Harnessing water management for more effective peacebuilding: Lessons learned

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Water resources play an important and multifaceted role in post-conflict peacebuilding. Immediately after conflict ceases, access to water and sanitation is vital for meeting basic human needs. In the longer term, effective water resource management can provide critical peace dividends by rebuilding livelihoods and promoting reconciliation. However, despite an increasing recognition of the value of integrating assessment and management of water and other natural resources into the planning and implementation of recovery and post-conflict peacebuilding, there is still little guidance on how this integration should take place.

To fill this gap with respect to the role that water management can play in promoting sustainable peacebuilding, three broad questions must be addressed: What are the risks to peacebuilding if water management issues are not appropriately addressed at war's end? How can local, national, and international actors capitalize on the shared experiences of practitioners, academics, and policy makers to more effectively harness water management for peacebuilding? How can these experiences and lessons be operationalized?

Given the diversity and complexity of post-conflict situations, there is no single blueprint for achieving water management that both promotes and supports recovery and peacebuilding. Prioritizing and sequencing interventions and coordinating those activities among multiple actors with diverse objectives present a number of context-specific challenges. However, the experiences documented here, coupled with the broader experiences with integrating natural resource management into peacebuilding efforts, point to an emerging framework that focuses on four post-conflict peacebuilding objectives and their respective activities: (1) establishing security; (2) restoring basic services; (3) revitalizing the economy and enhancing livelihoods; and (4) rebuilding governance and inclusive political processes.[1]

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[1] This framework follows that of Bruch et al. (2014), drawing substantially on the *Report of the Secretary-General on Peacebuilding in the Immediate Aftermath of Conflict* (UNSG 2009), although the activities have been regrouped and supplemented by activities articulated by USIP and U.S. Army PKSOI (2009) and the Sphere Project (2004).

Efficient and equitable water resource management and service delivery play a central role in achieving each of these objectives. Immediately after the end of a conflict, water must be available and of sufficient quality to support basic human needs and to restart local livelihoods for civilians, including excombatants, refugees, and internally displaced persons (IDPs). Access to safe water is also essential for maintaining public health and avoiding increased morbidity and mortality both during and following conflict (Kruk et al. 2009). As countries move beyond crisis into peace consolidation and toward development, water is key to sustaining food security, promoting poverty alleviation, and supporting broader economic recovery and development. To realize the benefits of effective water management, countries emerging from conflict must also rebuild (or build anew) water governance frameworks that have the human, technical, and institutional capacity to manage complex issues related to allocation, service provision, and resource sustainability. Moreover, many water resources are shared across national boundaries, adding a complex dimension to the governance and management of the shared waters while also providing an opportunity for water to play a crucial role in fostering regional cooperation.

Post-conflict conditions are complex and fluid. Of the many practical lessons learned over the years about the role of water in post-conflict peacebuilding, perhaps the most important is the need for programming to be deliberately adaptive in its approach. Dealing with the uncertainty and rapid change in post-conflict situations requires a flexible approach that can respond to the evolving reality on the ground. Water resource management more broadly will benefit from such an approach, which can help to address social, economic, environmental, and climate-related drivers of change that are affecting both water quality and quantity around the world. Thus policies and approaches—even those successful in other situations—must be capable of supporting the elements of adaptive water governance and management. These elements are (1) meaningful participation of stakeholders in decision making, implementation, and monitoring and evaluation; (2) support for governance mechanisms that are flexible and can better cope with uncertainty and change; (3) a focus on intersectoral, intergovernmental, and interinstitutional coordination and cooperation; and (4) programming that fosters learning and knowledge exchange. These elements are highlighted in the cases throughout this book.

In order to cover the various ways in which water plays a critical role along the post-conflict continuum, this chapter organizes the lessons related to water management in post-conflict peacebuilding along the timeline of peacebuilding more broadly—from the immediate aftermath of conflict to peace consolidation and on to development—while acknowledging that these categories are not distinct, but rather are intimately connected and often overlap. Thus, the first section discusses humanitarian interventions related to water and sanitation that begin to take place in the direct aftermath of conflict (or continue to evolve from interventions that began during conflict). The second section discusses the role of water in supporting post-conflict recovery of livelihoods and the broader

economy throughout the peacebuilding process. The third section examines the various ways in which water management has been and can be leveraged to foster local and regional cooperation. The fourth section considers several cross-cutting issues, including water governance at the local and national levels, the need for broad-based stakeholder and public engagement in planning and implementation, the critical role of women in post-conflict water interventions, and donor commitment. The fifth section addresses the challenges of coordinating and sequencing water-related interventions. The final section explores three key emerging issues and their impact on water and post-conflict peacebuilding, including the implications of climate change, large-scale land acquisitions, and the development of large mining operations.

WATER MANAGEMENT IN THE IMMEDIATE AFTERMATH OF CONFLICT: MEETING BASIC HUMAN NEEDS

During and immediately following conflict, humanitarian interventions focus on saving lives. As a basic human need, the provision of safe water (and basic sanitation) is invariably among the highest priorities. The 2009 *Report of the Secretary-General on Peacebuilding in the Immediate Aftermath of Conflict* highlights water and sanitation services as one of five recurring priorities for peacebuilding in the immediate post-conflict context (UNSG 2009).[2]

There is a growing body of evidence that water and sanitation services, as part of the broader delivery of social and administrative services, contributes positively to peacebuilding by reducing social tensions, by creating necessary services, and by reaching out to the population and rebuilding systems of legitimacy and accountability (UN PBSO 2012). It symbolizes a return to normality and builds both confidence and credibility in the intentions and capacity of government, thus creating important peace dividends—timely and tangible results that are associated with social cohesion and stability and can promote trust in the peace process (UN PBSO 2012).

In the absence of immediate improvements to their social welfare, populations may become disillusioned with the slow pace of recovery and lose confidence in the peace process and in the government. At times, support for insurgents in Iraq has been linked to areas where populations experienced a sharp decline in environmental and health conditions owing to disruptions in the supply of water and other key public services (Briggs and Weissbecker 2012).

Because governments frequently lack the technical, financial, and institutional capacity to provide basic water services in the immediate aftermath of conflict,

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[2] The United Nations, following the 2009 *Report of the Secretary-General on Peacebuilding in the Immediate Aftermath of Conflict*, defines *immediate aftermath* as the first three years following the signing of a peace agreement. Longer-term peacebuilding, or *peace consolidation*, follows this period, and the length of peace consolidation is context-driven (UN PBSO 2012).

aid delivery remains critical during this time. Humanitarian organizations, donors, and nongovernmental organizations (NGOs) must step in to build the capacity of those governments while implementing interim solutions that help avoid dire public health outcomes and enable people to begin to rebuild their lives. Effective coordination among those organizations presents an ongoing challenge for peacebuilding. Such coordination is critical not only for achieving immediate programming goals but also in building the necessary state ownership and capacity to take over provision of services.

Challenges in providing water for refugees and internally displaced persons

As refugees and IDPs seek to return home as soon as a conflict abates, their ability to restart their lives often depends upon access to basic services such as water. Humanitarian interventions that prioritize basic human needs such as the provision of safe water and sanitation can generate critical peace dividends.

At the end of 2012, a total of 15.4 million people worldwide were refugees and 28.8 million were internally displaced (UNHCR 2012). An estimated 7.6 million of those people were newly displaced by conflict or persecution in 2012, including 1.1 million refugees—the highest number of newly displaced in one year since 1999. While the numbers of people displaced have varied by conflict, more than half of all newly displaced persons (IDPs and refugees) worldwide in 2012 came from only five countries: Afghanistan, Iraq, Somalia, Sudan, and Syria. Over 50 percent of the more than half-million refugees repatriated in 2012 were resettled in post-conflict Afghanistan, Côte d'Ivoire, or Iraq (UNHCR 2012).

After nearly three decades of conflict, Afghanistan is one of the countries most affected by protracted population displacement. In the early 1990s, approximately 7.5 million people were forced to leave their homes. Approximately 3.2 million registered as refugees in Pakistan, 2.4 million in Iran, and 2 million of them remained in Afghanistan as IDPs (World Bank and UNHCR 2011). At the end of 2011, 2.7 million Afghan people were still refugees (UNHCR 2011), and the ongoing conflict had led to new forms of internal displacement as many people moved to informal settlements in urban areas with low or nonexistent levels of basic services, not to camps (World Bank and UNHCR 2011). Likewise, the conflict in Somalia has resulted in one of the highest instances of displaced persons: 2.2 million (1.1 million refugees and 1.1 million IDPs), nearly one-quarter of the country's population (UNHCR 2011).

The vast numbers of people living in camps, as well as resettling in areas with little or no infrastructure, present a daunting challenge to those tasked with providing basic water and sanitation services. Because post-conflict governments often lack the institutional, technical, and financial capacity to achieve such access, others must step in, including humanitarian organizations, donors, and NGOs. In situations of continued violence, even militaries are playing an important role. However, the ability of these organizations to meet the basic water needs

of refugees and IDPs in post-conflict situations is limited. A study by the United Nations High Commissioner for Refugees (UNHCR) using data from 2003 through 2005 showed that, out of the seventy to ninety camps studied,[3] over 40 percent were not able to meet the UNHCR standard of twenty liters of water per person per day (Cronin et al. 2008).

The public health consequences of inadequate water and sanitation services in these situations are evidenced by the recurring cholera outbreaks that have plagued populations from Guinea-Bissau to Iraq to southern Sudan (Colombatti et al. 2009; WHO 2008; Wakabi 2008). During the 1994 Rwandan crisis, more than 1 million Rwandans fled to the neighboring Democratic Republic of the Congo (DRC), where up to 60,000 people died from water shortages and cholera (Cronin et al. 2008). While simple measures to reduce contamination of water sources (such as bucket chlorination, designated defecation areas, and oral rehydration) significantly reduced death rates from cholera, the global acute malnutrition rates among refugees under five years of age and those in female-headed households were still extremely high and correlated closely with those who had a history of waterborne dysentery.

Access to clean water is also essential to prevent the malnutrition that results from infection with many waterborne diseases (Briggs and Weissbecker 2012). An estimated 50 percent of malnutrition is due to repeated diarrhea or intestinal nematode infections that result from unsafe water and insufficient sanitation and hygiene (Prüss-Üstün et al. 2008). Diarrheal disease not only causes malnutrition directly but also weakens an individual's resistance to subsequent infections, increasing overall morbidity and mortality (Dewey and Brown 2003).

In many parts of the world, water scarcity further complicates the provision of the minimum necessary even for survival, much less disease prevention. Due to fighting along the Sudan-South Sudan border, some Sudanese refugees arriving in the Doro and Jammam refugee camps in South Sudan were only receiving between five and seven liters of water a day, less than any of the minimum humanitarian standards, and are consequently suffering high rates of diarrheal disease (Amnesty International 2012). IDPs in Afghanistan, moreover, are less likely to have access to water and sanitation than the urban poor and more likely to experience diarrhea and other forms of waterborne and water-washed diseases (World Bank and UNHCR 2011).[4]

When host and camp communities must compete for water, the difficulties of achieving equitable allocation become greater, and the risk of disputes increases.

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[3] The number of camps with available data varied across the study years: in 2003, 92 camps provided data; in 2004, 73 camps; and in 2005, 93 camps (Cronin et al. 2008).

[4] There are two types of water-related illness—those that people get because water contains bacteria or other infectious agents and those that people get because they do not have enough clean water to prevent oral-fecal transmissions. For the latter, *water-washed* is a term of art within the WASH (water, sanitation, and hygiene) and public health communities.

The recent influx of Syrian refugees into neighboring countries, such as Jordan, has put increasing stress on already scarce local water supplies (IRIN 2013). The Jordanian government has been forced to dig new and deeper boreholes for Jordanians and the tens of thousands of refugees now sharing the resource, with resulting spikes in prices for delivered water and an increasing resentment by the local population (Warrick 2013). In Jordan, where water scarcity is also compounded by low water efficiency rates, donors should work with host governments to enhance water supply, not only through trucking in water, but more so through refurbishing dilapidated water systems in the host communities to prevent leakage and improve efficiency (Baker 2013).

The time necessary to collect water and the distances that people must travel to sources also present various risks to those living in camps. A survey conducted in eastern Chad reported that the average time people in camps spent to collect water was almost six hours per day, and that most households still used unsafe sources and had high rates of diarrheal disease and child malnutrition (UNHCR 2006). In northern Uganda, those searching for water outside camps were exposed to attacks by the Lord's Resistance Army and thus resorted to using unsafe sources.

Militaries and peacekeeping forces also place demands on local water resources. It is essential that they take into account the potential for competition with surrounding communities for scarce water resources and to adhere to best practices for water conservation so as not to cause harm to the water supplies of the local populations (Waleij et al. 2014; UNEP 2012). For example, even in water scarce environments, the UN Department of Peacekeeping Operations attempts to provide each soldier with approximately eighty-four liters of water per day (UNEP 2012). This high level of use can spark community resentment, leading some UN peacekeeping operations to take measures to reduce their water consumption while improving water conservation and reuse. For example, the United Nations Mission in Sudan introduced water conservation technologies, including rainwater harvesting (Waleij et al. 2014). The Sudan operations also established rules for groundwater extraction; adopted low-level technology such as flow regulators, shower timers, and water meters; used nonpotable water; and recycled wastewater. Swedish troops in Afghanistan are conserving water by using groundwater injection, a process that removes contaminants from wastewater and injects the treated water into an aquifer. Similarly, the U.S. Army Corps of Engineers has worked with Afghan soldiers to develop an irrigation scheme that recycles wastewater at an Afghanistan National Army base in Herat Province so Afghan soldiers can continue to water their trees and flowers on the base, while providing troops with ample potable water.

Too much water, in the form of floods, can also be a daunting challenge for humanitarian operations. Flooding in camps in Jordan (with Syrian refugees), South Sudan (with South Sudanese IDPs), and Thailand (with Burmese refugees) has destroyed shelters and other structures, washed out roads, prevented delivery of food and other aid, and promoted the spread of disease (*New York Times* 2013;

Guardian 2012; Sai and Saw 2011). This indicates the need for more effective assessment of the hazard vulnerability of proposed camp locations and more effective integration of disaster risk reduction (DRR) into planning and implementation of operations.[5]

The challenges of providing water immediately after conflict are not limited to refugee and IDP camps. In urban centers, the destruction of infrastructure and capacity to provide basic services frequently results in severe public health impacts for returning and conflict-affected populations. For example, because the sewage treatment plants in Baghdad, Iraq, remained nonoperational for years following the violence of 2003, cholera and typhoid outbreaks became rampant (Briggs and Weissbecker 2012). These impacts are exacerbated by the rapid urban population growth experienced by many post-conflict cities, which puts major stress on insufficient or damaged water service infrastructure and institutions. In Liberia, the population of the capital city of Monrovia increased from 400,000 in 1988 to approximately 1 million in 2003 as Liberians fled conflict and devastation in the countryside and settled in the capital and the camps surrounding it (Pinera and Reed 2014*).[6] Similarly, in less than two years, the population in Kabul, the capital of Afghanistan, grew from approximately 1.8 million under the Taliban to approximately 2.8 million in 2004, and an estimate of more than 3.5 million in 2008 (Pinera and Reed 2014*). In both Monrovia and Kabul, it took several years to rehabilitate the infrastructure necessary to meet even a portion of this increased demand for water.

