cut categories as for example Nkhata (2018) suggests, we posit that any of the three types will include the other two at least implicitly. Hence, what we would like to highlight is the emphasis given to these three priorities relative to one another within benefit-sharing arrangements.

Finally, we still concur that for sustainability of benefit-sharing arrangements, all three priorities need to be considered. Yet, based on our analysis of available empirical evidence, and particularly since setting priorities on the highest—conceptual—level, especially at large scales, as transboundary water governance often requires, tend to create strongest path dependencies (North 1990; Ostrom 1986; Williamson 1998; Meadows 1999), we stress that setting economic return as the highest priority in the short term might impose economic-development priority over egalitarian-social and environmental ones later on (e.g., Tarlock and Wouters 2007; Soliev et al. 2015; Soliev et al. 2018). It will be therefore important, should there be an opportunity and political will for improved cooperation, to prioritize environmental and egalitarian-social concerns at the outset of large-scale reforms that use benefit sharing as a governance approach.

4.4 Change of political regime in Uzbekistan and window of unique opportunity

What seems to be a promising critical change that would allow transformation from the traditional water-sharing approach to the benefit-sharing approach is the recent developments in Uzbekistan, triggered by new government and its new vision since 2016. The emphasis of the new leader on regional integration, and results achieved in such a short period provide window of opportunity to reconsider the transboundary water governance and regional cooperation in Central Asia on a fundamental level. For the first time since independence, the head of state of Uzbekistan visited his counterpart in Tajikistan, where assurances were made for new era of cooperation (National Information Agency of Uzbekistan 2018), which was followed by demilitarization and opening of the borders and abolishing of the extremely strict visa regime between the two countries (Resolution of the President of the Republic of Uzbekistan 2018). On a similar magnitude of change, in the last couple of years agreements have been reached on hundreds of kilometers of national borders with Kyrgyzstan, which had been disputed over the last three decades (MFA 2018). With Kazakhstan, Uzbekistan announced a joint “Silk Road” visa regime and similar commitments to expand this Silk Road visa to include other Central Asian countries in the future (somewhat analogous to Europe’s Schengen Visa regime) (Prime-Minister of the Republic of Kazakhstan 2018). A new bridge connecting the neighboring areas between Uzbekistan and Turkmenistan was opened by the presidents (National Information Agency of Uzbekistan 2017) that allowed prospect of reunification of families divided by difficult border crossing over several years in the past. A number of conferences and meetings dedicated to facilitating peace processes in Afghanistan were also initiated and hosted by Uzbekistan (e.g., Gotev 2018).

4.5 From fragmented water basin to common resource basin

A first step in taking advantage of the ongoing changes in the region and transforming the appropriation problem into a provision problem is to reconsider the conventional fragmented vision and ad hoc relations on individual water basins and move towards a vision of common resource basin (e.g., Al-Saidi and Hefny 2018) (**Figure 2**). It expands the negotiation potential and allows maximizing the benefits through connecting all the available resources in the basin.

