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Towards Sustainability in Transboundary Water Resources: The Role of Inter-State Solidarity

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Abstract

While cooperation regarding the management of transboundary water resources continues to improve in terms of the extent and intensity of inter-State engagement, watercourse States will increasingly need to employ flexible arrangements to facilitate the adaptive management of shared waters in response to the likely impacts of climate change. The legal challenges involved in crafting and applying such arrangements will require greater focus upon the community of interest understood to exist amongst co-basin States, and greater reliance upon the principle of solidarity underlying this concept. Though long a feature of international law, solidarity plays a particularly important role in the continuing development and functioning of international water law, and today offers a set of cooperative values to assist international water law in adapting to the looming global water crisis.

Keywords

Climate change, adaptive management, community of interest, solidarity, water crisis

Introduction

It would scarcely be possible to overstate the extent of the social, economic and environmental risks presented by the looming global water crisis.[1] A recent World Meteorological Organisation (WMO) report on global water resources highlights the very severe stress currently facing global water supplies, with five consecutive years of below-normal river flows and reservoir inflows seriously impacting communities, agriculture, and ecosystems.[2] The report identifies a range of factors contributing to these problems, but human-induced climate change features prominently. The WMO notes, for example, that 2023 was the hottest year on record, with glaciers experiencing their largest annual loss of mass in the last 50 years, and 2023 marking the second year of widespread ice loss globally. As time goes on, climate change is certain to make the hydrological cycle and related river flows significantly more erratic. Already, 3.6 billion people currently face water shortages, with this figure projected to exceed 5 billion by 2050. It is clear, therefore, that international water law must evolve to provide decision-makers with a range of appropriate cooperative tools and solutions which are adequate to the task of addressing such challenges in shared international river basins, which account for 60 per cent of the world's freshwater flows.[3]

On the contrary, however, it appears that the established patterns of transboundary water cooperation have crystallised around a suite of core rules and principles which predate the emerging water crisis and can increasingly be

[1] For a concise overview of the nature of the global water crisis, see generally E. Brown Weiss, *International Law for a Water-Scarce World* (Leiden: Martinus Nijhoff, 2013), at 1–9.

[2] WMO, State of Global Water Resources Report 2023, (WMO-No. 1362), (WMO, Geneva, 2024); https://wmo.int/publication-series/state-of-global-water-resources-2023.pdf

[3] See UN, *Progress on Transboundary Water Cooperation: Mid-term status of SDG Indicator 6.5.2, with a special focus on Climate Change* (2024), which notes, at 21, that 153 States have territory within at least one of the 313 transboundary river basins and 468 transboundary aquifers. These figures are based respectively on the Oregon State University, *Transboundary Freshwater Spatial Database*: https://transboundarywaters.ceoas. oregonstate.edu/transboundary-freshwater-spatialdatabase and on the International Groundwater Resources Assessment Centre (IGRAC), 2021 *Transboundary Aquifers of the World map:* https://unesdoc.unesco.org/ark:/48223/pf0000380193?posInSet=1&queryId=04eaf331- dd0b-409a-9c97-43ef221adee2.html

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regarded as somewhat out-of-date and unfit-for-purpose. Most notably, the established rules of international water law, having largely emerged from the practice of interaction amongst watercourse States relating to the development of major water-related infrastructure projects in shared international basins, are chiefly concerned with ensuring stability as regards the regime applying to the water-related uses and entitlements of each State. Such stability has been essential in order to safeguard financial investments by ensuring the long-term viability of such infrastructure projects. The type of adaptive water governance now is required to assist States in responding flexibly to erratic river flows. The significant risks associated therewith for cooperative transboundary water resources management, is largely anathema to the objectives, commitments and procedures set out under existing transboundary water cooperation regimes. It is increasingly apparent, therefore, that many of the presumptions upon which the general framework of international water law is based, require urgent and fundamental reassessment.

In terms of the higher-order values and fundamental principles which underpin transboundary water cooperation along with rules of international water law (IWL), the looming water crisis demands an acceleration of the ongoing gradual transition from a short-term self-interested paradigm, based upon a narrow conception of State entitlements ensuing from territorial sovereignty, towards one based on the existence of a community of interest amongst States sharing such a uniquely vital natural resource. Though a State's right to pursue its sovereign interests in the use of a shared watercourse has long been qualified to some degree by the equitable requirement to take account of the reasonable interests of other watercourse States.[4] This established paradigm doesn't necessarily support the optimisation of increasingly scarce water resources with a view to maximising human benefits and ensuring the resilience of water-related ecosystems. This transition, which, though clearly already underway, is becoming ever more urgent and mirrors Friedmann's prescient vision of international law's general evolution from a law of "coexistence" to a law of "cooperation".[5]

This article seeks to provide a snapshot of existing cooperative practice in the management of shared international water resources and, in so doing, to highlight the urgent need for flexible arrangements to facilitate the adaptive management of such waters in response to the likely impacts of climate change in terms of flow variability. It argues that such adaptive flexibility will require watercourse States to recognise the legal significance of the community of interest existing amongst co-basin States and to embrace the principle of solidarity which underlies and supports it. Solidarity has long been an important feature of international law, facilitating meaningful inter-State engagement and compromise, but it has played a particularly important, if under-explored, role in the evolution and functioning of modern international water law. Today, however, it offers a highly relevant set of cooperative values which can assist in ensuring that the practice of international water law can adapt to the looming global water crisis.

The Imperative of Transboundary Water Cooperation

The extent and intensity of inter-State cooperative engagement over shared transboundary water resources has been increasing steadily for some time. Several factors lie behind this increased interaction, including the impetus provided by the global commitment to transboundary water cooperation contained in Sustainable Development Goal (SDG) indicator 6.5.2, which is supported by a framework of related monitoring and reporting processes. The recently published third report on progress in the implementation of SDG 6.5.2 provides a useful snapshot of examples of cooperative arrangements that have been adopted or have entered into force between 2020 and 2023, and includes nine formal agreements, three memoranda of understanding, two protocols and two ministerial declarations.[6] While such increased inter-State interaction is to be welcomed as compelling evidence of heightened transboundary

[4] On the broad implications of the overarching cardinal principle of "equitable and reasonable utilisation", see generally J. Lipper, 'Equitable Utilisation' in A.H. Garretson, C.J. Olmstead and R.D. Hayton (eds.), *The Law of International Drainage Basins* (New York: Oceana Publications, 1967) 40; S.C. McCaffrey, *The Law of International Watercourses, 3rd ed.* (Oxford: Oxford University Press, 2019) 444–466; I. Kaya, *Equitable Utilization: The Law of the Non-Navigational Uses of International Watercourses*(Farnham: Ashgate, 2003); O. McIntyre, 'The Principle of Equitable and Reasonable Utilisation' in A. Tanzi, O. McIntyre, A. Kolliopoulos, A. Rieu-Clarke and R. Kinna (eds.), *The UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes: Its Contribution to International Water Cooperation* (Leiden: Brill Nijhoff, 2015) 146–159.