Thus one of the most important challenges that face policy makers and practitioners in the immediate post-conflict context is providing water services to the large number of displaced persons and resettling populations. It is critical that peacekeepers, governments, and communities understand as best they can how to do this in a way that both meets short-term needs of conflicting user groups and also enables sustainable management of water resources over the long term in often water-scarce environments. The water-usage footprint of refugee and IDP camps, and of peacekeeping forces in the area, must be minimized to limit competition for water with surrounding communities. Moreover, assessment of water resources prior to undertaking interventions can provide important data on where and how to site camps to minimize adverse impacts on water resources and provide sustainable access to those in need.

Standards for water services and delivery

The international humanitarian community tries to meet the challenges of providing water for basic human needs in post-conflict situations by setting and monitoring

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[5] Guidance on DRR mainstreaming into the emergency management cycle of WASH programming (including in post-conflict situations) was developed by the Global WASH Cluster, discussed later within this chapter, in 2011 (GWC 2011a).

[6] Citations marked with an asterisk refer to chapters within this book.

standards, and through efforts to better coordinate activities. The "cluster approach"—a system of sectoral coordination—was introduced as part of humanitarian reforms following a UN humanitarian response review's critical reflection on the coherence, efficacy, and accountability of the responses in Darfur in 2004 (Sistenich 2012). Clusters were defined by sector in 2005, and a lead organization was appointed to oversee implementation and capacity building in each sector. The United Nations Children's Fund (UNICEF) was designated as both the global water, sanitation, and hygiene (WASH) cluster lead and the default lead on coordination efforts at the country level, unless another organization is better positioned to do so (Steets et al. 2010; GWC 2011b). Membership in the Global WASH Cluster (GWC) is open to and includes humanitarian organizations, NGOs, and donors, as well as other stakeholders (including the private sector and academic institutions), with research institutions, governments, other clusters, and donors having various levels of involvement below a voting membership (GWC 2011b).

The GWC strategic plan for 2011–2015 identifies a number of improvements in practice that are attributable to the work of the cluster, including enhanced coordination at both the global and national levels; better identification of gaps and reduced duplication of efforts; improved guidance and formalization of practice (including information management and national-level coordination models); improved partnerships among UN and partner organizations; and enhanced ability and performance in mobilizing funding and resources (GWC 2011b). The plan also highlights several critical issues, including the lack of appropriate levels of inclusion of national and local actors, a focus on cluster processes rather than humanitarian actions, and inadequate attention to cross cutting and intersectoral issues.

The GWC and the institutions involved in national coordination efforts under the cluster approach are also key participants in an ongoing initiative to improve and integrate humanitarian standards and indicators of success. Perhaps the most widely referenced set of current standards is the *Humanitarian Charter and Minimum Standards in Humanitarian Response*, also known as the Sphere Handbook. The handbook was first drafted in 1997 by a number of NGOs and the International Federation of the Red Cross and Red Crescent Societies in order to establish a set of universal minimum standards of quality and accountability in core areas of humanitarian response (Sphere Project 2011). First published in 2000, then revised in 2004 and again in 2011, the handbook sets forth core principles in the form of a humanitarian charter, a set of principles that translate international humanitarian legal obligations into actions from a protection perspective, and a set of four technical areas of minimum standards, including standards for WASH interventions in a humanitarian context. The technical standards are evidence-based and represent sector-wide consensus on best practices. Minimum standards are followed by practical suggestions for action and a set of indicators to measure progress in achieving the standards. Guidance notes provide practical advice on application of the standards. With respect to water,

the Sphere Handbook sets a standard of at least fifteen liters per person per day, available within 500 meters of the household, with a waiting time of less than thirty minutes to obtain that water (Sphere Project 2011). UNHCR, in contrast, sets a higher standard for its operations at twenty liters per person per day (following the World Health Organization recommendations) available less than 200 meters from dwellings (UNHCR 2006).

Despite the comprehensive nature of the Sphere Handbook, several sets of standards are used in practice by various governments and international organizations. To address this issue, the Humanitarian Accountability Partnership, the Sphere Project, and People in Aid have come together to form the Joint Standards Initiative that will involve UN agencies, affected governments and populations, and others in an attempt to create a universal set of standards and indicators to facilitate integrated aid operations at the local and country levels (SDC 2013). While the Sphere Project (including the Sphere Handbook) has been criticized for attempting to universalize standards that should be uniquely tailored, it should be noted that the 2011 version of the Sphere Handbook recognizes that its standards cannot be met in many situations and stresses the need for analysis of vulnerability and capacity in order to understand the local context and to tailor responses accordingly (Sphere Project 2011).

The Sphere standards also promote a rights-based approach to WASH-related humanitarian interventions. Rights-based approaches to development more broadly have emerged in recent years, emphasizing social and economic rights as the basis for poverty alleviation and exerting more pressure on national governments to promote, fulfill, and protect human rights (SIDA 2012; Nyamu-Musembi and Cornwall 2004). These approaches also prioritize empowerment of the poorest and most marginalized populations in post-conflict situations, thus attempting to redress inequities that can undermine peacebuilding. Rights-based approaches set high standards and can improve the basis for state accountability when rights are not realized. They also emphasize the process through which rights are realized, focusing on inclusive decision making (Boesen and Martin 2007).

Critics of rights-based approaches point to the fact that in water-scarce or resource-constrained contexts, rights-based language makes little difference in implementation and can actually discourage the kind of practical actions that may be necessary under emergency circumstances. The basis for claims against governments is also arguably counterproductive and open to abuse where government capacity is still weak and being built to promote, protect, and fulfill the right to water. The notion of a rights-based approach also highlights the challenge of physical water scarcity and the difficult decisions that must be made about allocation, particularly where communities and refugee or IDP camps must compete for scarce water resources. In Darfur, for example, rights-based approaches led to the drilling and establishment of hundreds of wells and water points in or near camps for displaced persons in arid regions where groundwater is the only reliable source of water most of the year (Phillips 2008). Meanwhile, local communities were not supplied with the same minimum amounts, and in some

instances IDPs were selling the water received from international organizations to nearby cities, as the amount received in the camps was often more than many IDPs were accustomed to receiving before the crisis (UNEP 2013c). Rights-based approaches must therefore take sustainable yield of the resource into account, whether through integrating impact assessment processes into planning or by other means. Mechanisms for improving water harvesting and conservation are also important means for minimizing impacts on the resource and tensions among users.

Despite criticisms of various attempts to establish standards for water services—whether the Sphere Project or a rights-based approach—it is essential that standards be set in order to ensure effective delivery of water and sanitation services. At the same time, it is important to recognize that a single set of standards cannot apply to all circumstances. Water standards and policies must be tailored to specific situations and needs.

The diversified institutional landscape governing post-conflict water management

In post-conflict countries, interventions take place across different levels of scale, ranging from the community to the national and transboundary levels as well as across urban and rural areas and with different levels of danger (Burt and Keiru 2014*). Whereas water interventions in the immediate aftermath of conflict often have been implemented by humanitarian organizations, mounting insecurity in some post-conflict countries such as Afghanistan and Iraq has also caused some organizations to limit their interventions. When that happens, militaries that often are not trained in the basics of water governance and service delivery have had little choice but to oversee the provision of water. In Afghanistan, the U.S. military has begun to incorporate water delivery and services into its counterinsurgency operations and provincial reconstruction teams to both generate visible health and economic benefits as well as to garner local support (Palmer-Moloney 2014*; Mosher et al. 2008); Finland, Sweden, the United Kingdom, and other countries have subsequently deployed provincial reconstruction teams.

In highly insecure situations, humanitarian actors may need to rely on coordination with military forces in order to carry out water delivery. However, there can be long-term risks in blurring the line between humanitarian work and military engagement. Humanitarian actors can be put at risk if their work is too closely associated with military programs, and long-term development goals can be compromised by placing too much emphasis on short-term security objectives if programs are not integrated with other national programs (Civic 2014). Close cooperation in program design and funding mechanisms across organizations is thus required to minimize the risks to the long-term sustainability of water service programs while also balancing military objectives (Civic 2014).

As countries move away from immediate humanitarian interventions toward broader consolidation in water access and sanitation, there is also increasing

recognition of the important role that informal service providers are playing. During or immediately following conflict, an informal market of water sellers and transporters tends to emerge to fill service gaps in water provision. This is especially true in urban and peri-urban settings, as was the case in Luanda, Angola (Cain 2014*). There, the informal sector became highly developed during the country's long conflict, creating an informal system that could be harnessed in formalizing service networks and creating livelihood opportunities after the conflict. At the same time, the informal sector can also present challenges related to equity in access (often due to unregulated tariffs) and to the lack of regulation of the quality of the resource and service.

Experience from Liberia illustrates how informal service provision can be integrated into the formal water service sector. Criminal gangs controlled illegal water vendors, which hampered donor and government efforts to rebuild more formal structures (Pinera and Reed 2014*). Instead of setting up an adversarial situation with the informal sector, Oxfam, which has had a local presence for several years, was able to broker an agreement between the vendors and the Liberia Water and Sewer Corporation to recognize the vendors as legitimate and to provide them with tanks to improve their capacity; the agreement also provided for testing the quality of the water they were selling. Such arrangements can provide an interim mechanism for breaching the service gap over the short to medium term after conflict.

The diversity of institutions working on post-conflict water management requires specific mechanisms for coordination and cooperation, such as those being developed by the Global WASH Cluster and the Joint Standards Initiative described above. Emerging actors, such as informal service providers and militaries, are playing increasingly important roles, but both also call into focus the need for accountability and the importance of effective water governance to ensure that humanitarian and resource management goals are achieved.

Beyond humanitarian assistance: Laying the foundations for peace consolidation and sustainable development

Rapid restoration of water services immediately after conflict must also lay the foundation for sustainable recovery and a transition to peace consolidation and development. A number of experiences around the world point to key features of immediate and early post-conflict interventions in the water sector that will ensure this longer-term sustainability. It is critical to balance the humanitarian focus on the emergent needs of a post-conflict population with these factors impacting the medium- to long-term sustainability of the natural resource, even where this might require greater initial financial and technical investments in assessments and longer planning cycles, which in turn might require even higher levels of coordination among humanitarians, donors, and post-conflict governments and civil society.

Perhaps the most commonly cited factor for ensuring sustainability is the ongoing involvement of different users in planning, developing, and implementing

water sector interventions. Involvement of diverse stakeholders has the potential to ensure that the needs, priorities, and concerns of all are taken into consideration when developing and implementing water services and management interventions. This can be critically important in areas where competition over natural resources has contributed to conflict or has the potential to spark renewed conflict by exacerbating other tensions.

In Somalia, for example, UNICEF was forced to rethink its water and sanitation programming by first enabling negotiations to resolve historic conflicts over access to scarce water. Once existing tensions were addressed through a facilitated process that brought together all of the relevant stakeholders, an agreement was reached among local leaders on the construction of water systems and monitoring mechanisms, and water was provided to IDP camps while also creating mechanisms for longer-term management of the natural resource (UN PBSO 2012).

Similarly, in Kyrgyzstan, water access has been a key factor in ethnic tensions between Kyrgyz and Uzbek populations. Uzbek communities in southern Kyrgyzstan perceived their Kyrgyz neighbors to have better access both during and following the ethnic conflict in 2010 that killed 200 people and displaced thousands, deepening feelings of discrimination and intercommunal grievances. However, World Food Programme activities that focused on building irrigation channels were able to serve as platforms for bringing stakeholders together to air these grievances and develop trust (UN PBSO 2012). Because these communities saw that together they could work toward creating mutual benefits from the project activities, it was possible to harness that cooperation to support more effective water management.

The work of the NGO Tearfund in building community-based water management schemes has been notably successful and even brought to scale in the DRC by the national government (Burt and Keiru 2014*). This is largely due to the long-term involvement of local and government stakeholders in the planning, implementation, and monitoring and evaluation of the schemes. In particular, women from communities that previously suffered from high levels of mistrust played a leadership role in decision making and implementation throughout the process, which was key in building trust and ensuring the schemes' sustainability.

Similarly, during reconstruction in Kurdistan, the high level of community involvement facilitated a negotiating process to determine how decisions regarding water resources would be made, including timing and quantities of abstraction, allocation, and monitoring (Barwari 2013). However, while this resulted in sustainable management of irrigation water, it notably excluded women from the negotiations and failed to prioritize the domestic water needs that is the purview of the females running the households. Care must be taken to provide specific mechanisms for involvement of traditionally marginalized populations, such as women and the very poor, in order to ensure equitable outcomes.

In their chapter, Murray Burt and Bilha Joy Keiru highlight another key aspect of sustainable interventions: effective engagement with national and local

governments. When a government lacks the capacity to provide immediate access to water services, to manage aid packages, or to coordinate all of the activities within the sector, donors and other international institutions may turn to NGOs or the private sector to fill this role. While sometimes an effective short-term practice, bypassing government completely fails to build the necessary foundation for sustainability of these services. Tearfund's work emphasizes the importance of early and ongoing engagement of relevant government stakeholders to build their capacity and ensure the generation of political will to sustain these interventions.

For countries to reap the peace dividends associated with provision of water services, donors and governments must emphasize basic services in their funding allocations. Yet spending on water services is often a much lower priority than other areas. From 1977 to 1997, only 4.2 percent of World Bank lending in post-conflict reconstruction went to the water and sanitation sectors (Kreimer et al. 1998).[7] In Uganda, lending for water and sanitation services comprised only 6 percent of all post-conflict lending throughout the 1980s and 1990s (Kreimer et al. 2000). This general trend still continues in some post-conflict countries: from 2001 to 2009 in Afghanistan, for example, international, bilateral, and multilateral aid to the country reached US$24 billion, yet only US$1.2 billion, or 5 percent, went to the water sector (CPHD 2011).

Another challenge is the lack of information required for decision making that promotes sustainable interventions. Water quantity, quality, and allocation data, as well as the mechanisms for managing the water resources (and how these have been impacted by conflict) should inform sectoral activities, but are often missing because the baseline and monitoring data never existed, or they were destroyed during conflict. In Afghanistan's Helmand Province, for example, there is no comprehensive record of the number of wells that have been dug or drilled; no documentation of changes in the water table over time; and no ongoing collection and sharing of data on groundwater quality (Palmer-Moloney 2014*). Groundwater levels are dropping because of drought conditions and water withdrawn from wells, but lack of data has hampered effective responses. Environmental assessments can provide a tool for filling some of this data gap, but must be complemented by ongoing monitoring, which can be challenging in a post-conflict environment where equipment maintenance and human capacity are limited (Jensen and Lonergan 2012).

Experiences in Liberia and the DRC demonstrate how communities can generate such information—highlighting again the importance of community involvement in decision making (Pinera and Reed 2014*; Burt and Keiru 2014*). In the absence of such local knowledge, early interventions might inadvertently damage broader recovery efforts to restore livelihoods and sustain peace. Uncontrolled and uninformed digging of deep wells to meet immediate humanitarian needs in Afghanistan inadvertently undermined the traditional *karez* water

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[7]   There is limited data on water and sanitation lending.

system of underground canals, disrupting local livelihoods and engendering new conflicts over access to water (UNEP 2003). A similar experience occurred in Darfur: from 2003 until 2006, a number of humanitarian actors drilled and constructed hundreds of wells and water points to provide displaced persons with water, without monitoring extraction rates from the groundwater or assessing how much water can be withdrawn (UNEP 2007). A 2007 assessment by United Nations Environment Programme (UNEP) made it clear that some of the extraction rates were unsustainable, and had led to five of twelve boreholes running dry in the Abu Shouk camp in southern Darfur. This points to the importance of baseline resource assessments and adequate monitoring programs to prevent overuse of the resource and renewed conflict as access dwindles over time.

