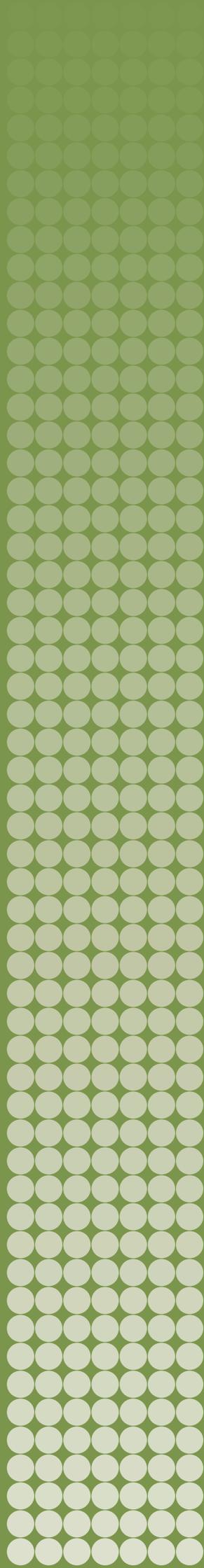


WATER COOPERATION IN THE HORN OF AFRICA

Addressing Drivers of Conflict and
Strengthening Resilience

KYUNG MEE KIM, EMILIE BROEK, ELIZABETH S. SMITH,
DAVID MICHEL, ERWIN DE NYS AND NICOLAS SALAZAR
GODOY



**STOCKHOLM INTERNATIONAL
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The Cooperation in International Waters in Africa (CIWA) programme was established in 2011 and represents a partnership between the World Bank, its African partners, the European Commission, and the governments of Denmark, Norway, Sweden, the Netherlands, and the United Kingdom. CIWA supports riparian governments in sub-Saharan Africa to unlock the potential for sustainable and inclusive growth, climate resilience, and poverty reduction by addressing constraints to cooperative management and development of international waters.



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Contents

<i>Acknowledgements</i>	iv
<i>Abbreviations</i>	v
<i>Summary</i>	vi
1. Introduction	1
Figure 1.1. Case study locations in the Horn of Africa	2
Box 1.1. Methodological considerations and limitations	3
2. The Sio–Malaba–Malakisi Basin	5
Basin context	5
Drivers of conflict	6
Drivers of resilience	8
Lessons learned	11
Figure 2.1. Map of the Sio–Malaba–Malakisi Basin, with fatality rates, Jan. 1997–Nov. 2021	6
Table 2.1. Summary of the Sio–Malaba–Malakisi Basin case study	7
3. The Dawa River and Aquifer	12
Basin context	12
Drivers of conflict	14
Drivers of resilience	17
Lessons learned	19
Figure 3.1. Map of the Dawa River and Aquifer, with fatality rates, Jan. 1997–Nov. 2021	13
Table 3.1. Summary of the Dawa River and Aquifer case study	14
4. The Bahr el Ghazal Basin and the Baggara Basin Aquifer	21
Basin context	21
Drivers of conflict	24
Drivers of resilience	27
Lessons learned	30
Figure 4.1. Map of the Bahr el Ghazal Basin and Baggara Basin Aquifer, with fatality rates, Jan. 1997–Nov. 2021	22
Table 4.1. Summary of the Bahr el Ghazal Basin and Baggara Basin Aquifer case study	23
5. Water cooperation and resilience: Constraints and entry points	31
Constraints on water cooperation and resilience	31
Entry points for water cooperation and resilience	32
<i>About the authors</i>	35

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Abbreviations

CPA	Comprehensive Peace Agreement
EU	European Union
EUTF	EU Emergency Trust Fund for Africa
FAO	Food and Agriculture Organization
IGAD	Intergovernmental Authority on Development
MOU	Memorandum of understanding
MW(e)	Megawatt-electric
NBI	Nile Basin Initiative
NGO	Non-governmental organization
PACC	Peace and Community Cohesion (project)
RASMI	Regional Approaches for Sustainable Conflict Management and Integration
REC	Regional economic community
SECCI	Support for Effective Cooperation and Coordination of Cross-border Initiatives
SMM	Sio–Malaba–Malakisi (Basin)
UN	United Nations
UNDP	UN Development Programme
UNEP	UN Environment Programme
USAID	United States Agency for International Development

Summary

The Horn of Africa is a region exposed to the risks of water insecurity due to population growth and the impact of climate change. Growing water stress complicates many of the region's social, political and economic difficulties, including weak governance and societal tensions between ethnic, regional or religious groups. The double impact of climate stress and violent conflict has led to increased social vulnerability and political fragility, which in turn affects the region's prospects for adapting to changing environmental conditions. Cooperation over water resources as a policy option to address such challenges has been high on the research and policy agenda for decades. International and national policymakers are particularly interested in how different forms of water cooperation can mitigate the drivers of conflict, prevent the escalation of tensions, and build resilience to better respond to the impacts of climate change. Previous research has identified that water cooperation is relevant both in different forms and at different levels, which calls for a better understanding of informal arrangements at the local level. This SIPRI report aims to help to fill this research gap by exploring the role of local-level cooperative initiatives in improving water resource challenges in the Horn of Africa. The report draws on illustrative case studies of transboundary basins in cross-border regions and provides lessons learned from existing cooperative initiatives.

Drivers of conflict and resilience in the case study basins

The three case studies under consideration—the Sio–Malaba–Malakishi (SMM) Basin; the Dawa River and Aquifer; and the Bahr el Ghazal Basin and the Baggara Basin Aquifer—all include resource challenges, conflict patterns and cooperative initiatives related to water. Yet these basins harbour different aspects of political fragility, socio-economic vulnerability and violent conflict. The ability of their populations to meet water resource challenges is primarily put at risk by intercommunal tensions, the presence of armed groups and militarized border conflict, respectively.

The SMM Basin, shared between Kenya and Uganda and part of the Upper Nile Basin, presents a case of intergovernmental cooperation leading to interactions with and between local communities over water. For example, the SMM Investment Programme, if signed, would provide crucial infrastructure for the local population in a communal conflict-prone area and could contribute to local peacebuilding efforts. The planned investment projects intend to enhance water quality and promote environmental conservation in the basin area, and they benefit local communities who have participated in the planning process.