[5] W. Friedmann, *The Changing Structure of International Law* (New York: Columbia University Press, 1964), at 60–62 and 367. See further, H.P. Hestermeyer, et al. (eds.), Coexistence, Cooperation and Solidarity: Liber Amicorum Rüdiger Wolfrum (Leiden: Martinus Nijhoff, 2011), in particular: J. Delbrück, 'Coexistence, Cooperation and Solidarity in International Law: The International Obligation to Cooperate – An Empty Shell or a Hard-Law Principle of International Law? – A Critical Look at a Much-Debated Paradigm of Modern International Law', at 1–16; A.G. Koroma, 'Solidarity: Evidence of an Emerging Legal Principle', at 103–129; E. Hey, 'Conceptualizing Global Natural Resources: Global Public Goods Theory and International Legal Concepts', at 881–899; and H. Türk, 'Water in the Contemporary World', at 1037–1064.

[6] UN, *supra,* n. 3, at 22–23.

water cooperation - an absolutely indispensable element of improved transboundary water resources management - there are as yet few indications that such arrangements are specifically tailored to address the severe, yet novel and unprecedented, challenges presented by the increasingly likely impacts of climate change.

The key problem is one of treaty design. On the basis of the outline template provided by the International Law Association's seminally important 1966 Helsinki Rules,[7] and firmly established in the treaty practice of States by the 1997 UN Watercourses Convention[8] (and to a lesser degree the 1992 UNECE Water Convention,[9] which was originally regional in its geographical scope and primarily environmental in its substantive focus), international water resources agreements have tended to adopt a highly standardised format at the global, regional, river-basin and bilateral levels. Generally, in addition to institutional arrangements for facilitating their implementation, international water agreements tend to include the following key substantive and procedural elements: the principle of equitable and reasonable utilisation;[10] the duty to prevent significant transboundary harm;[11] the general duty to cooperate;[12] commitments regarding environmental and ecosystems protection;[13] a requirement of prior notification of planned projects;[14] requirements regarding routine exchange of data and information;[15] requirements regarding inter-State consultation and negotiation;[16] and arrangements for the settlement of disputes.[17] While improved transboundary water cooperation in the shape of newly adopted water agreements is undoubtedly necessary having regard to the looming challenges, the consistency in practice and normative stability promoted by this tendency towards highly standardised content and format lacks adaptive capacity and flexibility. Thus, though the format has evolved over more than six decades in response to the needs of diverse transboundary water cooperation scenarios and processes, it militates against the kind of continuing flexibility that climate-related water resources variability will require.

For example, the recent practice of international water law places great emphasis on the prior notification of contentious projects to potentially affected watercourse States, and on ensuing good-faith inter-State consultation and negotiation with a view to resolving any outstanding differences,[18] all of which is to be based on the findings of an environmental impact assessment (EIA) process conducted to international standards. In recent decades, many international water agreements have either required,[19] or promoted reliance upon,[20] EIA procedures in order to facilitate meaningful and effective inter-State engagement concerning new projects. But, International Court of Justice (ICJ) now describes the conduct of an EIA in respect of a project likely to impact an international watercourse as a 'requirement under general international law', thereby suggesting that the obligation to conduct an EIA no longer depends upon an applicable treaty provision.[21] However, despite the obvious benefits of EIA in seeking to identify and prevent possible transboundary harm, it is in essence a onetime, 'front-loaded' process which assumes the possibility of predicting and mitigating adverse impacts in advance of the commencement of a project[22] – an assumption that is largely undermined by the uncertainty likely to beset water resources quantity and quality due to climate change.

[7] Helsinki Rules on the Uses of the Waters of International Rivers, International Law Association, *Report of the Fifty-Second Conference of the International Law Association* (Helsinki: ILA, 1966) 484, (Helsinki Rules).

[8] United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses, (1997) 36 *ILM* 700 (UN Watercourses Convention).

[9] UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes, (1992) 31 ILM 1312 (UNECE Water Convention).

[10] See, for example, Arts. 5 and 6 of the UN Watercourses Convention; Art. 2.2(c) of the UNECE Water Convention; and Arts. 4 and 5 of the 2008 International Law Commission (ILC) Draft Articles on Transboundary Aquifers, ILC, *Report of the International Law Commission on the Work of its Sixtieth Session*, UN GAOR, 62nd Sess., Suppl. No. 10, UN Doc. A/63/10 (2008).

[11] UN Watercourses Convention, Art. 7; UNECE Water Convention, Art. 2.1; ILC Draft Articles on Transboundary Aquifers, Art. 6.

[12] UN Watercourses Convention, Art. 8; UNECE Water Convention, Arts. 2.6, 9 and 11; ILC Draft Articles on Transboundary Aquifers, Arts. 7 and 16.

[13] UN Watercourses Convention, Arts. 20–23; UNECE Water Convention, Arts. 2.2 and 3; ILC Draft Articles on Transboundary Aquifers, Arts. 10–12.

[14] UN Watercourses Convention, Arts. 11–16; UNECE Water Convention, Art. 9.2(h) and (j); ILC Draft Articles on Transboundary Aquifers, Art. 15.1-2.

[15] UN Watercourses Convention, Art. 9; UNECE Water Convention, Arts. 6, 9.2(3) and 13; ILC Draft Articles on Transboundary Aquifers, Art. 8.

[16] UN Watercourses Convention, Art. 17; UNECE Water Convention, Art. 10; ILC Draft Articles on Transboundary Aquifers, Art. 15.3.

[17] UN Watercourses Convention, Arts. 30–33; UNECE Water Convention, Art. 22 and Annex IV; ILC Draft Articles on Transboundary Aquifers, Art. 15.3.

[18] See, for example, the prominence of such procedural requirements under the UN Watercourses Convention, as set out in Arts. 11–19. In addition, the duty to notify in international water law has featured prominently in recent cases before the International Court of Justice (ICJ), including *Case Concerning Pulp Mills on the River Uruguay,* ICJ (2010) ICJ Rep. 14; *Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v. Nigaragua) / Construction of a Road in Costa Rica Along the San Juan River*, Judgment, 16 December 2015.

[19] 2003 Convention on the Sustainable Management of Lake Tanganyika, Art. 15.

[20] UN Watercourses Convention, Art. 12.

[21] *Pulp Mills, supra,* n. 18, at para. 204.

[22] See further, E. Raitanen, 'Legal Weaknesses and Windows of Opportunity in Transnational Biodiversity Protection: As Seen Through the Lens of an Ecosystem Approach-Based Paradigm' in S. Maljean-Dubois (ed.), *The Effectiveness of International Law* (Cambridge: Intersentia, 2017) 81–100.

