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Insights on Water Governance: Research in the Middle East/North Africa and Latin America

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Abstract

International attention on water management issues focuses on crises of governance and the factors that endanger the water rights of marginalized people. We define effective water governance as the processes that encourage people to actively participate in designing, planning, managing and implementing water management activities while fostering communities ability to innovate and adapt to changing circumstances. In other words, water governance is as much about the art of social change as it is about the science of hydrology. To illustrate, this paper compares the experiences of two initiatives supported by the International Development Research Centre (IDRC): the Water Demand Management Initiative for the Middle East/North Africa (WaDI*mena*) and the Social Water Vision in Latin America. Responding to the opportunities that exist for new research to inform policymaking, each project has conceptualized water governance in a manner relevant to that region. The two initiatives have regionally specific levels of focus and research priorities; but they are both using a water governance framework to achieve their objectives. Effective water governance must encourage *participation* in the processes for deciding how water is used; promote *innovation* and learning among stakeholders, and foster *adaptation* to changes in water availability. An effective water governance framework includes three elements: policies that enable participatory water management, capacity to engage in the policy process, and the ability to negotiate among stakeholders. Further research on water governance contributes to the emerging field of adaptive environmental governance and our understanding of how social change occurs. Ultimately, such knowledge empowers poor women and men to obtain and use water they need to survive, grow food and sustain livelihoods.

Introduction

As stated by Mehta (2000) *"water is a multifaceted resource and in the everyday contexts within which people live their lives it has different faces and meanings".* As a basic substance, water is seldom created or destroyed, but is instead continually transformed as it flows through an extremely complex global system that is not fully understood. Water is a highly mobile, or a fugitive, resource that varies in quantity and quality across the

landscape and through time. During periods of drought and flooding, human societies must cope alternatively with its scarcity and superabundance. Water in factories and on crops is an input for the production of many goods, including food; yet water in rivers and in homes maintains human and environmental health. Water used for drinking and food preparation should be very clean, while the water quality requirements for other uses are not so stringent. There are opportunities to 'cascade' water through multiple uses in declining order of water quality, as evidenced by poor farmers that divert 'free' and nutrient rich wastewater from sewers to irrigate crops, effectively increasing supply by making available source of derivative water (Scott et al. 2004). Water tariffs provide an incentive to invest in improving the productivity of water used in manufacturing or irrigation, yet such tariffs also endanger the ability of the urban and rural poor to acquire sufficient water for their daily needs. Worldwide, an increasing number of river basins are 'closing' as every available drop of water is allocated to different human activities, endangering environmental health and precipitating conflict as the nature of water management shifts from adding more supply to rationing a scarce resource. This precarious balance is further threatened by anticipated changes in water availability due to climate variability.

In contrast to how governance is often referred to in international development – elections, rule of law, human rights and providing public services– *water* governance provides a narrower field of inquiry with a theoretical base, research approaches and an emerging set of metrics. This paper argues that water governance is transdisciplinary field of research that explores how water management policies and practices are formed and changed over time. Furthermore like coastal or forest governance, inquiry into water governance contributes to an emerging body of knowledge on adaptive environmental governance.

This paper includes three sections to demonstrate the flow from theory to practice, and back again. The first section briefly reflects and attempts to unpack the concept of water governance, in particular how change in how water is governed may be seen as a response to water scarcity, and understanding the role that research can play in water governance. The second section examines two examples of water governance in practice through two ongoing IDRC-supported research projects, WaDI*mena* in the Middle East and North Africa and the Social Water Vision in Latin America. Finally, based on these two experiences, the paper proposes insights to inform theory on adaptive environmental governance and future research in this area.

