Hydrosolidarity and International Water Governance

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Abstract
In the first decade of the 21st century, ‘hydrosolidarity,’ the notion that water management should include considerations of ethics and equity, has influenced international approaches to conducting environmental research and formulating water policy. Since its inception in the 1990s, the term appears frequently across a spectrum of water-related research. It has accordingly permeated discourses and publications on water management. Such rapid proliferation of the concept has helped usher in a wave of transition from conflict management to cooperative efforts between upstream and downstream basin users, as well as a complex paradigm that links both human and environmental welfare. In this paper, we trace the intellectual origins and changing conceptions of hydrosolidarity. We outline some of its applications as well as various reactions to the concept. We close by discussing how the concept can help frame negotiations between riparian states and influence treaty-making and institution-building in river basin settings.

Keywords
hydrosolidarity, international conflict, cooperation, transboundary, water management, water governance, stakeholder participation

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Introduction

In the past two decades, there has been increased attention to governance and sustainable management of water resources by policymakers, managers, academics, international institutions, and non-governmental organizations (NGO), among others (Hattingh 2007). Today’s water governance has been characterized as a “bottom-up process of norm diffusion and normative convergence over time across separate regimes at the basin level” (Conca 2005: 95). Governance, according to this view, is diffuse and decentralized. There exists no global rivers regime, nor is there a movement toward one (Falkenmark 1990; Conca et al. 2006). Rather, there are a myriad of ‘global water initiatives’ including mega-conferences on water, new organizations, and awareness-raising campaigns, which have arisen since the early-1990s (Varady et al. 2008). Some have referred to the absence of appropriate governance mechanisms, such as the lack of broad stakeholder participation and applicable international law on transboundary aquifers, as ‘hydroschizophrenia’ (Llamas and Martinez-Santos 2005; Jarvis et al. 2005). Insofar as it is generally accepted that the world is experiencing a water crisis, many of the leading voices in the global development community believe that this is more a crisis of governance than of actual physical resources (Global Water Partnership 2000). We agree that better governance of water resources will help confront the perceived crisis (UNESCO 2005). Accordingly we ask, how can the concept of ‘hydrosolidarity,’ as defined over the past decade, contribute to resolving these global problems, particularly management of transboundary waters?

What is “Hydrosolidarity”?

In its broadest sense, hydrosolidarity originated as a deliberate attempt to inject mutual understanding, common good, and ethics in relation to shared waters. It arose, perhaps unconsciously, as a rejection of and counteraction to the implicit and self-centered notion of ‘hydroegoism,’ the view that satisfying geopolitical self-interests (national, regional, sectoral, political, or other) should be the chief principle guiding water management in general and allocation in particular. Of course, the roots and principles of hydrosolidarity date back to the focus of the 1970s on holistic, equitable, appropriate-technology, small-is-beautiful (Schumacher 1999; orig. 1973), and socially responsible views of development and resource management.

To adapt such thinking to the increasingly important question of water, noted Swedish hydrologist Malin Falkenmark, an early proponent of integrated water

1) Hydroegoism is a term believed to have been first used during the 1998 Stockholm International Water Institute Young Water Professionals Report to describe self interests by stakeholders in the water sector. More specifically, hydroegoism refers to the control of water based on power, river-basin position (upstream vs. downstream), and potential to exploit water (Zeitoun 2005).
resources management, devised a new conceptual framework. Hydrosolidarity added social justice and human rights to the already long list of technical variables that influence the provision and management of water. Falkenmark initially presented her ideas on this subject in 1996 at the World Conservation Congress. After further reflection and refinement, she first used the term publicly in her Volvo Prize Lecture in Brussels, Belgium, in 1998. In her published article of the lecture, Falkenmark described the process of escaping what she termed ‘water blindness’ by addressing the need for ‘water solidarity’ (Falkenmark 1998: 356). This approach, she argued should be paired with the concepts ‘green water,’ or solid water originating from rainfall (Hoff 2007), and ‘virtual water.’ Virtual water, or water involved in the production of food, is transferred from one region that is better endowed in terms of water needed for food production to a water-deficient region with large food needs (Falkenmark 2002). This concept of virtual water is especially significant for equity in water-short areas because it seeks to trace hidden or unintended movement of water.