Scholars have outlined the significant role(s) that established principles of international water law will be called upon to play, in both mitigating climate change and adapting to its water-related impacts.[23] The formulation of inherently indeterminate and flexible cardinal principle of equitable and reasonable utilisation, as set out under the UN Watercourses Convention, requires watercourse States to have regard to '[g]eographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character' in any determination of States' respective rights to use an international watercourse,[24] alongside '[t]he population dependent on the watercourse in each watercourse State'[25] and 'economy of use of the water resources of the watercourse and the costs of measures taken to that effect',[26] whilst also exhorting them to seek to attain 'optimal and sustainable utilization thereof and benefits therefrom, taking into account the interests of the watercourse states concerned, consistent with adequate protection of the watercourse'.[27] Clearly, this provides significant scope for addressing the challenges posed by climate change.[28] Similarly, the general duty to take all appropriate measures to prevent significant harm to other watercourse States[29] should operate to avoid or mitigate any adverse transboundary impacts of unilateral adaptation measures and ensure that the potential transboundary impacts of one State's use of shared waters are not further aggravated by climate change.[30] In addition, the protections and entitlements arising under the emerging human right to water framework,[31] which inevitably informs the elaboration and application of rules of international water law by means of the field's traditional prioritisation of 'the requirements of vital human needs',[32] might prove helpful, 'even though this right has not yet gained any appreciable traction in either international climate negotiations, mitigation policies or national adaptation plans'.[33] Also, the environmental provisions routinely contained in international water agreements are also relevant in addressing climate change impacts, particularly in the case of the ecosystems obligations of watercourse States,[34] which are increasingly associated with a requirement to maintain minimum environmental flows.[35] However, as with most of the key established substantive and procedural principles of international water law, '[t]his principle needs to be implemented through joint institutional mechanisms where riparian states discuss and exchange data and information on the changing conditions of a river under the pressure of climate change.'[36] Significantly, the general duty to cooperate lies at the heart of the framework provided by international water law,[37] and this provides the legal basis for the kind of intensive inter-State engagement which will be so essential in facilitating effective adaptation to climate change. Nevertheless, notwithstanding the considerable degree of flexibility permitted by the key principles of international water law, leading commentators tellingly caution that

> 'there is the risk that the relatively static nature of IWL arrangements and the absence of clear joint climate change adaptation strategies hamper effective actions by riparian states. Thus, apart from applying the existing principles of IWL, it is necessary to negotiate, implement or revise transboundary freshwater agreements taking into consideration the uncertain nature of the impacts of climate change and developing joint mechanisms to address the impact of climate change on water resources.'[38]

[23] See, for example, M. Tignino and T. Kebebew, 'International Water Law and Climate Change' in V. Casado Pérez and R. Larson (eds.), *A Research Agenda for Water Law* (Cheltenham: Edward Elgar, 2023) 157–184; M. Reese, 'Climate Change Adaptation in Water Management – Regulatory Challenges and Approaches' in E. Hollo (ed.), *Water Resource Management and the Law* (Cheltenham: Edward Elgar, 2017) 297–326, at 306.

[24] UN Watercourses Convention, Art. 6(1)(a).

[25] UN Watercourses Convention, Art. 6(1)(c).

[26] UN Watercourses Convention, Art. 6(1)(f).

[27] UN Watercourses Convention, Art. 5(1).

[28] See, for example, V.-M. Tzatzaki and A.D. Tarlock, 'International Water Law and Climate Disruption Adaptation' in A. Tanzi et al. (eds.), *supra*, n. 4, 379–393, at 384–387; M. Jafroudi, 'A Legal Obligation to Adapt Transboundary Water Agreements to Climate Change?', (2020) 22 *Water Policy* 717–732; R.M. Stephan, 'Climate Change Considerations under International Groundwater Law', (2017) 42 *Water International* 757–772, at 765.

[29] UN Watercourses Convention, Art. 7; UNECE Water Convention, Art. 2.

[30] See Tignino and Kebebew, *supra*, n. 23, who stress the risk of increased concentrations of pollutants during low-flow periods and contamination by storm-water overflows and flooding, and also provide, as an example of such a unilateral adaptation activity, the development of 'storage schemes for adaptation purposes in the agricultural sector'.

[31] See, in particular, Committee on Economic, Social and Cultural Rights (CESCR), General Comment No. 15: The right to water (arts. 11 and 12 of the International Covenant on Economic, Social and Cultural Rights), 20 January 2003, UN Doc. E/C.12/2002/11.

[32] UN Watercourses Convention, Art. 10(2).

[33] Tignino and Kebebew, *supra*, n. 23. See further, P. Szwedo, 'Climate Change and the Human Right to Water' (2021) 23(2–3) *International Community Law Review* 209–218; UN OHCHR, *Special thematic report on climate change and the human rights to water and sanitation* (28 January 2022), available at: https://www.ohchr.org/en/ documents/ thematic-reports/special-thematic-report-climate-change-and-human-rights-water

[34] UN Watercourses Convention, Art. 20; UNECE Water Convention, Art. 2(2).

[35] Permanent Court of Arbitration (PCA), *Indus Waters Kishenganga Arbitration (Pakistan v. India)*, Partial Award, 18 February 2013, at paras. 450–452 and 454, and Final Award, 20 December 2013. See S.C. McCaffrey, 'International Water Cooperation in the 21st Century: Recent Developments in the Law of International Watercourses' (2014) 23(1) *Review of European, Comparative and International Environmental Law* 4–14, at 5–9.

[36] Tignino and Kebebew, *supra*, n. 23.

[37] UN Watercourses Convention, Art. 8; UNECE Water Convention, Arts. 2(6) and 9.

[38] Tignino and Kebebew, *supra*, n. 23.

The Challenge of Adaptive Management

Having regard to the uncertain, yet potentially unprecedented, water-related threats presented by climate change, along with the continuing catastrophic decline of aquatic ecosystems and resulting loss of related ecosystem services,[39] it becomes ever more apparent that shared international water resources require the development and adoption of effective adaptive management strategies. Such strategies tend to focus on resilience, with a view to conserving continually evolving, complex and resilient ecosystems, and are generally characterised as 'iterative and flexible, responsive to the constantly changing conditions of both complex ecosystem processes and available scientific knowledge' in seeking to ensure the "resilience" of an ecosystem.[40] Adaptive management can address fundamental uncertainty regarding the functioning of complex dynamic socio-ecological systems by adopting a systemic approach for adapting and improving natural resources management by learning from previous policy and management interventions.[41] Clearly, ecological and hydrological uncertainty will be greatly exacerbated by the threat posed to freshwater ecosystems by climate variability, making the case for adaptive strategies ever stronger.[42] The legal basis for employing such strategies is quite straightforward, as they are understood to play a central role in effective application of a so-called "ecosystem approach".[43] The obligation to protect and maintain watercourse ecosystems is now firmly established as a central tenet of general international water law,[44] with the State parties to one global water-related convention exhorted to include 'the application of the ecosystems approach' as an aspect of the measures to be adopted in promoting sustainable water resources management.[45] Indeed, the requirement to employ an ecosystem approach may already enjoy autonomous legal authority, at least in the field of international watercourses law.[46] Further, adaptive management is linked to the precautionary principle, as both seek to accommodate scientific uncertainty[47] and the former can be regarded as a means of implementing the latter,[48] which enjoys extensive support as established customary international law.[49] In addition, one might regard consistent International Court of Justice (ICJ) endorsement of a requirement for "continuing" environmental assessment in disputes concerning transboundary watercourses as amounting to judicial recognition of the role of adaptive ecosystem-based management in certain situations of scientific uncertainty.[50]

The challenge that climate change presents for water resources management has long been understood,[51] as has that of introducing adaptive decision-making processes into water resources management frameworks,[52] and intergovernmental bodies have developed detailed practical guidance to assist international watercourse States in this

[39] See, for example, S. Brels, D. Coates and F. Loures, *Transboundary Water Resources Management: The Role of International Watercourse Agreements in Implementation of the CBD*, CBD Technical Series No. 40 (Secretariat of the Convention on Biological Diversity, Montreal, 2008), at 37–42.