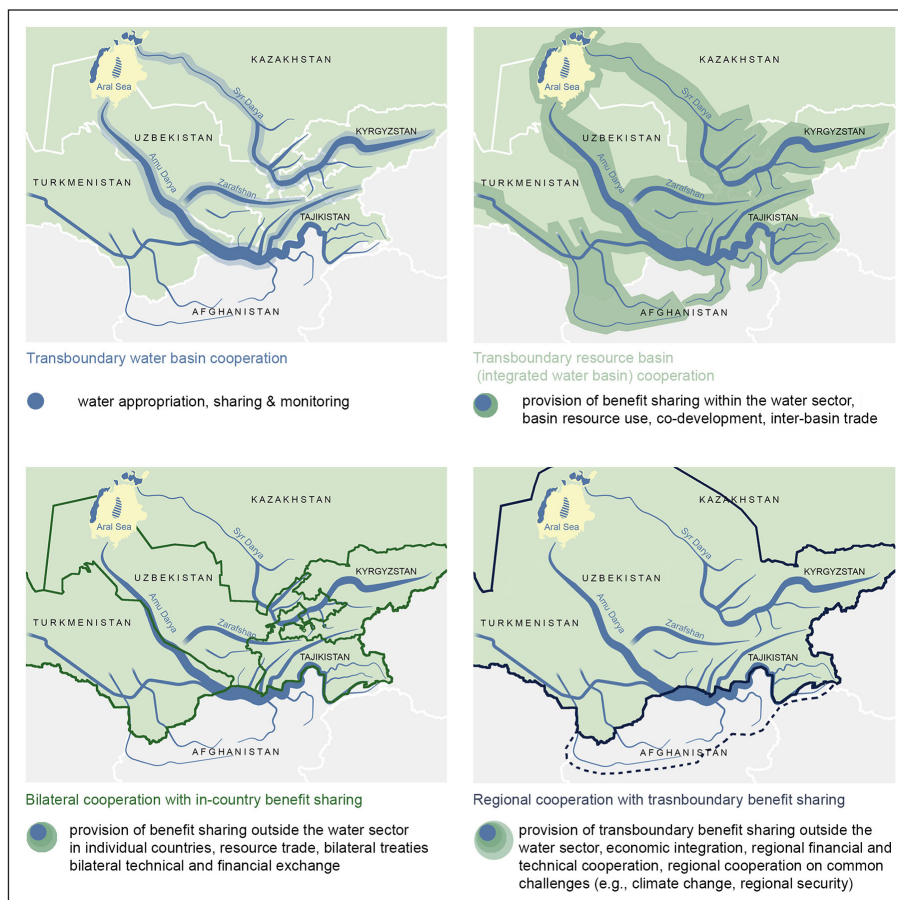


Figure 2: From fragmented water basin to common resource basin vision in Central Asia. Source: authors' own illustration.

Illustrative examples of benefit sharing have been depicted by an earlier Water Evaluation and Allocation Planning (WEAP) model developed by Raskin et al. (1992) or the more recent Basin Economic Allocation Model (BEAM) developed by COWI A/S and DHI (Pedersen 2014). Overall, a shift in the vision from fragmented water basin to common resource basin cooperation for Central Asia shows that win-wins are possible by optimizing supply and demand while encouraging trade and specialization on comparative advantages, that is, taking advantage of differences across countries and diversity of opportunities.

4.6 From appropriation problem to better provision problem

Taking into account the particular comparative advantages of each country in Central Asia and looking at the map of its water resources, it becomes evident that a water-sharing approach that exclusively insists on initial access and withdrawal rights will necessarily fail to solve the appropriation problem of the commons dilemma (**Table 2**).

Under these conditions, pursuing independent strategies on transboundary water resources is virtually impossible. The rivalry starting point combined with several degrees of interdependencies resulting in a high level of complexity create incentives for opportunistic behavior—the more water one can capture the greater the individual benefits are, yet violations of agreements are difficult to detect. Even if detected, punishment of a violating party is either impossible or counter-productive, and the likely outcome is once again a regime with disputed access and withdrawal rights, an increasing rivalry and inequality, at the same time leading to environmental degradation.

Table 3 shows how to reconstruct an appropriation problem into a provision problem. With that, it follows the approach described by Phillips (2009), while taking into account some of the key cooperative development opportunities in Central Asia (Raskin et al. 1992; PA Consulting 2002; Granit et al. 2012; Pedersen 2014).

4.7 Resilience of benefit-sharing solutions

Transforming the commons dilemma in large-scale resource systems also mean that coordination and implementation of new benefit sharing solutions will require a matching level of social capital. For ensuring that benefit sharing is resilient to new challenges, it is important that there are continuous public discussions of what at all constitute benefits or values. First, doing so is necessary for establishing a system that is flexible enough to discuss new challenges and make adjustments required to cope with them (Marshall 2005). Second, this is also in line with the broader concerns that materialism or economic production does not become the ultimate goal in itself leading once again to the neglect of social and environmental objectives (Schumacher 1973 cited in Marshall 2005).