The concept of water solidarity would then, according to Falkenmark, open the eyes of the water world to forms of management that would mandate three key components, namely that: (1) human water obligations deserve the same respect as other human rights to safe household water; (2) recognition of “upstream/downstream issues related to sharing water” must take precedence; and (3) the significance of support from ethical, religious, and philosophical circles as a means of incorporating water ethics (Falkenmark 1998).

‘Water solidarity,’ as originally conceived by Falkenmark in her 1998 lecture, subsequently underwent a metamorphosis as scholars and practitioners adopted and tweaked the concept, molding it into what became known as ‘hydrosolidarity.’ According to Victor Duchovny, Falkenmark’s hydrosolidarity has come to entail five key conditions: (1) motivating stakeholders and decision-makers to use broad information, (2) designing organizational structures for finding compromise solutions, (3) making public participation socially acceptable, (4) addressing social implications of resource use, and (5) redressing the use of resources that damages the interest of other uses (Duchovny 2002: 121). He advocates including four additional conditions, including state governance on the principle of national hydrosolidarity, public involvement in the promotion of moral awareness, creation of a regulating system of laws and provisions, and forecasting

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2) Falkenmark was awarded the 2005 Rachel Carson Prize, the 1998 Volvo Environmental Prize, and other awards recognizing her innovative approaches to the sustainable use of water resources.

3) Several years later Falkenmark would further elaborate on ‘water blindness’. She writes: “[w]ater tends in the general debate to be thought of with a strong technical bias. Thus the debate continues to be hampered by a sort of water blindness favoring a basically technical conceptualization of water. In line with such a view, water resources management is taken as various ways of controlling and governing direct water use and related waste flows, not as managing water’s various functions in the landscape.” (Falkenmark 2003b: 2037).
(Duchovny 2002: 121). These conditions can apply directly to negotiations involving shared river basins and the management of such basins.

Ultimately, Falkenmark maintains that it is critical to institutionalize interdependencies in river basins in order to foster hydrosolidarity (Falkenmark and Lundqvist 1999; Falkenmark and Folke 2002). She writes: “The basis should be general solidarity with focus on beneficial sharing of the joint water resource – that is, the rainfall caught within the water divide. Solidarity means the willingness to restrain one’s freedom. Adaptation to the hydroclimatic constraints of a catchment will demand that all the interested parties are prepared to compromise. Principles and rules for sharing will have to be found for the unavoidable compromises between incompatible water interests in a certain catchment” (Falkenmark and Rockström 2004: 214). Hydrosolidarity can be applied to many different scales, including the global and regional level, the national scale, and the catchment and cross-national scale (SIWI Waterfront 2002: 18).

The Influence and Use of Hydrosolidarity

In the first decade of the 21st century, the notion of hydrosolidarity has palpably influenced international approaches to conducting environmental research and formulating water policy. Since its inception, the term has appeared frequently in nearly every genre of water-related research and has accordingly permeated discourses and publications on water management. The concept of hydrosolidarity has served as a kind of centerpiece for several World Water Forums (WWF), including the most recent forums in 2003 and 2006. The 2006 World Water Forum in Mexico included an agenda for risk-reduction policies, strategies for alleviating social conflicts and armed threats, and ways to adapt to climate change and variability. Perhaps most significantly, the 2006 forum called for “the establishment of a local water culture and hydrosolidarity” (World Water Forum 2006). A WWF document asserts: “Developing and respecting water ethics becomes a key element of successful implementation of integrated and sustainable water resources management. Diversities of ethical values that take different forms in different cultural groups need to be respected” (World Water Forum Thematic Area 5 2006).

The term hydrosolidarity has been used in watershed management and transboundary water conflict publications to describe the interests and needs of upper and lower river basin stakeholders (Castelain 2002), in strategic plans for fisheries and hatcheries (International Water Association 2003), in aquaculture, dam building and hydropower (Ndung’u 2003), as best management practices recommended for catchment areas (Falkenmark et al. 2004), and even in urban planning meetings (USGS New Jersey 2005) and graduate thesis documents (Davidsen 2006). In addition, many international and regional organizations have adopted it for use in their workshops and conferences, including the United Nations Edu-
Reactions to Hydrosolidarity

Despite enthusiasm surrounding the concept, there remain concerns with the applicability of hydrosolidarity. Effective use of the framework requires realistic benchmarks for achieving and maintaining hydrosolidarity; few if any such metrics have been developed. Some observers and potential users have argued that hydrosolidarity needs definite boundaries and guidelines, including techniques to measure the impact of applying the hydrosolidarity paradigm at the global, regional, constitutional, national, and catchment levels. One critic is skeptical that the obstacles to hydrosolidarity can be overcome in a globalizing world, increasingly dominated by the corporate and social behavior of the World Bank and its partners and institutions (Afunaduula 2006).