While immediate post-conflict interventions focus on meeting urgent needs, the restoration of water and sanitation services to meet those needs also lays the foundation for long-term recovery and peace consolidation. How those services are developed and provided can have an important impact on the options for sustainable natural resource management. Stakeholder engagement and effective data collection and management are important tools to ensure that this foundation is strong and avoids unnecessary damage to the natural resource.

Peacebuilding and water infrastructure development

The building (or rebuilding) of water infrastructure is critical to post-conflict peacebuilding efforts, especially as countries move away from immediate humanitarian interventions toward recovery and peace consolidation. Water and sanitation infrastructure not only provides access to potable water and hygienic living conditions for concentrated populations, but investments in infrastructure also correlate positively with overall economic development rates (Mardirosian 2010). Moreover, infrastructure reconstruction is an important demonstration of legitimate state building, and the absence of basic services can be a flashpoint for public protest against authorities, as happened in Iraq during frequent water service interruptions in 2010.

Rebuilding of infrastructure requires large amounts of capital investment, high levels of technical and administrative capacity, and effective regulatory oversight. Whether the infrastructure never existed or suffered damage during conflict, rebuilding can take years, depending on the level of deterioration. For example, while the DRC is considered to be a water-abundant country, the water use in 2000 in the DRC, at seven cubic meters per capita (approximately nineteen liters per day), was much lower than in many water-scarce countries in the Sahel (UNEP 2011). In Liberia, by 2006 (three years after the end of Liberia's second civil war), the "percentage of people with access to basic social services such as clean and safe drinking water, averaged about 40 percent of their pre-war levels" (ROL and UNDP 2006, 40). Prior to the first Liberian civil war, in 1989, 45 percent of the urban population and 23 percent of the rural population had access to pipe-borne water; by 1999 only 25 percent of the urban population and

4.1 percent of the rural households had that access. By the end of the second civil war in 2003, pipe-borne water was almost entirely absent, leaving the population dependent upon (often untreated) wells, ponds, and rivers for their primary sources of drinking water. In Kabul, Afghanistan, where institutional reforms progressed more rapidly than in Liberia, it still took three years to develop a vision for the institutional development of the metropolitan water utility (Pinera and Reed 2014*).

In countries with continued violence, such as Iraq and Afghanistan, delays are often directly attributable to the physical risks to government staff and contractors. In Iraq, government contractors were forced to hire private mercenaries to protect infrastructure assets, but the costs had to be drawn from a budget for other infrastructure projects (Mardirosian 2010). The costs of protecting water infrastructure can be high: in 2004, half of the budget for the water sector from the Iraq Relief and Reconstruction Fund was reallocated from technical support to security, resulting in only forty-nine out of 136 water projects being completed by 2006.

While there has been a global debate on the role that privatization can play in increasing access to water services (Allouche 2014*), private investment in the water sector is rarely undertaken in post-conflict situations, particularly in the first few years following the end of armed conflict (Schwartz and Halkyard 2006). Private investors perceive several risks in post-conflict countries: physical risks to investments; little assurance of return on investment; and economic, political, and legal frameworks conducive to corruption (Hoeffler 1999). The countries also lack markets, and cost recovery is not viable without government subsidies, which are rarely possible in post-conflict situations (Mardirosian 2010). Accordingly, donors and development banks most often step in to work with national governments to rebuild conflict-damaged infrastructure. Only in a few cases have private investors entered the water sector; one exception was in Kosovo, where a management contract was signed with a foreign operator in 2001 that led to successful reinvigoration of water services and capacity building of national staff that took over when the management contract ended (Marin, Mugabi, and Mariño 2010).

A United Nations Development Programme (UNDP) project implemented in Lebanon following the 2006 conflict with Israel demonstrates how international actors can integrate local government capacity-building efforts in a decentralized water services governance framework. During the early recovery process, local governments in Lebanon engaged in deliberative problem solving, planning, decision making, and the conclusion of service delivery contracts, work plans, and timetables in a learning-by-doing approach (Hamill and Ali-Ahmad 2007). One of the challenges identified in this approach was the need to balance urgent response mechanisms with a participatory approach that is slower but results in more-sustainable solutions. As far as possible, local municipal councils were engaged in local planning and decision making. The mayor of each municipality had to obtain the approval of the relevant council when making project decisions,

and one council member was charged with day-to-day project administration. UNDP field officers undertook assessments of local stakeholder needs to feed into the project work plan, implemented by the council. With careful planning, speed and participation appear not to have been mutually exclusive. This UNDP project demonstrates the importance of building on existing institutional capacities, as the municipal governments were well positioned and had the underlying legal mandate for service provision, but lacked the financial and technical capacity to deliver on that mandate (Hamill and Ali-Ahmad 2007).

Coordination is critical among those investing in post-conflict infrastructure redevelopment. A World Bank evaluation of water and sanitation projects under-taken in Bosnia and Herzegovina during the first phase of reconstruction from 1991 to 1995 found that it was difficult to attain the projects' objectives because most of the funding agencies opted to work on their own, using different operational policies and procedures, causing confusion during project implementation and overlaps in donor activities (World Bank 2003). Similarly, Jean-François Pinera and Robert A. Reed highlight the high number of donors, humanitarians, members of civil society, and national governments participating in the rehabilitation of water and sanitation infrastructure in the urban areas of post-conflict Kabul, Afghanistan, and Monrovia, Liberia (Pinera and Reed 2014*). Large-scale reha-bilitation projects (often coupled with institutional reforms to support government capacity building) by multilateral development banks, international humanitarian organizations, and donors were accompanied by smaller NGO-led projects to avoid communicable disease outbreaks in underserved populations where the network is not likely to reach (Pinera and Reed 2014*). In Kabul, for example, at least seven institutions had separate initiatives on large water works projects alone, resulting in duplications in investments and a need for improved coordination.

It is also critical that infrastructure investments do not inadvertently increase social inequities that may spark renewed tensions. Following the end of the first civil war in Sudan in 1972, the government in Khartoum began construction of the Jonglei Canal to drain the Sudd marshes of the White Nile and convey water from Bahr el Jebel in the south to north Sudan and Egypt for commercial farm-ing. In failing to consider the negative impacts on the ecosystem or the adverse effects on the livelihoods of local communities, the plan sparked protest riots in southern Sudan (Salman 2014*).

In Zimbabwe, access to water services was leveraged to reinforce disparities among religious sects, ethnic groups, and the political opposition. Following independence in Zimbabwe in 1980, the new government sought to strengthen its political legitimacy by addressing inequalities in service provision. By 1988, as a result of the party's efforts to improve water services, 84 percent of the population had access to safe drinking water (Allouche 2014*). However, closer inspection of the government programs reveals that Matabeleland—a region that was a center of opposition to the government party during the conflict—was purposefully excluded from infrastructure and service improvements (Allouche 2014*). Intentional neglect of certain areas in order to disadvantage particular

political or ethnic groups may strengthen state control in the short term, but an imbalanced approach fosters grievances that can undermine state legitimacy and the peace process over the long term.

Rehabilitation of water services infrastructure plays a critical role in transitioning from immediate humanitarian assistance to sustainable development and peace consolidation, but faces many challenges related to the high levels of investment and capacity (technical and regulatory) that are necessary. Lessons from specific experiences highlight the need for careful coordination among donors, effective stakeholder engagement, conflict-sensitive approaches that avoid perpetuating inequities in allocation of services, avoidance of duplication or overlap, and support for meaningful livelihoods recovery and broader reconstruction.

WATER FOR LIVELIHOODS AND ECONOMIC RECOVERY

Armed conflicts tend to exacerbate poverty and destroy livelihoods (World Bank 2004). Countries that were immersed in violence between 1981 and 2005 are likely to have a poverty rate as much as 21 percent higher than a country that did not experience such violence (World Bank 2011). Armed conflict undermines economic growth by disrupting labor markets, obliterating infrastructure that provides access to markets (such as roads, bridges, shipping ports, and airports), and weakening the capacity of state institutions (Collier 1999). The World Bank estimates that the economic costs of lost production during civil war ranges from 2 to 3 percent of global domestic product over the course of a conflict (World Bank 2011).[8]

The durability of peacebuilding efforts thus depends substantially on the ability of governments to demonstrate the benefits of peace, especially so that former combatants and other conflict-affected groups, including returnees, will continue to have a stake in the political process (del Castillo 2008). One way to generate immediate material gains is to assist former combatants and others to build sustainable livelihoods and income-generating options (Doyle and Sambanis 2006). Providing access to water and other natural resources is often essential in supporting these activities. For post-conflict societies to reap the material gains of peacebuilding, water must invariably be mainstreamed into economic and development decision making.

Restoring trust among communities and in national institutions governing water is a core component of improving livelihoods. At war's end, there are high expectations that livelihoods will improve almost immediately, but the reality of fractured societies, weakened political institutions, and dilapidated infrastructure make it challenging to deliver these benefits quickly. As Jennifer McCarthy and Daanish Mustafa show in their analysis of experiences in Faryab Province,

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[8]   The World Bank notes that these numbers do not include the destruction or loss of assets (World Bank 2011). For further analysis on the economic costs of violence, see Skaperdas et al. (2009).

Afghanistan, poor implementation of national water management policies at the local level weakened trust in government institutions despite the emphasis on participatory development under the National Solidarity Programme (McCarthy and Mustafa 2014*). McCarthy and Mustafa argue that this distrust is due to the failure of post-conflict interventions to incorporate village- and household-level experiences and knowledge regarding water management.

Post-conflict planning must therefore focus on restoring both agricultural and nonagricultural livelihoods, improving intersectoral coordination, relying on existing social capital and water management institutions where they exist, and assuring that all steps toward economic recovery are conflict sensitive. These are discussed in turn below.

Agricultural livelihoods

In the immediate aftermath of conflict, humanitarian organizations and other actors focus their water-related interventions on securing safe water and sanitation to prevent the spread of infectious disease and to bring back a sense of normality to those displaced by conflict. Over the longer term, providing access to safe and reliable sources of water is necessary for the restoration of agricultural livelihoods and food security. While a wide range of livelihoods depends on access to water, the agricultural sector is responsible worldwide for 70 percent of water withdrawals (FAO 2010). The remaining 30 percent of water withdrawal goes to the industrial (19 percent) and municipal (11 percent) sectors. In sub-Saharan Africa, the balance shifts even further to agriculture, with 87 percent of water withdrawal going to agriculture, 3 percent to industrial uses, and 10 percent to municipal purposes.

Despite these global trends, there is wide variation in water usage in post-conflict countries. In post-conflict Sierra Leone, for example, agriculture consumes the largest percentage of water (UNEP 2010); likewise, agriculture (mostly irrigated) uses 95 percent of water resources in Afghanistan (CPHD 2011). In contrast, in Burundi only 0.9 percent of land area is irrigated. Similarly, in Angola and Liberia only 0.6 and 0.3 percent of land is irrigated, respectively (AFDB 2012).

Because agriculture in many post-conflict countries employs the largest percentage of the population, many countries invest in the sector to create jobs and simultaneously improve food security at war's end, especially where the service and manufacturing sectors are absent. Even in mineral-rich countries, agriculture often provides the main source of employment; in Angola, for example, approximately 85 percent of the labor force is employed in agriculture (USAID 2012). In rural areas where most of the population was previously employed in agriculture, as in post-conflict northern Uganda, restoring agriculture during early recovery efforts helps to absorb demobilized excombatants and returning IDPs, ultimately providing a key link between humanitarian assistance and development (Birner, Cohen, and Ilukor 2011; USAID 2009). Moreover, water in countries

like Afghanistan is what makes agricultural land valuable; UNEP has found that irrigated land with a reliable water source is four to fourteen times more valuable than that of rain-fed land (UNEP 2013a). Thus investments in sustainable water management are critical in supporting reinvigoration of an agricultural economy.

In many post-conflict countries, food insecurity is compounded by the widespread destruction of irrigation infrastructure. Experience from Afghanistan, Liberia, and Timor-Leste (among other countries) shows that irrigation infrastructure can be both deliberately and incidentally harmed by conflict. As a result, it is essential in the aftermath of conflict to restore irrigation systems as a step toward rebuilding agriculture-based livelihoods. In the Afghan village of Bako Kham, in Kapisa Province, food security depends entirely upon restoring an irrigation system that had fallen into disrepair during the conflict (Burt and Keiru 2014*). Yet, in restoring the irrigation system, it was necessary to look at the linkages between irrigation and drinking-water systems because the canals used for irrigation would pass through residential areas and would also be used as the main source of drinking water. This points to the need for a multiuse perspective in post-conflict water management.

One of the main tasks facing governments and the international community when seeking to jump-start agriculture is to use irrigation both to ensure food security and to incentivize the return of refugees, displaced persons, and demobilized soldiers. Indeed, this was the case in post–World War II Japan; in order to enhance its food security to feed returning soldiers, the government made the construction of irrigation projects a central component of its early recovery efforts (Sugiura, Toguchi, and Funiciello 2014*). Likewise, following the communal violence that engulfed India and Pakistan at independence and partition, the government of India was faced with the resettlement and rehabilitation of millions of refugees who had entered eastern Punjab. With more than 80 percent of India's population dependent upon subsistence agriculture that was fed by the waters from monsoons, the government developed irrigation systems to increase food production and establish an agrarian economy in eastern Punjab as part of its recovery efforts (Zawahri 2014*).

A lack of reliable hydrological data and functioning hydrological infrastructure is a challenge facing international actors and governments in many post-conflict countries as they seek to restore the economy, including the agricultural sector, and build government capacity. Three decades of war and instability in Afghanistan weakened its capacity for hydrological data collection, and the thirty-year gap in hydrometerological data and equipment has made the restoration of the country's irrigation infrastructure even more difficult (Dehgan, Palmer-Moloney, and Mirzaee 2014*; IRIN 2006; IDMC 2005). Without baseline hydrological data, donors and governments often must make decisions without knowledge about how the quality and quantity of the water resources are changing across Afghanistan's water basins.

Lack of historical data on water quality, quantity, abstraction rates, and rights for abstraction is common across post-conflict countries. This points to the

need for strong baseline assessment processes, as well as adaptive management approaches that focus on data gathering and regular monitoring and review of management approaches and resource status so interventions can be adjusted as new information becomes available. The post-conflict period can provide an important window of opportunity for instituting valuable programs for information collection and management and adaptive governance approaches that utilize this information as it becomes available to inform more effective planning and decision making.

The revival of the agricultural sector will be vital for reintegration of people displaced by armed conflict in the short term, and for stabilizing post-conflict societies over the long term by generating employment, providing sustainable livelihoods, and improving social welfare. To that end, donors have promoted agricultural development in Afghanistan as a bulwark against insurgency; the success of these activities is, however, heavily dependent upon securing sufficient water resources for water-intensive crops such as wheat (Dehgan, Palmer-Moloney, and Mirzaee 2014*). At times, segments of the population have quickly reverted to growing opium poppy instead of food crops because opium poppy requires less water and provides a higher financial return than staple crops (Goodhand 2005; Catarious and Russell 2012). In water-scarce Yemen, khat production, which consumes approximately 37 percent of all water for irrigation, has not only contributed to the country's growing water crisis—Yemen's capital, Sana'a, may be the first city in the world to run out of water—but has reduced the amount of agriculture devoted to food production, weakening food security (Lichtenthaeler 2010).[9]

Because agriculture is often the largest sector in a post-conflict country, restoration of irrigation systems is critical, as land values and productivity are tightly linked to access to water. But to do so, baseline hydrological data must be developed in order to maximize investment in irrigation systems.