The case of the Dawa River and Aquifer provides insight into the potential for water cooperation to build resilience in cross-border communities in Ethiopia, Kenya and Somalia. In the Dawa River and Aquifer basin area, community-based and nature-based solutions have been implemented to improve water supply to the local farmers. For example, local communities in the border region between Ethiopia and Kenya signed a water-sharing agreement to alleviate tension around growing water scarcity.

The Bahr el Ghazal Basin, a tributary of the Nile Basin, and the Baggara Basin Aquifer, both shared between Sudan and South Sudan, demonstrate how the resilience of communities with nature-dependent livelihoods has been challenged by prolonged insecurity and decades of armed conflict. Since the independence of South Sudan, access to water by pastoralist groups has become more restricted by militarized border conflict. Installing additional water access points, for example, aims to relieve

the tension over water and enhance social cohesion among water-sharing populations in the area.

Ensuring social inclusion and the rights of women and girls remains an important task in guiding water cooperation efforts. The double impact of climate stress and violent conflict has led to the increased vulnerability of women and girls in the region, who also suffer from gender-based violence linked to armed conflict. Water cooperation would therefore benefit both them and other marginalized groups in society. In the three case studies, development cooperation partners and international non-governmental organizations have provided substantial support to facilitate and promote water cooperation. Indeed, technical, financial and institutional support provided by donors has been instrumental for local communities and governments to consider coordinated responses to water challenges within these basins.

Entry points for water cooperation and resilience

Water resource challenges in the Horn of Africa require extensive national, regional and international efforts to support the affected, vulnerable populations. In fact, fast-changing political environments in the region suggest that solutions embedded in local communities may be crucial. This report identifies four main entry points for the international community to support water cooperation and resilience in the region. First, highlighting the concrete mutual benefits of water cooperation can strengthen bottom-up drivers of cooperation at the local level. Community-based organizations and local groups can play a pivotal role in identifying the needs and ensuring the sustainability of different initiatives. Second, supporting institutional frameworks and processes is crucial, and persistent international support is highly desirable. The report highlights promising prospects for strengthening the linkages between intergovernmental processes and local community engagement. Third, assisting research on groundwater resources should be a priority, as data availability is a significant constraint for many communities in sustainably managing transboundary aquifers. Fourth, strengthening local dispute-resolution mechanisms can help to achieve change, but intervention to reduce intercommunal tensions requires better understanding of the dynamics between local populations. Further investment in the physical and adaptive capacities of local communities is therefore needed across the Horn of Africa.

1. Introduction

The Horn of Africa—defined here as running from Sudan in the north to Kenya and Uganda in the south and Somalia in the east, and all countries in between (see figure 1.1)—is highly exposed to the risks of water insecurity.¹ There is a scarcity of water in much of the region during three months of the year or more.² Somalia, for instance, has experienced at least 14 droughts since 1960 and is facing major livelihood and food security problems due to consecutive seasonal droughts.³ Women and girls in the region bear the disproportionate burden of droughts and water scarcity.⁴ Water supply in the Horn of Africa is unpredictable due to the variability between seasons and years, which also increases the likelihood of multi-year droughts and catastrophic flash floods.⁵ The impacts of population growth and climate change add additional stress on the region's water resources, which could affect the intensity and extent of internal migration.⁶ Growing stress on water resources complicates many of the region's social, political and economic difficulties, including weak governance and societal tensions between ethnic, regional or religious groups.⁷ The double impact of climate stress and violent conflict has led to the increased vulnerability of women and girls in the region, who also suffer from gender-based violence linked to armed conflict.⁸

These dynamics have increasing security implications, with water being an important driver of intercommunal conflict and fragility in the region: water-related factors influence livelihood deterioration, seasonal patterns of livestock movement (transhumance), strategic considerations of armed groups, and economic and political exploitation by elites. In turn, these factors can contribute to greater security risks.⁹ The region's reliance on transboundary rivers and aquifers further complicates sustainable and cooperative use of water resources. For example, Sudan receives 96 per cent of its renewable water from upstream countries, and South Sudan and Somalia receive over 60 per cent.¹⁰ Without water-sharing arrangements and information exchanges, dependency on transboundary water sources creates uncertainty and vulnerability if upstream development schemes reduce downstream water flows.

Cooperation over water resources has been recognized by international and national policymakers as one of the policy options to mitigate these drivers of conflict and to prevent the escalation of tensions.¹¹ Formal cooperative engagement can take the form of joint management and investment, water-sharing agreements or mutually agreed

¹ Olet, E. et al., *Water Security in the Horn of Africa: Addressing the Challenges*, Water Development and Sanitation Department, African Development Bank, Regional Synthesis Paper (African Development Bank: Abidjan, 2020), p. 1.

² Mekonnen, M. M. and Hoekstra, A. Y., 'Four billion people facing severe water scarcity', *Science Advances*, vol. 2, no. 2 (Feb. 2016).

³ Famine Early Warning Systems Network, 'Multi-season drought is expected to drive high food assistance needs through early 2022', Somalia Food Security Outlook, June 2021 to January 2022, 30 June 2021; and Masih, I. et al., 'A review of droughts on the African continent: A geospatial and long-term perspective', *Hydrology and Earth System Sciences*, vol. 18, no. 9 (2014).

⁴ Strategic Initiative for Women in the Horn of Africa (SIHA) Network, *Still Bending Their Heads: A General Overview of the Human Rights Situation of Women in the Horn of Africa* (SIHA: Kampala, 2011).

⁵ Hall, J. W. et al., 'Coping with the curse of freshwater variability', *Science*, vol. 346, no. 6208 (Oct. 2014).

⁶ Rigaud, K. K. et al., *Groundswell: Preparing for Internal Climate Migration* (World Bank: Washington, DC, 2018).

⁷ Krampe, F. et al., *Water Security and Governance in the Horn of Africa*, SIPRI Policy Paper no. 54 (SIPRI: Stockholm, Mar. 2020).

⁸ ReliefWeb, United Nations Office for the Coordination of Humanitarian Affairs (OCHA), 'Horn of Africa: Impact of conflict and drought crises on women and girls', Mar. 2017.