In addition, policy and economic scholars have suggested that while striving towards hydrosolidarity may be beneficial, the approach still requires fundamental water laws to be successfully funded, implemented, maintained, and monitored (Wouters 1999; Piagram 2001; Jagerskog 2002). A lack of incentives has also been cited as a barrier to hydrosolidarity as upstream users are not likely to give up their interests for the benefit of downstream users without compensation. Appropriate incentives may include reduced taxes or other benefits such as financing of investments or provision of non-related goods and services (Bayarsaihan and McKinney 2002). The actions surrounding hydrosolidarity may be considered a “natural mass expression of charity” that is unlikely to occur if they are not encouraged by palpable financial measures such as tax reductions or other rewards, particularly in developing countries (Castelain 2002).

Finally, others have argued that hydrosolidarity is in practice difficult to achieve. Llamas and Pérez-Picazo (2001) maintain that a lack of knowledge, arrogance, vested interests, neglect, institutional inertia, and corruption are just some of the obstacles to hydrosolidarity. Llamas, a professor of Hydrology, and Pérez-Picazo, an economist, also wonder whether “the notable and beautiful concept of hydrosolidarity might be used for corruption and serve as [an] unethical way for lobbies to withdraw public money,” citing the Segura Catchments under the 2001 National Water Plan in Spain as an example of such abuse (Llamas and Pérez-Picazo 2001: 93).

Despite such concerns, hydrosolidarity contributes to the management and negotiations around transboundary waters through its emphasis on dialogue and ethics. In addition, hydrosolidarity can support some technical or functional
directives related to transboundary water governance. We discuss these contributions next.

The Value of Hydrosolidarity as a Broad Framework

Hydrosolidarity, which was meant to broaden perspectives, is a paradigm that can help shape how we negotiate and manage shared waters. Specifically, it promotes a broad framework of conflict resolution and emphasizes an ethical and equitable dimension to negotiations of shared waters. Considerable research warns of the potential conflict between upstream and downstream states over shared water resources. Gleditsch et al. (2006) find that upstream-downstream situations in river basins can induce conflicts related to resource scarcity. Homer-Dixon (1999) argues that conflict or war is most likely when a downstream state is highly dependent on the shared water for its national well-being and the upstream country threatens to substantially restrict the river’s flow. Others have argued that the upstream-downstream relationship can impede treaty formation (Song and Whittington 2004). Indeed, for some time, scholars have cited the upstream-downstream issue as arguably the most intractable problem along transboundary rivers (Le Marquand 1977).

Hydrosolidarity has the potential to ameliorate the upstream-downstream divide through its emphasis on dialogue. While negotiations around shared waters have historically focused on the technical and political issues of water distribution, hydrosolidarity can help reframe negotiations by promoting resolution of conflict with a climate of dialogue. The United Nations Educational and Scientific and Cultural Organization (UNESCO) seeks to encourage dialogue between peoples from diverse countries through instructional programs that allow participants to “learn how to develop genuine solidarity for the sharing of water resources through mutual understanding and support” (UNESCO 2005).

In addition to its emphasis on conflict resolution, hydrosolidarity advances an ethical and equitable dimension to negotiations of shared waters. According to Falkenmark, the social perspective of hydrosolidarity “involves the need to meet fundamental human needs in terms of safe household water, water-dependent food production, and – in view of present technique deficiencies – water-polluting income generation activities” (Falkenmark 2003a: 35). Similar attention to ethical concerns in recent years is contained in the Millennium Goals of 2000. Goal 7 of this suite of objectives aims to ensure environmental sustainability, including sustainable access to safe drinking water and basic sanitation (Heeb et al. 2006). For Falkenmark, attention to ethics can help us overcome many institutional, technical, and scientific weaknesses that characterize how we manage ecosystems, including our flawed organization of science and fragmentation of government systems (Falkenmark and Folke 2002). The ‘new ethics’ espoused by hydrosoli-
darity, according to Falkenmark, “have to incorporate principles that, on a catchment basis, allow for proper attention to the hungry and poor, upstream and downstream, to descendants, and to sites and habitats that need to be protected” (Falkenmark and Folke 2002: 1).