Nonagricultural livelihoods

Water is also a critical resource for nonagricultural livelihoods. In post-conflict DRC, given the population's reliance on rain-fed agriculture and minimal irrigation, only 32 percent of water withdrawals are for agriculture while domestic water consumption accounts for 52 percent (16 percent is used by industry)

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[9] In a similar manner, protracted drought in Syria from 2006 to 2010 amplified poor water management and agricultural policies that promoted self-sufficiency in food staples and water-intensive cash crops such as cotton. While there are a number of causes underlying the Syrian uprising, the social costs of the drought compounded by ineffective government policies contributed to societal grievances, as rural people were forced to migrate in large numbers to urban centers in the face of widespread crop failure, which in turn placed additional stress on overly stretched government resources (Dahi 2013; Mohtadi 2012).

(UNEP 2011). Water is important for other economic sectors in the DRC, including hydropower generation, fisheries, and navigation.

Pastoralists, especially in post-conflict and conflict-affected regions, are heavily dependent upon water for their livelihoods. In the Sahel, access to water points is vital for managing grazing lands and livestock (Thébaud, Vogt, and Vogt 2006). Shifting rainfall patterns and destruction of water points during conflict often force transhumant pastoralists to change migration patterns and use the same water sources as settled farming communities. In the Karimojong Cluster—an area that stretches from northeastern Uganda to southeastern South Sudan across northwestern Kenya and into Ethiopia—pastoralists have been forced to cover increasing distances to access water and grazing grounds they rely upon as drought and climate fluctuations drive resource scarcity (Lind 2014). Delineating access to water is also an important issue for pastoralists residing along the border between Sudan and South Sudan.

Water is also vital for supporting the livelihoods and ecosystem services for marshland families in Iraq, including wild and cultivated sources of food, livestock, fisheries, reeds for housing, transportation, and climate regulation. In the late 2000s, drought combined with upstream water diversions in Iraq and Turkey reduced the amount of water in the Iraqi marshlands; without water to support their livestock (primarily buffalos and cattle), families were forced to move away from the marshlands (IRIN 2009).

While conflict can arise between ethnic groups as they seek water for their livelihoods, those disputes also present an opportunity to reach water-sharing agreements that further peacebuilding efforts. In the state of South Kordofan, in Sudan, the British government and the international NGO PACT have developed an integrated approach that provides drinking water and water for livestock as a means to mitigate historical tensions between Misseriya herders and the Ngok Dinka; conflict between the two groups has often broken out during the dry season when cattle migrate over farmlands. Since the development of the new water sources and the social institutions to maintain them, a potentially difficult migration by the Misseriya was completed without incident in 2011. Unfortunately, these crossings were later stymied in 2012 by border closures and clashes (Craze 2013). Nevertheless, this is a positive example where water was successfully used, at least initially, as a platform for peacebuilding and cooperation between these two groups.

Water is thus critical for restarting and sustaining diverse nonagricultural livelihoods. While disputes can arise over water resources for livelihoods in post-conflict situations, those tensions can also provide opportunities for conflict-sensitive approaches that promote reconciliation and peacebuilding.

Intersectoral coordination

After Mozambique's civil war ended in 1992, peacebuilding was adversely affected by a combination of land and water shortages (Myers 1994). The absence

of coordinated reforms in land tenure and water rights caused many refugees and displaced persons to return to places other than their areas of origin, mostly moving to peri-urban and urban areas, placing new pressures on the already taxed water infrastructure (Myers 1994).

One of the main lessons for reviving the broader economy is mainstreaming water into the development processes among the land, water, agricultural, and energy sectors. Land tenure issues are a primary example where the failure to account for water rights and management can impact the utility and equity of reform. Despite this, there is little evidence of effective coordination among ministries and donors focused on various sectoral programs related to the impacts on and need for access to water in post-conflict programming.

As with land rights (that often combine both customary and statutory governance mechanisms), water rights vary across a spectrum from customary practices to statutory rights or authorizations for use. In practice, all of these rights systems can be influenced by the power distortions and coping mechanisms that emerged during the conflict. Transitioning to more formal systems of water rights can be a long process and requires a careful understanding of the various systems for allocating rights that often exist simultaneously within a post-conflict country, and the ways in which those rights may be linked to other natural resource tenure systems, particularly landownership. In Kurdistan, land allocation and water access were viewed as integrally connected in the design of community-based initiatives to support resettlement of displaced families (Barwari 2013). Because land and water were considered together, communities were better able to utilize traditional means of dispute resolution for conflicts that might ensue over reconstruction programs and the return of refugees and IDPs.

The importance of intersectoral coordination can also be seen in the post-partition economic reconstruction in eastern Punjab. Here, the Indian government's understanding of the importance of multilevel and intersectoral coordination led not only to efforts to coordinate water and land access but also to work across levels of government to integrate refugees and rebuild livelihoods. The Indian government from the outset was cognizant of the need to provide Punjabi farmers with both defined property rights and access to water (Zawahri 2014*). Specifically, it allocated land to refugees to assist with resettlement and economic recovery at the same time it made irrigation water available from canals and wells; it also undertook extensive investments in hydrological infrastructure, including the multipurpose Bhakra-Nangal Dam along the Sutlej River. Intersectoral coordination resulted in both short-term and long-term welfare gains accruing to the population at large. The construction of the hydrological infrastructure and cleaning of existing irrigation systems provided much needed employment for the refugee population in the short term, helping to stabilize the post-conflict economy.

Water-related policies, programs and decision making must therefore be integrated into or, at the very least coordinated with, other relevant sectoral programs and policies—particularly land reform initiatives, agriculture, and

broader development planning—so as to facilitate post-conflict economic reconstruction.

Social capital and water management institutions

Donor and government interventions to improve livelihoods and foster economic recovery are more effective when they consider how best to build upon existing social capital and local water governance practices. Social capital was critical to water management in post–World War II Japan (Sugiura, Toguchi, and Funiciello 2014*). Much of the country's post-war success at revitalizing the agricultural security and attaining food security was due to the persistence of social structures in Japan throughout the war. Japanese government policy makers fostered communication between local villages and central authorities over water alloca-tion and use—that is, they sought to build on existing institutions and capacities, and not try to establish new institutions that would be at odds with community institutions in the irrigation sector.

In urban and peri-urban areas of Angola, a community-based approach helped identify a balanced approach that built on existing social capital and increased capacity for improved water services (Cain 2014*). The focus in Angola was on the social capital and employment generated by the evolution of an informal water service sector during conflict. This informal sector was able to reach individuals not covered by the failing state infrastructure, but was also plagued with inconsistencies in availability and quality (Cain 2014*). Building community-based institutions was ultimately the key to linking the formal and informal sectors to enable increasing levels of oversight and regulation without destroying the social capital inherent in the relations formed by the informal market.

Informal institutions should not be viewed as either a challenge to the consolidation of the state or as a barrier to economic recovery, because they can support the reconstruction of the institutions vital for economic recovery (Allouche 2014*). Often, governments and international actors will give preference to the rebuilding of formal, state-based institutions for water services because the restoration of state institutions is seen as a way to enhance the legitimacy and authority of the government as part of a formal, bureaucratic concept of state formation (Allouche 2014*). Viewed through this lens, the state serves as the main provider of public goods, and the informal sector is seen as a challenge to the government's authority. Yet, as Jeremy Allouche argues, during conflict it is often the informal sector and small-scale providers that fill the void for water service provision, and harnessing the capacity of the informal sector after conflict may provide an alternative and viable means to complement more traditional state building and reach more of the population at a faster pace.

Water user associations (WUAs) are an institutional mechanism for groups of users (usually farmers) to come together to manage their shared water resources, often with the intended purpose of providing and maintaining irrigation schemes. WUAs are often more effective where social capital is present or where the

associations are built upon local governance structures (Sauer et al. 2010). In a few post-conflict situations, donors such as the Belgian Development Agency in the DRC have succeeded in establishing WUAs in rural areas to manage small-piped water networks; that these WUAs were designed to function as small-scale enterprises have enabled them to monitor water usage and collect payments for water sold (UNEP 2011).

Ultimately, whether building new institutions or revitalizing existing mechanisms, it is important to recognize that post-conflict water management does not take place on a blank slate. Customary and informal mechanisms for management that may have emerged or been impacted by conflict can provide significant sources of social capital for building effective water management regimes. It is therefore critical for those involved in peacebuilding efforts to understand the existing institutional (and practical) water management landscape and the ways it has been shaped by conflict.

Conflict-sensitive economic recovery

Investment in infrastructure and governance to facilitate economic recovery can—if not undertaken appropriately—exacerbate inequities in access to natural resources and impact communities and the environment quite severely, undermining both economic recovery and reconciliation. Many conflicts have a long history of poor governance and government corruption, including rent-seeking behaviors related to public services (Gaigals and Leonhardt 2001). One way to ensure that programs to remediate water infrastructure and service provision are conflict-sensitive is to ensure that they meaningfully involve local stakeholders in a thorough assessment of the local context to understand the political economy of the conflict and its impacts on resource-related interventions. It is particularly important to recognize the relationship between national-level investments—for example, in reinvigorating agriculture—and the various local contexts in which they will be implemented.

Job creation at the local level is not only essential for economic recovery in post-conflict societies, but also an important indicator of policies that successfully take into account the local context. Because state capacity to manage water and build water infrastructure was limited in rural Afghanistan, the NGO Tearfund played an important role in helping to build the local capacity to manage water in Bako Kham village, in Kapisa Province, by stimulating demand for a household water treatment system, a bio-sand filter, that could be produced by local artisans. Through working with the government, the community development council, and communities, Tearfund contributed to local livelihoods by training local artisans to produce the filters and by holding training sessions on how to operate and maintain the filters (Burt and Keiru 2014*). As a result of their efforts, several trained technicians opened bio-sand filter shops in Bako Kham village.

Examining experiences in South Sudan, Sam Huston points to two principles —equity and consensus building at the local level—that can foster conflict-sensitive

approaches in the water sector (Huston 2014*). While certain regions or populations may have greater needs within the water sector at conflict's end, experience in South Sudan shows that in the absence of data about where to target financial and technical resources, government decisions to equitably distribute the benefits from natural resources across its ten states has served to prevent and mitigate conflict within the allocation process. Consensus building helps to ensure that local authorities and communities have a voice in decisions to allocate natural resources and their benefits, helping to mitigate the likelihood for conflict. Huston describes how local authorities, traditional leaders, peace committees, and community organizations in Southern Sudan collectively decided where to situate new water points. An emphasis on transparency in decision making further strengthened communities' ownership over the process and contributed to the sustainability and management of these water points.

If post-conflict investment is not sensitive to inequities in access to water resources, there is a danger of relapsing into conflict. It is therefore important to assure equity and consensus at the local level, where disputes over access are most likely to arise.

TRANSBOUNDARY COOPERATION

Cooperative transboundary water management practices can play a critical role in peacebuilding between countries and at the regional level. Of the fifty-five countries affected by major conflict during or since 1990, fifty-one share at least one basin with one or more nations.[10] This hydrological interdependence has the potential to fuel competition and spark tensions between riparian states, but it also offers a unique set of opportunities to unite them. Indeed, research has shown that from 1948 to 1999, of 1,831 state-to-state water interactions in a transboundary basin, approximately two-thirds of the events were cooperative and none led to formal war (Wolf, Yoffe, and Giordano 2003). Violent conflict over water is more common at the subnational level than among countries (Wolf 2007).

The institutions created to enable countries to jointly manage shared waters have proven resilient, even during periods of acute conflict. The Mekong Committee, for example, was founded in 1957 and remained active through the Viet Nam War and internal upheavals in Cambodia and Laos (Wolf 2007; Nakayama 2011). Likewise, the Indus River Commission has endured two wars between India and Pakistan (Wolf 2007; Zawahri 2014*). This indicates that the complex interdependencies among countries created by sharing international waters can also provide powerful incentives for collective action and cooperation (Kramer 2008). These incentives can be harnessed to rebuild trust and confidence among former adversaries following interstate conflict and facilitate reconciliation and peacebuilding.

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[10] See table 1 on page 3 of this book for a listing of these fifty-five countries.

Water in negotiated agreements

For centuries, states have successfully managed to negotiate agreements over shared water resources; the International Freshwater Treaties Database includes more than 400 international freshwater agreements from 1820 to 2007. Today, more peace agreements are beginning to recognize the importance of including natural resources, such as water, within the treaty framework. Whereas between 1989 and 2004 natural resources were mentioned in approximately half of all agreements, from 2005 to 2010 natural resource provisions were included in all major peace agreements (Bruch et al. 2014). Table 1 lists countries affected by major conflict that have explicitly addressed water in peace agreements from 1990 through 2013.

How water is addressed in peace agreements has a significant impact on the overall peacebuilding process. The 2006 Abuja Agreement between the government of Sudan and Darfur insurgents, for example, recognized certain rights of all Sudanese citizens, including a right to safe drinking water. Peace agreements for ten other major conflicts also contain provisions explicitly addressing water resources. These include provisions addressing water supplies for former combatants, returning refugees, and IDPs; provisions on international cooperation over water resources; provisions on drinking water and navigation; and provisions covering water resource management and governance in general.[11]

When water is explicitly addressed in a peace agreement, especially where water was a contributing source of tension between the involved countries, the explicit nature of the commitment to jointly address water-related issues can facilitate the peacebuilding process. A primary example is the 1994 peace treaty between Israel and Jordan. Conflict over water had festered between the two countries since the failure of the Johnston mission in the 1950s to devise a water-sharing plan for the Jordan River Basin. Indeed, water was so contentious that it ended up being the last issue resolved, allowing for the successful conclusion of the 1994 treaty (Haddadin 2014*). Article 6, annex II of the treaty outlines the details of a water-sharing agreement; commits the parties to joint planning, development, and monitoring; requires the countries to notify each other of any proposed project that could modify the flow of their shared waters; and establishes the Joint Water Commission to undertake and manage the commitments in the treaty.[12] While somewhat skeletal in comparison to more comprehensive basin-level

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[11]   In addition to the peace agreements noted in table 1, some other peace agreements—including those between Georgia and Russia; Indonesia and the Free Aceh Movement; Indonesia and Timor-Leste; Iraq and U.S.-led coalition forces; and the Philippines and Muslim Mindanao—refer broadly to natural resources and the environment, implicitly addressing water resources. Peace agreements between Bangladesh and United People's Party of the Chittagong Hill Tracts and between Sri Lanka and the Liberation Tigers of Tamil Eelam address fisheries.

[12]   Treaty of Peace between the Hashemite Kingdom of Jordan and the State of Israel, October 26, 1994.

Table 1.   Objectives of water provisions in peace agreements, 1990–2013

Conflict and date of agreement†	DDR*	Basic services	Infrastructure and navigation	Resettlement	Livelihoods	Governance	Cooperation
Israel/occupied Palestinian territories (1993)			Desalination, infrastructure development			Water resource management	Water rights; equitable utilization
Rwanda (1993)	Water for troop assembly points			Water at resettlement sites			
Croatia/Serbia (1996)			Navigation				International river traffic
Guatemala (1996)		Drinking water	Water infrastructure			Management, water rights	
Sierra Leone (1996)		Drinking water					
United Kingdom/Northern Ireland (1998)							Inland waterways; water quality
Burundi (2000)						Water management	
Sudan/Southern Sudan (2005)	Water supply for excombatants		Navigation			Federal-state concurrent competencies	Nile Commission, transboundary dispute resolution
Sudan/Darfur (2006)	Water supply for excombatants	Drinking water, water services	Development of water resources	Access to water en route to and at resettlement sites; return of historic water rights	Access to water resources for agriculture and herds	Management, allocation, water rights	
Democratic Republic of the Congo (2009)				Water in return areas			
Myanmar (2012)				Water for resettlement			

Source: Compiled by the Environmental Law Institute.

