

How to manage transboundary waters in a changing climate?

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Abstract

Transboundary waters account for 60 percent of the world's freshwater flows. 153 countries have territory within at least one of the transboundary rivers and lake basins; transboundary aquifers underlay almost every country. Transboundary water cooperation is crucial for peace, sustainable development, and regional stability.

Climate change can exacerbate water scarcity in transboundary basins, particularly in regions already experiencing water stress. Higher temperatures, increased evaporation rates, and prolonged droughts can reduce water availability, leading to heightened competition and potential conflicts over shared water resources.

Therefore it is worthwhile to analyze that how to manage transboundary waters in a changing climate.

Keywords: Transboundary waters, Climate change,

Introduction

The 2015 Paris Agreement to the United Nations Framework Convention on Climate Change and SDG both urge countries to collaborate on taking urgent action in combating climate change and its impacts, including both mitigation and adaptation measures.

As climate change is expected to alter the desired and actual uses of water, it calls for adaptation measures in water resources management at the national, transboundary and regional scales(1). Types of adaptation measures include legislative and regulatory instruments (e.g. laws, regulations and agreements based on international conventions), financial and market instruments (e.g. licences, permits and taxes), education and informational instruments (e.g. public awareness campaigns), policy instruments (e.g. intersectoral mechanisms for cooperation and agreement of different sectoral policies, etc.), as well as structural (e.g. flood protection infrastructure) and non-structural (e.g. information exchange and nature-based solutions such as wetland restoration) measures(7).

In practice, examples of adaptation measures can range from demand management strategies, including structural changes in economy (e.g. shift to crops, sectors or technologies using less water), new technical standards (e.g. best available techniques (BAT)), metering and pricing, and introducing other incentives for water-saving and improving water-use efficiency, to trading of water rights(8) and ecosystem conservation and restoration.

Climate change and specific challenges for transboundary waters

Managing transboundary waters in a changing climate presents unique challenges due to the interconnected nature of water resources and the potential impacts of climate change on hydrological systems.

Climate change poses the following specific challenges for transboundary IWRM, among others:

- increased uncertainty regarding availability and variability of shared water resources;
- potentially unequal regional distribution in climate-change-induced effects and resulting impacts;
- changing water demands (e.g. agricultural water demands are sensitive to increase in evapotranspiration);
- resulting growing tensions, even in areas where transboundary interaction in the past has been characterized by cooperation;
- worsening of water quality and dissemination of water-related diseases;
- increasing costs for water management, especially if there is a lack of transboundary and crosssectoral cooperation in prioritizing the adaptation measures.

At the same time, enhanced transboundary cooperation provides many benefits for climate change adaptation. Benefits primarily come in the form of potential for joint climate and socioeconomic scenarios, vulnerability and impact assessments, disaster risk reduction strategies and response measures, reducing uncertainties through the exchange of data, sharing costs and benefits, better prioritization of measures and improving/developing broader regional cooperation and dispute settlement mechanisms(2).

Joint bodies are central forums for developing and implementing adaptation strategies, but their operationalization lies with the member countries. Conversely, some national adaptation measures may have transboundary impacts and thus require transboundary cooperation (3)

What does effective transboundary water management require?

In a changing climate, effective transboundary water management requires enhancing cooperation and dialogue, conducting joint assessments and monitoring, promoting integrated water resources management (IWRM), integrating climate change considerations into IWRM plans and strategies, considering flexible infrastructure designs that can be adjusted to changing conditions, enhancing technical capacity and knowledge sharing among riparian countries. Facilitate training programs, workshops, and exchanges to promote expertise in climate change adaptation, water management, and data collection and analysis.

It is also important to develop adaptive management plans in changing climate. It needs to formulate adaptive management plans that account for climate change impacts on transboundary waters. Include provisions for flexible and responsive actions to address changing conditions, such as altered precipitation patterns, increased water scarcity, or extreme events like floods and droughts.

To manage transboundary waters in a changing climate legal and institutional frameworks should be strengthened. Riparian states should establish robust legal and institutional mechanisms to facilitate transboundary water cooperation. They also need to develop

agreements or treaties that clearly define rights, responsibilities, and mechanisms for dispute resolution.

It's important to note that the specifics of managing transboundary waters will vary depending on the region and context. Therefore, it is crucial to tailor approaches to the unique characteristics and challenges of each transboundary water system while considering the evolving impacts of climate change.

How climate change can affect on Transboundary Water Management

Climate change can have significant effects on transboundary water allocation, impacting the availability, timing, and quality of water resources.

Climate change can alter water availability, It can change precipitation patterns, including increased frequency of droughts or intense rainfall events, and can lead to variations in water availability. Reduced snowmelt, decreased river flows, and changes in groundwater recharge rates can affect the overall volume of water available for allocation among riparian countries.