⁹ Mobjörk, M., Krampe, F. and Tarif, K., 'Pathways of climate insecurity: Guidance for policymakers', SIPRI Policy Brief, Nov. 2020.

¹⁰ Food and Agriculture Organization of the United Nations (FAO), 'AQUASTAT—FAO's Global Information System on Water and Agriculture', [n.d.], accessed 25 Oct. 2021.

¹¹ World Bank, *Climate Resilience in Africa: The Role of Cooperation around Transboundary Waters* (World Bank: Washington, DC, 2017); and Sadoff, C. W. and Grey, D., 'Beyond the river: The benefits of cooperation on international rivers', *Water Policy*, vol. 4, no. 5 (2002).

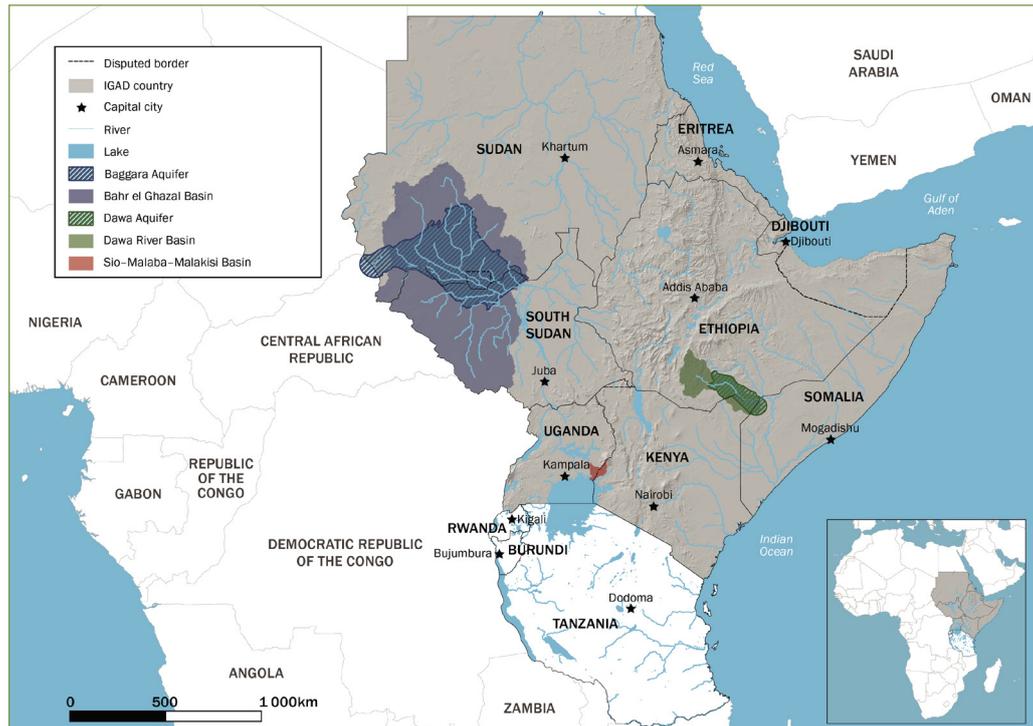


Figure 1.1. Case study locations in the Horn of Africa

IGAD = Intergovernmental Authority on Development.

Sources: Based on data from Natural Earth, <<https://www.naturalearthdata.com>>; and HydroSHEDS, <<https://www.hydrosheds.org>>.

Credit: José Luengo-Cabrera.

watershed-protection schemes. It can occur at various levels: while most cooperative frameworks worldwide have been between governments of water-sharing countries, some also involve local authorities (e.g. the tripartite cooperation over the Jordan River) or local communities (e.g. in Kosovo).¹² Water cooperation—especially at the community level—is one way to build resilience for the local population to better respond to environmental challenges.¹³ Further, the promotion of water cooperation needs to ensure and facilitate the equal and active participation of women and girls in the decision making.

The issue has been high on the research and policy agenda for decades. No consensus has yet been reached on how and why cooperation can aid conflict prevention, but there is an increasing need to find ways to resolve the conundrum. Evidence from Colombia, Nepal, South Sudan and Sudan suggests that environmental cooperation initiatives with strong community participation can contribute to confidence building and social cohesion across different social groups.¹⁴ Another mechanism through which water cooperation can strengthen resilience for the local population to adapt to growing water stress is by facilitating investment in infrastructure, which is crucial for responding to problems related to water resources.¹⁵ In fragile and

¹² Wessels, J. I., “‘Playing the game’, identity and perception-of-the-other in water cooperation in the Jordan River Basin’, *Hydrological Sciences Journal*, vol. 61, no. 7 (May 2016); and Krampe, F., ‘Water for peace? Post-conflict water resource management in Kosovo’, *Cooperation and Conflict*, vol. 52, no. 2 (June 2016).

¹³ Grech-Madin, C. et al., ‘Negotiating water across levels: A peace and conflict “toolbox” for water diplomacy’, *Journal of Hydrology*, vol. 559 (Apr. 2018).

¹⁴ Krampe, F., ‘Empowering peace: Service provision and state legitimacy in Nepal’s peace-building process’, *Conflict, Security and Development*, vol. 16, no. 1 (2016); Morales-Muñoz, H. et al., ‘Exploring connections—environmental change, food security and violence as drivers of migration—a critical review of research’, *Sustainability*, vol. 12, no. 14 (July 2020); Castro, J. A., ‘Environment and development: The case of the developing countries’, *International Organization*, vol. 26, no. 2 (2009); and World Bank (note 11).

¹⁵ World Bank (note 11).

Box 1.1. Methodological considerations and limitations

The three exploratory case studies—the Sio–Malaba–Malakisi Basin; the Dawa River and Aquifer; and the Bahr el Ghazal Basin and the Baggara Basin Aquifer—were chosen to cover as diverse a range of water-sharing contexts and countries in the Horn of Africa as possible. The case-selection process focused on selecting cases with interesting features that could be further explored.^a The presence of drivers of fragility, conflict and violence is one feature that all the selected cases share, but each has different features, such as communal conflict (Sio–Malakisi–Malaba Basin), the influence of armed groups (Dawa River and Aquifer) and pastoralist–farmer conflict (Bahr el Ghazal Basin and Baggara Basin Aquifer). The case-selection process also paid attention to the policy interests of international donors in exploring entry points to support cooperation in cross-border contexts and fragile and conflict settings. Further, the availability of existing research and documentation informed the case selection.