[40] V. De Lucia, 'Competing Narratives and Complex Genealogies: The Ecosystem Approach in International Environmental Law' (2015) 27 *Journal of Environmental Law* 91–117, at 93. See further, A.D. Tarlock, 'The Nonequilibrium Paradigm in Ecology and the Partial Unravelling of Environmental Law' (1994) 3 *Loyola of Los Angeles Law Review* 1123.

[41] See Raitanen, *supra,* n. 22, at 93. See further, B.K. Williams, 'Adaptive Management of Natural Resources: Frameworks and Issues' (2011) 92:5 *Journal of Environmental Management* 1346–1353.

[42] See J. McDonald and M.C. Styles, 'Legal Strategies for Adaptive Management under Climate Change' (2014) 26(1) *Journal of Environmental Law* 25–53; J.B. Ruhl, 'Climate Change Adaptation and the Structural Transformation of Environmental Law' (2010) 40 *Environmental Law* 363–435.

[43] Convention on Biological Diversity (CBD) Decision V/6, 'Ecosystem Approach' (COP V, Nairobi, 22 June 2000), UN Doc. UNEP/CBD/COP/5/23, at 1.

[44] See further, O. McIntyre, 'The Emergence of an "Ecosystems Approach" to the Protection of International Watercourses under International Law' (2004) 13/1 *Review of European, Comparative and International Environmental Law* 1–14; O. McIntyre, 'The Protection of Freshwater Ecosystems Revisited: Towards a Common Understanding of the "Ecosystems Approach" to the Protection of Transboundary Water Resources under International Law' (2014) 23(1) *Review of European, Comparative and International Environmental Law* 88–95.

[45] UNECE Water Convention, Article 3(1)(i). General ecosystems obligations are also contained in the only other global water convention, namely the UN Watercourses Convention, Article 20.

[46] See A. Trouwborst, 'The Precautionary Principle and the Ecosystem Approach in International Law: Differences, Similarities and Linkages' (2009) 18 *Review of European, Comparative and International Environmental Law* 26–35, at 30.

[47] R.K. Craig, '"Stationarity is Dead" – Long Live Transformation: Five Principles for Climate Change Adaptation Law' (2010) 34(1) *Harvard Environmental Law Review* 9–73, at 46–48.

[48] Raitanen, *supra,* n. 22, at 97.

[49] See O. McIntyre and T. Mosedale, 'The Precautionary Principle as a Norm of Customary International Law' (1997) 9 *Journal of Environmental Law* 221–241.

[50] *Case Concerning the Gabčíkovo-Nagymaros Project (Hungary/Slovakia)*, Judgment, 25 September 1997, [1997] ICJ Reports 7, Separate Opinion of Judge Weeeramantry, at 108–110; *Request for an Examination of the Situation (New Zealand v. France)* Case, (1995) ICJ Reports, at 344; *Legality of the Use by a State of Nuclear Weapons in Armed Conflict*, (1996) ICJ Reports, at 140; *Case Concerning Pulp Mills on the River Uruguay*, ICJ (2010) ICJ Reports 14, para. 205.

[51] Intergovernmental Panel on Climate Change (IPCC), *Climate Change and Water* (IPCC Technical Paper VI, June 2008).

[52] *Ibid.,* at 136. As regards specific guidance on addressing water-related disasters, see United Nations, *Words into Action Guidelines: Implementation Guide for Addressing Water-Related Disasters and Transboundary Cooperation: Integrating Disaster Risk Management with Water Management and Climate Change Adaptation* (UN, New York and Geneva, 2018), UN Doc. ECE/MP.WAT/56, available at: https://unece.org/sites/default/files/2021-07/ECE_MP.WAT_56_E_web_FINAL.pdf

regard.[53] Most notably, the Task Force on Water and Climate, established under the auspices of the UNECE Water Convention, published seminal 2009 general guidance on water and climate adaptation[54] and then subsequently developed, in collaboration with the International Network of Basin Organisations (INBO), 2015 guidance specifically focused on adaptation in transboundary basins.[55] The UNECE/INBO guidance lists and, using case-studies, elaborates upon a total of 59 "lessons" to assist international watercourse States including, for example, on how to craft 'adaptive legal frameworks', how to 'implement existing transboundary agreements in a flexible way' and how to 'design new transboundary agreements to be flexible'.[56] This latter collaborative initiative has given rise to the Global Network of Basins Working on Climate Change, which facilitates the sharing of experience on an ongoing basis across a wide range of basins globally, including those located in the territory of non-parties to the UNECE Water Convention.[57] Nevertheless, it remains readily apparent that significantly enhanced institutional cooperation amongst watercourse States will be required in order to agree and implement the adaptation measures necessary to build resilience to the water-related impacts of climate change and resulting uncertainty in water availability and quality.[58]

However, incorporation of adaptive measures into traditional treaty frameworks is highly problematic due to the traditional prioritisation of stability of applicable legal rules, especially where they are intended to facilitate large-scale infrastructure investment in an international watercourse and/or to resolve inter-State water resource disputes. It is an established truism that legal frameworks governing transboundary water resources 'are not structured specifically to address the increased variability, uncertainty, and potentially irreversible changes posed by climate variability and change'.[59] This feature is aptly illustrated by the well-established procedural rules of international water law, especially those concerned with inter-State notification and continued engagement over "planned measures". More sophisticated legal arrangements are required, reflecting an adaptive approach which can accommodate uncertainty through flexible decision-making procedures which permit 'incremental and gradual changes that transition experimentally to new standards or arrangements, while monitoring, assessing and adjusting these changes and their effects'.[60] The established rules and principles of international water law are 'based on historic conditions and linear patterns of change', whereas '[t]he complex and uncertain dynamics of interconnected ecosystems and social systems … require that resource regulators and managers have a certain amount of discretion'.[61] It is clear, therefore, that robust and sophisticated joint institutional arrangements, enjoying broad mandates and adequate technical resources, are absolutely crucial to effective implementation of adaptive management.[62] River basin organisations (RBOs) and other cooperative institutional arrangements for transboundary water management rarely enjoy such freedom of action today,[63] but the importance of their being empowered to react flexibly and decisively to changing conditions will become ever more apparent as the effects of climate change increasingly impact shared water resources.[64] Such "common management" of shared international water resources, by means of appropriately

[53] See, for example, A. Rieu-Clarke, R. Moynihan and B.-O. Magsig, *Transboundary Water Governance and Climate Change Adaptation: International Law, Policy Guidelines and Best Practice Application* (UNESCO, Paris, 2015), available at: https://unesdoc.unesco.org/ark:/48223/pf0000235678

[54] UNECE, *Guidance on Water and Adaptation to Climate Change* (UNECE, Geneva, 2009), UN Doc. ECE/MP.WAT/30, available at: https://unece.org/DAM/env/water/publications/documents/Guidance_water_climate.pdf

[55] UNECE and INBO, *Water and Climate Change: Adaptation in Transboundary Basins: Lessons Learned and Good Practices* (UNECE, Geneva / INBO, Paris, 2015), UN Doc. ECE/MP.WAT/45, available at: https://unece.org/sites/default/files/2021-12/ece.mp_.wat_.45_eng.pdf

[56] *Ibid.,* at 22-25.

