



The Water Security Nexus

Challenges and Opportunities for Development Cooperation





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Contents

1	Introduction	4
2	The Water Security Nexus: Linkages and Lessons Learned	5
2 1	Environmental Change: Challenges for Water Management	5
2 2	Water, Conflict, and Governance	7
3	From Conflict to Cooperation	13
3 1	Within States and Communities	13
3 2	Large Infrastructure Projects	17
3 3	Between Riparian States	17
4	Preventing Water Conflict: The Role of Development Cooperation	21
5	Annexes	26
5 1	List of Abbreviations	26
5 2	List of Boxes	27
5 3	References	27

1 | Introduction

Is water the 'gold of the 21st century,' potentially triggering 'water wars' between countries sharing the precious resource?¹ Such scenarios proliferated in the 1990s, but today a different paradigm is taking root. Politicians are beginning to emphasise the peace dividend of water cooperation; and development agencies are now supporting transboundary water cooperation projects around the world. And even at the highest level of political discourse, water cooperation has been identified as an entry point for broader peacebuilding.

In 2001, then UN Secretary-General Kofi Annan warned of water wars (Postel/Wolf 2001), but only a year later, he insisted on an alternate view: '[T]he water problems of our world need not be only a cause of tension; they can also be a catalyst for cooperation' (UN 2002). Lacking water supply and conflict are issues also garnering significant attention in the context of climate change and threatened livelihoods.

Yet, while support for water cooperation is spreading, the potential for water conflict persists. Global environmental change fuels uncertainty about the future of water resources. Water quantity is called into question due to increasing temperatures and diminishing precipitation. Water quality is declining from mass pollution. Competition over water increases as demand rises for growing domestic, industrial, and agricultural needs. And where governance structures are unable to manage increasing competition, divergent interests may spur disputes with the potential for violent conflict.

The emergence of violence over water is a real concern. However, warnings over impending 'water wars' are largely without merit—historically, inter-country disagreements over water have seldom led to violence. Rather, water conflicts² primarily occur at the sub-national level (Ohlsson 1999, Wolf 1998), where disputes can take many forms; from destruction of infrastructure or verbal

attacks to actual violence among competing parties. But regardless of the form of conflict, weak livelihoods and poor governance of the resource are common themes in the evolution of disputes over water.

While some of the factors leading to water conflict have been identified, the topic remains largely unexamined. To further understand the genesis of water disputes, this study focuses on water conflicts in two contexts; access to and control of the resource. This study then looks beyond conflict to the ways in which water management engenders or facilitates cooperation. Throughout, this paper draws on examples from and lessons learned at the sub-national and international level.

In the process of exploring past and present occurrences of water conflict and cooperation, this study seeks to answer three main questions:

- | Which trends may catalyse water conflicts in the near future? (Chapter 2)
- | Which approaches facilitate the conversion of conflict to cooperation? (Chapter 3)
- | How can development cooperation contribute to preventing and resolving water conflicts? (Chapter 4)

¹ As was predicted by e.g. Maude Barlow and Tony Clark (2002), and the then Vice President of the World Bank, Ismail Serageldin (1995).

² In this paper, the term 'water conflict' is not synonymous with armed or violent conflict, but, rather, is used to describe a situation of disagreement and incompatible interests over access and the right to distribute water. Such a disagreement may then escalate into violence, smoulder, and thereby hinder efficient water management, or be resolved peacefully.

2 | The Water Security Nexus: Linkages and Lessons Learned

Water management is confronted with many challenges, most notably rising demand and pollution, and the impacts of climate change. In the context of these developments, water is linked to security in three broad ways.

Firstly, conflict over the resource itself can induce socio-political destabilisation (see Section 2.2). Secondly, water can become intertwined in non-resource related conflicts. For example, parties can use water as a military tool and attempt to control access to the resource or limit the quantity or quality available to other parties (ICRC 1995). Thirdly, lacking water provision can significantly impact human security,³ and thereby contribute to the destabilisation of societies, increased migration, and heightened resource competition.

The present chapter summarises the challenges for water management caused by environmental change, and reviews key findings on the links between water and conflict at the international and local level.

2|1 Environmental Change: Challenges for Water Management

Rising water demand, growing pollution, and the impact of climate change

Across the globe, population growth and changing lifestyles have caused a greater level of water pollution as well as a heightened demand for water. Increasing quality and quantity issues exacerbate health problems, environmental degradation, and resource competition. These outcomes are most dire in the developing world, where clean water is already insufficiently available.

In developing countries, 3 million people die every year from water-related diseases (UNESCO / WWAP 2009).

Box 1 | Defining water and security linkages

Water security: Based on the UN Development Programme's (UNDP) Human Security concept referring to the 'security of the peoples' (UNDP 1994), water security is defined as freedom from direct or indirect impacts of lacking provision of sufficient and clean water. At the international level, it is determined by the dependency on transboundary water flows, the relationship to riparian countries, and the ratio of food security based on secure supply or own production.

Water conflict: Situations of incompatible or adverse interests among water users over modes of access, and resource quantity and quality.

Structural causes of water conflict: Factors directly or indirectly defining the conflict parties' overall position in the conflict, including socio-political, technical, or environmental conditions (see Box 4). Regions where structural causes provoke inequalities among groups or states are particularly vulnerable to water conflict when adequate adaptation measures do not exist.

Peacebuilding: A wide range of activities for the stabilisation of societies after war or civil conflict. In the water context, cooperation over water issues between population groups or states may contribute to peacebuilding by creating trust, and building alliances and collective action for shared interests.

³ As per UNDP's definition, human security means, first, safety from such chronic threats as hunger, disease, and repression; and second, protection from sudden and hurtful disruptions in people's daily lives. UNDP identifies seven categories of human security, one of which is environmental security.

Box 2 | Climate change increases the challenges of water management

Increased evaporation due to higher temperatures will reduce water availability.

Accelerated melting of polar glaciers and reduced winter snows severely restrain water availability in countries downstream of glaciers, such as in the Himalayas and the Andes.

Greater uncertainties in precipitation require adaptive management and storage capacities, but also flood prevention.

More frequent extreme weather events such as droughts or floods, but also rising sea levels, may threaten water mobilisation and supply infrastructure while at the same time spurring migration.

Food insecurity and migration are linked to loss of livelihoods, subsequent demand for water, and sanitation issues in destination areas.

Water quality problems and spreading of water-borne diseases are expected to increase as a result of higher temperatures.

A main source of water pollution is insufficient treatment of wastewater, which is not only spoiling rivers and lakes but also contaminating valuable groundwater resources. In developing countries, less than 20% of the sewage water is treated (WWAP 2009). As a result, untreated sewage flows into water supplies, reducing the availability of clean water for human use and is negatively impacting health and the environment.

In tandem with population growth, demand for water has spiked in recent decades; water withdrawals have tripled over the past 50 years. Yet, the infrastructure for wastewater treatment has often been neglected in fast-growing economies. The economic consequences of pollution and overexploitation of water are severe: For the Middle East and North Africa alone, water pollution and excessive withdrawals are estimated to cost US\$9 billion per year (Hussein 2008, also see Box 3).

Water availability for human use is therefore not only limited by rising demand, growing scarcity, deficient management and infrastructure, but also by pollution linked to insufficient treatment and recycling.

Of all freshwater use around the world, only 10 to 20% is used for domestic supply, with another 5 to 12% for industry and energy. The largest water user by far is agriculture, which accounts for 70 to 90 percent of all withdrawals. Appeals for more efficient water use are therefore mostly addressed to the agricultural sector. Yet, in the face of growing demand for food production—as well as for biomass and energy crops—water requirements for agriculture are expected to further increase (EEA 2009).

The agricultural sector is not only the largest water consumer, but in many countries, it is also the main source of income and a crucial component of rural livelihoods and food security. As a result, the issue of irrigation is a highly sensitive double-edged sword: The practice is often accused of wasting water, but restricting its use may threaten livelihoods or provoke social unrest.

Climate change places additional pressure on livelihoods (see Box 2). The impacts of climate change will not be uniform; some regions will suffer from increased water scarcity, while others will be affected by floods, rising sea levels, and unpredictable precipitation. Migration of rural populations is expected to increase, especially where reduced food production affects already food-insecure areas. The potential for migration further increases in areas dominated by rain-fed agriculture, such as sub-Saharan Africa and peninsular India (IPCC 2008). While conflict potential over water is rising, hotspots cannot be identified on the basis of environmental trends alone. Vulnerability to conflict will depend crucially on each country's



Flooded church compounds in Lagos, Nigeria

socio-economic dependency on the resource, as well as the availability and implementation of financial, technical, and human adaptive capacities (see Section 2.2).

Environmental degradation and climate change pose new challenges to water management—especially in the agriculture sector.

2|2 Water, Conflict, and Governance

Since water ignores boundaries, water resources are shared by users on all levels—local, national, and international. Conflicts can arise between end users of water, but they can also develop at the institutional or governmental level or between up- and down-stream riparians. Tensions over water allocation can increase when water is scarce, for example, if herdsmen and sedentary farmers compete for the limited resource. But allocation among parties can be highly contested even when the resource is not severely limited, such as when different sectors—hydro-power production and irrigation, for instance—have conflicting interests in using available resources.

When discussing water conflict, three major factors must be considered. **Quantity** of water—both in abundance and deficit—can play a role. For example, parties may struggle to adapt to increased frequency and intensity of droughts or floods. Water **quality** is also a chief concern, as decreasing quality can make water unusable for certain purposes and by some populations. Moreover, the **timing** of water flow—in the operation of dams, for example—is also a critical issue, as flow rates can significantly alter the lives and livelihoods of downstream populations. At the same time, water is a highly politicised issue, largely



List of recorded and agreed daily water entitlements of each family, Amran Governorate, Yemen

due to the fact that water allocation structures in many parts of the world reflect socio-economic inequalities. As a result, water issues may easily fuel tensions when incompatible political interests are at stake (Houdret 2008a).

Water conflicts may reflect any combination of the above factors, and may emerge in any number of ways. For example, limited water availability and lacking adaptation reinforce existing marginalisation of population groups. Or in places where ethnic strife and political tensions are already prevalent, lacking access to water may be an additional destabilising factor (UNDP 1994). Further, water quantity problems can negatively impact livelihoods, and may result in migration to already populated or cultivated

Box 3 | Conflicts over the extraction and pollution of groundwater resources

Groundwater is one of the most extracted raw materials with withdrawal rates of 600–700 sq km per year (Zekster and Everett 2004).

Technological innovation and the availability of electricity have led to a **sharp rise in pumping** of partly non-renewable water reservoirs.

Sinking water tables in rural and urban areas of Mexico, Spain, Somalia, India, China, and many other places lead to increased competition and marginalisation of poor farmers unable to invest in expensive drilling.

The contamination of groundwater, for instance by hazardous waste, can have far reaching impacts within states and on neighboring countries.

