CHAPTER IV: LIMITATIONS TO WATER ALLOCATION AND ITS LINKAGES WITH BROADER APPROACHES

SUMMARY:

This chapter highlights the conceptual and procedural limitations to water allocation and the broader approaches to transboundary water resources management and cooperation with their linkages to water allocation. Several recognized broader approaches—IWRM, basin-wide planning, benefit-sharing and the water-energy-food-ecosystem nexus—to consider in conjunction with transboundary water allocation, are presented with case studies and further resources for reference.

1. Limitations of Water Allocation

While potentially useful, water allocation has its limitations. Conceptually, the focus on water quantity, quality and timing means that water allocation does not really consider the broader aspects of water use, such as the linkages to sectors such as food and energy and to the broader development agenda, including the SDGs. Focus on water allocation may also conceal the need to progress from supply management options to demand management measures. Such measures include improved efficiency, the growing water demand rather than actual availability often being the limiting factor to development and human and environmental well-being.

The actual process of water allocation has additional limitations. First, in transboundary contexts, practically all agreed allocations are based on a simplification regarding the diverse and dynamic nature of shared waters. This is further amplified by the fact that most transboundary allocation arrangements have fixed mechanisms for water quantity, with over 30 per cent of the agreements with an allocation mechanism designating a fixed quantity or volume of water (see Chapter II).[153] While these mechanisms establish a clear structure for allocation, they also mean that fixed allocation mechanisms have a limited capacity to consider the changes that, for example, climate change or land use cause for shared waters (see Chapter III). Many water allocation arrangements can therefore lack the necessary flexibility to adapt to the changing nature of water resources.

Second, while water allocation arrangements benefit greatly from long-term observations and shared databases, as well as shared observation networks, these are not always in place; this hampers the operationalization of water allocation and may even lead to misleading decisions regarding it. Third, operationalization of transboundary arrangements may also face challenges at a national level. Results from a 2015 OECD survey of national arrangements on allocation indicated that, while important building blocks were in place in many cases, the design and implementation of the arrangements had significant flaws.[154] Finally, given that transboundary water allocation is typically agreed between the governments of riparian States, other key actors, such as the private sector and civil society, may have limited possibilities to participate in and influence water allocation.

153 McCracken and others, "Typology of Transboundary Water Allocation" (forthcoming).

154 OECD, *Water Resources Allocation: Sharing Risks and Opportunities* (2015).

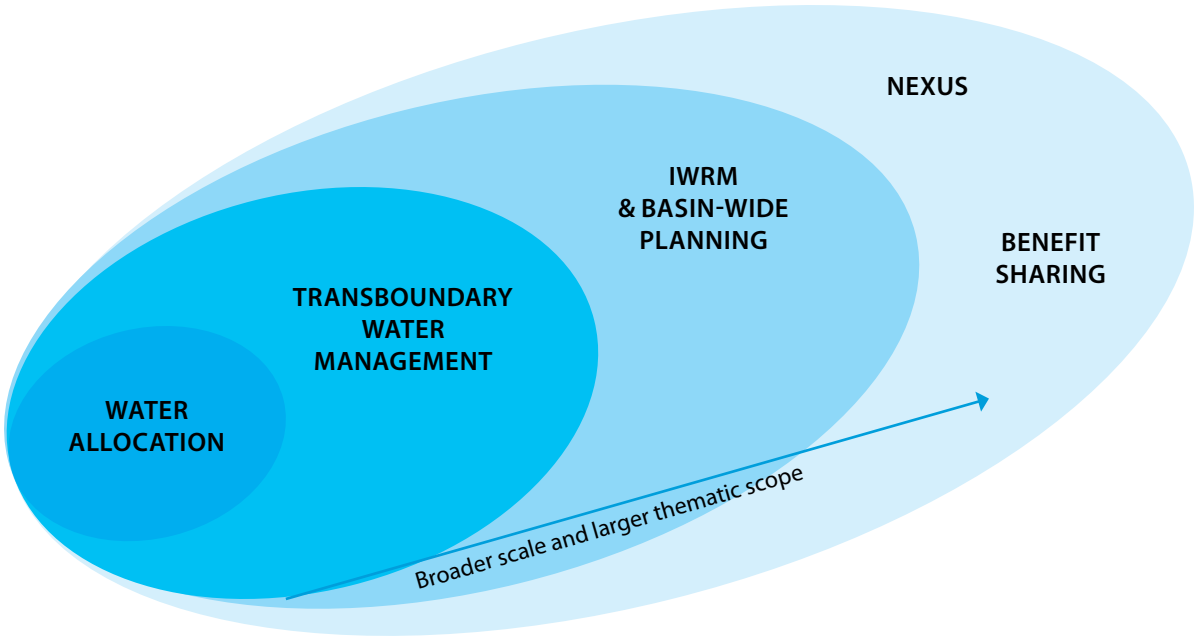
Yet these limitations do not render water allocation irrelevant. Instead, they highlight the importance of clearly describing and comprehending the important but focused role water allocation has in transboundary water resources management and the related governance, and the necessity to link it to broader social, environmental and economic development planning.[155] This also means that water allocation plays a critical part in many related, complementary or broader approaches used in transboundary water cooperation. The central ones are discussed next.