[57] Details of the Global Network's 7th Meeting, held in Geneva in May 2023, are available at: https://unece.org/environmental-policy/events/seventh-meeting-global-network-basins-working-climate-change-adaptation.pdf

[58] See, for example, C. Bruch and J. Troell, 'Legalizing Adaptation: Water Law in a Changing Climate', (2011) 36:7 *Water International* 828-845; Tignino and Kebebew, *supra*, n. 23.

[59] Bruch and Troell, *ibid*., at 830.

[60] Raitanen, *supra,* n. 22, at 96.

[61] *Ibid.*, at 95. Regarding transboundary water resources in particular, see further, S.C. McCaffrey, 'The Need for Flexibility in Freshwater Treaty Regimes' (2003) 27(2) *Natural Resources Forum* 156-162; G. Hearns and R.K. Paisley, 'Lawyers Write Treaties, Engineers Build Dykes, Gods of Weather Ignore Both: Making Transboundary Waters Agreements Relevant, Flexible, and Resilient in a Time of Global Climate Change' (2013) 6(2) *Golden Gate University Environmental Law Journal* 259-294.
M.E. Tekuya, 'Governing Shared Watercourses under Climatic Uncertainty: The Case of the Nile Basin' (2021) 51 *Environmental Law Reporter* 10590-10604.

[62] See M. Lim, 'Is Water Different from Biodiversity? Governance Criteria for the Effective Management of Transboundary Resources' (2014) 23(1) *Review of European, Comparative and International Environmental Law* 96-110; A.D. Tarlock, 'Four Challenges of International Water Law' (2010) 23(2) *Tulane Environmental Law Journal* 369-408, at 383-384; O. McIntyre, 'The Legal Role and Context of River Basin Organisations' in A. Kittikhoun and S. Schmeier (eds.), *Water Diplomacy and Conflict Management* (Routledge, 2021) 25-48.

[63] With very few exceptions, such institutions can only act on the basis of consensus among the participating riparian States. See further, S. Schmeier, *Governing International Watercourses: River Basin Organizations and the sustainable governance of internationally shared rivers and lakes* (London: Routledge, 2013), at 101.

[64] See S. Schulze and S. Schmeier, 'Governing Environmental Change in International River Basins: The Role of River Basin Organizations' (2012) 10(3) *International Journal of River Basin Management* 229-244.

empowered intergovernmental institutional arrangements, has long been associated with the persistent notion of a "community of interest" existing amongst the States sharing a particular international watercourse.[65]

Towards "Community" in International Water Law

The idea that States comprise, as the primary subjects of international law, an international "community" of interdependent actors has long been posited by scholars,[66] though the precise legal implications of the existence of such a community remain unclear.[67] At any rate, the specialist sub-field of international water law employs a particularly highly developed and pervasive notion of community interest amongst the riparian States in an international watercourse, giving rise to a general duty of institutionalised cooperation.[68] This has long been recognised in the deliberations of international courts and tribunals;[69] and is increasingly acknowledged explicitly in watercourse agreements,[70] largely due to the immediately apparent interdependence of neighbouring States sharing a river basin. One can increasingly discern 'manifestations of the culture of community and solidarity' in the cooperative practice of watercourse States working within the framework of a successful basin agreement, such as the joint development and operation of large-scale water infrastructure on the Senegal river by the Organisation pour la Mise en Valeur du Fleuve Sénégal (OMVS).[71] Though in the past one might reasonably 'doubt the possibility that the community of interest doctrine has entered the body of international customary law', the sheer range, intensity and near-universal acceptance of cooperative activity at the international level regarding sustainable water resources management, exemplified today by the adoption of SDG Indicator 6.5.2 on transboundary water cooperation, alongside the reporting process jointly coordinated by UNECE and UNESCO,[72] suggests that the situation has evolved significantly. Leading commentators have long regarded to the notable convergence in State practice globally around institutionalised transboundary water cooperation as demonstrating 'growing support for a community of interests approach to shared water resources management and development'.[73] Indeed, the same authors describe international water law's modern 'focus on building [institutional] legal regimes around the core substantive norms of equity and reasonableness' as 'hydrosolidarity in the making',[74] thereby highlighting the close interlinkage between the notion of solidarity and the community of interest approach, as both are based on interdependence and the need for collective action.[75]

Other developments within the practice of international water law suggest a growing sense of community in the relations amongst co-basin States. In particular, the emergence in human rights law, and its growing influence in international water law, the human rights to water paradigm,[76] as epitomised in the CESCR's 2002 General Comment No. 15[77] and captured by the globally agreed ambitions set out under Sustainable Development Goal Targets 6.1 and

[65] International courts have endorsed this idea for almost 100 years. See *Case Relating to the Territorial Jurisdiction of the International Commission for the River Oder,* PCIJ (1929) PCIJ Series A 23, para. 74; *Case Concerning the Gabčíkovo-Nagymaros Project,* ICJ (1997) ICJ Rep. 7, para 85; *Case Concerning Pulp Mills on the River Uruguay,* ICJ (2010) ICJ Rep. 14, para 281. For a comprehensive analysis of the community of interest concept and its legal implications, see J. Gjørtz Howden, *The Community of Interest Approach in International Water Law: A Legal Framework for the Common Management of International Watercourses*, (Leiden: Brill Nijhoff, 2020).

[66] See, for example, H. Lauterpacht, *The Function of Law in the International Community* (Oxford: Oxford University Press, 1933); H. Mosler, *The International Society as a Legal Community,* (Sijthoff and Noordhoff, Alphen aan den Rijn, 1980); G.M. Danilenko, *Law-making in the International Community* (Dordrecht: Martinus Nijhoff, 1993); G. Abi-Saab, 'Whither the International Community?' (1998) 9:(2) *European Journal of International Law* 248-265; B. Simma and A.L Paulus, 'The "International Community": Facing the Challenge of Globalization' (1998) 9(2) *European Journal of International Law* 266-277; B. Fassbender, 'The United Nations Charter as Constitution of the International Community', (1998) 36 *Colombia Journal of Transnational Law* 529-620; P.S. Rao, 'The concept of international community in international law: theory and reality' in I. Buffard et al. (eds.), *International Law between Universalism and Fragmentation: Festschrift in Honour of Gerhard Hafner* (Leiden: Brill Nijhoff, 2008) 85-106; D.C. Ellis, 'On the Possibility of "International Community"' (2009) 11(1) *International Studies Review* 1-26.