Water Governance in Theory

Governance is about how decisions are made, who participates in decision making, and how to participate. Concern over water governance is due to perceived crises in existing water management that has failed to provide water for poor people, resolve conflict, and protect environmental and human health. Improved understanding of water

governance reveals how societies develop and change water management practices over time. Turton and Ohlosson (1999) note that water management strategies must adapt as regions become increasingly water-stressed. Wolfe and Brooks (2003) build on this insight and describe different orders of scarcity and associated strategies. The initial response to water scarcity is to simply expand supply through additional water infrastructure. As the margin cost of increasing supply increases, the strategy shifts to maximizing the economic value of water use. Under extreme scarcity, society faces trade-offs between economic and social objectives, and the strategy shifts to addressing the underlining culture and value around how society uses water. Understanding water governance is essential for navigating such shifts in water management strategy.

Rogers and Hall (2003) define water governance as *'the range of political, social, economic and administrative systems that are in place to develop and manage water resources and the delivery of water services at different levels of society'*. This definition is reiterated in the first World Water Development Report (UN 2003) which adds consideration of how power and authority are exercised and distributed in society, and to what extent citizens can participate in decision making processes. Clearly more water infrastructure alone is not the solution to water scarcity. Innovative technologies –such as water harvesting or fog catchers– also require institutional innovations for their planning, operation, and maintenance. Studying the variable and uncertain mountain environments in South Asia, Moench et al. (2003) concluded *'specific solutions are less important than the existence of processes and frameworks that enable solutions to be identified and implemented as specific constraints arise and context change'*.

We define effective water governance as the *processes that encourage people to actively participate in designing, planning, managing and implementing water management activities while fostering communities ability to innovate and adapt to changing circumstances* (such as drought or floods). More effective water governance is needed in order to respond to uncertainty and increasing scarcity, and improve the linkages between the ecosystems through which water flows and the social systems of people who interact with it (Folke 2003).

Participate: Despite calls for more integrated approaches to water management, the political nature of water suggests that a certain amount of fragmentation is to be expected. Blomquist and Schlager (2005) argue that stakeholders seek to assert control over water in order protect their values and interests, and do so by engaging a variety of forums at different levels, both formal and informal. Thus, participation needs to be polycentric –involving multiple organizations and stakeholders– with and different coalitions of actors involved in determining how water is used at different levels and times. Watershed or river basin perspectives have been proposed as a means of integrating the physical reality of water management, yet these perspectives can fail to capture the complexity of how water use is affected by actions at the local, regional and national level ranging from water legislation, labour migrations, market demands for

certain products. Political participation determines in part whether change occurs, who benefits and who loses in terms of access and use of water resources. Research on water governance explores the interests of different actors to assess who is and is not involved in defining water management, as well as how they are involved and why.

Innovate and Adapt: Water management policies and practices evolve and change over time in response to drivers of change, such as climate variability, demographic growth and market pressures. This process is nothing new, as the Quichea and Aymara people, for example, have altered how they managed water in response such drivers over the past two millennia (Trawick 2004). Yet the present-day magnitude and intensity of these drivers mean change must occur at an increasing pace in order to adjust quickly enough to avoid ecosystem collapse or water crises (Folke 2003). How much change occurs and how quickly it happens depends upon society's ability to innovate and adapt. Water management policies and practices are altered through a shared process of problem solving and interactive learning among multiple stakeholders. As Sagasti (2004) notes, innovation is more than a matter of developing new technologies or installing devices, but involves transforming society and its value systems.

Water Governance in Practice

The approach of the International Development Research Centre (IDRC) is to partner with developing country researchers in order to contribute to the capacity within these countries to define and address the development issues their societies must confront. IDRC's research programs are based on regional consultations, held approximately every five years, to identify the priorities for development research with regional experts. These meetings are supplemented with special thematic consultations as needed, as well as staff participation in international conferences and continuous interaction with partners in the field, ranging from email communication to in-person field trips to monitor projects. Projects start as ideas proposed by research partners in the form of concept notes. These ideas evolve into full proposals over a period of time in a collaborative manner between staff and research partners. This relationship often continues as Centre staff provide sustained mentoring to partners throughout the life of funded projects. Thus, the research supported by IDRC is demand-driven and focused on the needs of developing countries.