Preventing groundwater conflict requires specific approaches. In contrast to rivers or lakes, groundwater is hidden, data collection and monitoring are often lacking, conceptual models are still uncertain, and institutional capacity is often inadequate (Jarvis 2008).

areas, where additional resource competition may fuel conflict. When capacities to cope with too much or too little water are weak and social cohesion is already fragile, populations might rapidly begin to question political leaders' legitimacy, leading to further destabilisation. Finally, conflicts fuelled by water abundance cannot be overlooked, as heavy rainfall and floods may also destroy livelihoods and restrain available land and clean water.

All these types of water conflicts highlight the need for conflict-sensitive approaches to water management. Water conflict within countries has gained increased attention from policymakers and development agencies. Policy discourses are slowly moving away from a purely technical understanding of water management in favour of a more holistic understanding of water and the socio-economic causes of conflict. In the context of dam building or public-private partnerships in drinking water supply, water policies are increasingly sensitised to conflict potential. The Global Water Partnership's integrated water resources management (IWRM) toolbox—which serves as an information clearinghouse on water management—proposes different instruments for dispute management, shared vision planning, and consensus building. However, these suggestions remain rather general and require further specification regarding their practical implementation, as well as their potential negative impacts.

While the underlying reasons for water-related conflict can be numerous—such as power struggles and competing development interests—the main water issues usually are quantity, quality, and timing of water flows.

Socio-political marginalisation can cause violent conflict within states

Environmental change such as resource degradation and scarcity can contribute to new conflicts, as well as aggravate existing socio-political tensions and conflict potential (Homer-Dixon 1999). In the context of these interdependent factors, climate change is yet another trend that may contribute to escalating resource competition, further exacerbating existing vulnerabilities, and increasing marginalisation of certain groups (IPCC 2008, Wassmann et al. 2004). Yet, while environmental change is an important piece of the conflict puzzle, it is not the only factor leading to the escalation of disagreements over water. Outbreaks of conflict leading to violence strongly depend on the socio-political, economic, and institutional environment (Bächler 1994, Bächler et al. 2002, Brown et al. 2007, Carus 2006, Carus et al. 2008).⁴ Cooperative water resources management, then, is contingent on adaptive capacity—from technical and financial capacities to legitimate water governance structures and efficient structures⁵ for conflict resolution.

Water conflicts within countries can arise in many different ways, as conflict parties at the local level are diverse: Farmers may disagree over irrigation water, local communities may defend their need for drinking water against farmers, and nomads may dispute pastoralists over water sources for their cattle. Additionally, water conflicts may pit local populations against public or private institutions over the conditions of access to drinking water or the implementation of large infrastructure projects such as dams. Water conflicts within countries may also directly influence international relations, for example, when water users exert

Box 4 | Characteristics of water conflicts at the local, national, and international level

Water conflicts are **rarely restricted to water issues** but mostly involve other socio-political or economic interests.

They are often **articulated first verbally** (e.g. via protests or diplomatic complaints) and parties refer to established formal or informal institutions for conflict resolution.

Confrontation entailing damage of infrastructure, riots, or breach of agreements may result if no agreement can be reached in due course.

Violent escalation of the conflict depends on the socio-political and institutional environment, as well as on the existence of previous conflicts.

⁴ A detailed survey of 70 'environmental conflicts' and the context of climate change confirmed that conflicts are related very much to weak socio-economic conditions and coping capacities (Carus et al. 2006).

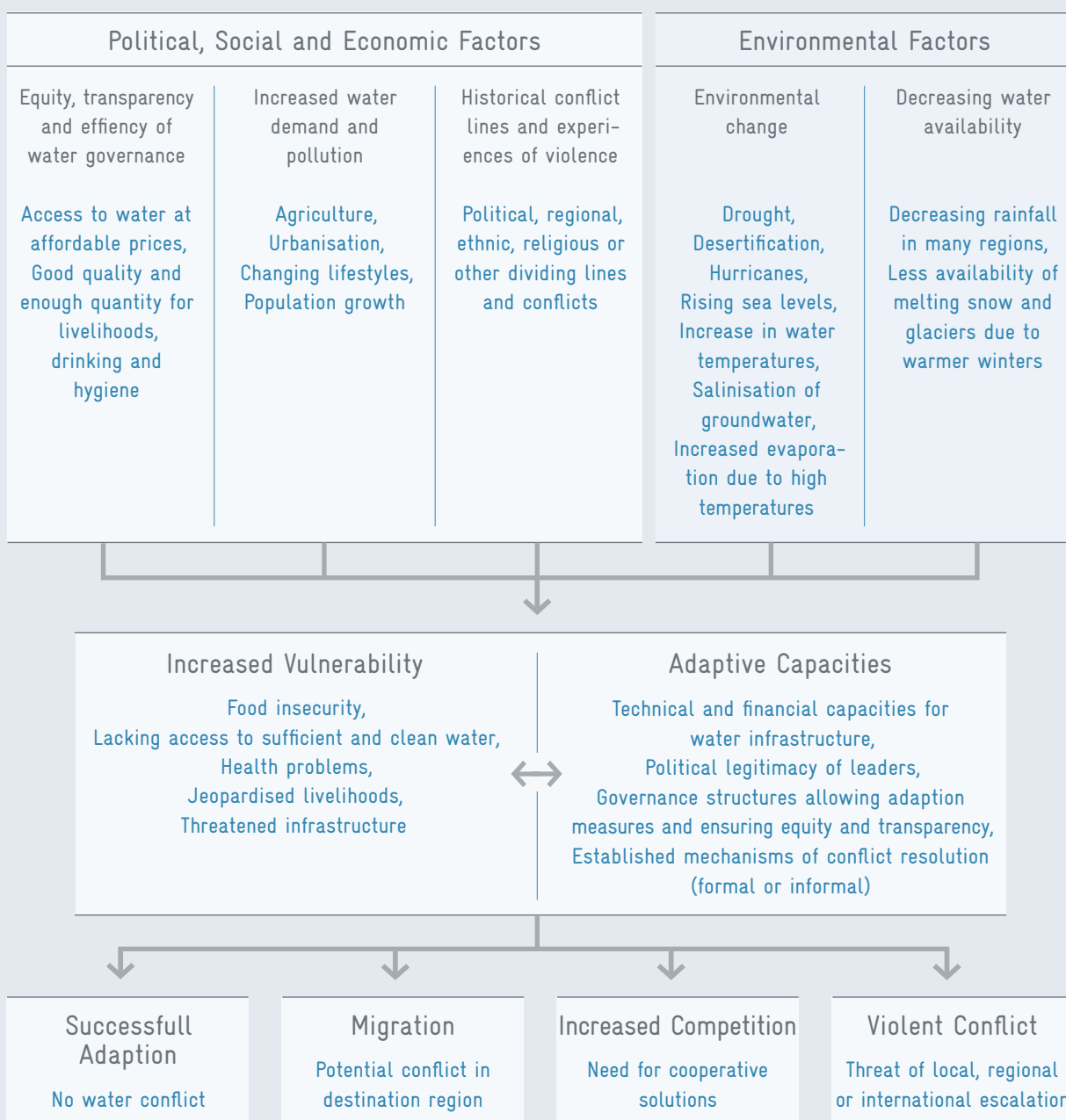
⁵ Water governance refers to the range of political, social, economic, and administrative systems that are in place to regulate the development and management of water resources and provisions of water services at different levels of society.

pressure on their governments to mobilise further resources by tapping into transboundary flows (Pachova et al. 2008).

While there is currently no comprehensive overview on water conflicts at the local level available (Ravnborg 2004, SWH 2004), evidence from different domains of water management shows that restrained access to water often provokes conflict when it affects already marginal-

ised groups. In the drinking water sector, conflicts may arise when poor population groups have insufficient access to the resource or face sharply rising fees, not matched by service improvements, as it happened in some cases of privatisation of services (Balanyá et al. 2005). Violent clashes and social unrest linked to lacking access to water have already been reported in different countries, including Kenya and Nigeria (IRIN 2009a,

Box 5 | Water conflict or cooperation? Key factors for vulnerability and adaptation



IRIN 2009b; NN 2009). In other settings, conflicts over land and livelihoods may be immediately linked to water issues. In Peru alone, a report revealed that ‘nearly 50 percent of the 218 social conflicts recorded by the national ombudsman’s office as of February 2009 were triggered by socio-environmental problems; many of them related to water management issues’ (Oré et al. 2009).

While water conflicts can take many different forms, they tend to share a common feature: Restrictions in water use are an additional, sometimes suddenly occurring experience that often exacerbates existing problems of the affected group. Thus, policy decisions on water and land use are often conflictual, as they tend to advantage (or disadvantage) certain economic sectors, regions, or populations. Inequalities are likely to be heightened in corrupt settings, where bribes or payoffs may result in policies that make access to the resource more difficult for already marginalised population groups.⁶

Violent conflict may emerge where already marginalised population groups are further penalised by inequitable water allocation policies.

Water conflict is fuelled by lacking governance and insufficient adaptation

Water conflicts within states escalate into violent confrontation more often than international conflicts over the resource (Giordano et al. 2002). Violence is often not triggered by water alone, as conflicts do not tend to be about water availability per se. Governance can often be the crucial factor for a conflict to either break out into violence or be peacefully resolved, both within and between states. For instance, violent escalation of water disputes is unlikely in settings where a legitimate government exists and decisions affecting water management and livelihoods are made in a transparent manner. Similarly, conflict is less likely in settings where institutions for conflict resolution are effective and compensation measures for lacking sup-

ply can be negotiated. A detailed survey of 70 environmental conflicts confirmed that conflicts are related more to weak socio-economic conditions and government coping capacities than to resource scarcity (Carius et al. 2006).

In the face of growing competition over water, legitimate governance structures, efficient and equitable methods of conflict resolution, and technical and financial capacities are all key factors in peaceful and cooperative resource management.

International water regimes can provide frameworks for cooperation between riparians

At the international level, water conflict usually involves riparian states of basins which include the political boundaries of two or more countries. Transboundary river basins cover much of the globe, with each basin forming an intricate and interconnected web of people, land, and resources (see Box 6). Those riparian states of transboundary waters that rely heavily on water availability for food production and energy are expected to enter into rivalry in cases of sudden water shortage or uncoordinated increase of water use (Ohlsson 1999).

However, while competition for shared water resources can intensify, so can conflict resolution and water management processes. Several studies have shown that the equation ‘Water Scarcity = Water Wars’ lacks both empirical support and conceptual justification (Beach et al. 2000, Elhance 1999, Wolf 1998). In the event of water scarcity, states are principally able to adopt coping strategies and, in particular, start initiatives to reach consensus with neighbouring states (Sadoff and Grey 2002).

Researchers at Oregon State University (OSU) investigated a total of 1,831 water-related events that occurred between states in the years 1948–1999, finding that two-thirds of the events were of a cooperative nature and that the vast majority of the remaining ones did not escalate

Box 6 | Dependencies and interdependencies in transboundary basins

The world’s more than 260 international river basins cover 45.3% of the Earth’s land surface, host about 40% of the world’s population, and account for approximately 60% of global river flows. Territory in 145 nations falls within international basins, and 33 countries are located almost entirely within these basins (Wolf et al. 1999).

The high level of interdependence is illustrated by the number of countries sharing international basins: The dilemmas posed by basins like the Danube (shared by 19 countries) or the Nile (10 countries) can be easily imagined.