Outlining a Functional Value of Hydrosolidarity

Beyond the use of hydrosolidarity as a broad paradigm that can help shape negotiations and management of shared waters, hydrosolidarity can be employed to support four salient features of transboundary water governance at the cross-national scale: (1) creation of a cooperative institutional structure; (2) promotion of stakeholder participation; (3) development of shared knowledge; and (4) enhanced integration and linkages.

Creation of a Cooperative Institutional Structure

Hydrosolidarity can help influence the development of institutional structures that support cooperation around shared waters. This may include the development of national plans, donor coordinating committees, river parliaments, strategic action plans, and river basin organizations. South African water-governance scholar Anthony Turton sees shared water-management regimes as a “durable manifestation of hydrosolidarity” and a necessary step to help ‘desecuritize’ the water discourse (Turton 2001: 4).

According to Ken Conca et al. (2006), there is a noticeable convergence of thinking on joint management and the protection of transboundary rivers. Increasingly, donor organizations are emphasizing new governance mechanisms, as evidenced by the Global Environment Facility’s (GEF) regional waters program, which seeks to improve cooperation around shared waters through the creation of regional basin institutions (GEF 2008; Gerlak 2004a; Uitto and Duda 2002). Durth (1996) points to the degree of institutionalism as an important catalyst for promoting cooperation and governing river basins. According to a UNEP report, “The historical record indicates an increased likelihood of conflict in basins lacking institutions that can accommodate changing political, hydrologic, or other basin conditions” (UNEP 2002: 4). Cooperation over water resources is also thought to produce ecological benefits to the river system (Sadoff and Grey 2002).

Green Cross International, an NGO founded by Mikhail Gorbachev whose mission is to “help ensure a just, sustainable and secure future for all,” recommends the creation of river basin authorities to help coordinate basin interests and reduce conflict in river basins (Green Cross International 2000). Some argue that river basin commissions or authorities need to be linked to national level authorities to ensure continued support within riparian country bureaucracies.
(Marty 2001). Others caution that states should not need to be limited by the basin level but rather they can more openly negotiate less rigid institutional scales that promote cooperation (Fischhendler and Feitelson 2003: 559). Based on UNESCO’s experience promoting cooperation around shared waters, that organization has found that: “Once international institutions are in place, they are tremendously resilient over time, even between otherwise hostile riparian nations, and even when conflict is waged over other issues” (UNESCO 2003: 318).

River basin cooperation in Europe is put forth as a model for cooperation around transboundary waters. Cooperative institutional arrangements along the Danube and Rhine Rivers in Europe, dating back to the early 1900s, provide evocative examples of the power of cooperation over common pool resources like transboundary rivers (Duda and LaRoche 1997; UNEP 2002: 12; Gerlak 2004b; Bernauer 1995; Verweij 2000). But regional cooperative institutional arrangements are also on the rise in Africa, perhaps as a result of increased donor emphasis there on regional cooperative arrangements (Lautze and Giordano 2007). Given that transboundary river basins are the norm rather than the exception (Varady and Morehouse 2003), recent research on institutions in such watersheds has found in some a large number of cooperative institutional arrangements. In all, 180 cooperative institutional arrangements were found across 124 international river basins, with varying degrees of the depth of cooperation; approximately 40 percent of all transboundary rivers in all regions of the world are managed through cooperative institutional arrangements of some form (Gerlak 2007).

Promotion of Stakeholder Participation

Falkenmark (2003b: 36) maintains that long-term resilience of the overall water system has to be secured for the benefit of coming generations and suggests that securing societal acceptance of necessary tradeoffs through stakeholder participation in planning and decision making is essential. The importance of stakeholder participation is similarly echoed in a variety of sectors. Fisheries for example must be managed within the framework of river basins and based on the concept of hydrosolidarity between all stakeholders, including respect for downstream interests. Jonch-Clausen et al. (2005: 155) assert “the value and the potential of local fisheries are often underestimated. Their true value must be evaluated and information spread to managers and decision makers. Both capture fisheries and aquaculture must respect local interests and facilitate local stakeholder participation.” Without stakeholder participation the “initiative to create and apply sustainable development indicators would also be ineffective and short-lived” (Annaev 2002: 166).