This report is based on a desk study, with a combination of secondary data and expert interviews used for the analysis. Information and research about local communities and their water use in the case study areas are scarce, and they lack granularity and detailed descriptions of local processes and interactions. For instance, search terms for the Sio–Malaba–Malakisi Basin yielded only four articles in the Web of Science (a primary academic journal repository), eight for the Dawa River and Aquifer, and two for the Bahr el Ghazal Basin and the Baggara Basin Aquifer. Further, these academic articles did not focus on local-level processes and interactions. Project documents did not either include local stakeholder analysis at the community level. In order to complement this, the study draws on expert interviews with project managers and advisers who have engaged with international initiatives supporting community cooperation in the selected cases. Interviews were carried out by the authors during September 2021, via video calls. The perspectives offered by these experts have been valuable for guiding the inquiry and the data-collection process.^b However, low turnout following interview requests to relevant project staff impeded the data collection effort and resulted in less detailed information than expected, especially regarding informal processes at that local level.^c The generalizability of the findings is limited by the number and characteristics of the selected cases.

^a Gerring, J. and Cojocar, L., ‘Selecting cases for intensive analysis: A diversity of goals and methods’, *Sociological Methods and Research*, vol. 45, no. 3 (Aug. 2016), p. 395.

^b Littig, B., ‘Interviewing the elite—Interviewing experts: Is there a difference?’, eds A. Bogner, B. Littig and W. Menz, *Interviewing Experts* (Palgrave Macmillan: London, 2009).

^c King, G., Keohane, R. O. and Verba, S., *Designing Social Inquiry: Scientific Inference in Qualitative Research* (Princeton University Press: Princeton, NJ, 1994); and Gerring, J., *Case Study Research* (Cambridge University Press: Cambridge/New York, 2006).

conflict-affected settings, cautious and inclusive approaches are warranted because cooperative practices, if not planned and implemented carefully, can lead to further disruption.¹⁶

In the context of the Horn of Africa, identifying which formal and informal community-level cooperative initiatives have worked and under what conditions is still in need of further research. Especially information on informal community-level cooperative initiatives is often lacking, because such research requires in-depth fieldwork in fragile contexts and an understanding of community settings, including access to local women and men. Nevertheless, this research is of particular interest to multilateral initiatives supporting water cooperation, such as the Cooperation in International Waters in Africa (CIWA) programme.¹⁷

This SIPRI report explores this research gap through a desk study that reviews existing research, policy reports and project documentation of relevance, and draws on interviews with experts (see box 1.1). The report highlights lessons learned from three case studies across the Horn of Africa (chapters 2–4) and then explores the constraints and potential for building resilience through water cooperation (chapter 5). The three case studies (see figure 1.1) describe experiences of dispute resolution and cooperation over transboundary waters:

¹⁶ Ide, T., ‘The dark side of environmental peacebuilding’, *World Development*, vol. 127 (Mar. 2020).

¹⁷ World Bank (note 11).

1. The Sio–Malaba–Malakisi (SMM) Basin, shared between Kenya and Uganda, presents a case of intergovernmental cooperation aided by institutional support from external partners (chapter 2).

2. The case of the Dawa River and Aquifer provides insight into the potential for water cooperation to build resilience in cross-border communities in Ethiopia, Kenya and Somalia (chapter 3).

3. The case of the Bahr el Ghazal Basin and the Baggara Basin Aquifer, shared between Sudan and South Sudan, demonstrates how the resilience of communities with nature-dependent livelihoods has been challenged by militarized border conflict (chapter 4).

These cases were selected from a sample of water cooperation initiatives supported by international non-governmental organizations (NGOs) working on peacebuilding, environmental conservation, development and governance, including gender equality. The analysis of the case studies provides important insight into the local- and national-level contexts and explores the linkages between local and international cooperation processes. In the selected cases, local-level water cooperation initiatives are nested in, or influenced by, national or intergovernmental cooperative frameworks. The report's ability to offer insight into the informal processes at the local level, however, remains limited (see box 1.1).

2. The Sio–Malaba–Malakisi Basin

Basin context

Kenya and Uganda share the Sio–Malaba–Malakisi (SMM) Basin. The term SMM Basin is a management label used by the Kenyan and Ugandan governments for two adjacent but unconnected hydrological basins: the Sio sub-basin and the Malaba–Malakisi sub-basin (see figure 2.1).¹⁸ Due to the similar socio-economic and environmental characteristics of the sub-basins, the two governments have taken a similar approach and chosen to jointly manage them (see table 2.1). The sub-basins are both part of the Upper Nile system and cover a catchment area of 5352 square kilometres. The Sio River rises in south-western Kenya, flows southwards along the border and empties into Lake Victoria. The headwaters of the Malakisi and Malaba rivers originate in the montane forests around Mount Elgon. They merge with the smaller Lwakhakha River to become the Mpologoma River, which delineates the Kenya–Uganda border, then runs westward to feed Lake Kyoga, one of Uganda’s major water basins.¹⁹ Located in humid and subhumid climates, the SMM Basin has varied annual rainfall. Part of the Sio sub-basin in Kenya receives 2160–2300 millimetres of rainfall annually, while the foothills of Mount Elgon in Uganda receive 1040–1180 mm. The catchment area includes Mount Elgon National Park, which is jointly managed by Kenya and Uganda.²⁰