6 In developing countries, corruption is estimated to raise a household’s connection prices to a water network by 30 percent (TI 2008).

Box 7 | Factors increasing the risk of water-related conflicts within or between states

A strong socio-economic dependency on the resource, where scarcity or floods threaten economies and livelihoods (e.g. the agricultural sector).

Low adaptive capacities of institutions and individuals, including ineffective responses to conflicts and inadequate technical, human, or financial resources.

Politicised water management structures, reflecting asymmetrical power relations and inequalities. Limitations in access to water are perceived as a threat to sovereignty or security.

Previous conflicts, dividing population groups or states along political, religious, cultural, ethnic, or other lines. These may be 'reactivated' in the context of disagreements over water management.

Lack of data and information and/or insufficient capacities for data generation and interpretation, leading to different assumptions of parties regarding the characteristics of a resource.

beyond verbal arguments (Wolf et al. 2003). Only 37 incidents reached an acute conflict level, 30 of which involved Israel and one or several of its neighbours, such as Israel's attacks on Syria following the latter's attempt to divert the Jordan River in the early 1960s. Even these incidents never escalated into serious armed conflicts.

Short of direct military conflict, interstate disputes over water can lead to tensions and low intensity conflicts that may significantly alter political attitudes of riparians towards each other (Phillips et al. 2006). For example, in the low-flow year 1975, Iraqis claimed that they received too little of the Euphrates flow from upstream Syria. As attempts to settle the dispute through an Arab League technical committee failed, Syria closed its airspace to Iraqi flights and both Syria and Iraq reportedly transferred troops to their mutual border. Eventually, Saudi Arabia successfully mediated the conflict (Gleick 1993).

The history of water conflict reveals that international water cooperation is supported and facilitated most frequently in places where a favourable regime for interstate cooperation is in place. Such forms of cooperation include treaties, river committees and organisations, shared management norms, and dispute-resolution mechanisms. In transboundary water management, regimes usually address the question of mutual consultations before other issues, like large water resources development projects, data sharing, or water quantities.

However, such regimes will only prevent further conflict if they are thoroughly implemented and perceived as fair by their parties. A complicating factor in interstate water negotiations is that disputes frequently concern not only the different 'rational' interest of the states concerned, but possibly also diverging attitudes, values, and cultural perceptions. Establishing regimes in transboundary basins is, thus, an essential task in political and institutional terms and is regularly characterised by long-lasting and difficult political processes: The Indus treaty took 10 years to negotiate; the Ganges, 30 years; and the agreement on allocation of the river Jordan's water between Israel and Jordan, 40 years (Wolf et al. 2005).

In addition, without joint agreements or during long negotiation processes, transboundary waters are often exploited unilaterally in an unsustainable manner, degrading water quality and quantity until the health of dependent populations and ecosystems is damaged or destroyed. The high percentage of people depending on transboundary resources highlights the importance of sound management of international waters in achieving water-related Millennium Development Goals⁷ and human security.

Water regimes can facilitate cooperation through institutionalisation, as well as increased accountability and transparency. Their negotiation, however, is often complicated by political relations between riparian states and their impact will finally depend on the riparian states' political will to comply with them.

⁷ The Millennium Development Goals (MDGs) are eight goals to be achieved by 2015 that respond to the world's main development challenges. The MDGs are drawn from the actions and targets contained in the Millennium Declaration which was adopted by 189 nations and signed by 147 heads of state and governments during the UN Millennium Summit in September 2000.



Mekong: Discussion between experts

Future local or international hotspots are difficult to determine

While conflict over transboundary waters very rarely turns violent, researchers at OSU found that the likelihood of a dispute increases significantly if the basin's physical or political setting undergoes a large or rapid change, such as the construction of a dam, an irrigation scheme, or territorial realignment. Conflict is also more likely if existing institutions are unable to absorb and effectively manage that change (Wolf et al. 2003).

Based on these findings, the researchers identified 16 basins with potential for tension over the next 5 to 10 years (Wolf et al. 2003). Interestingly, cooperative projects have started on several of those watercourses (e.g. in the Kura-Araks, Orange, and Lake Chad basins) and transboundary water agreements have been concluded in others like the Incomati Basin. Most of these activities have been supported by international organisations or donor agencies.

These developments clearly show the difficulties in predicting future hotspots, or—alternatively—predicting the impact that cooperative management structures, projects, and treaties can have in preventing escalation of conflict over water. The large number of variables determining vulnerability to conflict and adaptive capacities (see Box 5) makes it very difficult to develop a clear forecast of where water conflicts will most likely develop in the near future. Adaptive capacities and cooperative arrangements as well as socio-political stability and legitimacy are too complex to predict in the longer term. Furthermore, sudden changes such as political turmoil or riparian activities reducing water supply are often unexpected and can jeopardise the stability of an entire area. At the local level, however, conflict potential is increasing in many water-short regions that do not have sufficient coping capacities and where deficient supply threatens livelihoods and food security.

Hotspots of water conflict are likely to be found in regions simultaneously affected by water scarcity, droughts or floods with repercussions on livelihoods, and lacking adaptive capacities.

3 | From Conflict to Cooperation

Conflicting interests seem to be inherent to water management as many users compete over access. Still, even if the negotiation progress is lengthy, most disputes within and between states are managed peacefully and cooperatively. Several initiatives provide lessons for tackling water-related conflicts and fostering cooperation both at the transboundary and the national level.

Beyond resolving the conflict itself, successful water cooperation can facilitate broader cooperation between conflicting parties. In southern Africa, for example, a number of river basin agreements were signed in the 1970s and 1980s, when the region was embroiled in a series of local wars. Although complex to negotiate, the agreements represented one of the rare arenas of peaceful cooperation among countries. Now that most of the conflicts in the region have ended, water cooperation is one of the foundations for regional cooperation (Turton 2004).

Additionally, common rules and institutions for water management within states and between population groups can help stabilise relationships and provide platforms for negotiations—even in times of tension. Collective rebuilding of water infrastructure in post-conflict phases may further contribute to peacebuilding (UNEP 2009, for the case of Uganda see Muhumuza 2008). As the United Nations Environment Programme (UNEP 2009) states: ‘Integrating environmental management and natural resources into peacebuilding, therefore, is no longer an option—it is a security imperative.’ However, while cooperation over water resources may act as a particularly fruitful entry point for building peace, the precise conditions under which such cooperation can be facilitated remain unclear (Conca and Dabelko 2002). The present chapter highlights the main causes of national and international water conflicts and points to successful measures of negotiation and peacebuilding.

3|1 Within States and Communities

Within states, water management is an inherently political issue involving many different societal structures, groups of actors, and their interests (Houdret 2008b and Mollinga 2008). Good water management can help stabilise societies, secure livelihoods, and preserve social relationships. Conversely, lacking water governance and conflict may

also fuel social tensions and contribute to insecurity. In either scenario, water management within states and related conflicts are closely linked to governance, equity, and social cohesion.

Conflict and cooperation between nomads and settlers

In many rural areas, nomads and settlers both rely on land and water for their livelihoods. Conflicts between these two groups are reported from several countries, most recently (2009) in Nigeria, where the livelihoods of some 15 million pastoralists in the northern part of the country were threatened by decreasing access to water and pasture (IRIN 2009a, IRIN 2009b). In Kenya in 2005, conflict easily turned violent when Maasai—nomadic herdsmen—accused the resident Kikuyu farmers of drawing too much water from the Ewaso Kedong river. Several people were killed in the clashes, and thousands fled from the area.

Five key issues fuel conflict between nomads and settlers:

- | **The decrease of fertile land** resulting from environmental change and overexploitation of land and water resources, urbanisation, and the extension of agricultural land;
- | **Changes in the established routes of nomads** as a response to environmental degradation or to the impossibility of accessing formerly used land;
- | **The marginalisation of nomads** in the political system, weakening their negotiating power;
- | **The often poor economic conditions** of nomads and small farmers, hindering adaptation to environmental change and reinforcing a feeling of marginalisation; and
- | **The availability of small arms** and light weapons in (post)-conflict zones, which are then used in conflicts over water and land.

Considering these five triggers, it becomes clear that efforts to reduce conflict will necessarily involve improving

livelihoods and providing alternative sources of income. Changes in traditional income generation and social relationships can also be fruitful in conflict prevention—for example, trade can often provide new opportunities for trust building and cooperation between potentially rival groups. Conflict-specific measures have also proven to be effective in reducing water disputes. One of the means to support peacebuilding is the revivification of traditional arrangements and authorities for conflict management and the negotiation on conflictive issues. The NGO Friends of Nomads International facilitates such processes (Kramer 2004). Another project by the Agence Française de Développement in Chad helped negotiate transhumance routes between nomads and farmers, thereby reducing conflicts (AFD: no date). Wherever possible, arrangements for the dual use of existing land can be encouraged. For example, when nomads prefer to stay in the mountains during the summer, the land in the valley could be used for farming during this time. Moreover, cooperation over water resources works well where clear property rights exist and nomads are integrated into political decision-making processes and are offered access to social services (Werner 2006).

Conflict and cooperation between farmers

Conflicts over irrigation water are one of the most common types of water conflicts. Rivalries between upstream and downstream riparians or between users of a common

irrigation system can lead to the destruction of infrastructure or violence against people. In recent years, violent conflicts over irrigation water have been reported in many places, including Egypt, Somalia, and Uzbekistan (Abdoul-Fotouh et al. 2008, Holm-Müller and Zavgorodnyaya 2004, Wax 2006).

Key issues fuelling farmer-to-farmer conflict are:

- | **Increasing water demand and scarcity**, often coupled with weak water institutions;
- | **Overexploitation of groundwater resources** and subsequent falling water tables, rendering access difficult for some or all farmers;
- | **Lacking or damaged water infrastructure** entailing unequal access to and use of the resource; and
- | **Existing rivalries and socio-economic inequalities** between farmers.

There are several paths toward alleviating tensions among farmers, including promotion of alternative livelihoods, support for updated and water-efficient equipment, and increased education about water economy and supply. But intervening in and preventing these conflicts is also linked to efficient and legitimate water management institutions. Violence rarely erupts in places where traditional arrangements exist. Such agreements include precise regulations for water allocation and use, as well as mediating authorities to distribute water in an equitable way. Participative

Box 8 | Preventing conflict by dialogue over water management in Yemen

Yemen is one of the world's countries with the highest levels of water scarcity; it provides an interesting example for resolving conflicts over illegal drilling and groundwater abstraction. Focusing on building capacities to protect and manage Yemen's limited water resources, GTZ's water sector programme is often positioned between communities and stakeholders who are at odds with each other. When farmers planting the traditional mild stimulant 'qat' brought a rig to drill deep for irrigation water, the neighbouring village community 'Hijrat al-Muntasir' feared that further groundwater abstraction would dry up the only drinking water source for its 800 inhabitants. As a response, some of the tribesmen carried automatic rifles and the community displayed empty water containers to demonstrate their resolve to prevent the drilling. After several weeks of negotiations involving the Deputy Governor and the Local Council, both parties agreed to accept the outcome and recommendations of a technical study undertaken by the National Water Resources Authority (NWRA) with support from GTZ. GTZ's interventions contributed to avoiding the escalation of conflict by preventing deep drilling. Due to other factors, the availability of water in the village is decreasing, but as Saleh al-Muntasiri from the village comments: 'Without GTZ's support to prevent the drilling, we would now blame this slow drying-up of our spring on the qat farmers. There would be trouble and strife and God knows what'.