Public participation is also an important component of hydrosolidarity. It can help eliminate or minimize both corruption and infringement on rights (World
Water Forum Asia-Pacific Regional Document 2006). Professional and administrative control or hydroegoism exists when there is a lack of public participation (Global Water Partnership 2005). The 4th World Water Forum in 2006 echoed calls for citizens to more ethically interact with water, particularly in times of crises. This agenda also included a thematic baseline which incorporated the concept of integrated water resources management and which now considers the river basin as the fundamental planning unit (for non-urban water issues) “that seeks higher ethical involvement of citizens in their interaction with water, particularly during crisis” (World Water Forum Section 5 2006).

In order to overcome hydroegoism all sectors must be represented, including hydropower, irrigation, water supply, and recreation, in order to develop mutually acceptable rules and water management. Within the European Union, the hydrosolidarity concept “provides commonly accepted thinking in relation to basic needs of different stakeholders within a basin,” (IUGG 2003) thereby promoting stakeholder consultation and broad involvement of water users (Salomons 2004). India’s river parliaments, where upstream-downstream civil society institutions coordinate to bring together diverse users, are a good model for this (Agarwal 1999). Ultimately, however, states will need to adopt relevant laws and regulations and then implement and monitor them (Dukhovny and Sokolov 2005; Wouters 2001).

Development of Shared Knowledge

Data exchange provides a communication channel for countries that share water resources (Chenoweth et al. 2001). Integrating information sharing into decision-making processes is seen as essential to transboundary water management today (Grossman 2006: 179). The UN Convention (1997), Article 9 highlights the need for regular exchange of data. The ability of states to generate scientifically-sound basin-level data lies at the heart of hydrosolidarity (Turton 2001: 6).

There are several powerful arguments for improved information sharing regarding transboundary waters. First, discussions of science can promote trust between states and stakeholders (Miles et al. 2002; Uitto and Duda 2002). Second, reliable scientific knowledge about negative transboundary consequences of a problem is essential for creating international policy agreements to address the problem (Dimitrov 2006: 18; Varady and Morehouse 2003). States are better able to solve their problems if they have common understandings of them (LeMarquand 1977). Third, the joint investigation into scientific aspects of a problem and possible solutions is a way to mitigate fairness concerns (Marty 2001; Wolf 1997). Finally, data itself can be used as a form of negotiating capital, and data-sharing can lead to breakthroughs in negotiations that may spur further progress (Lautze and Gior- dano 2007). Conversely, the alternative – asymmetry in information – is thought to hinder cooperation and lead to sub-optimal outcomes, because the less informed
party tends to expect the worst scenario (Akerlof and Maun 1970; van der Zaag 2007; Elhance 2000).

Research on the role of information sharing in Africa found that formal information-sharing agreements were preceded by projects designed to improve the information basis (Grossmann 2006: 219). They found that river basin organizations play a variety of roles with regard to information gathering and sharing and that multiple instruments were employed along transboundary rivers and lakes in Africa to generate and share information. These include joint basin studies, hydrological measuring networks, hydrological databases, water-management models, and documentation centers. In his study of South African nations, Turton (2001: 5) found that the existence of durable regimes has a direct correlation with the ability of states to generate legitimate basin-level data. Other cases suggest that riparian states may spend years simply sharing information in advance of founding an effective, legally instituted international or regional body. This was the case of the Commission for the Protection of the Rhine (ICPR) from 1950–1963 (Myint 2007).

Enhanced Integration and Linkages

In the water resources arena, integrated water resources management (IWRM) has emerged as a guiding principle. Introduced in 1992 at the UN Conference on Environment and Development, it is a comprehensive approach for achieving sustainable freshwater resource use in catchments that can be traced back to the 1977 UN Conference on Water (Bonell 2004). As a response to more traditional approaches that rely on narrow engineering and sectoral water concerns, IWRM emphasizes the integration of different sectors, including industry, agriculture, energy, transport, and environmental protection while advocating management within the hydrological confines of the river basin. It calls for more integrated approaches, including management of water quality and quantity, surface and groundwater, water and land resources – and upstream and downstream uses (Dombrowsky 2007: 8). The Global Water Partnership, a global water initiative based in Sweden, has helped to operationalize IWRM with their “IWRM Toolkit,” a repository of actual experiences (Bonell 2004: 284).