Middle East / North Africa

Countries within the Middle East and North Africa are among the most water stressed in the world, many already have an annual renewable supply of freshwater of less than 1000m3 per person, and between population growth and raising affluence, many are expected to reach less than 750m3 per person by 2015 (UNDP 2002) of which up to 90% is used by the agriculture sector. IDRC has promoted research on water demand management as a tool to alleviate pressure on water resources and challenge the traditional supply-driven approach. Demand management encompasses a variety of

strategies and tools that seek to optimize the productive benefits obtained from a limited supply of water, such as adjusting irrigation patterns to minimize water use; promoting the reuse of treated wastewater and lesser quality water, or shifting the nature of a task to use less water. Ultimately, demand management seeks to change people's behaviour to use water more efficiently, equitably and sustainably.

In the early 1990's, IDRC began exploring the research questions on water scarcity, and supported a number of research projects in the region that focused on water demand management. In the latter part of that decade, IDRC conducted a survey with policy-makers to identify their specific research priorities in water demand management. The Water Demand Management project (project file 60025) [1] was structured into a series of trilingual forums (Arabic-French-English) designed to ensure participation of policy makers through high profile regional conferences. The project gained the attention of international donors, and four forums were held between 2002 and 2003 on wastewater reuse, water valuation, public private partnership, and decentralization and participatory irrigation. Together the forums attracted over 500 participants, from eleven countries, including Ministers in charge of agriculture or water departments within national governments. The forums generated a space for learning by encouraging policymakers to prepare and present case studies of their country's experiences at implementing specific demand management strategies. The Forums were successful in generating awareness amongst policy communities, but it was time to translate awareness into action to result in tangible impacts.

In 2004, the Water Demand Management Initiative (WaDI*mena*) was established (project file 101806) as a five-year project, coordinated and funded by IDRC, with additional support from the Canadian International Development Agency (CIDA), and the International Fund for Agricultural Development (IFAD). The WaDI*mena* initiative was designed to target policy communities, researchers and civil society organizations to identify and adopt innovative means to deal with water scarcity problems in the region. While it is known that a water problem exists, there is limited utility of specific solutions to enhance water-use efficiency, equity and sustainability. WaDI*mena* seeks to facilitate the adoption and implementation of water demand management strategies, policies and tools in the countries of Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine, Syria, Tunisia and Yemen to promote effective water governance. The objectives of the project are to (1) deepen the knowledge of the opportunities, challenges and incentives of demand management; (2) improve capacities of the policy and research communities, institutions, water users and civil society; and (3) foster dialogue, strengthen partnerships, share experiences and enhance networking.

WaDI*mena* conceptualizes water governance as *the relationships that exist amongst governments, researchers, private sector and citizens that influence the policies and practices that*

[1] More details on IDRC projects are available through the IDRIS database [online] http://idris.idrc.ca

determine how water is used. In this interpretation, effective water governance depends on an enabling environment that fosters dialogue and relationships that in turn promote transparency, participation, accountability and innovation. The project is structured around four sets of activities: applied research grants, a Regional Exchange Facility, capacity development and knowledge networking. Applied research grants support multidisciplinary teams to demonstrate an innovative solution to an existing water demand management problem. This is conducted using participatory research methodologies, with a focus on social and gender analysis. The Regional Exchange Facility supports study tours and field visits that allow teams from one country to learn best practices and lessons from the experiences from another country. Knowledge networking is a key component of WaDI*mena* to encourage dialogue, and support electronic means of communication, such as a dynamic website and e-discussion groups. Publications are also done in the working languages of French, English and Arabic. Finally, capacity development is an ongoing, iterative and constant effort. WaDI*mena* supports other activities including formal education, training courses, and conference participation to directly enrich the water management skills of individuals and institutions.