2. Broader Approaches to Consider

Water allocation forms an important part of transboundary water resources management, establishing an agreed baseline for water quantity, quality and timing. At the same time, water allocation links to the broader approaches that are commonly used to both initiate and advance transboundary water cooperation and the related governance arrangements. Understanding the linkage that water allocation has to such approaches—and its own focused but limited role—is important in order to put the allocation into the right context, also indicating how the limitations of water allocation can be addressed. Such approaches typically consider larger spatial scales and cross-sectoral aspects and themes of water resources management and governance and involve a more diverse group of stakeholders. The four broader approaches discussed below, which have been developed internationally, are particularly relevant to consider with water allocation.

FIGURE 8

Simplified visualization of linkages between water allocation and complementary approaches



Source: M. Keskinen, 2020.

Note: The figure also indicates their general hierarchy in terms of geographical scale and thematic scope: both of these increase when moving from left to right in the figure.

155 Speed and others (2013).

a. Integrated water resources management

As emphasized, water allocation is closely connected to the broader activities of transboundary water resources management. While there are many ways to describe the key principles for water resources management, integrated water resources management (IWRM) (Figure 9) is highlighted here due to its importance and well-recognized role within both the Water Convention and the water-related SDGs. SDG 6.5 specifically sets a target to implement IWRM at all levels by 2030, including through transboundary cooperation as appropriate.[156] The common definition of IWRM is provided by the Global Water Partnership (GWP): "IWRM is a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment."[157]

TABLE 3

Allocation characteristics vis-a-vis broader approaches to transboundary management and cooperation

	Water allocation	IWRM	Basin-wide planning	Nexus (e.g. water-energy-food security)	Assessing and sharing benefits and costs and minimizing harm
Focus (simplified)	WATER: Quantity, quality and timing of water at a given point (country border)	WATER: Coordinated development and management of water integrating different uses and water sources	BASIN: Strategic planning of economic, social and environmental priorities within a shared water basin	SECTORS: Facilitating the synergies between water and related sectors such as food and energy	REGION: Considering regional economic and political benefits derived from transboundary water cooperation
Main scale	At a specific defined point; typically a country border	Transboundary basin, building on national management plans	Transboundary basin; beyond States	Applicable at different scales, here considered at regional scale	Regional scale (i.e. in and beyond basin scale)
Timing	Targeted, to ensure meeting a need or to address a specific issue	Short medium, long-term	Medium to long-term	Medium term and preferably also *before* sectoral plans impact on water use	Medium to long-term
Scope of action	Water supply/ bulk water	Water resources management, mainly at operational and tactical level	Water resources management, mainly at strategic level	Trade-offs and synergies between sectors	Seeing water's role for regional economic and political cooperation

Source: UNECE Water Convention secretariat, 2021.

Note: The characteristics are simplifications and intentionally emphasize the differences between the closely related and partly overlapping approaches.