Hydrosolidarity can further the goals of IWRM. It can do so by promoting hydrological boundaries rather than administrative or territorial interests (Dukhovny and Sokolov 2005). At its core, hydrosolidarity adopts a river-basin perspective and an integrated approach to managing the basin. This reframes the spatial focus away from the artificial state or political border to the physical, hydrologic reality. For Falkenmark (2001), hydrosolidarity can build linkages across concerns over food security, water security, and environmental security.

Additionally, the GEF sees hydrosolidarity as helping to advance linkages among freshwater, oceans, and coasts (GEF 2006). For the GEF, linked manage-
ment can better ensure that upstream activities are “planned and implemented with full knowledge of the potential impacts on the ecosystems and economic activities and livelihoods of the ecosystems and the water cycle, and to promote the sustainable development of both the higher and lower watershed areas” (GEF et al. 2006: 6). The Organization of American States (OAS) sees hydrosolidarity as supporting the development of national water plans within countries that are based on the wider basin. According to OAS, these water plans can help better conceptualize shared problems and foster notions of hydrosolidarity as a political concept and basis for multi-jurisdictional cooperation (OAS 2006). Within the United Nations system, UNEP acknowledges that hydrosolidarity can help cast the management of fisheries in the framework of river basins and with a better recognition of downstream interests (UNEP 2005). An experiment with IWRM in the Upper Tiete Basin in the metropolitan region of São Paulo, Brazil demonstrates that public participation combined with modern decision support systems technology can ameliorate urban water conflict on the watershed scale (Braga 1999).

Applying Hydrosolidarity Principles to River Basins

Many efforts are underway to apply concepts of hydrosolidarity, including several of the features of transboundary water governance, to specific river basins and watersheds. The concept has been applied piecemeal to explain current activities in certain basins, but also to advocate for new practices. We find evidence – mostly implicit, though sometimes explicit – of the application of hydrosolidarity in most regions of the world. To illustrate this development, we briefly note a few select examples of where and how we see hydrosolidarity being applied to river basin governance. These have been chosen because to varying degrees they provide real-world examples of how elements of the concept of hydrosolidarity have either found their way into actual management paradigms or they outline governance. We discuss the basins in descending order of their incorporation of those elements.

Australia’s Murray-Darling River basin, which is commonly cited as a paragon of good water management in a water-scarce region, has adopted aspects of hydrosolidarity to help coordinate the development and management of the basin’s river systems (Pigram 1999). Several of the features of transboundary governance outlined above can be observed in this basin. These include the development and evolution of institutional arrangements and agreements between stakeholders, integration of water quality and quantity concerns, sharing of data and knowledge, and the existence of a well-developed participation process exemplified by the natural-resources management strategy. In Central Asia, in the Aral Sea region, the donor community has been an effective agent for fostering hydrosolidarity by
using its financial leverage. There, as elsewhere, donor organizations increasingly and demonstrably view hydrosolidarity as a way to achieve equitable water allocation (Le Moigne 2003). Accordingly, funders can promote information sharing and encourage governments to ensure water management that is equitable and attuned to human and environmental needs (Dukhovny 2002).

Going further, donors and development organizations have recognized the value of strengthening civil society, which can serve as an agent for progressive change. Along China’s Yellow River, some progress has been made in establishing water users associations and other NGOs. As in Australia and Central Asia, appropriate application of principles of hydrosolidarity can shed light on the impacts of regional development on water resources (Ongley 1999). In the Yellow River Valley, efforts have been underway to achieve hydrosolidarity in some development projects and thereby provide water to water-scarce parts of the basin, improving linkages between resources. A conservancy commission is the institutional arrangement at the heart of integrated basin management there (Ongley 1999: 115).

On the other side of the globe, in the Brazilian region around the mega-city of São Paulo, principles of hydrosolidarity combined with sophisticated technology are tackling water management concerns rising from population growth and increased urbanization (Braga 1999). An experiment joining integrated water resources planning with modern decision-support systems technology and enhanced public participation mechanisms is helping develop a master plan for the basin.

In a regional adaptation of hydrosolidarity in India, planners and managers have harnessed centuries-old traditions of local panchayati raj (decentralized governance by councils of village elders). Water authorities have promoted basin management and conflict resolution through the creation of river parliaments (Agarwal 1999). Such river parliaments consist of upstream-downstream society institutions that seek to improve dialogue and knowledge sharing between diverse stakeholders as well as apply joint pressure on the state to improve river basin management within a participatory framework (Agarwal 1999: 126).