Over time, the WaDI*mena* initiative has added to its research priorities to fill key knowledge gaps in the region on the ways in which water is used, and the policy framework in which it operates. In the area of gender for example, it was realized that there is little knowledge in understanding how and why women use water. WaDI*mena* is currently undertaking regional research to better appreciate the means by which women, as primary water-users, adapt and innovative their water consumption in water stress situations. WaDI*mena* is also working to better understand the policy context in the MENA countries, first by analyzing the enabling environment within each country by gauging the constraints and opportunities that exist for effective water demand management implementation. WaDI*mena* is developing a regional knowledge map to monitor change in specific water demand management policies and practices, and to assess the level of country progress towards water demand management. As an example, the use of greywater is being heavily promoted in Jordan and Lebanon as an alternative water resource. Jordan has moved towards legislating the use of greywater in the country due in part to the involvement of policymakers and new research on the subject.

WaDI*mena* has also focused on developing the capacity of young professionals, in both policy and research communities, to enhance their understanding of water demand management. As water demand management is ultimately about changing behaviours, the focus on the fresh graduates and new recruits ensure that their enthusiasm and willingness to change is captured. WaDI*mena* held a competition for participant support of seven young professionals to attend the 4th World Water Forum in Mexico City, based on their response to the question: *'How have you promoted water-use efficiency, equity and sustainability in your country?'*. The opportunity to participate in the World Water Forum

for these seven regional young professionals meant that they were able to enhance their learning of global water issues for specific application in their own countries, and to share their own experiences in water demand management at an international event.

Latin America

Water supply in the Andes Mountains has always been scarce and unpredictable, and has been further threatened with recent retreat of glaciers and land use changes. Supply cannot match the growing demand for water. Farmers are being pressured to plant more water intensive crops; yet must increasingly compete with cities for available water. Existing water governance has given rise to over-exploitation and conflict, as evidenced by the 'water war' in Cochabamba, Bolivia in 2000 over the privatization of city's water supply network; yet 32 different proposals to reform national water legislation over twelve years all ended in failure (Alurralde et al 2002). Fearing that international statements such as the World Water Vision, an output of the 2nd World Water Forum in the Hague in 2000, endorsed the privatization of water supplies and would consequently endanger customary uses and traditional water rights of poor and indigenous farmers, a consortium of researchers known as CONDESAN (*Consorcio para el Desarrollo Sostenible de la Ecoregion Andina*) prepared an 'Andean Water Vision'. The vision described the perspectives and experiences of farmers and social groups (project file 101689) and was presented at the 3rd World Water Forum (CONDESAN 2003). This Vision was useful for raising an alternative voice in this global policy dialogue, yet it was merely a statement of values describing water as a public good and social right. The Vision did not attempt to describe the technical and economic aspects of how these values could be implemented in practice.

Meanwhile research in Bolivia (project file 101423) demonstrated that, given the opportunity to generate their own technical analysis, social movements of poor farmers and indigenous people could participate in, inform, and influence the process of elaborating new water policies. A council of twelve private and public institutions - known as CGIAB (*Comision para la Gestion Integral del Agua en Bolivia*)- conducted participatory research involving stakeholder roundtables to explore existing tensions and apply GIS modelling to test different models for allocating water. This research informed a new irrigation law (Ley No. 2878) and represents a new opening for research-performing organizations to become a credible ally to both civil society and government in reforming water legislation.