GTZ's work in this and other cases fosters transparency and dialogue between conflicting interests. It helps prevent violent escalation and seizes existing opportunities for cooperation and community-based development instead.

Negotiating conflict resolution mechanisms, Yemen



approaches to water management also help to highlight common interests and strategies of stakeholders. In southern Morocco, for example, institutions concerned with water use (organisations for irrigation water use, locally-elected bodies, water administrations, professional associations, and others) established a contract for water use that included scenarios for the coming years and collective adaptation processes (ABH: no date). Water user associations (WUA) for decentralised irrigation management can also help prevent conflicts when they ensure the equal allocation of the resource and are supported by secure ownership, legitimate leaders, and adequate financial means (Baland and Platteau 1996, Burchard 2002, Garcés-Restrepo et al. 2007).

Conflict and cooperation among industrial, agricultural, and drinking water users

Competition over water also increases in areas in which agriculture was once the dominant sector, but which have rapidly changed into rural centres. Tensions over water and land use run especially high in settings in which agriculture is forced to compete against other sectors, for example, industrial development on land still used for agriculture, or the diversion of established irrigation water for use by growing domestic, industrial, or tourism sectors. Rapidly changing land use can also have a compounded impact on water resources as supply diminishes quickly and, thereby, leads to additional degradation through

intrusion of saltwater and pollution. In Yemen's capital, Sanaa, for example, the water table is dropping six meters per year, increasing competition for the resource (see Box 8) (Brown et al. 2007).

Key issues fuelling multi-sector water conflict include:

- | **Privileged water supply** for politically and financially powerful players and the marginalisation of other users (Molle 2006);
- | **Weak governance and lacking infrastructure** in peri-urban areas (Janakarajan 2003);
- | **Rapid increase of water use** for urban and industrial needs without commensurate water treatment plants and a comprehensive strategy for integrated water resources management (IWRM); and
- | **Decreasing water tables** increasing saltwater intrusion and often escalating the pollution level of aquifers.

In the long term, addressing and preventing these water conflicts is primarily a matter of sustainable urban planning and IWRM. Since corruption plays a key role in water allocation among competing users, reducing its prevalence can greatly contribute to equitable allocation. However, IWRM and anti-corruption measures take time. More immediate measures are also needed to bring conflicting parties together. Such actions could include simple strategies for resource use and conflict resolution, legal measures against overexploitation, and stakeholder dia-

Box 9 | Kenya: persisting water cooperation in an environment of violence

Cooperation over water can persist even in an environment of violence. In the heavy post-election violence in Kenya in early 2008, surprisingly, water projects in the slums of Ongata Rongai, a Nairobi satellite town, were not affected negatively. The common interest of achieving access to water and sanitation as a basic human need united its residents, despite the ethnic and political tensions. Ongata Rongai is one of the areas in which GTZ supports the Kenyan Water Services Trust Fund (WSTF), to improve services in urban low-income areas—starting by pilot projects which prepared for large-scale implementation funded by the German Government and the European Union. Despite the violence in the country, in February 2008, the WSTF and the residents decided to continue the Ongata Rongai project with a public hearing. Residents of different ethnicities, representatives of the water utility, different authorities, and last but not least representatives of the local authorities discussed the selection of suitable sites for the construction of water kiosks and found solutions to the issues at stake. Even though the latter belonged to rival parties, they publicly stated that a solution to the water problem was more important than ethnic conflict. This shows water can be a powerful driver to uphold cooperation even in times of conflict.

Meeting on water cooperation in the slum Ongata Rongai with the Area Chief and District Officers during the Kenyan post election violence 2008





Box 10 | Improving socially sustainable drinking water supply in Bolivia

The violent struggles after the implementation of a public-private partnership for water services in the Bolivian city of Cochabamba were cited as one of the first 'water wars'. After months of protest, the Bolivian government was forced to end the contract with the private contractor and to review its water services system while specifically respecting the needs of poor population groups.

A GTZ programme aims at improving water provision and sewage water treatment focusing on several small and middle-sized cities of Bolivia by backing and developing national authorities, regional associations and local operators, and by accompanying KfW investments in infrastructure. In order to prevent water conflicts in this context, the programme provides several specific measures strengthening efficient services in alignment with government policy of promoting sustainable public services. Innovative public service models of horizontal cooperation aim to overcome potential disadvantages of small-scale structures and promote shared responsibilities between municipalities, operators and the population. Additionally, the programme strengthens participatory approaches in key IWRM processes such as the allocation of water withdrawal and discharge rights, and reinforces capacities in conflict management by balancing stakeholder interests. Moreover, it improves the pro-poor orientation of water projects, e. g. in the context of the financial sector policy (GTZ/ PROAPAC: website).

logues. An innovative project by the UN Division for Sustainable Development established tradable urban-rural water rights regimes in Yemen in response to potential water conflict. As a first step, groundwater rights were defined and registered. Stakeholders could then engage in inter-sectoral transactions in water rights. When legal approaches remain inefficient because of lacking enforcement, stakeholder dialogues can help bring conflicting parties together to negotiate other possible arrangements (Butterworth et al. 2007, UNDP: no date). In India, widespread conflict and unrest followed the pollution and overexploitation of water in peri-urban areas of Chennai. A multi-stakeholder dialogue brought together the different parties and is still working to achieve common solutions. A drawback of this approach, however, is that a threshold level of crisis seems to be necessary to bring parties together (Janakarajan 2003).⁸

Conflict and innovative solutions in the drinking water sector

Deficient drinking water supply provokes conflict in many parts of the world. The essential need of clean water for human existence explains why these conflicts often escalate into violence. In Algeria, for example, irregular water supply during the summer months of 2007 resulted in violent riots against public administrators (El Houari 2007). And in Kyrgyzstan, lacking water supply coupled with irregular access to electricity led to clashes between inhabitants and the administration in 2008 (Mamatov 2008).

Key issues fuelling conflict over drinking water include:

- | **Poor water quality, disrupted delivery mechanisms, and irregular supply;**
- | **Lack of transparency** in administration and billing; and
- | **Rising prices for water services unmatched by service improvements.**

Yet, cooperative and participatory approaches to drinking water management can help prevent conflict. For example, in the aftermath of the water conflict in Cochabamba, Bolivia (see Box 9), drinking water users participated in the amendment of the Drinking Water and Sanitation Services Act of 2000, which included the installation of a public-private partnership, and addressed enforcement of universal access, quality and continuity of basic services, and environmental concerns (Sánchez Gómez and Terhorst 2005). In Santa Cruz de la Sierra, Bolivia, a cooperative manages the drinking water supply and every water user becomes a co-owner of the co-operative with voting rights (Yavari 2005). Other places with community participation over water supply include cities in Argentina, Brazil, and Ghana (Balanyá et al. 2005).

Preventing conflict over drinking water supply requires management structures and conditions of access acceptable to the population, particularly the poor. Water sector reforms—including monitoring and regulating both public and private suppliers, and transparent management—further bolster conflict prevention efforts.

⁸ Butterworth et al. (2007) provide a good overview on successful multi-stakeholder dialogues in water conflicts and highlight the use of role playing in this context.



Bridge in the Southern African Development Community (SADC)

3|2 Large Infrastructure Projects

Around the world, burgeoning cities, new tourist resorts, and additional irrigated land are triggering increased demand for water resources. Efforts to meet this growing demand are still primarily addressed through new large infrastructure projects. Important large-scale projects transfer irrigation and drinking water between regions in China, and from rural areas to growing cities in Mauritania, Mexico, and India (Molle and Berkoff 2006, UNDP 2006.). Although providing water, large infrastructure projects often have far-reaching impacts, both in their immediate surrounding and also on neighbouring states, and can lead to social unrest, diplomatic incidents, and violent conflict.

Key issues fuelling conflict in this context include:

- | **Water transfer entailing scarcity in the original location.** Where livelihoods and domestic water supply are threatened, conflicts may emerge;
- | **Lacking compensation** for the expropriation of local communities losing housing and livelihoods;
- | **Restricted water availability of neighbouring states,** which may provoke transboundary tensions; and
- | **Critical environmental impacts** threatening livelihoods and ecosystems.

Appropriate measures for conflict resolution and prevention need to tackle the social and environmental impacts of such projects. The World Commission on Dams (WCD)—a forum including stakeholders from the public and the private sector, as well as civil society—published detailed guidelines for the assessment, the prevention, and the compensation of social and environmental ef-

fects of dams at the local, national, and international level (WCD 2000a). Regional organisations can also help negotiate agreements. In the case of the Salween River—shared by China, Myanmar, and Thailand—the diversion of water flows through Thailand was debated by the Association of Southeast Asian Nations (ASEAN). However, dissent on social and environmental impacts, as well as the fate of future projects in the river basin, still persist (Affeltranger 2008).

3|3 Between Riparian States

In transboundary basins, water management in one state will impact (and be affected by) water use in another, possibly distant state. This is true not only for rivers, but also for lakes and groundwater, which are often connected to each other via surface and/or subterranean flows. Without relations or institutions conducive to conflict resolution, unilateral action can heighten tensions and regional instability, requiring years or decades to resolve. Cooperative arrangements range from implementing joint projects to bi- or multi-lateral agreements and river basin organisations that jointly manage the shared water resources. Third parties, such as international organisations or donor agencies, can be instrumental in facilitating cooperation by mediating conflicting interests, or providing financial incentives for cooperation or technical assistance.

Upstream-downstream and power constellations

At the international level, tensions arise typically between riparian countries located upstream and downstream. Most often, use of water and implementation of flow regulation measures in the upstream part of the river influence down-

Box 11 | A source of peace – transboundary water management in Central Asia

In the Central Asian region, global climate change, combined with chronic exploitation of available water reserves, is causing serious consequences. Water scarcity, inappropriate water resource management by users, such as wastage and inefficient irrigation, as well as uneven water distribution based on disparate interests, result in a major conflict potential in the region. Today, Tajikistan and Uzbekistan deploy water of the major upstream rivers (Syr Darya and Amu Darya) mainly for energy production in winter, while Kazakhstan, Turkmenistan and Uzbekistan use downstream water for irrigation in summer. The widely known ecologic catastrophe of the dwindling Aral Sea is symbolic of the precarious water situation in the region.

As a response, the German Federal Foreign Minister launched with the 'Berlin Process' a water initiative for Central Asia in April 2008. GTZ is carrying out the Central Asian Transboundary Water Management Programme on behalf the German Federal Office until 2011. It contributes to conflict prevention and strengthened cooperation through three main components; fostering regional institutional cooperation, strengthening transboundary river management, and implementing fast-track projects towards efficient water use.

stream water quantity and quality. For example, diverting large amounts of water for irrigated agriculture or to supply drinking water to large cities can significantly reduce the amount of water that flows downstream. Disputes can also arise between those which cause water quality problems upstream and those affected by them downstream.