[67] See, for example, R. Wolfrum, 'Solidarity and Community Interests: Driving Forces for the Interpretation and Development of International Law' (2021) 416 *Recueil des cours* 9-479.

[68] See generally, J. Gjørtz Howden, *The Community of Interest Approach in International Water Law: A Legal Framework for the Common Management of International Watercourses* (Leiden: Brill Nijhoff, 2020).

[69] See *Case Relating to the Territorial Jurisdiction of the International Commission for the River Oder,* PCIJ (1929) PCIJ Series A 23, para. 74; *Case Concerning the Gabčíkovo-Nagymaros Project,* ICJ (1997) ICJ Rep. 7, para. 85; *Case Concerning Pulp Mills on the River Uruguay,* ICJ (2010) ICJ Rep. 14, para. 281.

[70] See, for example, Article 3(9) of the 2010 Agreement on the Nile River Basin Cooperative Framework; Preambular Para. 4 of the 1994 Agreement on the Establishment of a Permanent Okavango River Basin Water Commission (OKACOM Agreement).

[71] See Gjørtz Howden, *supra,* n. 68, at 33-34.

[72] *Supra,* n. 3.

[73] P. Wouters, S. Vinogradov and B.-O. Magsig, ''Water Security, Hydro-solidarity and International Law: A River Runs Through It' (2008) 19 *Yearbook of International Environmental Law* 97-134, at 130.

[74] *Ibid.*

[75] Wouters et al., *ibid*., at 127-128.

[76] See, for example, O. McIntyre, 'The Human Right(s) to Water and Sanitation and the Relentless Development of Standards' in S. Turner, D. Shelton, J. Razzaque, O. McIntyre and J.R. May (eds.), *Environmental Rights: The Development of Standards* (Cambridge: Cambridge University Press, 2019) 147-173.

[77] *Supra*, n. 31.

6.2,[78] provides a stark demonstration of common interests arising amongst international watercourse States. Leading international law scholars tend to regard recognition of human rights in a particular sector as an indication of the emergence of community interest in that area of activity.[79]

More generally, it is the total human dependence upon water that gives rise to legal recognition of a community of interest among the States sharing a transboundary watercourse, and which similarly necessitates the deeply distributive conception of the notion of equity that pervades every aspect of international water law.[80] This sense of community is further amplified by the fact that the circumstances pertaining in each international watercourse are quite unique, identifying transboundary water cooperation as an area of international legal activity particularly 'likely to be influenced by regional postures and implications'.[81] The highly particularised requirements of each international watercourse regime can only enhance recognition amongst States of their interdependence and of the imperative of meaningful inter-State cooperation concerning shared water resources. The challenge presented by climate change can only render the common interests of watercourse States ever more starkly apparent.

The Critical Role of Solidarity

The intensification of interaction amongst watercourse States regarding their common interests, which inevitably gives rise to an increasingly highly developed sense of community, implies a certain measure of solidarity amongst the members of that community.[82] Solidarity enjoys a degree of recognition in the practice of States and international institutions, both in specialist fields, such as international disaster law[83] or international climate law,[84] and in general international law,[85] prompting commentators to consider the existence and implications of a general "principle of solidarity" in international law.[86] However, several key features of international water law demonstrate how values characteristic of this principle permeate every aspect of practice in the field, including the dominance and pervasive influence of distributive equity, the central importance of inter-State communication and cooperation, and the increasingly urgent imperative of optimising the human benefits to be derived from an increasingly scarce resource, whilst ensuring protection of vital aquatic ecosystems.[87]

As a 'constitutive principle of social ties and equal rights',[88] solidarity is understood as a legal concept essential for any functioning community. It is closely associated with equality, fraternity, dignity, fundamental rights and individual and collective responsibility, all values which correspond with the ongoing shift away from the narrow and short-term self-interest traditionally pursued by sovereign actors.[89] Solidarity has principally been associated with progressive and cosmopolitan human rights values, such as social welfare entitlements and migrant rights, and can thus lend itself quite easily to issues of environmental protection and sustainable natural resources management, including at the inter-State level.[90] Solidarity therefore reflects the transboundary nature of many challenges in environmental and natural resources management and the reality of States' interdependence, thereby implying the need for meaningful inter-State cooperation which would operate to counter narrow and short-term self-interest.[91]

Solidarity has long been acknowledged, at least by scholars, as 'both a fundamental and a fundamentally sound principle of

[78] Respectively concerning universal and equitable access to adequate drinking water and sanitation. See further, O. McIntyre, 'SDG 6: Ensure Availability and Sustainable Management of Water and Sanitation for All' in I. Bantekas and F. Seatzu (eds.), *Commentary on the Sustainable Development Goals* (Oxford: Oxford University Press, 2023) 441-508; O. McIntyre, 'International Water Law and Sustainable Development Goal 6: Mutually Reinforcing Paradigms' in D. French and L.J. Kotze (eds.), *Sustainable Development Goals: Law, Theory and Implementation* (Cheltenham: Edward Elgar, 2018) 173-201.

[79] B. Simma, 'Human Rights Before the International Court of Justice: Community Interest Coming to Life?' in, Hestermeyer, et al., *supra,* n. 5, at 577-603.

[80] See further, O. McIntyre, 'Utilisation of Shared International Freshwater Resources – The Meaning and Role of Equity in International Water Law' 38(2) (2013) *Water International* 112-129.

[81] J. Crawford, *Chance, Order, Change: The Course of International Law* (Hague Academy of International Law General Course on Public International Law, 2014), at 328.

[82] See generally, S. Vilalpando, 'The Legal Dimension of the International Community: How Community Interests Are Protected in International Law' (2010) 21(2) *European Journal of International Law* 387-419, at 391, 392 and 396.

[83] International Law Commission, *Report of the International Law Commission on the Work of its Sixtieth Session* (2008), UN Doc A/63/10, Ch IX ('Protection of Persons in the Event of Disasters'), at paras. 241–250.

[84] See N. Schrijver, 'The Impact of Climate Change: Challenges for International Law' in U. Fastenrath et al. (eds.), *From Bilateralism to Community Interest: Essays in Honour of Judge Bruno Simma* (Oxford: Oxford University Press, 2011), at 1278-1297.

[85] See, for example, the contribution of Ivory Coast to the 1968 Vienna Conference, which refers to 'a new solidarity of nations, based on the interdependence of States, international co-operation, peaceful coexistence and assistance by the wealthier to the less-favoured nations.' See further, Vilalpando, supra, n. 82, at 403.

[86] Most notably, R.StJ. Macdonald, 'Solidarity in the Practice and Discourse of Public International Law' (1996) 8(2) *Pace International Law Review* 259-302; Wolfrum, *supra*, n. 67.