The Social Water Vision initiative (project file 102599) builds upon both these experiences and seeks to reduce tensions and conflicts in the water sector through research, information, training and meetings from the perspective of technical and social viability in reform and public policy proposals. The project is led by Agua Sustentable, a NGO based in Bolivia, yet utilizes the networks of CGIAB and CONDESAN to include over thirty, primarily young researchers from across the Andes including: Argentina,

Bolivia, Chile, Colombia, Ecuador, Peru and Venezuela. The Social Water Vision conceptualized water governance as *the institutional arrangements and norms, upon which government is based, and that define water policies and practice. Governance depends upon 'governability', or the degree of political stability or social agreement between government and civil society*. Following a planning workshop that gathered researchers in Cochabamba in October 2004, the project focused upon three themes. First, the implications for water in free trade and investment protection agreements, in which the project seeks to influence and orient key national decision makers and trade negotiators. Second, water governance and governability, which seeks to contribute to the creation of public policies that are based on the values and principles acceptable to both government and civil society. Third, water rights and citizenship, which seeks to contribute to ideas and proposals for legislative reforms related to water rights. This latter theme includes the concept of a 'social watershed', based not only on the spatial extent ecosystems services but the geographic footprint of culture and practices of people living within these watersheds.

As an entry point, the Social Water Vision used a method of social analysis known as conflict, legitimacy, interests and power (CLIP) to determine the stakeholders involved and the relationships among them (project file 100836). This analysis aided in the design of scoping studies for each theme to identify whom within ongoing policy processes had particular needs for knowledge, and the specific research questions that would address these needs. Subsequently, country-level case studies were commissioned to answer these research questions and enable comparisons between countries. Simultaneously, the researchers involved the initiative have used this research as an opportunity to involve and build networks among policymakers, advocacy groups and indigenous people. In addition to their individual skills as anthropologists, lawyers or agronomists, each of the researchers involved in the project also brings in their own network of contacts and colleagues within each country. In this respect, the Social Water Vision has been designed to be demand-driven and inform policy, and attempts to bridge the gap between government and civil society.

An early example of project's policy influence was a seminar on free trade agreements and public services held in Buenos Aires in September 2005 that gathered over 100 representatives from treasury and finance departments from 14 different countries. The researchers presented evidence to demonstrate how clauses related to protecting investments impact urban water supply, even when water was not included in free trade agreements. The seminar culminated in the chief trade negotiator for Argentina suggesting that he needed to alter his country's negotiating strategy. The researchers are continuing to prepare policy briefs and engage policymakers in different forums – including the 4th World Water Forum– to communicate their research findings, build the capacity of Andean countries to engage in trade negotiations, and build a Southern agenda into global policy debates.

The Social Water Vision increasingly focused on the free trade agreements to take advantage of the opportunity at the 4th World Water Forum to influence policy. Meanwhile, water governance and governability ceased to be an independent theme and was instead rolled into the research on free trade and investment, or on water rights and citizenship. With recent shifts to the political left in the region, there is increased interest on behalf of policymakers in seeking public participation and revitalizing the public management of natural resources. On the ground, however, participating in water management is still tied to social position, or the ability of social movement to apply pressure through protest. Water managing organizations still do not perceive the benefit of sharing knowledge, such as comparing their experiences on providing sanitation. Furthermore, the demand for new research favours a focus on practical, short-term solutions, reducing the space for longer-term study of the complex relationships amongst stakeholders in the water sectors. How water rights are allocated is still a sensitive area of research, as are the issues of financial oversight, corruption and clientism within the water sector.

Table 1: Intent within the Regional Context

	WaDI*mena*	Social Water Vision
Goal	Facilitate the adoption and implementation of water demand management strategies, policies and tools	Reduce conflicts in the water sector through research, information, training and meetings on the technical and social viability in reform proposals
Conceptualization of Water Governance	The relationships among the government, private sector, research organizations and citizens that influence the policies and practices that determine how water is used	The institutional arrangements and norms that upon which government is based and in turn define water policies and practice; depends upon 'governability' or the degree of social agreement between government and civil society.
Approach	Competitive small grants for applied research and pilot activities, a Regional Exchange Facility, capacity development and knowledge networking	Case studies and comparisons on the implications for water in free trade and investment protection agreements, water governance and governability, and water rights and citizenship.
Learning	Multi-stakeholder research teams, WaDI*mena* network including civil society groups, governments and researchers to share experiences and enhance knowledge for greater policy impact	Research can involve and build networks among policymakers, advocacy groups and indigenous people