Upstream-downstream constellations often imply unequal power relations, as downstream states do not usually possess the means to directly and physically influence the flow upstream (Rogers 1997). Consequently, these upstream-downstream situations often render interstate cooperation particularly complicated because incentives to cooperate are not uniform between riparians (Klaphake 2005). However, the distribution of political, military, or economic power also plays an important role. For example, powerful downstream states—like Egypt in the Nile basin—oftentimes have the potential to influence 'weaker' upstream states and upend the traditional upstream-downstream power dynamic.⁹

Joint projects or infrastructure for shared benefits and trust building

Joint activities and measures in water management, as e.g. joint water monitoring, can help moving the riparians' focus away from conflict and toward the benefits of cooperation and, thus, prevent the escalation of disputes. Developing water resources in collaboration with neighbours may facilitate win-win solutions for all riparians (e.g. reduced costs for infrastructure, predictable water supply, flood prevention, etc.) (Sadoff and Grey 2002). Where joint projects do not deliver mutual or equal ben-

efits to all parties, agreements can help establish procedures for better sharing the benefits and costs through means such as compensation.

Many joint projects among riparian states concern the construction of dams. In the Mekong Basin, for example, China proposed building 15 dams for hydroelectric power (Elhance 1999). This unilateral development project alone would have large implications for the downstream riparian states. Yet, considering the often already tense political relations among riparians, such unilateral developments have the potential to make hydropolitics in the Mekong Basin much more contentious (Elhance 1999). Further downstream, on the other hand, Thailand provided financial support to Laos for a hydropower project in exchange for a percentage of the generated electricity (on the Mekong Basin see also Le-Huu and Nguyen-Duc 2003). Naturally, such joint projects will only prevent conflict if the distribution of benefits is perceived as acceptable by all riparians.

Another common field for joint projects among riparians is collaboration in data collection and monitoring of water quality and quantity. A hydrological database acceptable to all riparians is essential for any joint water resources management efforts, as it would not only enable water-sharing parties to make decisions based on the same understanding of the existing hydrological situation, but would, in turn support trust building. In the Kura Basin, for example, the German Federal Environmental Agency (FEA) implemented a project on pollution prevention and early warning between the riparian

⁹ Within this context, the concept of hydrohegemony has recently emerged (Zeitoun and Warner 2006). However, the term is only loosely defined. It is most frequently used to describe how more powerful riparian states can control water use in shared basins through various means.

states Armenia, Georgia, and Azerbaijan. The jointly developed cross-border warning and alarm systems are to be a first step in establishing an international river basin commission for the protection of the Kura (FEA and IABG 2006). To create trust, such projects need to ensure transparent procedures and share accurate and relevant data. Without these basic trust-building elements, common data banks and monitoring systems might actually deepen existing suspicion—as has been observed in the Water Data Banks Project on the Jordan River (Kramer 2008).

Cooperation on specific topics, such as joint infrastructure or data collection can promote broader water cooperation. Success, however, depends on mutually perceived benefits and establishing good relations among the parties.

Legal frameworks for transboundary water cooperation

Treaties between riparian states can provide a basis for settling disputes over water issues. Many bi- and multi-lateral agreements concerning the joint use of transboundary watercourses already exist. One of the early examples is the Boundary Waters Treaty between the United States of America and Canada. As early as 1909, the two riparians of the Great Lakes signed the treaty which also established the International Joint Commission (IJC). Today, treaties to facilitate and to some extent legislate the sharing of water resources have been established in many international basins (UNESCO/WWAP 2003). However, many of these agreements are narrow in scope—they tend to be bilateral and focus on resolving particular water issues rather than building comprehensive approaches to overall basin management.

Even if a treaty comes to pass, the mere existence of an agreement is not sufficient—effective implementation, as well as enforcement on the national level, must be

ensured. Further, to evaluate the success of such agreements, exact contents need to be considered.

To provide sustainable frameworks for conflict prevention, agreements should:

- | **Delineate the most conflict-prone issues** in basins where this is politically feasible and appropriate;
- | **Include all riparian states;**
- | **Be adaptable to changing environmental conditions;** and
- | **Include mechanisms for monitoring compliance, enforcement, and dispute resolution.**

International water law (see Box 12) can provide useful guidance for designing transboundary water agreements. Several characteristics have been identified as favourable for achieving an agreement between riparians: 1) the lack of clear upstream-downstream constellations and/or marked power asymmetries; 2) overall friendly relations between riparians; 3) a limited number of riparians that have to find a consensus; 4) riparians with similar levels of economic development; and 5) a strong political integration of the riparians (Bernauer 2002, Durth 1996).

Negotiations on transboundary water agreements may further be facilitated by linking water with other issues. For example on the Syr Darya Basin in Central Asia (see Box 11), to overcome the conflict of interests, riparians reached an agreement according to which downstream countries would deliver alternative heating sources to upstream Kyrgyzstan (natural gas, coal, and fuel oil) in exchange for releasing irrigation water in summer. While riparians have not always complied with the agreement, it does provide an example of creative issue linkage. On the other hand, however, linking water with other issues can increase the risk of making negotiations more complicated by bringing too many issues onto the table, or

Box 12 | International law on cooperation in transboundary basins

Several international organisations have worked to establish legal frameworks for cooperation in transboundary basins. The UN General Assembly adopted the **Convention on the Law of the Non-navigational Uses of International Watercourses** in 1997, but it has not been enforced to date. Legally binding norms therefore only exist on the regional level.

The most explicit laws on cooperation in transboundary basins are the 1992 **Convention on the Protection and Use of Transboundary Watercourses and International Lakes** of the United Nations Economic Commission for Europe (UNECE), and, for the sub-Saharan region, the **Protocol on Shared Watercourses in the Southern African Development Community**, which was revised in 2002.

These framework laws stipulate binding norms and guiding principles on how competing claims for water use can be reconciled. They also offer a legal basis for the establishment of international agreements and institutions. However, international water law has been criticised for being too vague and lacking effective enforcement mechanisms (Luzi 2006).



Passenger traffic, Lake Chad

by further politicising or securitising international water relations. Yet, linkages are also possible on issues within the water sector (Dombrowsky 2007).

Closely connected to issue linkage is the approach of benefit sharing, which focuses on sharing the economic benefits from transboundary water resources rather than on sharing the resource itself. While the approach provides a conceptual framework to identify alternative and mutually beneficial development opportunities,¹⁰ benefit sharing has seldom been put into practice in transboundary water management. Implementation of benefit sharing is often complicated by difficulties in valuating the economic benefits of water resources or by riparian states' political agenda and differing development priorities (Klaphake 2005).

The potential of transboundary water treaties to solve water-related disputes heavily depends on the substance and scope of the treaty, as well as on the parties' willingness and capacity to enforce international agreements at the national level.

Joint management institutions and river basin organisations

Agreements to settle water-related disputes have proven more effective if strong and competent river-specific institutions are established to implement them (Hensel et al. 2006). On the international level, river basin commissions have been successfully involved in joint riparian water resources management, provided that they ensure equal representation and participation of all riparian

states—examples include the aforementioned IJC between the USA and Canada, the International Commission for the Protection of the Rhine, and the Orange-Senqu River Basin Commission (ORASECOM) in southern Africa, among others.

The form and function of joint management institutions can vary significantly across basins. As such, joint management institutions should be adapted to the existing level of willingness to cooperate (Phillips et al. 2006). In order to ensure that new institutions do not support existing power asymmetries and, thus, foster potential for conflict, care must be taken to prevent the most powerful riparian from dominating the process. Regional integration can play a significant role in this regard, as it can help balance existing inequalities. Furthermore, river commissions are likely to be more successful if they are systematically linked to national level authorities, thereby ensuring financial and political support within riparian country bureaucracies (Marty 2001). Where riparian states do not have the human and financial resources, external support is often crucial for joint water management bodies to actually ensure the implementation of the countries' tasks.

Intervening in disputes and mediating in conflict

If the level of dispute between riparians is too high and disparities of positions are too great, conflicting parties are not likely to reach consensus and might even refuse to participate in cooperative activities. In such cases, interventions designed to manage disputes, transform conflicts or increase confidence, can be adopted as precursory or supportive measures to establish cooperative mechanisms. While confidence and consensus-building measures, such as joint training or joint fact-finding, will support the process of cooperative decision-making, conflict transformation measures involving a neutral third party—for mediation, facilitation, or arbitration—are helpful in cases where open disputes already exist. In some cases of transboundary water disputes, such as in the Okavango Basin, an 'Elite-Model' aimed at reaching consensus between high-level representatives of the riparian states had been adopted prior to establishing management processes with broader participation (Kramer 2004).

When third parties intervene in disputes through mediation or promoting joint management bodies they must act as a neutral party and prevent existing power asymmetries from being reflected in the process.

Box 14 | Build on existing water management approaches for preventing conflict

Sustainable water management and good water governance are at the heart of preventing the escalation of water conflicts. Development cooperation should therefore continue and further develop existing approaches in the water sector.

| Develop capacities for sustainable water management by:

Supporting equitable and sustainable water management policies and advising on necessary water sector reform;

Improving legal frameworks for water and land use and strengthening capacities for their enforcement (e.g. sanctioning illegal water withdrawal and pollution). In addition, effective regulation of service delivery must be guaranteed;

Strengthening human, institutional, and technical capacities, through technical assistance to enable water management institutions to formulate and implement sustainable water management plans;

Supporting data collection and knowledge management as the basis for problem-oriented decision-making, overcoming mistrust among conflicting parties linked to disparities in capacity and knowledge, and also strengthening the negotiating skills of less-powerful parties;

Improving transparency and participation of stakeholders in planning and implementing water projects to build confidence among parties and to guarantee that water users' interests are taken into account. Moreover, civil society organisations can contribute to auditing and monitoring of water utilities;

Supporting the development of IWRM and investing in its implementation (e.g. through investments in infrastructure).

| Support cooperation and facilitate negotiation in water issues by:

Promoting communication and collaboration among the various players in water management, including civil society, public institutions, and private companies, as well as regional organisations at the international level (e.g. through experience exchange or sharing of data);

Implementing joint projects with cooperative gains and improving benefit-sharing of all stakeholders. This helps to institutionalise contacts and build trust. These sorts of activities need to be further developed in potential hotspots;

Supporting the formulation of water contracts or agreements between water users or states that regulate consumption and preservation of the resource, and supporting their implementation through harmonisation of national or sectoral water policies. River basin organisations, particularly those located in fragile riparian basins, need support;

Establishing cooperative water management institutions such as water user associations or river basin organisations, and building their capacities and providing institutional, financial, and technical support.



Water provider warns against vandalism and theft, Zambia

Avoiding any harmful impact of projects which may contribute to exacerbating tensions or degrading the environment is an essential aspect in this regard.

Conflict-sensitive strategies are increasingly being implemented in development cooperation but require even more specific attention in light of the changing environmental policy landscape (Carius et al. 2008). The current global focus and interest in climate policy is a window of opportunity for improving resource—and especially water—strategies, for promoting conflict-sensitive water governance, and taking advantage of the numerous possibilities water projects offer for conflict prevention, stabilisation, and peacebuilding.