Therefore, to make benefit sharing work not only in theory but also in practice, and while doing so to enable a proper prioritization leading to more sustainable and equitable outcomes, a host of broader,

Table 2: Limitations of the water-sharing approach to the commons dilemma in Central Asia.

Starting point: Arguments for individual shares	Limitations	Outcome
Share of Kazakhstan	Dependence on Kyrgyzstan, Tajikistan and Uzbekistan on the Syr Darya	Limited to country's capacity and cooperative behavior of upstream countries
Share of Kyrgyzstan	Dependence on energy imports and trade routes from downstream Uzbekistan and Kazakhstan	Limited to country's capacity and cooperative behavior of downstream countries
Share of Tajikistan	Dependence on energy imports and trade routes through downstream Uzbekistan	Limited to country's capacity and cooperative behavior of downstream countries
Share of Turkmenistan	Dependence on Tajikistan, Afghanistan and to some extent Uzbekistan on the Amu Darya	Limited to country's capacity and cooperative behavior of upstream countries
Share of Uzbekistan	Dependence on Kyrgyzstan, Tajikistan, Afghanistan and Turkmenistan	Limited to country's capacity and cooperative behavior of upstream countries

Table 3: Benefit-sharing approach to the transboundary commons dilemma in Central Asia.

Starting point: Cooperative development opportunities	Examples of potential benefits	Examples of sharing responsibilities towards common goal
Hydropower and power trading (linked to provision of more water)	Tajikistan and Kyrgyzstan have developed only a minor share of their hydropower potential. Energy needs of the population in Central Asia and new energy transmission lines through Uzbekistan, Turkmenistan, and Afghanistan to reach markets in Pakistan, Iran, and India.	Construct the reservoirs collectively, for example downstream assisting upstream with necessary investments and technical expertise.
Primary production (linked to provision of more use per drop)	Immense potential, primarily in Uzbekistan but also in irrigated lands in all other countries, through improving efficiency in irrigation methods with the goal to restore quality of land and water resources, and renovation of outdated infrastructure. Afghanistan's north offers new lands with favorable conditions for agriculture.	Continue abandoning the practice of state-ordered crops; facilitate access to one another's and international agricultural markets. Attract regional investments to modernize the existing infrastructure matching the needs.
Urban growth and industrial development (linked to provision of more value per drop)	The much higher economic return from water in the industrial and services sectors (compared to the agricultural sector) provide a route to enhanced economic growth. However, societal effects of reallocation must be addressed.	Assess and implement reallocation options from agriculture to urban growth and industrial development.
Environment and ecosystem services (linked to provision of sustainable and non-use values of water)	Restoring the fisheries downstream, tourism development across the rivers with immense potential of mountain tourism upstream areas and recreational river and lake tourism downstream. Educational excursions.	Continue regional integration and create conditions for recreational activities, attract international tourists but also promote regional tourism and overall culture of tourism towards appreciating the environment.
Regional security (linked to provision of benefits beyond involved resources)	Tackle unemployment by creating jobs in new water-related developments. Create opportunities for rural population in Northern Afghanistan and contribute to peace and security.	Involve Afghanistan as a partner in negotiations and brainstorming of development opportunities in the Aral Sea Basin, use technical expertise of Central Asian states. Integrate water-land-energy-food discussions in peace and security related meetings.

fundamental, societal transformations are necessary. These include changes in the deeper processes in societies defining whether new approaches such as benefit sharing are truly valued, and whether political, economic, social structures form in the ways that will develop leaders and citizens that will aim at the types of cooperation leading to more equitable and sustainable use of shared resources. With the presence of a leader that is willing to work in this direction and wide support from the international community, which seems to be the case in Central Asia at this point in time, it might be the appropriate moment to set the priorities right and make use of the tension-defusing advantage that the benefit-sharing approach offers.