Climate change can alter the timing of water availability, affecting the seasonal distribution of water resources. Changes in the timing of snowmelt, for example, can impact the flow regime of rivers shared by multiple countries. This can create challenges in coordinating water allocation and managing competing demands during different seasons.

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Climate change can influence water quality in transboundary rivers and lakes. Rising temperatures, changes in precipitation patterns, and altered flow regimes can affect water temperature, nutrient levels, and pollutant concentrations. This can have implications for water treatment and the suitability of water resources for various uses.

Climate change can intensify the occurrence and severity of extreme weather events, such as floods and storms. These events can disrupt water infrastructure, damage water supply systems, and result in the loss of water resources. Dealing with the aftermath of such events can impact the allocation of water resources among riparian countries.

Climate change introduces greater uncertainty to water resource planning and management. The variability and unpredictability of future hydrological conditions make long-term water allocation challenging. Decision-makers need to consider a range of possible climate scenarios and develop adaptive management strategies to address the uncertainty associated with changing climate conditions.

To effectively address the impacts of climate change on transboundary water allocation, it is crucial for riparian countries to engage in cooperative and adaptive management approaches. This includes robust data collection and sharing, joint modeling and scenario planning, and the development of flexible water allocation agreements that can adapt to changing conditions. Collaborative efforts, adaptive governance structures, and the integration of climate change considerations into water management plans are essential for sustainable and equitable transboundary water allocation in a changing climate.

Transboundary water allocation in a changing climate

Climate change must be approached as a cross-cutting challenge for effective transboundary allocation.

It is a potential risk multiplier that may necessitate adjustment of existing—and careful drafting of any new—transboundary water allocation agreements and arrangements. Ideally, transboundary allocation arrangements should factor in the increased uncertainty, inter- and interannual variability of precipitation, run-off and, in some cases, step reductions to cope with increasing frequency and extremity of drought and flood events. Measures such as adaptive capacity and flexibility can assist in addressing these issues, as outlined in Chapter V, section 6.

Making transboundary allocation arrangements climate resilient also requires strong coordination mechanisms between different levels of governance, sectoral policies and stakeholder groups(4). They need to be aligned with climate change adaptation and mitigation efforts, taking into account the different water requirements of different energy options, such as hydropower, solar, and across climate boundaries”, wind power and biofuels(5) Renewable energy can drive sustainable water use and allocation and vice versa when the synergies and trade-offs in the water-food-energy-ecosystem nexus are appropriately addressed(6).

Conclusions

There is no specific international convention that focuses exclusively on transboundary water allocation in the context of a changing climate. However, several international agreements and frameworks address various aspects of climate change and water management, which indirectly influence transboundary water allocation.

The United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses (UN Watercourses Convention) provides a framework for the peaceful, equitable, and sustainable utilization of transboundary watercourses. While it predates the significant focus on climate change, it acknowledges the potential impacts of changing hydrological conditions on watercourses and encourages cooperation among states sharing such water resources.

The Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention), under the auspices of the United Nations Economic Commission for Europe (UNECE), focuses on the sustainable management of transboundary waters. It somehow recognizes the influence of climate change on water resources and encourages cooperation and adaptation measures among its member states.

Climate change has significant implications for water resources, including altered precipitation patterns, changing river flows, increased frequency of extreme weather events, and rising sea levels. These changes affect the availability, quality, and distribution of water in transboundary basins. A convention that acknowledges and addresses climate change impacts would provide a framework for countries to assess and respond to these challenges collectively.

Therefore it is important to note that the field of transboundary waters allocation under the effects of climate change is still waiting for a comprehensive approach to avoid potential conflicts between riparian states.

A convention that integrates climate change considerations into transboundary water cooperation would foster greater collaboration among countries. It would encourage the development of joint projects, data-sharing mechanisms, and technical assistance programs to address common challenges. By working together, countries can optimize the use of shared water resources, minimize negative impacts, and achieve sustainable development goals in a changing climate.

Overall, an international convention that includes climate change impacts for transboundary water cooperation would provide a framework for countries to address the challenges posed by climate change, promote cooperation and collaboration, and ensure the sustainable and equitable management of shared water resources.

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Biography



Dursun Yıldız (Msc.) is a hydropolitics specialist and Director of the Hydropolitics Academy Association located in Ankara-Turkey. He is a civil engineer and used to be Deputy Director at State Hydraulic Works in Turkey; completed a hydroinformatics post graduate course at the IHE in Delft, a Technical training program in USBR-USA, and a master's degree in Hydropolitics at the Hacettepe University-Turkey. He has over 5 years of teaching experience in some Turkish Universities and now works as head of his own Hydro Energy & Strategy consulting company located in Ankara. He has published several international articles and 15 books. He received the Most Successful Researcher Award on International Water Issues from Turkish Agricultural Association in 2008 and from the Central Union of Irrigation Cooperatives in 2016. He received the Professional Services Award of Excellence from İstanbul Çekmeköy Rotary Club in 2021.

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