The SMM Basin is home to 3 million people, divided roughly evenly between Kenya and Uganda.²¹ Poverty rates are high on both sides of the border. In Kenya, the poverty rate in Busia County is nearly 70 per cent, and at least one-third of the residents in the counties of Bungoma and Trans Nzoia live below the poverty line.²² On the Ugandan side, the poverty rate ranges between 25 and 40 per cent within the SMM Basin.²³ The population of the basin relies on rain-fed, smallholder farming for its livelihood and food production. Fisheries are also an important source of livelihoods and food in parts of the basin.²⁴ Whether or not women can fully participate in the agriculture and fishery sectors of the basin area is unclear. A study on women’s role in fisheries in the nearby Lake Victoria Basin highlights gendered contributions and discrimination.²⁵ Such dynamics may be a relevant consideration for the SMM Basin. Since the farming is largely rain fed, it is practised with limited irrigation and little mechanization on small plots. Nevertheless, irrigation accounts for the largest share of water requirements in the SMM Basin, representing 40.1 per cent of total consumptive water use, followed by rural industry (32 per cent), fisheries and aquaculture (19.3 per cent), domestic water supply (4.6 per cent) and livestock (3.9 per cent).²⁶

¹⁸ Kenyan Government and Ugandan Government, *Sio–Malaba–Malakisi Basin Investment Plan and Financial Sustainability Strategy* (Kenyan Government/Ugandan Government: Nairobi/Kampala, 2020).

¹⁹ FAO, *AQUASTAT Country Profile–Kenya* (FAO: Rome, 2015); and FAO, *AQUASTAT Country Profile–Uganda* (FAO: Rome, 2014).

²⁰ Petursson, J. G., Vedeld, P. and Kaboggoza, J., ‘Transboundary biodiversity management: institutions, local stakeholders, and protected areas: A case study from Mt Elgon, Uganda and Kenya’, *Society and Natural Resources*, vol. 24, no. 12 (Dec. 2011).

²¹ Azza, N., Badaza, M. and Muli, C., *Situation Analysis and Activities Refinement for Strengthening Transboundary Water Cooperation in the Sio–Malaba–Malakisi Sub-Basin* (International Union for Conservation of Nature: Kampala, 2017), p. vi.

²² Diwakar, V. and Shepherd, A., *Understanding Poverty in Kenya: A Multidimensional Analysis* (Chronic Poverty Advisory Network/Overseas Development Institute: London, Dec. 2018), p. 7.

²³ Uganda Bureau of Statistics, *Poverty Maps of Uganda*, Technical Report (Uganda Bureau of Statistics: Kampala Oct. 2019), p. 6.

²⁴ Azza, Badaza and Muli (note 21).

²⁵ Aloo, P. et al., *The Role of Women in Fisheries Management in Kenya: Financing of Women Activities in the Fisheries Sector* (Lake Victoria Fisheries Organization: Jinja, 2000).

²⁶ Azza, Badaza and Muli (note 21).

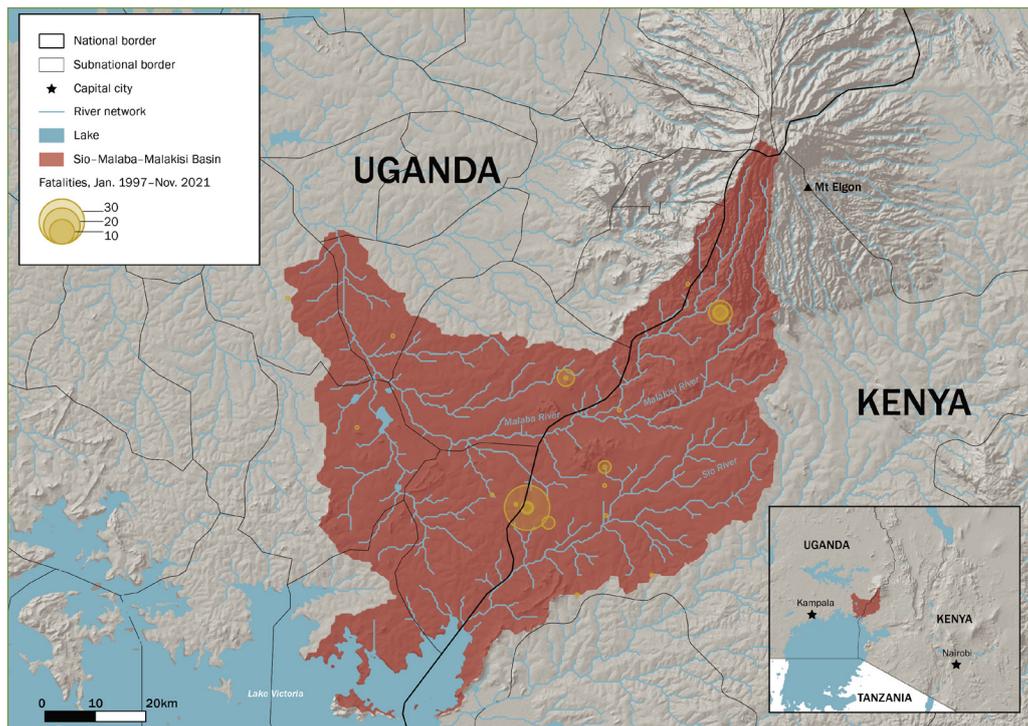


Figure 2.1. Map of the Sio–Malaba–Malakisi Basin, with fatality rates, Jan. 1997–Nov. 2021

Note: The figure shows fatality rates within the basin area only.

Sources: Based on data from Raleigh, C. et al., ‘Introducing ACLED: An Armed Conflict Location and Event Dataset: Special data feature’, *Journal of Peace Research*, vol. 47, no. 5 (Sep. 2010); Natural Earth, <<https://www.naturalearthdata.com>>; HydroSHEDS, <<https://www.hydrosheds.org>>; and Africapolis, <<https://africapolis.org>>.

Credit: José Luengo-Cabrera.

Drivers of conflict

Several instances of communal violence over land have been observed in parts of the SMM Basin in the past. Major water resource problems in the basin are related to water quality rather than quantity. Competing demands for water development are emerging as a source of conflict between water-sharing communities and governments. Climate modelling of the SMM Basin projects increasing volatility and extremes of precipitation, with deeper dry season droughts and greater rainy season flooding, which could disrupt growing seasons and undermine agricultural economies and food security.²⁷ Growing tensions between ethnic groups such as the Sebel and the Luhya over scarce land suggest a risk for potential conflict and further deterioration of water quality, if these groups are displaced by conflict and forced to expand their agricultural land by clearing forests.²⁸

Declining water quality and land degradation

Water resources in the SMM Basin are under pressure due to rapid demographic changes and internal migration.²⁹ Water quality is declining in the areas experiencing population growth. Intensive agricultural expansion practices and deforestation, driven by rapid population growth, are increasing the pressure on the SMM Basin.