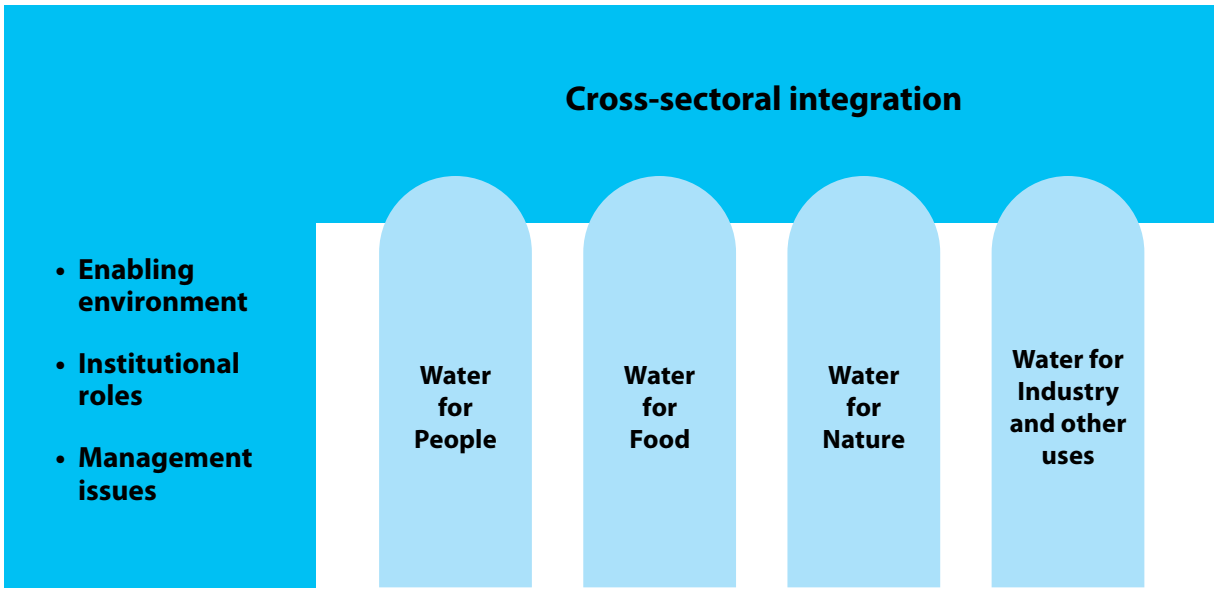
156 See https://sdgs.un.org/goals/goal6.

157 Anil Agerwal and others, "Integrated water resources management", TAC Background Papers, No. 4 (Stockholm, Global Water Partnership, 2000).

IWRM thus aims to ensure sustainable and equitable use of water and related resources with the help of key management instruments (e.g. allocation) and key institutions, as well as a broader enabling environment (e.g. policies and cooperation forums) and financing. According to the recent progress report on SDG 6.5, a great majority of countries have already established a firm institutional foundation for IWRM, including in transboundary basins. The actual degree of implementation varies greatly, however.[158]

FIGURE 9

Conceptualization of integrated water resources management and its related subsectors



Source: Anil Agerwal and others, "Integrated water resources management", TAC Background Papers, No. 4 (Stockholm, Global Water Partnership, 2000).

b. Basin-wide planning or strategic basin planning processes

During the past decade, basin-wide planning or strategic basin planning processes (Figure 8) have emerged to complement IWRM implementation. Their best practices exemplify 10 golden rules:

- Develop a comprehensive understanding of the entire system;
- Plan and act, even without full knowledge (or perfect foresight);
- Prioritize issues for current attention, and adopt a phased and iterative approach to the achievement of long-term goals;
- Enable adaptation to changing circumstances;
- Accept that basin planning is an inherently iterative and chaotic process;
- Develop relevant and consistent thematic plans;
- Address issues at the appropriate scale by nesting local plans under the basin plan;
- Engage stakeholders with a view to strengthening institutional relationships;
- Focus on implementation of the basin plan throughout;

158 UNEP, *Progress on Integrated Water Resources Management: Global Baseline for SDG 6 Indicator 6.5.1: Degree of IWRM Implementation* (Geneva, 2018).