Notes: This table includes peace agreements for countries affected by major conflict between 1990 and 2013, with *major conflict* defined as a conflict resulting in more than 1,000 battle deaths (Bruch et al. 2014).

†The date provided is the date of the agreement that addressed water; in protracted conflicts, there often are multiple peace agreements.

*DDR: disarmament, demobilization, and reintegration of excombatants.

treaties (not peace treaties), the inclusion of these water-related provisions in the peace treaty has provided a legal and institutional basis for sustaining cooperative interactions between Israel and Jordan. Even as political tensions have increased between Israel and Jordan, the countries have continued to abide by the spirit of the water agreement.

The inclusion of provisions on water management in a peace agreement can also serve as a preliminary confidence-building measure (Conca and Dabelko 2002). Following the conflict between Israel and the Palestinian Authority, the inclusion of water issues in the Oslo Accords offered a mechanism for technical cooperation that enabled the parties to begin to work together to build confidence before more controversial issues were addressed. Mara Tignino argues that the states must redress the "deliberate destruction of water installations, discriminatory practices, [and] the denial of access to drinking-water aid" through both institutional and pecuniary means if there is to be real reconciliation and sustained peacebuilding (Tignino 2014, 398*). Recognizing this kind of discrimination at the onset of post-conflict peacebuilding can provide accountability for past injustices and help initiate appropriate trust-building measures (Tignino 2014*; Weinthal and Marei 2002). Thus the Permanent Status Agreement between Israel and Palestine included provisions on Palestinian water rights, as well as an agreement that additional water must be developed in order to meet the needs of "various uses" in the two countries. These provisions provided a foundation upon which to deal with the inequitable use of water resources during the Israeli occupation of the West Bank and Gaza that had restricted Palestinian agriculture. Yet, because the Palestinians were not allowed to implement water infrastructure projects as anticipated, the inequalities in water access became entrenched. Furthermore, restrictions on Palestinian access to water resources have remained in place despite the Oslo Accords. Consequently, the initial peace benefits of including water in the peace process have been undermined over time as the concrete steps to remedy water-related grievances have not been taken (Selby 2013).

When South Sudan became an independent nation in 2011, waters that were previously domestic became transboundary. The country also became the newest member of the Nile Basin Initiative, and appears poised to sign the Cooperative Framework Agreement of the Nile Basin countries, which would replace colonial-era treaties that allocated the basin's water to Egypt and Sudan. The experience of then-Southern Sudan in negotiating when and how to address water as part of the peace process is informative. In concluding the 2005 Comprehensive Peace Agreement (CPA) with Sudan, Southern Sudan ceded all authority for both broader regional water cooperation in the Nile Basin and economic development to the north (Salman 2014*). This was especially remarkable given the central role of natural resource management (particularly oil and gas) laid out in the Wealth Sharing Agreement under the CPA. However, by placing management of the Nile waters under the exclusive jurisdiction of the Sudanese national government, at least for the period 2005–2011, the CPA process avoided getting mired

in Nile politics. Thus, while South Sudan did claim status as a new Nile riparian post-independence, the CPA's management structure maintained regional stability in the Nile Basin prior to the independence of South Sudan. Over the longer term, conflicts over the management and use of the tributaries of the Nile that flow through South Sudan could precipitate a new set of disputes between Sudan and South Sudan (Salman 2014*).

Treatment of water issues in peace agreements can significantly affect the level of cooperation between governments. Collaboration over water can build confidence between governments that otherwise have little formal communication or which have experienced a high degree of tension. Such water treaties thus offer a concrete mechanism for not only institutionalizing interactions among countries previously in conflict, but also for initiating steps toward joint management of a shared resource.

Third-party intervention and technical cooperation

Addressing transboundary water management in post-conflict peacebuilding often hinges on the involvement of third parties that can help to promote conflict resolution and foster reconciliation among state and nonstate actors. Third-party facilitators, which may include local stakeholders, international NGOs, international organizations, or other national governments, play an important role throughout the conflict cycle—that is, from bringing governments to the table to negotiate a water agreement, to providing incentives for keeping parties at the table, to assisting with the implementation of an agreement and providing support for dispute resolution (Nakayama 1997; Weinthal 2000, 2002; Zawahri 2009).

The Indus River and Jordan River experiences illuminate the role of third-party support for conflict resolution and reconciliation in post-conflict peacebuilding. Partition created fundamental economic and political divisions between India and Pakistan. In recognition of the fact that a third party would be necessary to facilitate discussion over shared waters, the World Bank stepped in to facilitate the negotiation of the 1960 Indus Waters Treaty between the two countries. The Bank helped to define the agenda, used incentives and pressure to mediate disputes (for example, through the granting or threatening to withhold financial assistance), and coordinated the donor community in underwriting the construction of hydrological infrastructure to facilitate the treaty's implementation (Zawahri 2009, 2014*).

In the Jordan Basin, civil society has facilitated cooperation and peacebuilding. Through sustained engagement at the grassroots level in environmental education and public awareness, Friends of the Earth Middle East (FoEME) has been instrumental in pushing Israel and Jordan to commit to restoring the water quality of the Lower Jordan River (Mehyar et al. 2014*). As a result of these efforts, the Israeli Water Authority announced in May 2013 that it would begin for the first time to pump water regularly from the Sea of Galilee into the Lower Jordan River in order to begin to rehabilitate the river (Rinat 2013).

Cooperation over the Sava River Basin in the period following the breakup of Yugoslavia was greatly facilitated by the sustained intervention of the European Union (EU) (Čolakhodžić et al. 2014*). Confronting the transformation of a domestic river system into an international one, in 2001 the EU designated the Sava River Basin as one of thirteen European pilot projects to implement the EU Water Framework Directive, which supported the negotiation and conclusion of the international Framework Agreement on the Sava River Basin, a protocol on navigation, and the establishment of the International Sava River Basin Commission in 2006.

Impartial third parties can also mitigate asymmetries in information and power among riparian states—imbalances that can lead to misunderstanding and perpetuate conflict. This is particularly true in cases where a party emerging from conflict is faced with negotiating and implementing a water agreement with one or several other parties that have greater scientific knowledge about the water basin and possess stronger institutional capacity. During the Oslo Accords negotiations between the Israelis and Palestinians, for example, there was an acute asymmetry of power caused by the fact that the Israeli military administration had controlled all data on the West Bank aquifers since 1967. Accordingly, bilateral donors, including U.S. Agency for International Development (USAID) and the Norwegian Ministry of Foreign Affairs, focused on the creation of databases that would both provide greater information to the newly created Palestinian Water Authority and support more effective and balanced cooperation between the parties (Kramer 2008; Claussen et al. 2004).

Problems can arise when donors or other international organizations promote regional projects without addressing the priorities of each country. This was the case with the program sponsored by the Centre for Environmental Studies and Resource Management to build a regional computerized library system, called Waternet, that would have enabled Israel, the Palestinian Authority, and Jordan to share information (Claussen et al. 2004). Because the parties all sought to gain different benefits from the Waternet program, each country pursued their own local data project rather than integrating their databases into a regional one, ultimately fragmenting cooperative efforts. Israel, for instance, was able to concentrate previously unpublished reports into one network. Jordan sought to make water information electronically available to local water users. In contrast, the Palestinian Authority sought access to Israeli water data, but the unpredictable political climate impeded any chance of the program's implementation.

When managed appropriately, donor efforts to address weak and missing hydrological data can build domestic institutional capacity to participate in regional water management. Following the collapse of the Taliban regime in Afghanistan in 2001, there was almost no reliable, up-to-date hydrological data for the country. In fact, a World Bank baseline study of the Amu Darya Basin had to rely upon river flow data from before the Soviet invasion in 1979 (Ahmad and Wasiq 2004). Matthew King and Benjamin Sturtewagen argue that the absence of technical knowledge and limited hydrometeorological data greatly hampered

Afghanistan's ability to pursue regional cooperation (King and Sturtewagen 2010). UNEP sought to fill this void in the Sistan Basin wetlands (shared by Afghanistan and Iran) by commissioning a survey of satellite images of environmental change in the basin from 1976 to 2005 (UNEP 2006).

Helping to build up institutional capacity and technical knowledge may not be sufficient to foster broader regional cooperation in the absence of strong negotiating capacity. Thus, despite UNEP's efforts to broker a dialogue over the Sistan Basin, negotiations ultimately came to a standstill in 2007 because Afghanistan was wary of moving forward too quickly with any regional agreement for fear that they lacked the technical and negotiating capacity to make an optimal deal.

Donors have played a role in supporting technical cooperation around water in the South Caucasus (Vardanyan and Volk 2014*). There, USAID supported a regional program to promote capacity building for integrated water resource management in the Kura-Araks Basin, which was meant to provide a foundation for broader regional cooperation during a protracted conflict. USAID assisted with the collection and sharing of data on water quality and quantity in the South Caucasus as a first step toward restoring relations between decision makers and civil society. While the participation in data sharing promoted better understanding of the causes and severity of water issues and highlighted the need for regional cooperation, the political tensions in the region have forestalled more comprehensive cooperative efforts.

The role of third parties as mediators in regional post-conflict reconciliation is thus a key lesson from a number of transboundary basins. In addition to providing a neutral forum for negotiations, third parties (particularly donors) can provide important resources to mitigate power differentials that arise when riparians have uneven access to data and technical information. Such technical cooperation can be an important first step in regional cooperation over shared water resources, although much still hinges on the broader political climate.

Basin treaties and institutions

As with peace agreements, agreements on shared waters can also provide an important legal mechanism for confidence building and conflict resolution among riparian states. For example, the inclusion of information sharing and joint monitoring can provide the transparency and accountability to shore up confidence and build trust between countries (Hamner and Wolf 1998; Conca, Wu, and Mei 2006). Neda A. Zawahri argues that the clear rules pertaining to conflict resolution and monitoring set forth in the Indus Waters Treaty were critical in enabling India and Pakistan to resolve disputes over water despite the fact that the two countries continue to be enmeshed in broader political disputes (Zawahri 2014*). Undoubtedly, the fact that the treaty was also able to divide the six rivers shared between India and Pakistan (the Indus River and the two westernmost tributaries to Pakistan and the three easternmost tributaries to India) and ultimately break down the physical interdependence of the water system was also important.

Treaties that include provisions for the establishment of a joint water management institution are more apt to build confidence and trust, resolve conflicts, and hence promote cooperation and peacebuilding over the long term (Wolf et al. 2005). Most international freshwater treaties establish a permanent basin organization to oversee implementation and enforcement of the treaty's provisions.[13] Permanent basin organizations help to institutionalize cooperation and build trust among the parties by convening regular meetings among representatives of the riparian countries and, more and more frequently, facilitating joint data collection and monitoring and even joint development and resource protection projects. They also provide a venue for dispute resolution. Mechanisms for jointly monitoring and verifying members' activities (for example, through field visits or submission of annual reports) help to rein in opportunities for noncompliance and build confidence through increased accountability (Zawahri 2009). Regular meetings can also build trust by providing direct communication between representatives of the basin governments through the exchange of hydrological and meteorological data, which over time can help to build a community of likeminded experts concerned with management of the water system.

Both the Indus Waters Treaty and the Jordan-Israel peace treaty established institutional interdependence by committing the water managers to meet regularly to ensure its implementation. Throughout the second half of the twentieth century, the existence of the Permanent Indus Commission mitigated the possibility that water might be a significant source of tension, despite decades of otherwise mounting political tension between the two countries, and in many ways has provided a lifeline for maintaining some measure of communication between the states (Zawahri 2014*). In contrast, the lack of provisions regarding water resources, including dispute resolution over shared waters, in the Dayton Peace Agreement has negatively affected the post-conflict peacebuilding process in Bosnia and Herzegovina. The Dayton Peace Agreement focused on a division of authority over natural resources based on ethnic lines, creating three separate political entities that have overlapping control over shared water resources. It has proven difficult for the jurisdictions to establish appropriate legal mechanisms to foster the necessary cooperation for effective management (Bogdanovic 2014*).

Basin treaties and institutions are thus important mechanisms for fostering regional cooperation and trust among states sharing water resources. Much hinges, however, on the inclusion of effective provisions within the relevant treaty and the ongoing commitment to implementation on the part of the countries. This, in turn, depends heavily on the competence and capacities of the basin institution, which often requires significant and long-term technical support.

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[13] Ken Conca, Fengshi Wu, and Ciqi Mei found that this was indeed the case in forty-five out of sixty-two (73 percent) international river treaties concluded from 1980 until 2000 (Conca, Wu, and Mei 2006).

Regional stability and post-conflict water management at the national level

Post-conflict reconstruction and development of water resources at the national level has the potential to undermine regional stability and peacebuilding if undertaken unilaterally and without consideration for transboundary consequences. Afghanistan's plans for developing and upgrading water infrastructure in each of its major river basins are crucial to the country's social and economic development (Deghan, Palmer-Moloney, and Mirzaee 2014*). However, these actions will also affect transboundary water flows and the ability of Iran in the Helmand Basin and the Central Asian states in the Amu Darya Basin to address their own increasingly pressing water needs. Afghanistan claimed that it was unable to enter into bilateral negotiations with Iran, for example, because it lacks the expertise, capacity, and data necessary to negotiate. Failure to engage, however, may be pushing some neighboring countries, such as Iran, to intentionally undermine water development projects in Afghanistan and even contribute to the rationale for Iran's support for factions of the Taliban in western Afghanistan (Deghan, Palmer-Moloney, and Mirzaee 2014*).

Afghanistan's economic development must be understood within its regional context if it is to avoid backlash from neighboring countries (Dehgan, Palmer-Moloney, and Mirzaee 2014*; Palmer-Moloney 2014*). Donors in the water sector must look beyond the local and national levels and incorporate regional water strategies into policy development and aid programming that promote joint data collection and monitoring and establish some sort of institutional mechanism for coordination, such as a basin organization. Such an organization could initially be guided by a neutral third party to provide a baseline assessment of the Helmand Basin and make recommendations for bilateral management initiatives. Likewise, any decisions undertaken by South Sudan to develop the White Nile will have implications for economic development downstream in Sudan and Egypt (Salman 2014*). South Sudan's entry into the Nile Basin Initiative signals its willingness to engage on the basis of this regional interdependence (*Sudan Tribune* 2013).

While the establishment of basin organization and the mandating of data sharing in treaties can facilitate increased levels of cooperation, these alone are not sufficient to promote reconciliation and sustain peacebuilding in post-conflict basins. Often overlooked is the importance of how critical the dissemination of data is for restoring trust in government agencies and for coordination among donors and policy makers to ensure implementation of projects (Palmer-Moloney 2014*). It is common for donors to undertake project assessments and make them publicly available; however, many other agencies, including the United Nations, militaries, and NGOs, should share and disseminate unclassified data. This would also allow for better coordination among governments, donors, militaries, and local communities in integrated water resource management.

If undertaken without consideration of its regional impact, national water policies can endanger regional stability. Domestic decision making must be

based on engagement in bilateral negotiations and cooperation with neighboring governments when policies have a transboundary effect. Joint data collection and monitoring are two functions on which governments can collaborate.

CROSSCUTTING ISSUES

Many of the lessons related to post-conflict interventions in the water sector fall within the main thematic areas in post-conflict peacebuilding: humanitarian interventions, livelihoods, economic recovery, and transboundary cooperation. Additional lessons derived from the chapters in this book and the broader experiences of those implementing post-conflict water management cut across the timeline and sector-specific issues of post-conflict recovery and apply to diverse aspects of water interventions. Four crosscutting issues are particularly important to the effectiveness of water management in peacebuilding: rebuilding water governance regimes, facilitating stakeholder and public engagement, mainstreaming gender considerations, and sustaining donor commitment.