5 Conclusion

We have shown that the main advantage of benefit sharing is to recognize diverse values of water use and allocation, and configure most beneficial options. From empirical evidence in Central Asia, we conclude by hypothesizing on the importance and trade-offs between the different ways of prioritization of the envisioned objectives within benefit-sharing arrangements as summarized in **Table 4**. We can observe that Central Asian countries see the need to develop as more urgent, while financial constraints make environment rather a luxury problem, particularly in practice. Similarly, with the pressing priority of "getting things done", ensuring equitability might be seen as a factor slowing down the development. The

Table 4: Prioritization within benefit-sharing arrangements and likely outcomes.

Top priority	Risks	Probability of risk occurrence in the long run	Order of preference for sustainability
Economic-development	Rebound effect (improved efficiency – reduced costs – increased use), exclusive governance	High	4
Environmental	Increased social inequality (especially where livelihoods directly depend on natural resource use)	Medium	2 or 3
Egalitarian-social	Economic failure (incentive misalignment), environmental degradation – status-quo (not constructive) benefit sharing	Medium	2 or 3
Environmental and egalitarian-social	Weak economic feasibility in the short term (crucial to attract development aid and investments)	Low	1

evidence appears sufficient to assume that for benefit-sharing solutions to be sustainable in the long run, Central Asian states need to set environmental and egalitarian-social priorities as the joint top priority.

Although benefit sharing is a good way to start collaboration, it does not solve the appropriation problem of the commons dilemma directly. It reconstructs it into a provision problem. This means the appropriation problem is postponed until new pressure arrives or when riparian parties face the challenge of sharing the benefits. However, by envisioning constructive activities as a focus and postponing the appropriation problem, benefit sharing might create time and means for trust building among state actors, but more and more also among civil society actors by helping them shape the negotiations or directly enter these negotiations. The promise of the approach is that, when successful and under favorable political conditions, trust building will prepare the involved parties to cope with the appropriation problem better at a later stage. Hence, particularly in a historical distrust environment, as has been described for the Central Asian states, it will be critical to work on trust building among the riparian actors. In this regard, the changes in the government of Uzbekistan leading to fundamental transformations in regional cooperation, and the signals from the government encouraging the active civil society (e.g., Virtual Reception 2019) can be key to making benefit-sharing solutions resilient. The challenge is how to find ways that stimulate evolution of civil society capable to address effectively complex issues, despite the fact that active civil society has not been practiced for past several decades. If trust and likewise power are decisive for whether or not benefit sharing arrangements will emerge and lead to equitable and reasonable use, a broader question also arises on how dynamic internal societal processes can ensure trust is appreciated and power pursues these improved outcomes. Thus, the two true questions, with which scholars and policy makers in the field of Central Asia's transboundary commons and broader regional cooperation should be concerned are: (1) How to build trust, where conditions are inherently unfavorable for trust due to formed complexities and historical rivalry? and (2) How can individuals and societies learn to be active on issues that were considered to be purely government's matter for at least last two-three generations and shape policy processes that will safeguard equitable and sustainable use of shared resources?

We have outlined that benefit sharing enlarges the cake itself, making win-win possible. This implies that the potential of the approach is particularly great for those actors representing the riparian parties with an overview and authority to bring in other sectors. The multidisciplinary and multi-sectoral knowledge and oversight therefore become an important factor, too. This means that actors leading the negotiations over water resources should not be limited to representatives of the authorities from the water sector. District and province administrators, mayors and heads of states, who are aware of underused potential across sectors under their authority, are the ones who can truly unlock the potential of constructive benefit sharing through issue linkages. When there is a window of opportunity to transform the regional cooperation on a fundamental level, as it appears to be the case in Central Asia at the moment, to ensure that constructive benefit sharing is resilient in the long run, particularly considering that the focus here is on large-scale commons problems, along with well-informed leaders, states need strong civil society, that is, active citizens in all sectors ready to communicate, experiment, create new opportunities, develop, agree and enforce institutions that work better than before. As Marshall (2005: 51) puts it, "[...] a state's capacity to solve all the large-group commons problems faced by its citizens depends [...] on its capacity to develop and implement solutions in collaboration with civil society".

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Competing Interests

The authors have no competing interests to declare.

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