[87] See further, O. McIntyre, 'Embedding "Solidarity" in International Water Law: Framing "Equity" in Transboundary Water Governance' (2020) 51 *Netherlands Yearbook of International Law* 227-256.

[88] A. Russo, 'Law and solidarity nowadays in Europe' (2021) *Academia Letters* 2849, at 2, citing (and translating) S. Rodotà, *Solidarietà: un' utopia necessaria* (Editori Laterza, 2014), at 90.

[89] Friedmann, *supra*, n. 5.

[90] Russo, *supra,* n. 88, at 3, citing (and translating) Rodotà, at 113.

[91] Rodotà, *ibid.,* explains further that 'environmental protection sought without regard to the principle of solidarity would lack a foundation that could enable it to counter the force of national and economic interests and selfishness, which continually act as a brake on effective protection'.

international law' and as 'the basic condition for the existence of a community of states'.[92] Having regard to de Vattel's early characterisation of solidarity as a fundamental norm originating in natural law, and to its essential role in the functioning of international law and the maintenance of an international community of States, Macdonald suggests, in his seminal study of the origins and implications of the principle, that it comprises a peremptory *jus cogens* norm of international law, from which no derogation is permitted.[93] This might however, be an overstatement of the principle's formal status in law.[94] Other commentators suggest that solidarity may comprise, or may eventually evolve into, an obligation *erga omnes,* applying to relations amongst all States.[95] Another speculates that, in certain circumstances, solidarity may transform key rules of international law into generally applicable *erga omnes* obligations, as 'acknowledgement of common interests can promote solidarity, and solidarity is necessary for the protection of common interests'.[96] Gjørtz Howden suggests, in her comprehensive study of the legal nature and implications of the community of interest approach in international water law, that this is certainly the case with transboundary water resources, where solidarity is 'a central feature of *erga omnes* obligations in the sense that every [watercourse] State is considered to have a legal interest in their protection'.[97] Though solidarity benefits from few express endorsements in formal legal instruments,[98] the concept nevertheless penetrates the field of international environmental and natural resources law, including the specialist sub-field of international water law, by means of the central role ascribed to the overarching objective of sustainable development and the closely related concept of equity.[99]

One of the key dimensions of equity permeating the vision of sustainable development set out under the 1992 Rio Declaration is that of intra-generational equity, in the particular form of the principle of "common but differentiated responsibility" (CBDR) as between States bearing different degrees of responsibility for environmental degradation and possessing different national capacity to contribute to solutions.[100] Solidarity informs every aspect of such differentiation as ''[t]he measure of common responsibility in the CBDR principle is thus rooted in the principle of cooperation, which posits that states are obliged, *in the spirit of solidarity*, to cooperate in preventing transboundary pollution'.[101] The universally accepted CBDR principle, which lies at the very heart of international environmental and natural resources law, and most notably the global climate and biodiversity regimes, is intended to promote inclusive sustainable development by ensuring flexibility in international environmental and natural resources cooperation having regard to three key factors, *i.e.,* the extent of the needs, capability and responsibility of each State concerned.[102] Consistent with the central tenets of the concept of solidarity, a distributive conception of equity, such as that employed in international water law,[103] involves the distribution of benefits derived from scarce shared resources primarily on the basis of the essential needs and capacity of each party.[104] Thus the CBDR principle, and thereby the broader solidarity concept, is centrally relevant in international water law's response to the challenge of climate change.

The other equitable principle comprising a core element of the overarching objective of sustainable development, that of "inter-generational equity" which essentially requires the fair distribution as between present and future generations of the benefits to be derived from natural resources use, also implies a significant role for solidarity. Rio Principle 3 states that '[t]he right to development must be fulfilled so as to equitably meet developmental and environmental needs of

[92] See Macdonald, *supra,* n. 86, at 259, citing the seminal early work of the Swiss jurist Emmerich de Vattel: E. De Vattel, *Le Droit des Gens ou Principes de la Souveraineté* (1758, reprinted 1958), translated by J. Chitty (Sweet, Stevens & Maxwell, London, 1834), available at: <https://books.google.ie/books?id=pQFDAQAAMAAJ&pg=PR1&source=kp_read_button&redir_esc=y#v=onepage&q&f=false>. See further, Wolfrum, *supra,* n. 67; R. Wolfrum and C. Kojima (eds.) *Solidarity: A Structural Principle of International Law* (Springer, Heidelberg, 2010).

[93] Macdonald, *ibid.,* at 260-261 and 263.

[94] See further, McIntyre, supra, n. 87, at 241.

[95] See, for example, Wouters et all, supra, n. 73, at 132.

[96] Gjørtz Howden, *supra*, n. 68, at 61.

[97] *Ibid.*

[98] Though the idea of a 'community of interest' existing among States sharing and international watercourse does find expression in modern watercourse agreements. See, for example, Article 3(9) of the 2010 Agreement on the Nile River Basin Cooperative Framework (Nile CFA); Preambular Para. 4 of the 1994 Agreement on the Establishment of a Permanent Okavango River Basin Water Commission (OKACOM Agreement).

[99] See P. Wouters, 'The Relevance and Role of Water Law in the Sustainable Development of Freshwater: From "Hydrosovereignty" to "Hydrosolidarity"', (2000) 25:2 *Water International* 202-207.

[100] United Nations Conference on Environment and Development, Rio Declaration on Environment and Development, UN Doc. A/CONF.151/26 (3-14 June 1992), Principle 7. See also, Principles 3, 4, 5 and 6 regarding the right to development, poverty alleviation, *etc*.

[101] L. Rajamani, *Differential Treatment in International Environmental Law* (Oxford: Oxford University Press, 2006), at 134.

[102] See C.D. Stone, 'Common but Differentiated Responsibilities in International Law' (2004) 98(2) *American Journal of International Law* 276-301; E. Brown Weiss, 'Environmental Equity: The Imperative for the Twenty-first Century' in W. Lang (ed.), *Sustainable Development and International Law* (Dordrecht: Martinus Nijhoff, 1995) 17-27; Rajamani, *ibid*.

[103] See, for example, McIntyre, *supra,* n. 8; O. McIntyre, 'The Principle of Equitable and Reasonable Utilisation' in A. Tanzi, O. McIntyre, A. Kolliopoulos, A. Rieu-Clarke and R. Kinna (eds.), *The UNECE Convention on the Protection and Use of Transboundary Watercourses and Lakes: Its Contribution to International Water Cooperation*, (Leiden: Brill Nijhoff, 2015) 146-159, at 148-154.

