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EDITED AND REVIEWED BY
Robin Kundis Craig,
University of Southern California,
United States

*CORRESPONDENCE
Chukwuebuka Edum
✉ chukwuebuka.edum@gmail.com

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Editorial: Doubling global hydropower capacity by 2050 – what about the transboundary dimension?

Chukwuebuka Edum^{1*}, Alistair Rieu-Clarke², Owen McIntyre³
and Mara Tignino⁴

¹University of Bologna, Bologna, Italy, ²Northumbria University, Newcastle upon Tyne, United Kingdom, ³University College Cork, Cork, Ireland, ⁴University of Geneva, Geneva, Switzerland

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Editorial on the Research Topic

Doubling global hydropower capacity by 2050 – what about the transboundary dimension?

This Research Topic is primarily the product of a workshop held at the University of Bologna, Italy, on 9 May–10, 2023. We would like to express our gratitude to the workshop participants, including the contributors to this Research Topic, for their enthusiasm and engagement during the workshop and in the preparation of Research Topic.

Both the workshop and this Research Topic sought to develop a highly focused research programme that explores the complex and multifaceted relevance of various subfields of international law to the development and operation of major hydropower infrastructure within shared transboundary basins.

It examines the significance of hydropower project development and operation across a wide range of sub-fields of international law, including transboundary water resource management, environmental protection, climate change mitigation and adaptation, human rights protection, indigenous rights, cultural heritage protection, transnational governance, international investor protection, and international trade. Additionally, the contributors offer unique theoretical and empirical analyses of legal developments, drawing particularly upon lessons learned from experience in transboundary basins around the world.

Utilizing an international legal geography approach to the governance of transboundary waters, [Dr Hensengerth's](#) article examines the roles of international river basins in managing the legal pluralism represented by the varying interests of local communities regarding transboundary hydropower projects. Applying this approach to the case study of the Mekong River, it finds that project-affected communities are largely unable to exert influence and are relegated to participation in alternative forums, which are usually disconnected from official processes and often heighten tensions and conflicts amongst stakeholders.

The article by [Dr Tignino and Mr Jara](#) provides an overview of how various human rights frameworks and, in particular, the human right to safe drinking water and indigenous people's rights, are relevant to hydropower development. It presents available international law tools and mechanisms, including river basin organizations and judicial bodies, which may help to reconcile tensions between and within states when the development of a hydropower project risks affecting the quantity or quality of water provided to local and vulnerable communities, including indigenous people. This work highlights the challenges of ensuring the effective implementation of the human right to safe drinking water and indigenous rights, particularly in the context of hydropower development.

[Dr Schmeier's](#) article assesses whether, how, and to what extent institutionalized governance mechanisms can prevent or mitigate conflict from both the global (based on global datasets on relevant international water agreements on hydropower development) and case study perspectives (based on in-depth analysis of the three river basins of the Mekong, Zambezi, and Senegal). It finds, while globally institutionalized cooperation mechanisms are lacking, in those (albeit rather few) basins where they do exist, they can prevent and mitigate conflict risks. Due to these benefits, the article calls for the promotion and strengthening of institutional cooperation mechanisms over transboundary uses of shared water resources.

[Dr Ziganshina's](#) article examines existing governance arrangements for transboundary water infrastructure in Central Asia. It finds that there are generally three approaches to the management of water infrastructure (including hydropower projects) in transboundary waters in the region. First, some infrastructure facilities are state-owned but are operated by regional organizations. Second, some are operated by the country where they are located, with operation and maintenance costs shared with another country. Third, others are owned, operated, and funded by a country other than the countries in which they are located. These diverse approaches are due to the political, social, and technical realities in the region.

The article by [Wouters et al.](#) examines the rules of international water law and international economic (investment) law applicable to transboundary hydropower projects, with a focus on China as one of the key actors at home (as a significant upstream developer of major transboundary hydropower projects within its shared rivers) and abroad (as a significant investor in transboundary hydropower projects). It concludes that while international economic law is not directly concerned with international water law, host states and foreign investors must be informed regarding, and should take into account, the applicable legal obligations governing transboundary waters.

[Dr Edum's](#) article examines the allocation of competences between the state and its subnational units over the development of transboundary hydropower projects under the Swiss Constitutional federal system. The article addresses the added complication of managing a transboundary hydropower project from a national law perspective. Aside from legal analysis, the article also provides an analysis of the political economy of the development of such a project. This article recommends cooperation in good faith between relevant stakeholders as the most promising approach to finding sustainable and acceptable solutions.

[Professor McIntyre's](#) article examines transnational standards applying to transboundary hydropower projects by virtue of two forms of transnational governance regime. First, it explores the potential role of transnational standards (such as the hydropower Sustainability Standards Scheme of the International Hydropower Association) and, second, the environment and safeguard standards for water-related projects of multilateral development banks, both of which aim to improve regulation of environmental and social impacts associated with transboundary hydropower projects. In addition, it examines the extent to which such standards cohere with established and emerging requirements of international water law, with the view of developing a better understanding of their interaction in practice.

Taking the Binational Entity of ITAIPU (between Brazil and Paraguay) as a case study, [Dr Gwynn's](#) article illustrates how riparian States with varying or contrary uses of their shared water resources can cooperate in the management of such resources by utilizing international water law's principle of reasonable and equitable utilization. The principle was employed by the parties to develop the concept of a "water window special operation," aimed at addressing varying water uses in the basin. The parties are able to invoke the principle as a customary rule of international water, even though the principle is not contained in any pertinent agreement between the parties.

Author contributions

CE: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. AR-C: Conceptualization, Formal analysis, Funding acquisition, Project administration, Writing – review & editing. OM: Conceptualization, Formal analysis, Funding acquisition, Project administration, Writing – review & editing. MT: Writing – review & editing.

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Conflict of interest

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