Rebuilding water governance

Experiences in post-conflict peacebuilding and water management from around the world—including those analyzed in this book—stress the integral role of water resources in peacebuilding. Indeed, of the fifty-five countries affected by major conflict between 1990 and 2013, thirty addressed water in their post-conflict constitutions (see table 2).

Governments and other institutions that are charged with post-conflict peacebuilding are faced with multiple, often competing, priorities with limited resources and time to address them. Sustaining access to water for livelihoods, economic growth, and development over time requires a governance framework that can balance competing demands for an increasingly scarce resource, prevent and manage pollution and other adverse impacts, regulate service provision, and maintain infrastructure. Additionally, there are tensions between technical efforts that have concrete outcomes on an immediate or short-term basis and the need to allocate resources to institutional and governance capacity building that can sustain interventions over the long run. These tensions present difficult questions. At what points along the post-conflict continuum must water policies, laws, and institutions be built to ensure sustainability and prevent inequitable and unaccountable decision making? What levels of governance are most effective at these various points? When will failure to invest in governance frameworks—policies, laws, and institutions—undermine the sustainability of post-conflict investments?

Importance of context

The history of every post-conflict country includes coping mechanisms used by different factions and the civilian population during the conflict to obtain access

Table 2. Countries affected by major conflict between 1990 and 2013 that adopted constitutional provisions related to water

Country	Constitution year (amended)	Legislative power	Public domain/ interest	State responsibility/ management	Local authority or federalism	Transboundary waters	Development	Protection of water resources	Other
Algeria	1996	✓							
Angola	2010		✓		✓				
Chad	1995 (2005)	✓							
Congo, Republic of (Brazzaville)	2001	✓							
Democratic Republic of the Congo	2005				✓				Criminal law, water pollution
Eritrea	1997			✓					Sustainability, future generations
Ethiopia	1994				✓	✓			
Guatemala	1985 (1993)	✓	✓	✓				✓	Water pollution
Guinea-Bissau	1984 (1996)		✓						
India	1949 (2007)	✓					✓	✓	Duties
Indonesia	1945 (2002)		✓	✓					
Iraq	2005				✓	✓			
Kosovo	2010							✓	
Laos	1991 (2003)							✓	Duties
Mozambique	2004		✓						
Myanmar	2008	✓	✓		✓		✓		
Nepal	2007 (2010)	✓	✓	✓					
Pakistan	1973 (2004)				✓				
Peru	1993	✓		✓					

Table 2. (*Cont'd*)

Country	Constitution year (amended)	Legislative power	Public domain/ interest	State responsibility/ management	Local authority or federalism	Transboundary waters	Development	Protection of water resources	Other
Philippines	1946 (2011)	✓	✓	✓			✓		Rights
Russia	1993	✓	✓	✓					
Serbia	2006	✓	✓		✓				
Somalia	2012			✓					Rights
South Sudan	2011	✓		✓	✓	✓			
Sri Lanka	1978 (2010)				✓		✓		Floods
Sudan	2005	✓			✓	✓			
Tajikistan	1994 (2003)		✓	✓					
Thailand	2007		✓	✓				✓	Sustainability
Turkey	1982 (2010)		✓						
Uganda	1995 (2005)		✓	✓	✓				

Source: Compiled by the Environmental Law Institute.

Notes: This table includes constitutional provisions on water for countries affected by major conflict between 1990 and 2013, with major conflict being a conflict resulting in more than 1,000 battle deaths (Bruch et al. 2014). The constitutions of Iran (1979, amended 1989) and Nicaragua (1986)—whose conflicts extended into the period of analysis—include multiple provisions related to water.

Many constitutions also refer to fisheries, including those of Chad, Republic of Congo, India, Myanmar, Philippines, Serbia, and Sri Lanka.

Legislative power: Constitution gives a mandate to regulate water resources.

Public domain/interest: Constitution states that water resources are in the public domain, are public property, or to be managed in the public interest, giving an implicit constitutional mandate to the state to regulate and manage water resources.

State responsibility/management: Constitution provides for broad state responsibility over water resources.

Local authority or federalism: Constitution provides that local authorities or provinces (in nonfederal states) have responsibilities related to water resources; in federal states, constitution provides explicit responsibilities of subnational units in water management.

Transboundary waters: Constitution allocates responsibility for transboundary waters.

Development: Constitution notes importance of water for development or provides a mandate for using water for development.

Protection of water resources: Constitution provides for the protection of water resources.

to and control water. Understanding the role that water may have played during the conflict is an important starting point in strengthening its contribution to peacebuilding. This is a complicated picture, however, with multiple levels of formal and customary water governance that can be difficult for peacebuilders to discern without involvement of diverse stakeholders in program planning and implementation.

More broadly, conflict-sensitive and participatory approaches must be employed to avoid undermining societal confidence in the process and inadvertently creating new drivers of conflict. As noted above, water scarcity has played a role in perpetuating local conflict among ethnic groups and subgroups in South Sudan (Huston 2014*). Such scarcity is a critical factor in structuring decision making that focuses on issues of equity and consensus building at the local level. Recognizing these underlying tensions and involving relevant stakeholders— particularly local government and community leaders—in decisions on water management is critical for preventing new conflicts over access to water in South Sudan and elsewhere.

Post-conflict water governance regimes are characterized by complexity. In Afghanistan, local water governance has traditionally been undertaken by community-based management structures with elected or, more often, selected water masters (called *mirabs*), who oversee water infrastructure construction and maintenance, enforcement of local norms, and conflict resolution (McCarthy and Mustafa 2014*). Community-level water rights and allocation regimes are based primarily on landownership and levels of contribution to water infrastructure maintenance, and the state's role has been largely absent at the local level. During the conflict, however, warlords often replaced local mirabs and violated customary water agreements to divert resources for their benefit, including poppy production. McCarthy and Mustafa suggest that a lack of thorough understanding of local conditions, particularly of power structures and contemporary social dynamics as influenced by the conflict, appear to be hindering effective progress of water interventions in some Afghan communities. More broadly, while customary water management practices and traditional leadership can provide an important foundation for fashioning locally appropriate water governance responses, it is also important to recognize that traditional structures are not necessarily inclusive and can often be subject to elite capture.

Governance and political economy assessment tools geared toward the water sector can support the development of the broad and deep understanding necessary to determine whether to build on existing governance structures or use the window of opportunity of post-conflict rebuilding to reassess critical issues of equity, representation, and capacity building. For example, strategic environmental assessment (SEA), which can be applied at the sectoral level, is a tool increasingly being used to support development decision making. An SEA analyzes the potential environmental and social consequences of proposed policies, plans, and programs. David Jensen has noted that although a lack of robust regulatory regimes, low levels of baseline information, and insufficient technical capacity

can provide substantial obstacles to carrying out an SEA, the assessments have proven effective at the sectoral level, particularly in the early phases of post-conflict reconstruction (Jensen 2012). Jensen points to the importance of leveraging the SEA process to identify peacebuilding opportunities from natural resources, in addition to increasing aid effectiveness between related donor projects. An SEA can also provide an opportunity to engage with diverse stakeholders—from identifying potential impacts to implementing mitigation measures.

Role of local governance

Over the past decades, many countries have attempted to decentralize water resource management authority and strengthen local government capacity to undertake these responsibilities. Decentralization recognizes that water management and service delivery is inherently a local process that requires the participation of users and other stakeholders. Bringing water governance to a local level can facilitate such participation and enable more effective and responsive resource management.

Moreover, strong local government and inclusive local governance are important pieces of the peacebuilding process. Local governments are key actors in bringing formal state institutions into direct contact with citizens and in giving them a voice in decision making. Water management provides an important platform for rebuilding community trust in the local administration, as well as reconnecting local governments to the national level. Where the state lacks the capacity to govern water or other natural resources throughout a country, local governance mechanisms can provide important peace dividends. Tailored approaches at the local level can also more readily address the often vast differences between urban and rural needs and challenges (Pinera and Reed 2014*). Active participation of stakeholders and cooperative planning are key aspects of such approaches.

Burt and Keiru demonstrate the importance of building local water governance in rural areas to bridge the gaps at the state level in post-conflict Afghanistan, the DRC, and Liberia. Because institution building at the national level can take years, Tearfund invested in building community-based management institutions that focused on inclusivity and local peacebuilding while successfully expanding water and sanitation services to multiple rural communities (Burt and Keiru 2014*).

Linking local water governance with national processes is important to ensure that local initiatives contribute to the national objectives for integrated water resource management and support a unified and coordinated approach to nation building in post-conflict situations (Burt and Keiru 2014*). Providing the appropriate linkages between local and national governance building can also prevent overreliance of communities on NGOs and help develop an understanding of the role of the government in ensuring the right to basic services. In Afghanistan, the DRC, and Liberia, these linkages were established via institutions that purposefully engaged civil society, communities, and the central government in local water management and oversight.

While important, decentralization is not necessarily a panacea for effective post-conflict service provision. Decentralization of responsibilities without the necessary resources and capacity building of local institutions to carry out those responsibilities (that is, an unfunded mandate) can further undermine governmental legitimacy in the eyes of the public. It can also stunt the rebuilding of necessary linkages between the state and society if management authority is devolved to local communities before the lines of responsibility are delineated between the central and local authorities. Moreover, effective integration of post-conflict assistance into the local institutional landscape can be challenging. As noted above, local institutions rarely escape conflict unscathed, and it can be difficult for outside organizations to penetrate the complexities of such impacts and the ways in which they affect inclusiveness, accountability, and equity.

Adaptive governance for a rapidly changing context

Water governance in the wake of conflict is characterized by complex and uncertain conditions. Multiple levels of formal and informal governance often coexist and continue to evolve as peacebuilding and reconstruction efforts foster new institutions, activities, and policies. Data on which to make informed decisions may be limited or missing altogether. Dealing with uncertainty and change of this kind requires governance tools that are flexible enough to incorporate data as they become available and to adapt to new circumstances as they arise.

That complexity is illustrated by the attempts to improve access to water in South Sudan. Since southern Sudan and Sudan signed the Comprehensive Peace Agreement in 2005, large numbers of South Sudanese have returned from areas in the north and neighboring countries (UNEP 2007). Between 2007 and 2012, over 1.8 million people returned to South Sudan, with 155,000 reaching their final destination in 2012 (International Office of Migration 2012). As Huston underscores, meeting the expectations of these returnees for basic water services is an "overwhelming task," given the destroyed or dilapidated infrastructure, lack of hydrological data to develop and manage the resource sustainably, and weak institutional capacity in South Sudan for water governance (Huston 2014*, 85).

The ability to adapt to changing circumstances is particularly relevant in the water sector, as water resources are subject to seasonal, annual, and decadal variability. Demands on water will continue to evolve with changes in development levels, population growth, and urbanization, among other pressures. Climate variability and change is already influencing various aspects of the hydrological cycle, including the amount and timing of precipitation, presenting increased uncertainty and the need for adaptive approaches to water governance. Management constraints in post-conflict situations further contribute to uncertainty, as institutions, policies, and laws and the capacities to implement and enforce them evolve over time.

In Afghanistan, Angola, the DRC, and Liberia, interim solutions tailored to local needs have achieved pockets of success in sustainable water management

(Cain 2014*; Burt and Keiru 2014*; Pinera and Reed 2014*). Yet these experiences also highlight common challenges, including continued lack of capacity and resources for scaling up and failures in coordination among levels of government or peacebuilding actors. Accepting change as an inherent aspect of rebuilding water governance requires periodic review of policies, plans, and programs to ensure that responses are still appropriate as new data become available, capacities are built, and interventions mature. Iterative assessment processes, especially SEAs that look more broadly at the potential impacts of policies, plans, and programs provide one mechanism for operationalizing an adaptive management approach. Assessment processes, when structured appropriately, also provide an entry point for stakeholder and public involvement in decision making.

Public and stakeholder participation

One of the most critical and consistent lessons from experiences around the world in post-conflict peacebuilding and water management is the importance of meaningful stakeholder engagement and public participation in decision making. Stakeholder engagement is essential to understanding the often-competing water needs and priorities of various users, from community members to the private sector. It also uncovers issues among users or communities that could reignite conflict; the dialogue that meaningful participation facilitates can be an important mechanism for fostering trust and mutual understanding. As noted above, post-conflict governance is often characterized by multiple (polycentric or hybrid) coexisting systems of water governance, which are likely to have been impacted by conflict. Numerous experiences examined in this book point to the importance of understanding these various systems and their evolution to ensure that new policies and institutions respect and undergird functional systems and the social equity they foster, while also avoiding the entrenchment of existing inequities in power and access.

In their chapter on post-conflict water management in northern Afghanistan, McCarthy and Mustafa highlight the risks of ineffective involvement of local stakeholders. The National Solidarity Programme in Afghanistan sought to improve rural infrastructure, create robust local governance mechanisms, and alleviate poverty throughout the country. It specifically aimed to devolve decision making over water and other natural resources to the local level through community development councils and implementing partners (including local and international NGOs). The authors found, however, that in certain communities this process did not account for customary water management arrangements or address the power differentials that had been created or reinforced during conflict through water management practices (McCarthy and Mustafa 2014*). Failure to engage effectively with these communities led to a perception that the government was ignoring their needs for improved water sources.

The lack of data that plagues post-conflict water interventions can also be mitigated by engaging broadly with stakeholders who may hold important local

or technical knowledge about water resources. By broadening the available information, data, and knowledge, stakeholder engagement can significantly enhance both the legitimacy and the quality of decisions—revealing hidden assumptions and increasing the likelihood of effective solutions. Engaging with stakeholders also contributes to their knowledge base, increasing capacity for more effective and sustainable water management over the long term. Incorporating stakeholder priorities, needs, and feedback into decision making also builds trust in decision makers and contributes to the legitimacy of the decision-making process, contributing to the reestablishment of sound governance and peacebuilding overall.

Water management needs to be integrated into and support national, local, and sectoral development plans and projects. This requires effective engagement of local institutions—formal, informal, and customary—to ensure that policies, strategies, and activities consider the competing priorities for and impacts on water resources. Governance tools that foster access to relevant information and access to decision making can be used to support stakeholder engagement. Transparency and accountability must also be centerpieces of resilient water governance interventions. This is particularly important given the need to strengthen lines of communication and accountability between the central government and local governments in post-conflict situations.

The rehabilitation of the Iraqi marshlands, for example, requires a complex mix of domestic efforts to promote both community stewardship and regional consensus and cooperation with Syria and Turkey over the sharing of the waters of the Tigris and Euphrates rivers (Lonergan 2012). Given these constraints on restoring the Iraqi marshlands, Chizuru Aoki and colleagues highlight how important it is for donors and public authorities to narrow the scope of their work with local communities in such complicated settings (Aoki, Al-Lami, and Kugaprasatham 2014*). They demonstrate how continuous consultations between the national coordinator and local partners, including tribal chiefs and religious leaders, thus facilitated a transparent process for carrying out a project to improve water supply in the marshlands.

If undertaken appropriately, interventions to provide access to water and sanitation provide an opportunity to build important relationships among government institutions, civil society, communities, and the private sector, promoting cooperation and supporting peacebuilding (UNEP 2013b). Experiences in the DRC and elsewhere demonstrate how active involvement of all relevant stakeholders at both the community level and within the government can lead to practical solutions while building both capacity and stakeholder relations (Burt and Keiru 2014*). Often, however, these opportunities are missed and rebuilding government capacity to resume basic functions, such as water service provision, takes several years.