Discussion

Based in part on the regional context, each initiative has nuanced research goals, approach and the conceptualization of water governance (table 1). WaDI*mena* conceptualizes water governance as being the relationships that exist amongst governments, researchers, the private sector and citizens that influence the policies and practices that determine how water is used. The Social Water Vision interprets water governance as the institutional arrangements and norms that upon which government is based and in turn define water policies and practice. Both projects emphasize dynamic learning and networking among researchers, policymakers and the public to generate and share knowledge. Yet there is openness to inquiry on the social aspects of water management in Latin America, which is relatively restricted within the Middle East/North Africa. The goal of WaDI*mena* is to promote water demand management strategies and tools to improve water-use efficiency, equity and sustainability. In comparison, the Social Water Vision seeks to defend the water rights of poor and indigenous farmers, understand the implications of free trade agreements for water management in order to inform Andean trade negotiators.

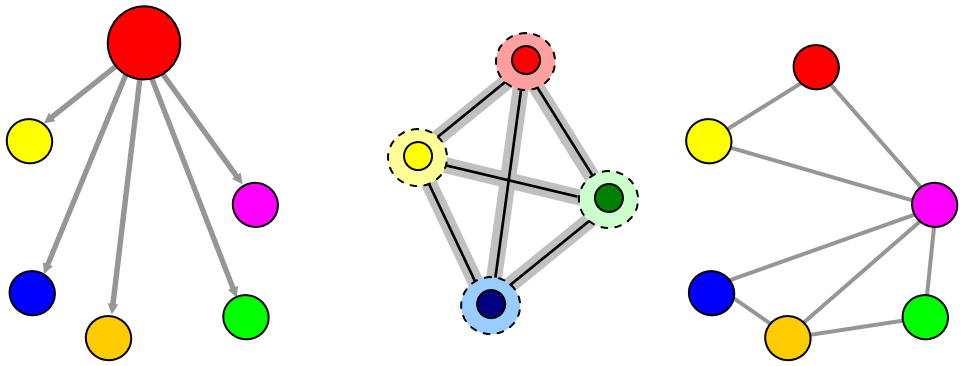
The two initiatives have regionally specific levels of focus and research priorities; but they are both using a water governance framework to achieve their objectives. Effective water governance builds upon what is seen as appropriate water management strategies with the region, and facilitates knowledge sharing and experimenting with different tools, techniques and strategies. Effective water governance must encourage *participation* in the processes for deciding how water is used; promote *innovation* and learning among stakeholders, and foster *adaptation* to changes in water availability. An effective water governance framework includes three elements: *policy* that enables participatory water management, *capacity* to engage in the policy process, and *negotiation* amongst stakeholders (figure 1).

Policies – Research can address the rules for managing water, the policies and laws that determine which practices and technologies are acceptable. This includes questions of how effectively is water used under these policies? For what purposes? What alternatives exist? And how can policy be changed? Policies necessarily engage the politics of how water is governed and play a key role in clarifying the rights and obligations of different stakeholders, including actions towards monitoring, compliance and enforcement (Allen and Wouters 2004). These rights and obligations maybe be embedded in formal water policies and legislation, or exist informally in the accepted practices of society and the relationships among stakeholders. Bustamante (2004) introduce 'governability' to describe the degree of informal, social agreement among stakeholders regarding water rights and how this agreement –or lack of it– is expressed in formal, public policy. Conflicts, such as those over the privatization of water supply networks, are aggravated when no such social agreement exists or formal policy threatens the ability of poor to access and use water. Research can stimulate dialogue and inform the policy process by examining how water contributes different ecosystem

services, how to reuse wastewater, how to manage demand for water and how to implement institutional design principles for managing water as a common pool resource (Agrawal 2002).