- Select the planning approach and methods to suit the basin needs.[159]

At their core are shared scenarios and visions for the future of the basin, which are crucial for reaching joint understanding on allocation needs and requirements.

c. The water-food-energy-ecosystem nexus approach

The nexus approach to managing interlinked resources has equally gained prominence during the past decade as a way to enhance water, energy and food security.[160] Resource management and economic policy decisions in agriculture and energy are taken outside the sphere of water management but they translate into impacts and demands on water, and vice versa. The nexus approach aims to increase resource efficiency, reduce trade-offs, build synergies and improve governance among and between sectors, while simultaneously protecting ecosystems. Integrated planning, coherent policies and multipurpose investments are among the means to address nexus issues. Intersectoral or nexus assessments and dialogues, supported by analysis to varying degrees, have sought to point at such opportunities in policy and in taking technical measures.[161]

Identifying and addressing intersectoral trade-offs and synergies can inform water allocation decision-making processes, foster transboundary cooperation and increase resource use efficiency. The need for water allocation measures to address scarcity or its impacts could potentially be avoided by integrated planning and informed sectoral policies that are coordinated and take into account availability and variability of water resources. For example, in areas suffering from water scarcity, locating water-intensive primary production or industries in areas with more abundant water resources or importing water-intensive commodities, and thus "virtual water",[162] is an example of nexus strategy that helps to expand the pool of water resources available for different uses and needs. Another nexus strategy is to explore alternative renewable energy technologies such as solar, wind and tidal that are less water intensive than conventional energy generating methods, such as hydropower. Doing so may relieve the pressure on water resources use and trade-offs between power generation and irrigation or other water uses. Using the nexus approach can help to identify the stress points where hydropower development is creating concerns.[163] UNECE has developed a methodology to assess such nexus interactions and synergistic solutions and applied it in eight basins to date.

d. Identifying, assessing and sharing benefits of transboundary water cooperation

Identifying, assessing and sharing benefits of transboundary water cooperation increases the scope of benefits considered from pure water allocation to benefits from improved water management and enhanced trust for and beyond economic activities. Those may include, among others, economic, social and environmental benefits, as well as regional economic integration benefits and enhanced peace and security benefits.[164] Sadoff and Grey (2005)[165] outline a process leading to capturing shared benefits through implementation of relevant projects, starting from assessing cooperatively the opportunities for potential benefits in the region in question, followed by negotiating a bundle of projects, benefit-sharing

159 Speed and others (2013).

160 UNECE, *Methodology for Assessing the Water-Food-Energy-Ecosystems Nexus* (2018).

161 UNECE, *Reconciling Resource Uses in Transboundary Basins: Assessment of the Water-Food-Energy-Ecosystems Nexus* (New York and Geneva, United Nations, 2015).

162 J. A. Allan, "Virtual water – the water, food, and trade nexus. Useful concept or misleading metaphor?", *Water International*, vol. 28, No. 1 (2003), p. 106–113.

163 UNECE, *Deployment of Renewable Energy: The Water-Energy-Food-Ecosystem Nexus Approach to Support the Sustainable Development Goals: Good Practices and Policies for Intersectoral Synergies to Deploy Renewable Energy* (Geneva, 2017).

164 UNECE, *Policy Guidance Note on the Benefits of Transboundary Water Cooperation* (2015); Laura López-Hoffman and others, "Ecosystem services across borders: a framework for transboundary conservation policy", *Frontiers in Ecology and the Environment*, vol. 8, No. 2 (2010), p. 84–91.

165 Claudia W. Sadoff and David Grey, "Cooperation on international rivers: a continuum for securing and sharing benefits", *Water International*, vol. 30, No. 4 (2005), p. 420–427.

arrangements and legal agreements. The analysis of potential for sharing benefits can be revisited to continue the cycle.

The broad-ranging benefits from transboundary cooperation are illustrated by the outcomes of the assessment of benefits in the Drina River Basin (see Case Study 16). Focus on benefits in strictly economic terms (quantifiable and monetized, e.g. by hydro-economic modelling) does not lessen the importance of other benefits which may not all even be quantifiable. Identification of qualitative benefits of cooperation can be equally helpful, helping to create enabling conditions, including political willingness to strengthen cooperation. Besides sharing benefits, sharing of costs may be a central part of joint management of shared water resources, such as in the case of the Chu–Talas Basin between Kazakhstan and Kyrgyzstan (see Case Study 9).