In South Africa, hydrosolidarity has helped actors understand and overcome critical institutional issues over shared waters. Applications of the equity features embedded in the framing of hydrosolidarity have helped recreate a balance between asymmetrical interests in river basins (van der Zaag 2007). Here the emphasis is on water-allocation principles and practices, data-sharing and capacity building, and harmonization of national water policies and laws. In the Nile River Basin, another region characterized by upstream-downstream conflict, hydrosolidarity has been embraced to promote stakeholder participation (Sendama and Granit 2002). Under the auspices of the Nile Basin Initiative and the Shared Vision Program, a series of development projects are underway in the basin that embrace components of hydrosolidarity, namely upstream-downstream cooperation in the context of integrated water resource management.
The above examples demonstrate how hydrosolidarity is being promoted to improve how countries enhance their internal water-management processes and how, in some cases, they negotiate with one another over water resources. Varying levels of cooperation are embraced, highlighted by the mix of transboundary water-governance features adopted in these cases.

Ultimately, there exists no perfect case study to illustrate hydrosolidarity in practice. While bits and pieces of the concept have been adapted and employed, no basin or region has officially adopted hydrosolidarity in its entirety. This is to be expected since except for natural and human-induced cataclysms, water governance tends to occur incrementally and evolve over time. As the illustrations above indicate, various features of hydrosolidarity have been embraced in *ad hoc*, rather unofficial ways across the globe. We see hydrosolidarity in practice at various governance levels, including small-scale actions like river parliaments in India to greater, regional levels, like efforts in the Nile River basin. There are numerous examples of small steps taken to further develop the concept, from actual management practices to seminars, workshops, and conferences.

Perhaps the greatest contribution of the notion of hydrosolidarity to water governance is its strong ethical dimension. Dozens of donor agencies, international organizations, and non-governmental organizations have been working for some time now to promote cooperation along shared waters, with many of the aims we outline above in our discussion of the functional value of hydrosolidarity. Falkenmark’s framing of hydrosolidarity helps shape our dialogue within an ethical frame. Hydrosolidarity can then be viewed as a larger umbrella to more holistically capture both old and new water-management practices, from virtual water to stakeholder engagement. In this way, it can be seen as more of a manifesto on how to frame water management today. It is not surprising, then, that it has been influential in shaping dialogue about water, as demonstrated by the World Water Forums. Indeed hydrosolidarity has become so embedded in our discourse about water that even if you are unfamiliar with the term ‘hydrosolidarity,’ it is possible to recognize its principles in action or to be familiar with examples of its practice.

**Conclusion**

The notion of hydrosolidarity – and all that it embraces – parallels and overlaps a host of contemporary developments in water governance. Over the past decades, the more traditional top-down, closed, and national-interest-based water-management frameworks have been yielding to new, more diffuse models. These newer paradigms encourage public participation and transparency, seek to achieve greater equity, and introduce integrated approaches to management that enhance efficiency and environmental sustainability. In a period of rising concerns over global change and water scarcity, these and other holistic and humanistic principles are
being promoted in numerous writings and adopted by various organizations and basin states.

In this article, we have attempted to demonstrate how hydrosolidarity, which packages a number of the above features, might be harnessed to reduce tension between upstream and downstream riparians. There is a functional value to hydrosolidarity that can shape negotiations around water and the management of shared waters. The concept can be employed to support four salient features of transboundary water governance: (1) creation of cooperative institutional structures; (2) promotion of stakeholder participation; (3) development of shared knowledge; and (4) enhanced integration and linkages.

Ultimately, for hydrosolidarity to make a meaningful contribution to negotiations about shared waters and the management of such waters, it will need to be seen as something separate and greater than integrated water resource management. It will need to become valued for its ethical component that makes it more of a grand manifesto and less of a cookbook or toolkit of practical water management guidelines characterized by integrated water resources management. In view of the strong institutional inertia and obstacles that remain pervasive in most settings, hydrosolidarity may not be the be-all, end-all magic cure for basin conflicts. But employed in whole or in part, selectively and in concert with other strategies and incentives, and as part of a holistic approach that is well adapted to the geopolitical and cultural conditions of a particular basin, hydrosolidarity offers the potential for alleviating conflict over shared water resources.

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