While there has been a consistent push by the international community to engage stakeholders broadly in projects, these forms of civic engagement and public participation must also engage the informal sector broadly (Allouche 2014*). By engaging the informal sector—for example, through programs that

train mechanics to repair water systems, rehabilitate private latrines, and establish water committees—there is a greater likelihood that populations outside of the reach of the main water network will gain access to improved water (Pinera and Reed 2014*). Top-down approaches that seek to enhance the institutional capacity of the government water providers over the long term through large-scale rehabilitation projects often do not have the capacity in the short-term to reach marginalized populations. Thus, direct engagement of illegal vendors in Monrovia and signing agreements with the Liberia Water and Sewer Corporation not only ensured that populations unconnected to the water network could buy water, but also provided some degree of water quality control by connecting the vendors to the network of treated water (Pinera and Reed 2014*).

Public participation also plays a vital role in enhancing regional cooperation around water.[14] Treaties negotiated by political leaders are unlikely to sustain the peace if there is no societal support for their implementation. Civil society engagement can help to foster this support by enabling organizations and individuals to become vested in the outcomes of decision-making processes in which they took part. Indeed, regional cooperation in the Jordan River Basin has been strengthened since the mid-1990s by Track II diplomacy.[15] Focusing on the mutual dependence of shared water resources, the Good Water Neighbors project of FoEME has brought together a range of community activists to undertake community-level projects in Israel, Jordan, and Palestine to build trust through community participation (Mehyar et al. 2014*). Just as donor projects require long-term and sustained commitments to generate political benefits, fostering trust and confidence among communities also requires a long-term and active commitment.

Within the Sava River Basin, regional regimes such as the 1998 Aarhus Convention have helped to strengthen domestic governance by mandating the creation of domestic mechanisms for citizen participation in decision making on environmental matters.[16] The Aarhus Convention, related regional treaties (including the Espoo Convention on transboundary environmental impact assessment), and accompanying guidance developed by the treaties' secretariats assist its members, including the riparians on the Sava Commission, on fostering public participation in its decisions (Čolakhodžić et al. 2014*).

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[14]   On public participation in international water management generally, see Bruch et al. (2005).

[15]   In contrast to state-to-state diplomacy (Track I diplomacy), Track II diplomacy focuses on civil-society-to-civil-society engagement. See Davidson and Montville (1981–1982); McDonald and Bendhamane (1987).

[16]   The Aarhus Convention's formal name is the United Nations Economic Commission for Europe Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters.

Gender and water

Because girls and women in most post-conflict countries are usually charged with collection and management of water for household use, they usually suffer the greatest impact from water scarcity and lack of sanitation (ROL and UNDP 2006). Where water is not readily accessible, it can take up to six hours daily to collect water for household needs (WASH Advocates 2013). The burden is even greater for displaced populations. In Kyangwali camp in Uganda, for example, 42 percent of school-age children were regularly kept from school to help their mothers collect water (AAH 2004). The time that women spend collecting water can severely undermine their ability to spend time on income-generating activities or on growing food for their families. It also results in high energy expenditures: a woman collecting water for a family of four only 200 meters from her home spends on average 15 percent of a standard ration of 2100 kilocalories per day (Shrestha and Cronin 2006).

The lack of safe water and sanitation for girls and women inhibits not only their livelihood opportunities but also the overall economic recovery. In eastern Uganda, women have to spend as much as seventeen hours per week collecting water (UNDP 2006). Because it is so time-consuming, girls are also likely to miss school, have higher rates of illiteracy, and lower income-generation potential. It is also common for girls to stop attending school once they begin to menstruate owing to the lack of sanitary facilities (UNDP 2006); the International Rescue Committee has estimated that there is likely to be a 10–20 percent school absenteeism rate for girls who have reached puberty and begun to menstruate (IRC 2005). On the contrary, for every 10 percent increase in female literacy, it is estimated that a country's economy can grow by 0.3 percent (UNICEF n.d.).

Where women and girls have to leave their villages and camps to secure water, they are often exposed to gender-based violence. The farther they have to travel, the more at risk they are. Addressing these concerns is challenging, because women are often reluctant to speak about their fears (Burt and Keiru 2014*). With the use of participatory techniques, the NGO Tearfund, in conjunction with its partner Association of Evangelicals of Liberia, created a safe space for women in Henry Town, Liberia, to raise these issues and to engage the broader community in developing solutions that enabled women to play a larger role in water resource management. In this case, representation on the community development council was changed to require equal representation of men and women. By empowering women and institutionalizing their role in water-related decision making, new construction of hand-pump wells was completed in safe locations close to town. The installation of these wells led to a reduction in water-related diseases by 48 percent for adults and 30 percent for children, while also greatly reducing instances of gender-based violence (Burt and Keiru 2014*). Thus, changes in governance mechanisms during the post-conflict period can capitalize on changing social and policy dynamics and provide a window of opportunity to strengthen women's voices in water-related decision making.

Including women in decision making also has broader implications for restoring livelihoods, as was the case in Kurdistan where women were allowed to partake in the negotiations over water allocations, albeit indirectly (Barwari 2013). Men in the community focused on water for irrigation and its relevance to land use; women, on the other hand, needed sufficient water for domestic purposes. The government held separate meetings for women so that they had a culturally appropriate forum in which they felt comfortable voicing their concerns about water issues. Similarly, when women returning from refugee camps were able to play a role in leadership and decision making in South Kivu in eastern DRC, they identified rehabilitation of the water system as a high priority (Burt and Keiru 2014*). From their experience living in refugee camps during the conflict, they understood the link between water quality and health. Moreover, because many of these women returned as widowed heads of household, they were forced to assume leadership roles and to resolve conflicts with the neighboring village so as to share a water source between the two communities.

Gender-specific or gender-differentiated interventions in the water sector can help to ease the burden on women and enhance their personal security. One notable intervention by the African Union–United Nations Mission in Darfur has been the introduction of rolling water containers known as "water hippos," which has made it safer and easier for women and girls to transport larger quantities of water (IRIN 2011). Increasing the peacekeeping patrols in areas where women and girls go out alone to collect water has also enhanced their security (UNEP 2012).

Donor commitment

Sustained donor commitment is necessary to ensure the long-term viability of interventions, whether constructing water and sanitation delivery systems, reviving agriculture and ecosystems, reinvigorating water governance regimes, or rebuilding infrastructure for irrigation, flood control, storm drainage, and wastewater treatment. The lack of investment in water and other infrastructure at the end of armed conflict becomes a formidable impediment in the early phases of the peacebuilding process (del Castillo 2008), compounded by post-conflict governments' lack of financial resources and institutional capacity.

While donor assistance is clearly necessary for post-conflict economic recovery, the great variation among donor policies and approaches makes it difficult to distill generalized lessons. For the most part, investments come from a mix of donations and lending from multilateral development banks, bilateral organizations, and NGOs, and are intended for different purposes. Following the Israeli-Palestinian and Israeli-Jordanian peace processes, many international and bilateral donors' concentrated their initial efforts on national-level projects; since 2001 in Afghanistan, in large response to the National Solidarity Programe, donors have instead introduced water resource initiatives at the local level (McCarthy and Mustafa 2014*).

Aid to post-conflict countries often peaks right after conflict and then declines —ironically—at the point when post-conflict countries are better able to absorb

it (Schwartz and Halkyard 2006). In the water sector, investments are channeled into the immediate provisioning of basic services and jump-starting the economy. But in order to sustain peacebuilding efforts and foster environmental restoration in conflict-affected countries, experience shows that donors must take a longer and wider perspective on water management that looks beyond rehabilitation of delivery infrastructure and considers integrated management of the resource at the level of the watershed. This requires elongating the time horizons of planning and donor commitments as well as adhering to an integrated water resource management approach that incorporates mechanisms for coordination across sectors and among levels of government. Short-term funding cycles are, however, all too common and pose numerous challenges, as has been the case with watershed planning in Haiti. Owing to USAID's three-year funding cycle, which is dependent on congressional allocation, a failure to renew the Economic Development for a Sustainable Environment project in Haiti resulted in the cessation of the watershed program (Fischer and Levy 2011).[17] In addition, the focus predominately on short-term infrastructure projects in the lower watershed areas, rather than taking a longer-term approach that takes into account the entire catchment area, has limited the project's ability to address the underlying causes of Haiti's environmental vulnerabilities (Fischer and Levy 2011).

Wetland restoration, in particular, requires longer donor time and investment commitment. In Iraq, where it was difficult for international donors to work on the wetlands owing to security conditions, investments in local capacity building and training activities were important small steps for enhancing the expertise of Iraqi personnel and institutions (Aoki, Al-Lami, and Kugaprasatham 2014*).[18] Moreover, balancing longer-term goals with more visible short-term projects such as drinking-water provision that are highly visible to local communities were considered important for reestablishing local livelihoods in the marshlands.

In the case of the Indus Waters Treaty, the World Bank mobilized financial resources to underwrite large-scale water reconstruction projects and sustain those commitments over a long period. The Indus Waters Treaty is hailed as a success because the World Bank was responsible for operating the Indus Basin Development Fund, to support infrastructure development, and as such was able to coordinate funding from the broader donor community and allocate aid to India and Pakistan for adhering to the agreement (Zawahri 2009, 2014*).[19]

Where multiple donors are involved in implementing projects with different objectives, coordination is necessary to ensure that donors do not work at counter

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[17] For further discussion on integrated resource management and other lessons drawn from restoration projects in Haiti, see Gingembre (2012).

[18] For additional perspectives on restoration of the Iraqi marshlands, see Lonergan (2012); Suzuki and Nakayama (2011).

[19] In 1960, the year the treaty was signed, US$893.5 million was raised. In 1964, the Indus Basin Supplemental Agreement raised an additional US$315 million (Wolf and Newton n.d.; World Bank n.d.).

purposes. This has become increasingly important with donors, such as militaries, that are subject to funding and operation cycles. In Afghanistan, water projects carried out under the auspices of the U.S. military had to follow the civilian-military command cycles (Palmer-Moloney 2014*; Civic 2014). A change in command—from the regional military to civilian leaders at the provincial or district level—could cause water projects to fail unless more guidance and training of civilian and military leadership at the command and control levels is introduced.

Donors—whether bilateral organizations, multilateral development banks, or NGOs—play a central role in post-conflict peacebuilding, especially in the immediate aftermath of conflict. But there is often an irony in that role: their aid often drops off just when a post-conflict country has stabilized enough to absorb it usefully. To overcome this, it is important for donors to take a longer view of the recovery process.

SEQUENCING INTERVENTIONS AND COORDINATION

While humanitarian assistance is usually short term, it can persist for much longer than anticipated, extending well beyond the immediate aftermath of conflict (Bruch et al. 2014). It therefore both coexists with and shapes development and other post-conflict peacebuilding activities. A critical lesson that emerges in post-conflict countries regarding sequencing in the water sector is that donor commitments must be sustained and cannot be parceled into neatly defined time frames with clearly delineated transitions from humanitarian assistance to development, especially since peacebuilding transcends both of these periods.

Despite the emphasis in post-conflict recovery on sequencing humanitarian, security, and economic interventions (Doyle and Sambanis 2006), there is no fixed sequence of how water interventions should progress beyond the humanitarian demands immediately following armed conflict. Emergency interventions to provide basic services quickly for stabilization purposes often end up not being maintained because they are not designed to be sustainable and hence fail to contribute to long-term development (Huston 2014*).

Rather than conceptualizing post-conflict interventions linearly, more flexible funding mechanisms are necessary to allow donors to emphasize long-term sustainability so interventions can achieve both stabilization and development. Post-conflict needs assessments that evaluate water systems and infrastructure remain vital for providing not only an initial baseline for humanitarian interventions, but also for influencing subsequent development interventions (Jensen 2012). Likewise, delaying institution building in the water sector until security is stabilized and human needs are met can impede both short-term and long-term economic recovery, as well as regional cooperation. Table 3 presents approaches to post-conflict water management thematically, reflecting the wide variety of considerations that must be taken into account in interventions.

The perspective of humanitarian organizations—often focused on short-term impacts—can be at odds with longer-term governance and sustainable planning

Table 3. Approaches to managing water in post-conflict situations

	Immediate aftermath	Peace consolidation
Drinking-water and sanitation provision	Conduct assessments of: – Baseline hydrological data (and initiate collection of baseline data). – WASH in refugee and IDP camps to help define priority areas for interventions. – Damage to water infrastructure from conflict. – Institutional capacity and governance mechanisms for drinking-water and sanitation provision, using participatory methods. Introduce monitoring of water withdrawals and quality in camps, rural areas, and urban areas. Include a rights-based approach in water and sanitation interventions. Invest in coordination among actors involved in humanitarian provision of assistance (likely under existing cluster approach). Identify projects that can be completed rapidly to produce visible peace dividends, such as purification systems for reducing contamination of water sources; conduct rapid EIAs for such projects. Carry out SEAs of sector-wide policies, plans, and programs. Provide immediate support for provision of basic services (particularly drinking water and sanitation) to ensure the return and reintegration of refugee populations and IDPs. Adhere to codes of conduct or standards for humanitarian interventions in water and sanitation. Introduce conflict sensitivity in programming so that humanitarian and military operations do not place additional stress on limited water supplies.	Build capacity to monitor water quality and maintain databases. Invest in infrastructure rehabilitation to support (1) the return of refugee populations and IDPs, and (2) the broader population. Carry out EIAs in the rehabilitation and construction of infrastructure. Engage both the informal sector and private sector to ensure that service is effectively regulated. Build capacity of institutions and governance mechanisms for effective water and sanitation provision, including legal and regulatory frameworks.
Livelihoods and economic recovery	Conduct assessments of: – Livelihoods uses and users that depend on water (may be integrated into SEA). – Competing demands from different sectors on access to water. – Availability and quality of hydrometerological data. – Water infrastructure. – Linkages between water uses and users across sectors. Invest in measures to promote food security. Take into account local knowledge and mechanisms for water use and allocation. Invest in projects to rebuild water infrastructure that also provide short-term employment, including food-for-work projects.	Mainstream water into economic development policy and decision making pertaining to livelihoods recovery. Promote intersectoral coordination, especially pertaining to (1) land and water, and (2) drinking water and irrigation. Promote coordination among levels of governance (community, local, regional, national, and transboundary) and incorporate into framework water legislation. Invest in irrigation rehabilitation and infrastructure construction. Build capacity to collect and share water-related data. Adopt a conflict-sensitive approach for infrastructure development, taking into account equity and consensus-building principles.

Table 3. (*Cont'd*)

	Immediate aftermath	*Peace consolidation*
Transboundary water	Conduct assessments of: – How water sharing may have changed during conflict. – Available data for transboundary waters. Identify conflicts that may have existed or exist between upstream and downstream water users. Provide training to water negotiators.	Establish formal water negotiation teams as part of line ministry or across relevant departments, and build negotiation skills. Negotiate water-sharing treaties that include best practices such as establishing a water basin commission, data sharing, conflict resolution mechanisms, and adaptive management. Create a mechanism for states to resolve potential conflicts between upstream and downstream water users. Ensure an inclusive approach to negotiating and implementing agreements that draws upon civil society and its linkages both within society and across borders.
Governance	Identify and assess the types of institutions governing water—including both customary and formal—and the ways in which they have been impacted by the conflict and their effectiveness. Use an institutional assessment to determine whether to build on existing water governance arrangements or integrate new approaches to achieve policy goals. Promote institutions that take into account inclusion, equity, and justice, including water affordability and water quality. Include local and national organizations and civil society in designing water policies and programs. Include water rights in the design of international peace agreements and constitutions, especially where water was a source of tension during conflict.	Undertake water reform so that water institutions across the formal, informal, and customary sectors are connected and harmonized in a mutually reinforcing manner. This should be reflected in any legal reforms. Update or develop new water legislation, regulations, and institutional arrangements that: – Reflect best international practice tailored to national and local circumstances and priorities. – Implement and enforce national obligations under international agreements pertaining to water management. – Promote integrated water resource management and adaptive water governance approaches.