²⁷ Moses, T. and Ageet, S., ‘Assessment of impacts of climate change on hydro-meteorological ecosystem services and water stress in Lake Kyoga catchment’, *International Journal of Research and Engineering*, vol. 5, no. 4 (Apr. 2018); and Mwangi, K. K. et al., ‘Vulnerability of Kenya’s water towers to future climate change: An assessment to inform decision making in watershed management’, *American Journal of Climate Change*, vol. 9, no. 3 (Sep. 2020).

²⁸ Azza, Badaza and Muli (note 21).

²⁹ Azza, Badaza and Muli (note 21).

Table 2.1. Summary of the Sio–Malaba–Malakisi Basin case study

Aspect	Details
Transboundary water source and water-sharing countries	The Sio–Malaba–Malakisi Basin is shared by Kenya and Uganda
Basin communities in focus	Farming communities and peri-urban residents in Bungoma and Busia counties (western Kenya) Sebel and Luhya ethnic groups (Kenya) Farming communities in Bududa, Manafwa and Tororo districts (eastern Uganda)
Water-linked factors that triggered the dispute	Pollution from human settlements and agriculture Existing tensions between farming communities in Kenya
Main brokers and supporters of water cooperation	Sio–Malaba–Malakisi Joint Working Group on Investment Strategy Ministry of Water and Environment, Uganda Ministry of Water and Irrigation, Kenya International non-governmental organizations and donors (International Union for Conservation of Nature, Sweden, Norway, Switzerland and the USA) Local peacebuilding actors in Kenya (e.g. Rural Women Peace Link)
How water cooperation contributed to addressing the water-linked challenges identified above	Kenya and Uganda agreed on the Sio–Malaba–Malakisi Investment Plan and Financing Strategy and jointly drafted a memorandum of understanding (pending approval) As part of the bilateral investment plan, local stakeholders have jointly provided inputs for water-development and conservation investment initiatives Communal conflict-resolution mechanisms have been established to reduce conflict risks

Agricultural expansion and intensification of land use have accelerated during recent years, leading to soil erosion in the Mount Elgon protected area. This can have several consequences, including higher levels of sedimentation in the SMM rivers.³⁰ By one calculation, agricultural expansion could convert 78 per cent of the total basin area to cropland and pasture by mid century.³¹

Extensive agricultural land use has contributed to worsening basin-wide soil erosion and river sedimentation, which in turn has led to increased water pollution from run-off and untreated effluents.³² Carried downstream, high pollutant levels from agriculture and sediment loads can compromise fisheries, clog irrigation works and contaminate domestic water supplies. Growing pressure on water availability and quality is likely to exacerbate existing communal grievances and tensions over water resources.³³

Competing demands for water development

The governments of Kenya and Uganda are both keen to promote economic development in the SMM Basin, with social and other benefits.³⁴ However, the different demands of the two riparian countries can be a source of conflict. Current water demand on the Ugandan side of the basin is four times the level in Kenya.³⁵ The difference largely reflects the fact that much of Uganda's modest agricultural

³⁰ Issaka, S. and Ashraf, M. A., 'Impact of soil erosion and degradation on water quality: A review', *Geology, Ecology, and Landscapes*, vol. 1, no. 1 (2017); and Karamage, F. et al., 'Soil erosion risk assessment in Uganda', *Forests*, vol. 8, no. 2 (Feb. 2017).

³¹ Chasia, S. et al., 'Analysis of land-cover changes in the transboundary Sio–Malaba–Malakisi River Basin of East Africa: Towards identifying potential land-use transition regimes', *African Geographical Review* (Nov. 2021).

³² Schürz, C. et al., 'A systematic assessment of uncertainties in large-scale soil loss estimation from different representations of USLE input factors—A case study for Kenya and Uganda', *Hydrology and Earth System Sciences*, vol. 24, no. 9 (Sep. 2020).

³³ Azza, Badaza and Muli (note 21).

³⁴ Kenyan Government and Ugandan Government (note 18).

³⁵ Azza, Badaza and Muli (note 21).

irrigation occurs in the SMM Basin, while only 2 per cent of Kenya's basin area is irrigated.³⁶ Kenya devotes two-thirds of its water use in the basin to fisheries.³⁷ Busia County in Kenya relies heavily on aquaculture and fisheries from the SMM rivers.³⁸ Water pollution from the irrigated agricultural expansion in Uganda thus has a disproportionately negative impact on the fisheries on the Kenyan side, increasing the risk of cross-border tensions.

It is notable that Kenya and Uganda each sit upstream and downstream of the other in different portions of the SMM sub-basins. This means that typical upstream-downstream dynamics may not be applicable to the SMM Basin, but instead increase the opportunities for cooperative management.

Intercommunal tensions over land and water

In the SMM Basin, similar ethnic groups live alongside each other on both sides of the border and the resulting communal conflict has implications for water resources. Communal conflict in the eastern part of Uganda has rarely been deadly. In Kenya, however, conflict over land and water has escalated into deadly violence due to historical grievances against the government's land distribution policies and politicization of communal tensions.³⁹ Communities whose land has been subject to dispute have turned to cultivating new land through slash-and-burn agriculture, which has led to deforestation and soil erosion. This has then increased sedimentation and pollution, and resulted in a decline in water quality in the downstream areas.