The potential for sharing benefits from the use of water resources can help to prioritize water uses and needs. Integration of clear benefit-sharing measures into water allocation arrangements, including priority water needs to be secured and how any costs incurred in exceptional or changing circumstances should be dealt with, can help prevent related tensions and disputes (see also Chapter V, section 4 on adaptability of allocation arrangements). Understanding the benefits from the use of shared water resources and from transboundary cooperation broadly can: i) inform and help design a more equitable water allocation; ii) reinforce cooperation on basin management that contributes to, for example, sustaining the allocable water resource, ensuring the functioning of the necessary built or natural infrastructure and reducing transboundary impacts; and iii) with a cross-sectoral (nexus) perspective, extend and diversify the types of benefits that can be realized through cooperation engaging economic sectors.

CASE STUDY 16: **Identifying benefits of cooperation with a nexus approach as a broader perspective to revisit flow regulation in the Drina River Basin**

The Drina River, shared mainly by Bosnia and Herzegovina, Montenegro and Serbia,[166] serves various flow-related needs: there is currently important hydropower generation and also plans for further development; the population's water needs are met partly from the river (while groundwater is also important); recreational activities, notably water sports, are practised on the tributaries; and valuable ecosystems and their services depend on the Drina. Various sections of the river are also at risk of flooding.

All economic activities in the Drina River Basin depend on the timely flow of adequate quantities of water, with quality fit for purpose. Currently, the regulation of flow is uncoordinated and suboptimal, and this has an impact on both water availability and water quality.

The identification and assessment of benefits of transboundary cooperation in the Drina River Basin (see Table 4) was integrated into a participatory assessment of the water-food-energy-ecosystems nexus[167] under the Water Convention, which aimed to foster transboundary cooperation by identifying, jointly with the riparian States' concerned ministries, intersectoral trade-offs and synergies. To capitalize on the benefits, coordinated policy and technical actions in the fields of water management, energy and environmental protection, at different levels, across borders were proposed.

In the nexus assessment of the Drina River Basin,[168] some benefits were quantified: energy system modelling allowed the estimation that cooperative operation of hydropower dams could deliver

166 A very small part of the Drina River Basin (less than 1 per cent) is in Albania.

167 UNECE, *Assessment of the Water-Food-Energy-Ecosystems Nexus and Benefits of Transboundary Cooperation in the Drina River Basin* (New York and Geneva, United Nations, 2017).

168 Ibid.

more than 600 GWh of electricity over the 2017–2030 period, compared with optimization of dam operation on a single unit basis. Overall system savings for the three countries could amount to $136 million over the entire modelling period with the assumptions made. Setting aside 30 per cent of dam capacity for flood control would have a cost (in terms of lost energy production) equivalent to 4 per cent of the combined operational cost of the electricity system in the three countries. The analysis also points to the value of increasing energy efficiency to reduce pressure on hydropower generation.

TABLE 4

Benefits of transboundary cooperation identified in the Drina River Basin

	Economic activities benefits	Benefits beyond economic activities
From improved water management	Economic benefits • Expanded activity and productivity in economic sectors • Reduced cost of carrying out productive activities • Reduced economic impacts of water-related hazards (floods, droughts etc.)	Social and environmental benefits • Health impacts • Employment and reduced poverty impacts • Improved access to services (electricity, water supply, etc.) • Preservation of cultural resources or recreational opportunities • Avoided/reduced habitat degradation and biodiversity loss
From enhanced trust	Regional economic cooperation benefits • Development of regional markets (for goods, services and labour) • Increase in cross-border investments • Development of transnational infrastructure networks	Peace and security benefits • Strengthening of international law • Increased geopolitical stability • Reduced risk and avoided cost of conflict • Savings from reduced military spending

Source: UNECE, *Identifying, Assessing and Communicating the Benefits of Transboundary Water Cooperation: Lessons Learned and Recommendations* (Geneva, 2018).

Various issues are still to be solved in the Drina River Basin, including some border-related and historical compensation issues, and the riparian States are still negotiating and looking for feasible solutions. Paths to solving these issues include water management, including bilaterally and in the framework of the International Sava River Basin Commission (ISRBC), but also the field of energy, where possible new development opportunities are at stake as the sector grapples with the challenge of a sustainable transition.