Table 3. (*Cont'd*)

	Immediate aftermath	*Peace consolidation*
Public engagement	Undertake iterative stakeholder analyses to account for a changing institutional and actor landscape across sectors. Include civil society and informal-sector groups in assessments. Include civil society and informal sector in planning meetings to present and discuss options for water management. Assess local grievances over water use and allocation. Integrate gender considerations across all water resource management work and analyze the gender-specific aspects of water provision and use. Include women in high-level negotiations over water to ensure that domestic water needs are addressed.	Include civil society (including the informal sector) in implementation of projects and monitoring. Create institutionalized mechanisms for ensuring transparent, participatory, and accountable decision making and policy making related to water management. Design mechanisms for continued feedback from civil society on water and sanitation services provision. Create a forum for community actors to raise potential sources of conflict over water resources. Provide for a larger role and greater representation for women in water resource management at all levels. Design gender-specific interventions in the water sector to ease the burden on women and enhance their personal security.
Donor commitment	Establish mechanisms to coordinate water-related interventions. Such coordination is often undertaken as part of the WASH cluster approach, but broader coordination across WASH and water resource management interventions should be considered.	Leverage private-sector investment. Encourage projects that take a long-term approach by focusing on the entire watershed or catchment area.
Emerging issues	Integrate climate change concerns into planning and implementation of water sector planning and projects. Carry out vulnerability assessment and adaptation planning at the sectoral level. Take into account intersectoral impacts.	Ensure that projects are sensitive to impacts of climate change. Build resilience mechanisms and adaptation planning into projects. Encourage transparency and best practices in foreign investment in mining and large-scale land acquisitions, especially regarding impacts on the water sector. Carry out EIAs and SEAs on emerging projects such as large-scale agricultural developments and extractive industries.

Notes: EIA: environmental impact assessment; IDP: internally displaced person; SEA: strategic environmental assessment; WASH: water, sanitation, and hygiene.

for the development of water resources. Coordination among multiple actors and simultaneous interventions presents a daunting challenge. But who can play such a coordinating role? In the area of municipal water, one option is the establishment of dialogues among stakeholders under the auspices of the relevant water utility (Pinera and Reed 2014*). However, there are few post-conflict situations in which utilities have the capacity to play that role, at least at the outset, leaving donors to fill the gap. Without integration and coordination, there are higher risks of unsustainable results, such as the potential socioeconomic impacts from drilling wells in areas of Afghanistan with dropping water tables (Palmer-Moloney 2014*).

Table 3 outlines various approaches to managing water in post-conflict situations. These approaches are organized thematically to capture critical entry points for governments, donors, and communities to intervene: drinking-water and sanitation provision, livelihoods and economic recovery, and transboundary water management. Because there is no single formula for integrating water into post-conflict peacebuilding, approaches must also take into account overarching, crosscutting issues that include governance, public engagement, and donor commitment. Managing water resources is particularly susceptible to emerging issues and uncertainty, especially in light of climate variation and change. In all these approaches, policy makers must devise solutions that are adaptive.

A great deal of thinking has been devoted to describing the stages of the post-conflict period, from immediate humanitarian and security needs to long-term recovery and development. While it is important to understand how the stages, in theory, fall into a general order, it is more important to understand that post-conflict recovery is not a linear progression that unfolds in discrete, clearly defined phases. It is therefore important to exercise flexibility in sequencing interventions, not simply to follow a set playbook. It is also important to understand how short-term interventions can lay the groundwork for longer policies that can achieve stability, sustainability, and governance.

EMERGING CHALLENGES

Post-conflict countries not only face humanitarian, security, and development challenges, but also are often characterized by an ever-changing institutional landscape. The fluid conditions complicate the design of adaptive, inclusive, and conflict-sensitive water resource management policies. Three emerging issues are likely to significantly affect future water resource management and post-conflict peacebuilding: climate change, large-scale land acquisitions, and the development of large mining operations.

Building climate resilience into post-conflict water management

Looming in the background of many post-conflict programs are the uncertain impacts that climate variability and change will have on water management over

the long term and the potential implications of these impacts on food security and peacebuilding. Climate change, especially as experienced through its effects on water quantity and quality, is likely to influence the effectiveness of water interventions for restoring basic human security, strengthening livelihoods, and fostering cooperation. Changing weather patterns that increase the intensity and occurrence of floods, droughts, and storms are likely to exacerbate already existing development problems and human vulnerabilities that have already been aggravated due to conflict (Matthew and Hammill 2012). If the challenges posed by climate variability and change are not effectively addressed in post-conflict recovery planning, the international community's efforts in the water sector to rebuild sustainable livelihoods and provide security could be seriously undermined. Notwithstanding these challenges, the post-conflict period can be a window of opportunity to introduce adaptive and responsive water governance structures that are capable of coping with the uncertainties and impacts of climate variability and change and, in turn, build a sector that is less prone to conflict over water availability and quality.

Many discussions surrounding adaptation have focused on water resources and have become a central component in the policy discussions on climate change and conflict (Clausen and Bjerg 2010; Stark, Mataya, and Lubovich 2009). One of the sectors most vulnerable to water variability and rising temperatures is agriculture, where changing water availability and temperature could result in greater food insecurity and food shortages worldwide (Smith and Vivekananda 2007). In Côte d'Ivoire, for example, recurring drought compounded by conflict resulted in a 27 percent drop in cereal harvests in 2003 from the previous year (IRIN 2007). Drought in the late 2000s in Iraq undermined the country's economic recovery, damaging its wheat harvest (Ryan 2009). Pastoralism in many post-conflict countries is similarly vulnerable to fluctuations in water availability, as pastoralists will have to travel farther to look for water sources or compete with other communities at the local level over water points, potentially causing conflict (Stark, Terasawa, and Ejigu 2011).

It therefore is important for post-conflict water interventions to account for the fact that economies heavily dependent on agriculture (and perhaps also experiencing rapid population growth, unregulated economic development, and poor health levels) are more likely to be sensitive to climate impacts (Stern 2007). Laura Palmer-Moloney underscores, for example, the immediacy of climate impacts on water resources for Afghanistan's economic recovery. From 1998 to 2008, severe drought contributed to dropping groundwater tables, diminishing agricultural productivity and increasing scarcity of surface water and contamination in the water supply (Palmer-Moloney 2014*). At the other extreme, it is expected that climate change will influence glacial melt patterns, thus increasing the risk of flooding (UNEP 2013a). And because conflict-affected countries experience high levels of poverty, inequality, and weak governance, climate change may also exacerbate the risk of relapse into armed conflict (Smith and Vivekananda 2007).

Post-conflict development strategies can better manage climate risk through enhanced disaster planning that takes climate data into account (Matthew and Hammill 2012). Marginalized and rural communities are often the first to experience the effects of climate change on the water sector because of their heightened vulnerability to external stressors; as such, they should be included in decisions that shape development pathways (Matthew and Hammill 2012).

Because the impacts of climate change on water may overwhelm the capacity of weak institutions, as well as of informal coping mechanisms, how a government responds to the stresses of climate change will determine whether local disputes over water, pasturage, and other natural resources escalate into local conflicts and then into national or international conflicts (Kevane and Gray 2008; Hsiang, Burke, and Miguel 2013). Adaptation planning will need to be a central component of humanitarian and development policies in post-conflict countries, both to ensure food security and to absorb populations in urban centers that migrate owing to protracted drought or recurring floods. Within the water sector such policies have focused on demand control, water reuse, and loss reduction (Hallegatte 2009).

Even for countries that have successfully negotiated agreements over shared water after conflict, climate change introduces new constraints on the robustness of these agreements. For example, changing precipitation patterns and sustained droughts in 1999 led to tension between Israel and Jordan when Israel indicated that it would be unable to deliver water to Jordan per its treaty obligations; likewise, Jordan has had problems delivering water to Israel from the Yarmouk River per its treaty obligations, most likely due to upstream extraction by Syria (Freimuth et al. 2007). And climate change has the potential to complicate negotiations by providing a plausible reason (or excuse) for water problems, when a source of the problem has to do with overextraction. In the case of the Yarmouk River, for example, Jordan has argued that decreases in the flow of the Yarmouk are because of Syrian water use, whereas Syria has argued that these reductions are a result of climate change (Haddadin 2014*). More recently, treaties governing transboundary waters have begun to recognize the need for flexibility and have ceased to allocate on the basis of fixed quantities, instead adaptively managing allocations in response to changes in flows. Tools used to implement this flexibility include mandatory or triggered review processes, drought response provisions, and institutional procedural requirements for monitoring and evaluation of allocation strategies (Kistin and Ashton n.d.).

Large-scale land acquisitions

An emerging issue for post-conflict countries is threats to food security, threats that can arise both from within and also from abroad. In many instances, foreign investment in post-conflict countries is being devoted both to developing large-scale agriculture to feed domestic populations in post-conflict countries and to growing food for populations elsewhere in the world that are facing diminishing

water supplies, reduced arable land, rising food prices, and growing populations (Paul, Weinthal, and Harrison 2012). Countries such as Brunei, China, Kuwait, Oman, Pakistan, and Saudi Arabia have sought to enhance their food supply, for example, by purchasing or leasing large swatches of farmland abroad in Ethiopia, the Philippines, and Sudan (Cotula et al. 2009; Woertz 2011; Pulhin and Ramirez 2013). While the full scope of countries seeking to enhance their food security through purchasing or leasing large swatches of farmland abroad is not entirely known, studies have documented an increasing trend since the 2007–2008 global food crisis in such countries as Ethiopia, Liberia, Mali, Madagascar, Sierra Leone, and Sudan (Jägerskog et al. 2012; Cotula 2011; De Schutter 2011; Provost and McClanahan 2012). One impact is that large-scale agricultural acquisitions often compete with small-scale subsistence farming, resulting in new conflicts over access to land and livelihoods viability (Unruh and Williams 2013).

One issue in discussions about large-scale land acquisitions is weighing the advantages and disadvantages for revenue and employment generation. An often-overlooked question, however, is the impact of these operations on the water sector, as substantial amounts of water are required to support agricultural plantations. As a result, industrial farming often brings the construction of large irrigation projects, which may have an impact on the recharge capacity of surrounding groundwater supplies, as well as on the sustainability of surface water sources. Water quality may also be degraded when runoff from these developments and operations are not sufficiently regulated. Despite the risks, most concession contracts with foreign investors do not take into account water issues (Cotula 2011). For example, agricultural concession contracts in Liberia have failed to adequately address water, whereas some contracts in Mali grant investors the right to use water with few, if any, restrictions during the wet season (Cotula 2011). Large-scale land acquisitions may also affect transboundary water resources, especially where irrigation schemes require energy sources from hydropower (Jägerskog et al. 2012). Water usage for large-scale agriculture in Ethiopia and Mali, for example, could potentially add another layer of complexity to transboundary water management in the Nile and Niger River basins, respectively (Jägerskog et al. 2012).

In order to prevent large-scale land acquisitions from undermining access to water and damaging livelihoods, foreign investment in post-conflict countries must be sensitive to local interests and must address water in any land transaction. In addition to mitigating potential impacts on subsistence agriculture, investors and governments will need to take into account the ways in which large-scale land acquisitions might restrict pastoralists' ability to access commonly owned watering holes for their cattle.

Mining and water in post-conflict peacebuilding

Investments in the mining sector hold the potential to help countries such as Afghanistan, Angola, the DRC, Liberia, and Sierra Leone to foster economic

recovery (Rustad, Lujala, and Le Billon 2012).[20] Much attention has been paid to the management of resource extraction and revenue generation to ensure that local populations benefit from high-value natural resources. Less attention has been paid, however, to the impacts of mining on the water sector.

Mining operations in Katanga, in the DRC, have reduced surface water availability and contaminated surface and groundwater sources (UNEP 2011). Similar effects of mining operations on water quality and quantity are seen across the globe. Countries emerging from conflict need to balance the immediate needs for economic recovery with sustainable water management, especially for drinking water in surrounding communities.

Water consumption is also an important component of mining. Major investments in the mining sector, such as the Aynak copper mine in Afghanistan, will require large quantities of water to process the copper ore; one estimate is that the mine will use 43 million cubic meters of water annually by 2020 (UNEP 2013a).[21] For Afghanistan, this will be critical given that water demand for Kabul, approximately thirty miles from Aynak, is expected to increase six-fold over the next forty years (UNEP 2013a).

CONCLUSION

Experiences from numerous conflict-affected countries demonstrate that water interventions are integral to all stages of the post-conflict process, from the end of conflict through recovery and rebuilding, to long-term sustainable development. At conflict's end, the provision of safe drinking water and sanitation is an utmost priority to maintain public health and support basic human needs. Unfortunately, many decisions concerning the provision of basic services are made while countries have yet to fully emerge from conflict, and as a result, decisions must be made before full accounting of local conditions and data have been taken. To generate crucial peace dividends under such conditions, donors and governments must coordinate programming goals and adhere to widely accepted standards for provision of water and sanitation services. And in situations where governance mechanisms are in flux, informal service providers can play a critical role in service provision.

In post-conflict countries, efforts to restore livelihoods, revive the economy, and foster cooperation are all likely to require data collection and infrastructure development. Here too, coordination and sequencing becomes imperative to

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[20]   While significant water is also used in oil and gas exploration, especially for non-conventional sources of energy, this section highlights cases of minerals and metals.

[21]   A lack of water metering precludes exact comparison between the water demands of the mine and the current water footprint of Kabul; however, Thomas J. Mack and colleagues report an estimated per capita domestic water-use rate of 40 liters per day in the city of Kabul (Mack et al. 2010). With a metropolitan population of 3,289,000 (Central Statistics Office Afghanistan 2012), this would put annual domestic water withdrawals for the city at 48 million cubic meters.

ensure that such activities contribute to local capacity building and do not engender societal inequities. It is important to incorporate strategic environmental assessments and meaningful local input into program design. An overarching challenge that confronts most conflict-affected countries, however, is ensuring long-term investment in the water sector, especially since priorities and time horizons of funding agencies and the private sector may not comport with the timelines needed for infrastructure investments for longer-term economic recovery.

Throughout the post-conflict peacebuilding process, local involvement through inclusion of the informal sector, broad stakeholder and public engagement, and mainstreaming of gender issues can also help to support the rebuilding of governance and institutional mechanisms that undergird efforts to restore livelihoods, rebuild the economy, and foster cooperation. A holistic focus on governance mechanisms (for example, integrated water resource management) rather than compartmentalizing governance interventions, in particular, is important for designing interventions to manage shared river basins or fragile ecosystems like wetlands that provide numerous services to local populations. By not overlooking the role of local governance, donors and governments may further avoid aggravating tensions between local and national water institutions that often exist in conflict-affected or weakly institutionalized countries.

While there are multiple pathways by which water can be harnessed to address humanitarian crises, promote economic recovery, and foster regional cooperation, it is equally true that there is no overarching template that can be applied to all countries emerging from conflict. Rather, attention should be paid to the specific context in which these interventions are taking place with an emphasis on fostering a nuanced, coordinated, participatory, flexible, and conflict-sensitive approach to managing water and its natural variability. Such an adaptive approach will be especially important as water governance institutions respond to unprecedented changes in the global climate.

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