On the Kenyan side of the border, several instances of organized violence have occurred in the basin area. Approximately 12 ethnic groups reside in the SMM Basin area and a number of them have engaged in communal violence in the Kenyan border region. The 2006–2008 Mount Elgon conflict was driven by ethnically mobilized armed groups such as the Sabaot Land Defence Force and the Moorland Defence Forces.⁴⁰ It resulted in the deaths of 32 members of the armed groups, and their attacks against unorganized civilians resulted in the killings of at least 100 civilians.⁴¹ Many of the combatants for the armed groups were farmers who lacked non-agricultural livelihood skills.⁴² The conflict particularly impacted young men, many of whom were either killed or had to flee the area, leaving women in charge of the conflict-affected communities.⁴³ This resulted in a heavy workload for women and increased their overall vulnerability. The armed groups were demobilized after counter-insurgency operations and mass arrests in 2008, but tensions persist over land and the government's eviction policies.⁴⁴

Drivers of resilience

The SMM Basin is located in border regions with limited socio-economic development and infrastructure. Most of the populations living there are dependent on land and resources that are vulnerable to the changing climate, with women and girls being

³⁶ FAO, *AQUASTAT Country Profile—Kenya* (note 19); and FAO, *AQUASTAT Country Profile—Uganda* (note 19).

³⁷ Azza, Badaza and Muli (note 21), p. vi.

³⁸ Azza, Badaza and Muli (note 21), p. vi.

³⁹ International Crisis Group, *Kenya's Rift Valley: Old Wounds, Devolution's New Anxieties*, Africa Report no. 248 (International Crisis Group: Brussels, 30 May 2017).

⁴⁰ Uppsala Conflict Database Program (UCDP), 'Kenya: MDF-SLDF', 2021, accessed 10 Oct. 2021.

⁴¹ UCDP, 'Kenya: SLDF-Civilians', 2021, accessed 10 Oct. 2021; and Human Rights Watch, *All The Men Have Gone: War Crimes in Kenya's Mt. Elgon Conflict* (Human Rights Watch: New York, 27 July 2008).

⁴² von Uexkull, N., *Climate, Conflict and Coping Capacity: The Impact of Climate Variability on Organized Violence*, Report, Department of Peace and Conflict Research, Uppsala University, 2016.

⁴³ Mung'ou, C., 'The role of non-state actors in enhancing peacebuilding among women in Mount Elgon Region, Kenya', *Journal of African Conflicts and Peace Studies*, vol. 4, no. 1 (Apr. 2018).

⁴⁴ Human Rights Watch (note 41).

more adversely affected. Having a basin-level cooperative framework is therefore important for governments and communities to respond to water resource challenges. Local-level cooperation in the SMM Basin is also nested in a bilateral investment programme between the Kenyan and Ugandan governments, known as the SMM Investment Programme, and influenced by a memorandum of understanding (MOU) drafted by their water ministries.⁴⁵ If signed, the MOU will provide a basis for setting up ministerial, permanent secretarial and technical advisory committees for basin management, and a joint investment strategy.⁴⁶ Local and national level cooperation to tackle the drivers of conflict includes initiatives to strengthen community capacity, local peacebuilding initiatives, and institutional cooperation.

Initiatives to strengthen community capacity

Community capacity is key to dealing with major water resource challenges in the SMM Basin, such as declining water quality and soil degradation. Investment in public infrastructure is crucial for strengthening water management at the local level in the basin. Local communities in both Kenya and Uganda have contributed to the formation of the SMM Investment Programme, by indicating their priorities at multi-stakeholder workshops held in 2018.⁴⁷ In total 67 infrastructure projects are listed in the programme, several of which are in cross-border regions.⁴⁸ A range of projects are included, such as irrigation, waste management infrastructure, wetland and soil conservation, gravity-fed schemes, small-scale hydroelectricity production, and information sharing and monitoring. Many of them respond to the water resource challenges faced by local communities.⁴⁹ It remains unclear how these community-level infrastructure projects can affect and benefit women. Women's representation and meaningful participation needs to be ensured and strengthened in these projects.

Local communities have favoured projects with economic benefits, such as irrigation canals and dams.⁵⁰ The Malaba irrigation project, for instance, would straddle the border, irrigating 300 hectares in Kenya and 100 hectares in Uganda and boosting transboundary collaboration via the creation of joint farmer committees to manage irrigation schedules.⁵¹ Similarly, several land-management and conservation projects have been included in the SMM Investment Programme in order to reduce upstream erosion and flooding risks, while reducing downstream sedimentation.⁵² Another prominent project in the portfolio is the Angololo multipurpose dam on the Malaba River.⁵³ The local governance response to these joint infrastructure projects is still unfolding, and the inclusion and representation of women and girls in the decision making requires attention.

Thus, some impediments remain to safeguarding the social and environmental impacts of these infrastructure projects after financing is secured. This means there is a need for technical support to assess impacts and facilitate stakeholder engagement in the project planning stage, including ensuring the equitable inclusion of women and other vulnerable populations in the consultation process in a way that enables

⁴⁵ Kenyan Government and Ugandan Government (note 18).

⁴⁶ Kenyan Government and Ugandan Government, *The Sio–Malaba–Malakisi 4 Clusters of Prioritized Investment Projects* (Ugandan Ministry of Water and Environment/Kenyan Ministry of Water and Sanitation: Kampala/Nairobi, 2018).

⁴⁷ International Union for Conservation of Nature (IUCN), *Workshop Report for the Second SMM Basin Stakeholders' Consultative Workshop* (IUCN: Gland, 2018).

⁴⁸ Kenyan Government and Ugandan Government (note 18), p. 8.

⁴⁹ IUCN (note 47).

⁵⁰ Kenyan Government and Ugandan Government (note 18).

⁵¹ Kenyan Government and Ugandan Government (note 46).

⁵² Kenyan Government and Ugandan Government (note 18).

⁵³ Kenyan Government and Ugandan Government (note 46).

their full participation. External support may also be needed to set up community-to-community cooperation for the joint scheme.

Local peacebuilding initiatives

Local peacebuilding initiatives mostly target farming communities on the Kenyan side of the border in the SMM Basin. As mentioned above, the escalation of communal tensions over land can lead to population displacement and agricultural expansion by displaced communities, which in turn results in soil degradation and water quality decline. Therefore, peacebuilding efforts aim to enhance a community's capacity to deal with intercommunal tensions and to reduce the risks for declining water quality.

In Kenya, various community-based organizations have been involved in promoting peace in the SMM Basin. For example, the Keewaap Ng'etuny Women Group in Chepyuk subdistrict led efforts to resolve boundary conflicts between neighbours and to promote information exchanges within the community.⁵⁴ Other peacebuilding initiatives such as Rural Women Peace Link, a grassroots network of women's organizations in conflict areas, have focused on economically empowering women displaced by the Mount Elgon conflict.⁵⁵

Nevertheless, challenges remain in managing the tensions in these communities. Without substantial national and international efforts to address their root grievances, communal violence can erupt again in the area and have implications for water resources.