Sharing benefits and costs: hydropower as an example

Based on global data,[169] one of the predominant purposes for allocation has been hydropower but, in fact, States often allocate benefits from hydropower rather than allocating water volumes to hydropower

169 Source: Oregon State University, College of Earth, Ocean, and Atmospheric Sciences, "Transboundary Freshwater Dispute Database".

projects. Benefits from hydropower are shared or divided, among other approaches, as fixed quantities of power, percentages of power and value generated from power sales (see Table 5).

TABLE 5

Hydropower division of benefits according to the method of water allocation classification used in the Handbook

Hydropower Benefits Division	
None: Only generally describes a hydropower project and does not detail any benefits (e.g. power, money) shared/allocated	**Percentage of power generated**
Fixed quantities of power: generated from a hydropower project	**Fixed value of electricity generated**: determined by an agreed pricing mechanism, such as market pricing
Variable quantities of power: generated from hydropower projects; may vary due to water availability, time, etc.	**Consultation:** States must consult with other parties to determine or change the division of benefits from a hydropower project
Percentage of assessed value of electricity generated: such as an assessed value determined by market pricing mechanism	**Other**: States use a different mechanism than listed above. In such a case, this will be specified in the hydropower text code.

Source: M. McCracken and others, "Typology of Transboundary Water Allocation: a look at global trends in international freshwater agreements" (forthcoming).

CASE STUDY 17: **Cooperation on the use of water and energy resources of the Syr Darya River Basin (Central Asia)**

Over the Soviet period, water allocation in the Syr Darya River Basin and in the broader Aral Sea Basin, centrally decided as a domestic issue, was based on the irrigation conditions of the main reservoirs and compensatory energy supplies were ensured to the upstream Soviet republics.

With the establishment of new sovereign States in the region (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan) in 1991, the conditions for using water resources fundamentally changed: the countries' resource base and economic development led to different priorities, which were—and are still—not compatible at all times, with upstream Kyrgyzstan and Tajikistan developing and operating hydropower with generating peak in winter and downstream Kazakhstan and Uzbekistan needing water for irrigation in spring and summer. With a market economy and no central enforcement mechanism, the former seasonal exchange of water and energy carriers between now newly independent countries ceased to work.

However, just a few months after gaining independence, five Central Asian countries signed an agreement in early 1992, stressing that earlier structures, principles and agreements on water allocation will remain valid. In an attempt to regulate the crucial water–energy nexus, an Agreement on the Use of Water and Energy Resources of the Syr Darya River Basin was signed in 1998 by Kazakhstan, Kyrgyzstan and Uzbekistan, with Tajikistan joining a year later. The Agreement concentrated on multi-annual regulation of the Naryn Syr Darya cascade and Toktogul reservoir in Kyrgyzstan. The compensation from downstream countries was foreseen in energy resources, such as coal, gas, electricity and fuel oil, and the rendering of other types of products (labour, services), or in monetary terms as agreed upon.

Water consumption quotas among the countries to implement the Agreement were to be agreed in the framework of the Interstate Commission on Water Coordination (ICWC); for its role in water allocation and its functioning, see Case Studies 29 and 31 on the Amu Darya Basin). The ICWC was established in 1993 with a secretariat with the mandate to elaborate and approve annual water consumption quotas for five Central Asian countries, as well as schedules for reservoir operation regimes, based on forecasts and actual flow. However, the agreed water consumption quotas among the countries to implement the Agreement soon began to be neglected and the Agreement ceased to work after a few years.

The assessment of the water-food-energy-ecosystems nexus in the Syr Darya River Basin[170] provided for a dialogue about the intersectoral challenges on a broader basis. It illustrated the value of actions such as diversifying energy sources—including for energy security—from the current heavy reliance on hydropower in the upper reaches, as well as improving energy efficiency and developing a regional electricity market and trade. The nexus assessment also recommended improvement of water efficiency to reduce dependency on water, which would be particularly effective in the lower reaches.

170 UNECE, *Reconciling Resource Uses in Transboundary Basins: Assessment of the Water-Food-Energy-Ecosystems Nexus in the Syr Darya River Basin (shared by Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan)* (New York and Geneva, United Nations, 2017).