Three types of measures are apt to achieve this aim:

- | **Building on successful approaches in water management** within the water sector itself, and developing new tools for responding to conflict potential;

- | **Developing specific measures and tools** for detecting conflict potential, and intervening in disputes;
- | **Sensitising other sectors of development cooperation** to water security issues and adopting cross-sectoral approaches.

Maintain and improve existing water policies and integrate conflict-specific measures

As Chapter 3 revealed, the main driving force behind water conflicts is availability. Poor governance and management in terms of social, environmental, and economic sustainability are likely to trigger water-related conflicts. In light of this knowledge, existing water policies should be improved to meet the challenges mentioned in Chapters 2 and 3. **Good water governance**—including transparency, the rule of law, accountability, and legitimacy of institutions and leaders—contributes to the prevention of water conflicts. The increasing pressure on water resources and subsequent spike in competition require the implement-

Box 15 | Measures for intervening in and preventing water conflict

Identify potentially conflictual aspects of water and related projects on the basis of a Social Impact Assessment (SIA) or a Peace and Conflict Impact Assessment (Anderson 1999, Bush 2001). Existing tools should be complemented by water-specific concerns and also consider existing disparities or conflicts and local power constellations, as well as social, technical, and financial capacities of population groups to cope with water problems (Houdret 2008a).

Monitor the implementation of projects with respect to water conflict and on the basis of the above-mentioned tool. As Saferworld has shown for the case of Uganda, conflict-sensitive approaches in projects need to be adapted to the specific setting in order to be effective (Saferworld 2008).

Adopt participatory approaches by including civil society and local government actors into discussions on conflict-sensitive development. In addition, support policy dialogue meetings and public debates on these issues.

Assess the potential impact of existing conflicts and crucial environmental and socio-economic trends on the project before, during, and after its implementation. This facilitates an understanding of interconnectedness and allows a (re)-orientation of the activities so that they can contribute to peacebuilding.

Identify and support effective institutions for conflict resolution in the water sector or elsewhere, which enjoy legitimacy and can be mobilised in cases of disputes. Traditional and modern systems alike provide good entry points for negotiating agreements and stabilising social relationships.

Identify opportunities for peacebuilding through water policies and projects at the local, national, and international level, which should include

- | An assessment of existing cooperation structures and the linking of issues across the different parties;
- | Giving the beneficiaries an opportunity to discuss what issues divide them and where and how peacebuilding is desired and possible;
- | The development of policies and guidelines for making use of technical issues as an entry point for negotiation and trust building.

Support specific capacity building measures for conflict awareness, prevention, and resolution. This includes negotiation skills and the assessment of conflict potential, but also broader training for the conflict-sensitive implementation of water management. Training for courts, lawyers or water administrations could improve knowledge about water use rights, allocation structures or groundwater depletion and subsequent disputes.

tation of the **IWRM principles**, and **adequate capacities and infrastructure** for improving water economy and fighting pollution. High consumption in the agricultural sector requires **technological innovation accompanied by capacity building**, as well as the generation of alternative incomes. Additionally, **conflict-specific measures** need to be added to water policies where necessary. Climate change adaptation in the water sector, for instance, needs to be conflict-sensitive: Policymakers need to consider the potential marginalisation of population groups and observe the principles of the ‘do no harm-approach’ (Anderson 1999). **Long-term involvement** of donors is important, as institution and capacity building, as well as the creation of stable relationships and trust between conflicting parties, need time and ongoing support in order to be effective (see Box 14).

Develop specific measures and tools for water conflict prevention and resolution

Water conflicts between farmers and nomads, or social turmoil linked to deficient drinking water supply (see Chapter 4) are potentially violent situations. Specific measures can address this effectively (Box 14). While more and more development organisations have their

own guidelines for dealing with the links between projects and conflict, these guidelines are rarely specific for intervening in water conflicts and identifying related conflict potential. Furthermore, in the face of the high number of civil conflicts and possible cases of state ‘failure’, the need for water project approaches to be adapted for (post)-conflict contexts and regions in which public administrations are weak or nonexistent could be analysed. Box 15 presents measures for tackling these issues.

Cross-sectoral approaches to water conflict potential

As water concerns all aspects of human life, its direct and indirect linkages to development projects are manifold. Chapters 3 and 4 highlighted key domains which need to be considered for a comprehensive water strategy; the industrial sector, the agricultural sector, as well as domestic infrastructure and rapidly growing urban centres and economic sectors, such as tourism. Negotiations over access to clean water and competition take place within and between each of these sectors and influence the conflict potential of water management. Therefore, development cooperation needs to adopt a cross-sectoral approach and mainstream the consciousness about potential water conflict throughout a large variety of its projects, with the

Box 16 | Cross-sectoral approaches to water conflict potential

Reduce vulnerability of certain population groups and neighbouring countries to sudden changes in water supply. Within countries, reducing vulnerability involves the creation of alternative livelihoods and adaptive capacities of groups and institutions to water scarcity and floods. At the international level, vulnerability reduction includes transboundary information on new infrastructure projects and their possible impact on other riparians.

Inform decision makers in other fields about water conflict potential, pointing to the direct and indirect links between their activities and water security. Study tours, regular cross-sectoral working groups, as well as scientific studies, and media reports can help raising awareness on these issues. Increased education also facilitates long-term dialogue among stakeholders, which, in turn, is the basis of common scenarios and strategies.

Include water conflict sensitivity at the macro-political level, for example, when considering decisions about the future of the agricultural sector or large infrastructure projects.

Improve coordination between and among donors in order to adopt common conflict prevention approaches and to assess the impacts of projects and policies. A report on the Horn of Africa highlights that a patchwork of activities by different donors in the same area can contribute to water conflict (Allan and Alan 1998).

Use Social Impact Assessments (SIA) to identify water conflict potential across sectors at an early stage. Specific conflict-related aspects could be included into common SIA tools and thereby integrated into already established assessment processes (see Box 14).

Consider the overall socio-political context when implementing projects in the water sector or related fields. Such considerations help identify conflict potential. Identification of power structures and interests, as well as social capacities and resources of individuals and groups, reveal both key actors as well as the causes of conflictive and cooperative issues.

concept of IWRM serving as the basis. While improving existing water management and adopting conflict-sensitive strategies is necessary, this approach should be complemented by sensitivity to water interdependencies.

Summing up, development cooperation already offers great support for sustainable water management, good water governance, and the development of capacities to cope with and adapt to challenges. These are activities which are at the heart of preventing the escalation of water conflicts. In light of the rising importance of the water security nexus, however, the potential should be explored to better target these measures so that the direct and indirect effects of water projects contribute to enhanced conflict prevention and peacebuilding. Practical experiences in the sector could be more systematically analysed on the international and national level. Likewise, to date, only little experience exists with employing the tools and approaches developed by conflict prevention experts within the water sector. The peacebuilding potential of water development remains under research and would certainly benefit from a specific assessment of related experiences. Finally, the importance of cross-sectoral approaches needs to be highlighted. Cooperation

beyond sector boundaries, e.g. working more closely with the agricultural, the urban planning and the environment sectors, is important to prevent and manage conflict.

Development cooperation in the water sector already contributes much to building the prerequisites for conflict prevention and management by development partners in the water sector. Yet, possibilities for exploring instruments and approaches more systematically could be thoroughly assessed. This would increase the opportunities of development cooperation to a more focussed and strategic approach to deal with the water security nexus, which will grow more important in the future.



Heavy erosion, Botswana

5 | Annexes

5|1 List of Abbreviations

ASEAN	Association of Southeast Asian Nations
ABHN	Agence du Bassin Hydraulique
EEA	European Environment Agency
FAO	Food and Agriculture Organisation
FEA	Federal Environment Agency
GTZ	Deutsche Gesellschaft für technische Zusammenarbeit (GTZ) GmbH
GWP	Global Water Partnership
IABG	Industrieanlagen-Betriebsgesellschaft mBH
ICRC	International Committee of the Red Cross
IJC	International Joint Commission
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resources Management
KfW	Kreditanstalt für Wiederaufbau
NBI	Nile Basin Initiative
ORASECOM	Orange-Senqu River Commission
PPP	Public-Private Partnership
RBO	River Basin Organisation
SADC	Southern African Development Community
SIA	Social Impact Assessment
SWH	Swedish Water House
TI	Transparency International
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNECE	United Nations Economic Commission for Europe
WCD	World Commission on Dams
WUA	Water User Association
WWAP	World Water Assessment Programme

5|2 List of Boxes

BOX 1	Defining water and security linkages	5
BOX 2	Climate change increases the challenges of water management	6
BOX 3	Conflicts over the extraction and pollution of groundwater resources	7
BOX 4	Characteristics of water conflicts at the local, national, or international level.	8
BOX 5	Water conflict or cooperation? Key factors for vulnerability and adaptation	9
BOX 6	Dependencies and interdependencies in transboundary basins	10
BOX 7	Factors increasing the risk of water-related conflict within or between states	11
BOX 8	Preventing conflict by dialogue over water management in Yemen.	14
BOX 9	Kenya: persisting water cooperation in an environment of violence	15
BOX 10	Improving socially sustainable drinking water supply in Bolivia.	16
BOX 11	A source of peace - transboundary water management in Central Asia.	18
BOX 12	International law on cooperation in transboundary basins	19
BOX 13	GTZ involvement in the Nile Basin Initiative	21
BOX 14	Maintain and improve existing water management approaches for preventing conflict	22
BOX 15	Measures for intervening in and preventing water conflict	23
BOX 16	Cross-sectoral approaches to water conflict potential	24

5|3 References

Aboul-Fotouh, Nahla; Alaa Eddin Abdin and Samir Sedky 2008: Assessment of grass roots irrigation water conflict through governorates' profiles. In: Maroun El Moujabber; Muhammad Shatanawi; Giuliana Trisorio Liuzzi; Mohamed Ouessar; Pietro Laureano and Rafael Rodriguez (eds.): *Options Méditerranéennes. Series A No. 83.* Bari: CIHEAM, 185–196.

Affeltranger, Bastien 2008: Inter-basin water transfers as a technico-political option. Thai-Burmese projects on the Salween River. In: Nevelina I. Pachova; Mikiyasu Nakayama and Libor Jansky (eds.): *International Water Security: Domestic Threats and Opportunities.* Tokyo, New York, Paris: United Nations University Press, 161–179.

Agence Française de Développement (no date): Accompagner la transhumance et prévenir les conflits. In: www.afd.fr/jahia/webdav/site/afd/users/administrateur/public/infos-projets/Telechargements/Hydraulique-pastorale-Tchad.pdf .

Agence du Bassin Hydraulique du Souss Massa (no date): Le contrat de nappe. In: www.abhsm.ma.

Allan, Tony and Alan Nicol 1998: *Water resources, prevention of violent conflict and the coherence of EU policies in the Horn of Africa.* London: Saferworld.

Anderson, Mary B. 1999: *Do No Harm: How Aid Can Support Peace - Or War.* Boulder: Lynne Renner Publishers.