[104] B. Saul, *Climate Change, Resource Scarcity and Distributive Justice in International Law* (Sydney Law School, Legal Studies Research paper No. 09/101, 2009), at 18.

present and future generations',[105] and is generally understood to mean that 'each generation has an obligation to pass on the natural and cultural resources of the planet in no worse condition than received and to provide reasonable access to the legacy to the present generation'.[106] This implies the existence of an inter-generational community and the relevance of solidarity between present and future generations in ensuring equitable balancing of the interests of each. The principle has received consistent support in declarative instruments since Stockholm,[107] as well as more imperative expression in the preambular and textual provisions of a wide range of environmental and natural resources conventions, including some concerned with shared international water resources.[108] It finds particularly cogent expression in the 1992 UNECE Water Convention[109] and, though its precise normative status and binding force remains somewhat unclear,[110] the Brundtland Commission's Expert Group on Environmental Law could conclude in 1987 that 'to the extent that this basic obligation concerns international or transboundary natural resources or environmental interferences, it already may in many respects be deemed to find substantial support in existing general international law'.[111] Once again, this equitable principle, informed by the solidarity values underlying a sense of community, has a critically important role to play in addressing the water-related challenges of climate change.

Commentators increasingly recognise that key axiological elements of solidarity are intrinsic to effective transboundary water cooperation and are thus woven throughout the very fabric of the established rules and principles of international water law.[112] This reflects international water law's instinctive pursuit of the increasingly urgent imperative of cooperative management of shared international freshwater resources with a view to optimising the welfare benefits derived from an increasingly scarce and environmentally vulnerable resource, thereby requiring (or at least encouraging) co-basin States to engage in intensive cooperative efforts, usually by means of permanent institutional mechanisms, involving difficult compromise on the part of all States.[113] In this way the principle of solidarity can operate as a counterweight to the contested absolutist conceptions of territorial sovereignty or integrity, upon which the interests of co-basin States recognised under international water law had traditionally been asserted and contested. Throughout the historical development of international water law, such sovereignty-based assertions of States' respective rights and interests have operated to retard meaningful inter-State water cooperation by failing effectively to address tensions arising between upstream and downstream watercourse States and between more and less economically, socially or technologically developed watercourse States.[114] The adoption of such positions has largely encouraged States in contrasting geographical, hydrological or socio-economic circumstances to assert their narrow and short-term self-interest, rather than seeking mutually beneficial optimal outcomes.

Guided by the overarching concept of sustainable development, modern practice in relation to transboundary water resources is more likely to stress the interdependence of the community of co-basin States and the need for compromise in order to optimise human livelihood interests and effective ecological protection. Such aims require robust institutions to facilitate effective exchange of information and broad stakeholder participation with a view to identifying common goals and making difficult compromises socially acceptable.[115] In recent decades, the practice of international water cooperation has generally been characterised by the development of basin-level agreements and of supplemental guidelines and procedures for cooperative engagement under the auspices of institutional arrangements established thereunder.[116] By means of such cooperative institutional machinery, which is specifically designed to assist in finding compromise by making use of extensive cross-sectoral information and broad stakeholder participation, solidarity can operate to restrain unilateral action and to promote inter-State compromise based on

[105] United Nations Conference on Environment and Development, Rio Declaration on Environment and Development, UN Doc. A/CONF.151/26 (3-14 June 1992), Principle 3.

[106] E. Brown Weiss, *In Fairness to Future Generations: International Law, Common Patrimony and Intergenerational Equity* (Tokyo: UNU Press, 1989), at 37-38.

[107] Stockholm Declaration, Principle 2, *Report of the United Nations Conference on the Human Environment* (Stockholm 5-16 June 1972), part I, chapter I, reprinted in (1972) 11 ILM 1416.

[108] For a comprehensive list, see O. McIntyre, '*Environmental Protection of International Watercourses under International Law* (Ashgate, Farnham, 2007), at 254-255.

[109] UNECE Water Convention, 1992; Article 5(c) provides that 'Water resources shall be managed so that the needs of the present generation are met without compromising the ability of future generations to meet their own needs.'

[110] Brown Weiss, *supra,* n. 106, at 30 and 47; C. Redgwell, *Intergenerational Trusts and Environmental Protection* (Manchester: University of Manchester Press, 1999), at 126-127.

[111] Experts Group on Environmental Law of the World Commission on Environment and Development, *Environmental Protection and Sustainable Development: Legal Principles and Recommendations* (1987), reprinted in R.D. Munro and J. Lammers (eds.), *Environmental Protection and Sustainable Development: Legal Principles and Recommendations Adopted by the Experts Group on Environmental Law of the World Commission on Environment and Development* (London: Graham & Trotman, 1987), at 44-45.

[112] See for example, Wouters et al*., supra,* n. 73 ; McIntyre, *supra,* n. 87; P. Stejskal, 'The Principal of Solidarity in the Law of Transboundary Groundwater' in E. Kassoti and N. Idriz (eds.), *The Principle of Solidarity: International and EU Law Perspectives* (Asser Press / Springer, 2023) 55-74.

[113] McIntyre, *ibid.,* at 228.

[114] *Ibid.*, at 233.

[115] Gjørtz Howden, *supra,* n. 68, at 58-59.

[116] On the proliferation of such institutional arrangements, see S. Schmeier, *Governing International Watercourses: River Basin Organizations and the sustainable governance of internationally shared rivers and lakes* (London: Routledge, 2013); I. Dombrowsky, *Conflict, Cooperation and Institutions in International Water Management: An Economic Analysis* (Cheltenham: Edward Elgar, 2007); O. McIntyre, 'The Legal Role and Context of River Basin Organisations' in A. Kittikhoun and S. Schmeier (eds), *Water Diplomacy and Conflict Management* (London: Routledge, 2021) 25-48.

sophisticated benefit-sharing arrangements which respect the hydro-climatic and socio-ecological limits of a shared basin.[117] Thus, the utility of the concept of solidarity is clear, as a broad value-framework and pervasive organising principle to inform and guide inter-State cooperation for the purposes of climate adaptation in shared international watercourses.

Conclusion

Whereas sociological thinkers 'conceived of solidarity as the social glue that stimulates individuals to share with, and collaborate in, a larger collective',[118] it has clear relevance and utility in the modern practice of international water law as 'an understanding among formal equals that they will refrain from actions that would significantly interfere with the realisation and maintenance of common goals or interests'.[119] In this context, solidarity can be understood as a principle of modern international law, which is 'beginning to inform the entire system … similar to the concept of equity …'.[120] As a principle founded upon recognition of the formal equality and essential interdependence of the community of States, and the need for meaningful cooperation amongst States in order to maximise welfare, the solidarity has clear relevance for the progressive elaboration and practice of international water law in order respond to climate variability, where a commitment to solidarity can act as a counterweight to short-term and narrowly self-interested conceptions of the rights of States flowing from territorial sovereignty.[121]

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[117] See further, B.O. Magsig, *International Water Law and the Quest for Common Security* (London: Routledge, 2015), at 69; McIntyre, *supra,* n. 87, at 229.

[118] M. Loopmans and J. Hoogesteger, 'Hydrosolidarity: A Socio-Political Reading of a Moral Concept' (2004) 17(3) *Water Alternatives* 688-711, summarising, at 690, the work of Comte, Durkheim and Tönnies in theorising solidarity.

[119] P. Cullet, *Differential Treatment in International Environmental Law* (Aldershot: Ashgate, 2003), at 18.

[120] Macdonald, *supra*, n. 86, at 262.

[121] McIntyre, *supra*, n. 87, at 233.