Capacity – Research can address the ability of people to manage water –the skills, training, knowledge and information required to engage in the policy process. In practice, many participatory bodies, such as watershed councils, are more advisory boards than true co-management authorities. Instead only those stakeholders that are already organized and able to exert political pressure on authorities and participate in the policy process. This highlights a need to enhance the capacity of water users to influence decision-making (Wester et al. 2003). Capacity includes a wide range of skills including the ability to identify knowledge gaps, to design and conduct research, to assess the policy environment, and to communicate effectively with bureaucrats, scientists and the farmers and poor people all of whom influence how water is used. The policies and practices that determine how water is governed depend on an interconnected system of researchers and organizations with the ability to detect problems, experiment with alternatives and design solutions. Enhancing the capacity to govern water can focus on the individual level - the skills and experiences of people- or the institutional level –the existence and ability of organizations to host and support such individuals.

Negotiation –Research can address who has power to change water management policies and practices, and who engages whom in doing such. Indeed water governance concerns mediating multiple conceptual perspectives and stakeholder interests related to the access and use of freshwater resources (Ravnborg 2004). In other words, water governance is the political process through which water management institutions and practices are created or changed. This understanding is similar to adaptive governance, referred to by Dietz et al. (2003) as the "*need to (make decisions) in the face of substantial uncertainty, and … reconciling amongst people and groups who differ in values, interests, perspectives, power, and the kinds of information they bring to situations.*" Successful water management policies and practices must be socially acceptably and mobilize resources and support (Rogers and Hall 2003). The complexity of the water management often goes beyond the ability of individual stakeholders to deal with on their own. Effective water governance therefore requires public participation, which in a recent review was shown to result in a higher benefit-cost ratio in medium and low-income regions (Joshi et al. 2005).



	(a) Policy	(b) Capacity	(c) Negotiation
Change Mechanism Research Subject Nature of research	• Modify rules governing water use • Water policies and legislation • Technical	• Improve skills and build relationships • Ability to participate in water management • Diagnostic	• Promote stakeholder dialogue • Distribution of power amongst stakeholders • Socio-Political

Figure 1: Elements of a Water Governance Framework Circles represent different stakeholders while lines represent the connections amongst them. *Policy* is the set of rules issued by a key governing organization. *Capacity* is the ability of stakeholders to participate in management and their connection to others. *Negotiation* is the continuous interaction among stakeholders to define acceptable water management practices.

Conclusion

Understanding the regional context is key to promoting effective water governance. Our experience suggests that water governance cannot be captured in a simple definition. Beyond a checklist of characteristics, such as accountability and transparency, water governance depends in part on the regional context in question. What constitutes effective water governance the Middle East/North Africa not necessarily appropriate for Latin America and vice-versa. The regional context matters and determines the nuances in local conceptualization of water governance and realm of possible actions

Yet, different conceptualizations of water governance can lead us to a more global understanding of adaptive environmental governance. Generalizing from the WaDI*mena* and Social Water Vision, a water governance framework includes policies that enable participatory water management, capacity to engage in the policy process, and the ability to negotiate among stakeholders. As such, effective water governance must encourage *participation* in the processes for deciding how water is used; promote *innovation* and learning among stakeholders, and foster *adaptation* to changes in water availability.

Such insights and are useful beyond the water sector and enhance our understanding of how the concept of 'effective' governance varies between regions. Indeed, improved understanding of water governance is a critical contribution to a growing body of knowledge related to adaptive environmental governance. Recent literature emphasizes the need to assess resource scarcity in light of the connections between environmental health and human well-being. Adaptive environmental governance address how management policies and practices are formed and changed; and emphasizes uncertainty, unpredictability, and the need to mediate among people and groups who differ in values, interests, perspectives and power, and the kinds of information they bring to situations (Dietz et al 2003). Continued research in this field enhances our understanding of how social change occurs and ultimately contributes to the ability of poor women and men to obtain and use water they need to survive, grow food and sustain livelihoods.

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