Bächler, Günther 1994: *Desertification and Conflict. The Marginalization of Poverty and of Environmental Conflict.* Paper presented at the Symposium on Desertification and Migration, Almeria, 9.–12.04.2004.

Bächler, Günther; Kurt Spillman and Mohamed Suliman (eds.) 2002: *Transformation of Resource Conflicts: Approaches and Instruments.* Bern: Peter Lang AG/European Academic Publishers.

- Baland, Jean-Marie and Jean-Philippe Platteau** 1996: Halting the Degradation of Natural Resources - Is there a Role for Local Communities? Oxford: Oxford University Press.
- Balanyá, Belén; Brid Brennan; Olivier Hoedeman; Satoko Kishimoto and Philipp Terhorst** (eds.) 2005: Reclaiming Public Water. Achievements, Struggles and Visions from Around the World. Transnational Institute and Corporate Europe Observatory.
- Ban, Ki Moon**: Secretary-General's video message for the First Asia-Pacific Water Summit, Beppu, Japan, 3 December 2007. In: www.un.org/apps/sg/sgstats.asp?nid=2888.
- Barlow, Maude and Tony Clark** 2002: Blue Gold: The Battle Against Corporate Theft of the World's Water. Toronto: Stoddart Publishing Co. Ltd.
- Beach, Heather L.; Jesse Hamner; Joseph J. Hewitt; Edy Kaufman; Anja Kurki; Joe A. Oppenheimer and Aaron T. Wolf** 2000: Transboundary Freshwater Dispute Resolution: Theory, Practice, and Annotated References. Tokyo, New York, Paris: United Nations University Press.
- Bernauer, Thomas** 2002: Explaining success and failure in international river management. In: *Aquatic Sciences* 64, 2002, 1–19.
- Brown, Lester (lead author); Brian Black and Galal Hassan Galal Hussein (topic editors)** 2007. Aquifer depletion. In: *Encyclopedia of Earth*. Eds. Cutler J. Cleveland (Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment). [First published in the *Encyclopedia of Earth* 14.09.2006; Last revised 12.02.2007; Retrieved 25.05.2009].
- Brown, Oli; Anne Hammill and Robert McLeman** 2007: Climate change: the new security threat. In: *International Affairs* 83: 6, November 2007, 1141–1154.
- Burchard, Marian** 2002: Soziokulturelle Aspekte von Kooperationen in Wassernutzergemeinschaften. Evidenzen im Nahen Osten und Nordafrika. Discussion Paper. Bonn: Deutsches Institut für Entwicklungspolitik.
- Bush, Kenneth** 2001: Peace and Conflict Impact Assessment (PCIA) Five Years On: The Commodification of an Idea. In: Alex Austin; Martina Fischer and Olivier Wils (eds.): *Peace and Conflict Impact Assessment. Critical Views on Theory and Practice*. Berlin: Berghof Research Center for Constructive Conflict Management, 37–51.
- Butterworth, John; Raphaelle Ducrot; Nicolas Faysse and Srinivasan Janakarajan** (eds.) 2007: *Peri-Urban Water Conflicts: Supporting dialogue and negotiation*. Delft, the Netherlands: IRC International Water and Sanitation Centre.
- Carius, Alexander** 2006: *Environmental Cooperation as an Instrument of Crisis Prevention and Peacebuilding: Conditions for Success and Constraints*. Study commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ). Berlin: Adelphi Consult.
- Carius, Alexander; Dennis Tänzler and Achim Maas** 2008: *Climate Change & Security: Challenges for German Development Cooperation*. Eschborn: GTZ.
- Carius, Alexander; Dennis Tänzler and Judith Winterstein** 2006: *Weltkarte von Umweltkonflikten – Ansätze zur Typologisierung*. In: *Welt im Wandel – Sicherheitsrisiko Klimawandel*. Berlin-Heidelberg: Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen (WBGU).
- Conca, Ken and Geoffrey D. Dabelko** (eds.) 2002: *Environmental Peacemaking*. Washington D.C. and Baltimore: The Woodrow Wilson Center Press and Johns Hopkins University Press.

- Conca, Ken; Alexander Carius and Geoffroy Dabelko** 2005: Building peace through environmental cooperation. In: The Worldwatch Institute (ed.): State of the World 2005: Redefining global security. New York & London: WW Norton& Company.
- Cooke, Bill and Uma Kothari** (eds.) 2001: Participation: The New Tyranny? London and New-York: Zed Books Ltd. and Room 400.
- Dombrowsky, Ines** 2007: Conflict, Cooperation and Institutions in International Water Management – An Economic Analysis. Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
- Durth, Rainer** 1996: Der Rhein - Ein langer Weg zum grenzüberschreitenden Umweltschutz. In: Politik und Zeitgeschichte, B7/1996, 38–47.
- Elhance, Arune** 1999: Hydropolitics and the 3rd World. Conflict and Cooperation in International Water Basins. Washington, DC: US Institute for Peace.
- El-Houari, Dilmi** 2007: Les émeutes de l'eau de retour à Tiaret. In : Le Quotidien d'Oran, 09.07.2007.
- Esty, Daniel C.; Jack A. Goldstone; Ted Robert Gurr; Barbara Harff; Marc Levy; Geoffrey D. Dabelko; Pamela Surko and Alan N. Unger** 1998: State Failure Task Force Report: Phase II Findings. McLean, VA: Science Applications International, for State Failure Task Force.
- EEA** 2009: Water resources across Europe – confronting water scarcity and drought. Report No. 2/2009, Copenhagen: EEA.
- FEA and IABG** 2006: Development of Cross-National Cooperation for Incident Planning in the Kura River Basin Watershed. Summary Final Report of the Federal Ministry for the Environment, Nature Conservation, and Reactor Safety/ Federal Environmental Agency Project. In: www.kura.iabg.de/documents/ergebnisse/Sum14_12_2006a_engl.pdf.
- Garces-Restrepo, Carlos; Giovanni Muñoz and Douglas Vermillion** 2007: Irrigation Management Transfer. Worldwide Efforts and Results. FAO Water Reports No. 32.
- Giordano, Meredith A.; Mark Giordano and Aaron T. Wolf** 2002: The Geography of Water Conflict and Cooperation: Internal Pressures and International Manifestations. In: Giordano, Meredith A.: International River Basin Management: Global Principles and Basin Practice. Dissertation submitted to Oregon State University.
- Gleick, Peter H.** 1993: Water and conflict: Fresh water resources and international security. In: International Security 18, Vol. 1, 79–112.
- Gresh, Alain; Philippe Rekacewicz and Dominique Vidal** 2006: Planet in Peril. An Atlas of current threats to people and the environment. Paris: Le Monde Diplomatique.
- GTZ** 2007: Donor activity in transboundary water cooperation in Africa. Results of a G8-initiated survey 2004–2007. Eschborn: GTZ.
- GTZ** (no date): Project description Boliva. In: www.gtz.de/en/themen/umwelt-infrastruktur/wasser/3789.htm.
- Hensel, Paul R.; Sara McLaughlin Mitchell and Thomas E. Sowers II** 2006: Conflict Management of Riparian Disputes: A Regional Comparison of Dispute Resolution. In: Political Geography 25, 4 (May 2006): 383–411.
- Hoering, Uwe** 2008: Water to the People. Drinking Water and Water for Livelihoods. Conflicts and Alternative Concepts in India. Bonn and Tarnaka: EED and Water and Democracy Initiative.

Holm-Müller, Karin and Darya Zavgorodnyaya 2004: Conflict-resolution mechanisms of Water Users' Associations in Uzbek context. In: www.zef.de/module/register/media/5bd6_DaryaZavgorodnyaya_montpellier.pdf.

Homer-Dixon, Thomas 1999: *Environment, Scarcity and Violence*. Princetown: Princetown University Press.

Houdret, Annabelle 2008a: Innerstaatliche Konflikte um Wasser: Ursachen, Kooperationspotentiale und politische Handlungsoptionen. In: Corina Bastian; Anne Gunkel; Hannes Leistert; Timo Menniken; Regina Rhodius and Bernd Schlipphak (eds.) 2008: *Wasser - Konfliktstoff des 21. Jahrhunderts: Von der Krisendiagnose zum Problemmanagement*. Heidelberg: Universitätsverlag Winter, 47–61.

Houdret, Annabelle 2008b: Scarce Water, Plenty of Conflicts? Local Water Conflicts and the Role of Development Cooperation. INEF Policy Brief 03. Duisburg: Institute for Development and Peace (INEF).

Houdret, Annabelle 2008c: The privatisation of irrigation water services: New partnerships and water conflicts in the El Guerdane project, Morocco. Paper presented at the 13th World Water Congress of the International Water Resources Association, Montpellier, 1–4 September 2008. In: www.worldwatercongress2008.org/resource/authors/abs89_article.pdf.

Hussein, Muawya Ahmed 2008: The cost of environmental degradation in the Middle East and North Africa region. In: *Management of Environmental Quality: An International Journal*, 19/3, 305–317.

ICRC 1995: *Water and War: Symposium on water in armed conflicts*. Conference report. Geneva: International Committee of the Red Cross.

IPCC (Bates, B.C., Z.W. Kundzewicz, S. Wu and J.P. Palutikof eds.) 2008: *Climate Change and Water*. Technical Paper of the Intergovernmental Panel on Climate Change. Geneva: IPCC Secretariat.

IRIN 2009a: Nigeria: Nomad-farmer clashes increase as pasture shrinks. In: www.irinnews.org/report.aspx?ReportID=84761 (08.06.2009).

IRIN 2009b: Kenya: Drought exacerbating conflict among pastoralists. In: www.irinnews.org/report.aspx?ReportId=82683 (08.06.2009).

Janakarajan, Srinivasan 2003: Water pollution and groundwater depletion multi-stakeholders' dialogue as a key for finding ways forward. Paper presented to the Seminar on Water, Centre for Economic and Social Studies, Hyderabad, 30–31 July 2003.

Jarvis, Todd W. 2008: Strategies for groundwater resources conflict resolution and management. In: Christophe Darnault (ed.): *Overexploitation and contamination of shared groundwater resources. Management, (bio) technological, and political approaches to avoid conflicts*. Dordrecht: Springer, 393–414.

Klaphake, Axel 2005: *Kooperation an internationalen Flüssen aus ökonomischer Perspektive – das Konzept des Benefit Sharing*. Discussion Paper. Bonn: Deutsches Institut für Entwicklungspolitik.

Kramer, Annika 2004: *Water and Conflict* (policy briefing for USAID). Berlin, Bogor, Washington DC: Adelphi Research, Center for International Forestry Research, Woodrow Wilson International Center for Scholars.

Kramer, Annika 2008: *Regional Water Cooperation and Peacebuilding in the Middle East*. Brussels: Initiative for Peacebuilding.

Le-Huu, Ti and Lien Nguyen-Duc 2003: *Mekong Case Study*. UNESCO and Green Cross International, Water for Peace Series, No. 10.

- Luzi, Samuel** 2006: International River Basins: Management and Conflict Perspectives. CSS Environment and Conflict Transformation, 2007, No. 63.
- Mamatov, Arslan** 2008: Kyrgyzstan: Water shortage ratches up social tension. In: Eurasia Insight, www.eurasianet.org/departments/insight/articles/eav122208.shtml (01.08.2009).
- Marty, Frank** 2001: Managing international rivers: Problems, politics and institutions. Bern: Peter Lang.
- Mathieu, Paul; Ahmed Benali and Olivia Aubriot** 2001: Dynamiques institutionnelles et conflit autour des droits d'eau dans un système d'irrigation traditionnel au Maroc. In: *Revue Tiers Monde*, Vol. XLII, 166/2001, 353–374.
- Molle, François and Jeremy Berkoff** 2006: Cities versus Agriculture: Revisiting Intersectoral Water Transfers, Potential Gains and Conflicts. Comprehensive Assessment Research Report 10. Colombo, Sri Lanka: IWMI.
- Molle, François and Jeremy Berkoff** (eds.) 2007: Irrigation Water Pricing: The Gap between Theory and Practice. Oxfordshire/Cambridge: CABI Publishing.
- Mollinga, Peter P.** 2008: Water, politics and development: Framing a political sociology of water resources management. In: *Water Alternatives*, 2008, Vol. 1, issue 1, 7–23.
- Muhumuza, Didas; Leah Finnegan; Hesta Groenewald and Sonia Rai** 2008: Water provision as a peacebuilding tool. Developing a conflict-sensitive approach to water delivery in Uganda. London: CECORE/Saferworld.
- NBI** 2010: Nile Basin Initiative. In: www.nilebasin.org (02.02.2010).
- NN** (no date): Prevention, minimization and resolution of conflict in local water management projects. In: waterwiki.net/index.php/Prevention,_minimization_and_resolution_of_conflict_in_local_water_management_projects.
- NN**, 2009: Mob runs riot as part of Hargeisa runs out of water. In: *Somaliland Globe*, 08.06.2009, www.somalilandglobe.com/596/mob-runs-riot-as-part-of-hargeisa-runs-out-of-water/.
- Ohlsson, Leif** 1999: Environment, Scarcity, and Conflict - A study of Malthusian concerns. PhD dissertation, Dept. of Peace and Development Research. Göteborg: University of Göteborg.
- Oré, Maria Teresa; Laureano del Castillo; Saskia van Orsel and Jeroen Vos** 2009: El agua, ante nuevos desafíos, actores e iniciativas en Ecuador, Perú y Bolivia. Lima: Oxfam/Instituto de Estudios Peruanos.
- Ostrom, Elinor** 1990: Governing the Commons. The Evolution of Institutions for Collective Action. Cambridge: Cambridge University Press.
- Pachova, Nevelina I.; Nakayama Mikiyasu and Libor Jansky** (eds.) 2008: International Water Security: Domestic Threats and Opportunities. Tokyo/New York/Paris: United Nations University Press.
- Phillips, David; Marwa Daoudy; Stephen McCaffrey; Joakim Öjendal and Anthony Turton** 2006: Transboundary Water Cooperation as a Tool for Conflict Prevention and Broader Benefit-Sharing. *Global Development Studies*, No. 4. Stockholm: Swedish Ministry for Foreign Affairs.
- Phillips; D.J.H.; J.A. Allan; M. Claassen; J. Granit; A. Jägerskog; E. Kistin; M. Patrick; M. and A. Turton** 2008: The TWO Analysis: Introducing a Methodology for the Transboundary Waters Opportunity Analysis. Report No. 23. Stockholm: SIWI.
- Postel, Sandra and Aaron T. Wolf** 2001: Dehydrating conflict. In: *Foreign Policy*, September/October 2001, pp. 60–67.

PROAPAC (no date): Programa de Agua Potable y Alcantarillado Sanitario en Pequeñas y Medianas Ciudades. In: www.proapac.org/index.html.

Raleigh, Clionadh and Henrik Urdal 2006: Climate Change, Environmental Degradation and Armed Conflict. Paper presented to the 47th Annual Convention of the International Studies Association, San Diego, CA, 22–25 March 2006.

Ravnborg, Helle Munk 2004: Water and Conflict – lessons learned and options available on conflict prevention and resolution in water governance. DIIS Brief., Copenhagen: Dansk Institut for International Studier.

Rinaudo, Jean-Daniel and Patrice Garin (2003): An Operational Methodology to Analyse Conflicts over Water Use at the River Basin Level. Paper presented at: 54th International Executive Council of ICID, 20th ICID European Conference, Montpellier, 14–19 September 2003.

Rogers, Peter P. 1997: International River Basins: Pervasive Unidirectional Externalities. In: Partha Dasgupta; Karl-Göran Maler and Alessandro Vercelli (eds.): *The Economics of Transnational Commons*. Oxford: Oxford University Press, 35–76.

Sadoff, Claudia and David Grey 2002: Beyond the River. Benefits of Cooperation on International Rivers. In: *Water Policy*, Vol. 4, 389–403.

Saferworld 2008: Water and conflict. Making water delivery conflict-sensitive in Uganda, London: Saferworld, CECORE, REDROC, YODEO.

Sánchez Gómez, Luis and Philipp Terhorst 2005: Cochabamba, Bolivia : Public-collective partnership after the water war. In: Belén Balanyá; Brid Brennan; Olivier Hoedeman; Satoko Kishimoto and Philipp Terhorst (eds.): *Reclaiming Public Water. Achievements, Struggles and Visions from Around the World*. Amsterdam: Transnational Institute and Corporate Europe Observatory, 121–131.

Serageldin, Ismail 1995: 'Water'. In: www.serageldin.com/Water.htm.

Swedish Water House 2004: Water and Local Conflict: a brief review of the academic literature and other sources. Stockholm: Swedish Water House.

Tamas, Pal 2003: Water resource scarcity and conflict: review of applicable indicators and systems of reference. Paris: UNESCO-IHP.

Transparency International and Water Integrity Network 2008: Global Corruption Report 2008: Corruption in the Water Sector. Cambridge: Cambridge University Press.

Turton, Anthony R. 2004: The Evolution of Water Management Institutions in select Southern African International River Basins. In: Cecilia Tortajada; Olcar Ünver and Asit K. Biswas (eds.): *Water as a Focus for Regional Development*. Oxford: Oxford University Press, 256–294.

United Nations 2002: World's Water problems can be 'catalyst for cooperation' says secretary general in message on world water day. In: Press Release SG/SM/8139 OBV/262. www.un.org/News/Press/docs/2002/sgsm8139.doc.htm.

UNEP 2009: From conflict to peacebuilding: The role of natural resources and the environment. Nairobi: United Nations Environment Programme.

UNDP (no date): Community P.O.W.E.R.; People, Opinions, Wealth, Environment, Responsibilities. In: sgp.undp.org/index.cfm?Module=Projects&Page=ShowProject&ProjectID=7519.

UNDP Sudan (no date): Reduction of Resource Based Conflicts among Pastoralists and Farmers. In: www.sd.undp.org/projects/cp3.htm.

UNDP 1994: The Human Development Report. New dimensions of human security. Oxford: Oxford University Press.

UNDP 2006: Beyond Scarcity: Power, Poverty and the Global Water Crisis. Human Development Report 2006.

UNDP 2006: The Human Development Report. Beyond Scarcity: Power, Poverty and the Global Water Crisis. Gordonsville: Palgrave Macmillan.

UNESCO/WWAP, United Nations Education Scientific and Cultural Organisation/World Water Assessment Programme 2003: Water for People Water for Life. The United Nations World Water Development Report 1. Paris: UNESCO/WWAP.

UNESCO/WWAP, United Nations Education Scientific and Cultural Organisation/World Water Assessment Programme 2009: Water in a changing world. The United Nations World Water Development Report 3. Paris: UNESCO/WWAP.

UN News Center: At World Economic Forum, Ban Ki-moon pledges action on water resources. In: www.un.org/apps/news/story.asp?NewsID=25398&Cr=davos&Cr1.

Wassmann, Rainer; Nguyen Xuan Hien; Chu Thai Hoanh and To Phuc Tuong 2004: Sea level rise affecting the Vietnamese Mekong Delta: water elevation in the flood season and implications for rice production. In: *Climatic Change*, 66, 89–107.

Werner, Jutta 2006: Nomades entre marginalisation, entreprenariat et conflits. Stratégies des éleveurs mobiles du sud du Maroc face aux bouleversements du contexte pastoral et aux impératifs d'un développement durable. In: Hermann Boland; Volker Hoffmann and Uwe Nagel (eds.): *Kommunikation und Beratung. Sozialwissenschaftliche Schriften zur Landnutzung und ländlichen Entwicklung*. No. 70. Weikersheim: Margraf Publishers.

Wax, Emily 2006: Dying for water in Somalia's drought. *Amid Anarchy, Warlords Hold Precious Resource*. In: *The Washington Post*, Washington DC, 14.04.2009.

Wolf, Aaron T. 1998: Conflict and Cooperation along International Waterways. In: *Water Policy*, Vol. 1#2, 251–265.

Wolf, Aaron T. 1999: Water and Human Security. AVISO, 1999, No. 3. Victoria: The Global Environmental Change and Human Security Project.

Wolf, Aaron T.; Jeffrey A. Natharius; Jeffrey J. Danielson; Brian S. Ward and Jan K. Pender 1999: International River Basins of the World. In: *International Journal of Water Resources Development*, Vol. 15 No. 4, 387–427.

Wolf, Aaron 2000: Indigenous Approaches to Water Conflict Negotiations and Implications for International Waters. In: *International Negotiations: A Journal for Theory and Practice*, Vol.5:2, Dec. 2000.

Wolf, Aaron T.; Shira B. Yoffe and Giordano Mark 2003: International Waters: Identifying Basins at Risk. In: *Water Policy* 5 No. 1, 29–60.

Wolf, Aaron T.; Annika Kramer; Geoffrey Dabelko and Alexander Carius 2005: Managing Water Conflict and Cooperation. In: The Worldwatch Institute (Ed.): *State of the World 2005: Redefining global security*. New York & London: WW Norton & Company.

World Commission on Dams 2000a: Dams and Development: A New Framework for Decision-Making: The Report of the World Commission on Dams. London and Sterling: Earthscan.

World Commission on Dams 2000b: Case Study: Kariba Dam-Zambezi River Basin. In: www.dams.org/kbase/studies/zz/zz_exec.htm.

Yavari, Luis Fernando 2005: Management of Basic Drinking Water and Sanitation Services by a Co-operative in Bolivia. In: Belén Balanyá; Brid Brennan; Olivier Hoedeman; Satoko Kishimoto and Philipp Terhorst (eds.): Reclaiming Public Water. Achievements, Struggles and Visions from Around the World. Amsterdam: Transnational Institute and Corporate Europe Observatory, 37–44.

Yoffe, Shira 2001: Basins At Risk: Conflict and Co-operation Over International Freshwater Resources. PhD diss., Oregon State University, USA.

Zeitoun Mark and Jeroen Warner 2006: Hydro-hegemony: A framework for analysis of transboundary water conflicts. In: *Water Policy* 8(5): 435–460.

Zekster, Igor S. and Everett, Lome 2004: Groundwater resources of the world and their use, IHP-VI Series on Groundwater No. 6, UNESCO.



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