Institutional cooperation

Through the Nile Basin Initiative (NBI), longstanding institutional support from bilateral donors has contributed to extensive intergovernmental cooperation over the SMM Basin. The NBI was established in 1999 to cooperatively develop the river, share its benefits, and promote peace and security.⁵⁶ Earlier bilateral support from Norway and Sweden to the Nile Equatorial Lakes Subsidiary Action Program (NELSAP), one of the joint investment programmes under the NBI, financially contributed to the institutional processes that led to the SMM Investment Programme.⁵⁷ The Intergovernmental Authority on Development (IGAD), as the regional economic community (REC) for the eight states of the Horn of Africa, also played a role in promoting a joint initiative on the SMM Basin.⁵⁸ The International Union for Conservation of Nature (IUCN) has been a core partner in facilitating bilateral cooperation during recent years, providing technical expertise and promoting stakeholder participation with donors such as the United Nations Economic Commission for Europe (UNECE), the Swiss Agency for Development and Cooperation, and the United States Agency for International Development (USAID).⁵⁹ Initiatives by international development cooperation partners have been coordinated to a degree in terms of supporting cooperation over the SMM Basin. Opening up these financing possibilities has been important for developing the joint investment strategy and reducing the risks of conflict over competing water use.

⁵⁴ Mung'ou (note 43).

⁵⁵ Kirimi, S., 'The role of local networks for peace in Kenya', eds L. Connolly and L. Powers, *Local Networks for Peace: Lessons from Community-led Peacebuilding* (International Peace Institute: New York, 2018).

⁵⁶ United Nations Environment Programme (UNEP), *Adaptation to Climate-change Induced Water Stress in the Nile Basin: A Vulnerability Assessment Report* (UNEP: Nairobi, 2013).

⁵⁷ Claassen, M., *Transboundary Integrated Water Resources Management and Development Projects in the Mara (Kenya/Tanzania), Sio-Malaba-Malakisi (Kenya/Uganda) and Kagera (Uganda, Rwanda, Burundi, Tanzania)*, SIDA Decentralised Evaluation 2014/74 (SIDA: Stockholm, May 2013).

⁵⁸ Earlier support for NELSAP from Sweden and Norway has been instrumental in building confidence among the riparian states.

⁵⁹ Kenyan Government and Ugandan Government (note 18).

However, the impact of this institutional cooperation has not been fully realized due to political impediments. Kenya and Uganda have not yet signed the MOU, and a lack of political buy-in has continued to block the finalization of a cooperative framework.⁶⁰ The IUCN's Building River Dialogue and Governance (BRIDGE) programme that supported institutional processes for the SMM Basin was well received by technical policy actors, but it had difficulties reaching out to and communicating with national political stakeholders.⁶¹ Without political endorsement, the possibility of securing financial commitments from national governments is highly constrained.

Lessons learned

The SMM Basin presents a promising case, demonstrating that a government-led cooperative framework can also address the needs of women and men from local communities and contribute to local-level cooperation. The case study outlines the importance of long-term engagement by development partners in building institutional capacity for transboundary cooperation. It primarily provides lessons learned about local stakeholder engagement, with interactions between and with local communities over water driven by top-down initiatives. This suggests that the linkages between transboundary, national and local cooperation can be strengthened by complementing the existing top-down approach through supporting bottom-up initiatives.

⁶⁰ IUCN BRIDGE Programme Officer, Interview with authors, Video call, Sep. 2021.

⁶¹ IUCN BRIDGE Programme Officer (note 60).

3. The Dawa River and Aquifer

Basin context

The Dawa River covers a catchment area of 56 000 km², 70 per cent of which is made up of lowlands. It flows from Ethiopia, along the Ethiopia–Kenya border and then along the Ethiopia–Somalia border, before joining with the Genale River to form the Juba River, which flows south through Somalia (see figure 3.1).⁶² The Dawa River thus forms part of the Genale–Dawa Basin, which feeds into the Juba–Shebelle Basin in Somalia. There are a few large towns of 10 000–30 000 people in the upstream river areas, scattered settlements throughout, and a larger population of around 87 000 people in the town of Mandera, Kenya, downstream.⁶³ High unemployment rates, economic inequality and widespread poverty challenge development in the cross-border communities of the Dawa River.⁶⁴ The river is known for its unique geological environment and proximity to volcanic–tectonic dynamics. The mean annual rainfall in the basin is 1500 mm in the north and 200 mm in the south.⁶⁵ The two rainy seasons are from March–May and September–November, with droughts occurring on average every four to five years.⁶⁶

The Dawa Aquifer is shared by Ethiopia, Somalia and Kenya, covering an area of 24 000 km² with 223 150 inhabitants (see table 3.1).⁶⁷ The aquifer is formed of volcanic rocks and alluvial and Precambrian basement rocks. It receives an average annual rainfall of 300–650 mm and has a high groundwater extraction rate and a low annual water recharge.⁶⁸ The groundwater potential in the aquifer varies, with a greater quantity of resources in Ethiopia.⁶⁹ The Dawa Aquifer is recharged during periods of high river discharge, and in some areas can be extracted through shallow wells. Because the aquifer is covered in medium- to coarse-sized sediments and volcanic rocks, it is an important groundwater reservoir for local communities.⁷⁰

The Dawa River runs through the heart of the Mandera Triangle, a cross-border region encompassing Mandera County in Kenya, Gedo Region in Somalia and Dolo Ado District in Ethiopia. Transhumance pastoralism and livestock trading are critical livelihood strategies in the Mandera Triangle.⁷¹ Households rely on cattle, sheep and camels to meet their daily needs.⁷² Gender roles in pastoralist societies often disadvantage women in accessing vital resources.⁷³ Because most societies tend to be patriarchal, very few women have their own assets or businesses, and although land is managed by both women and men, during droughts and floods women are more

⁶² Woldemariyam, F. and Ayenew, T., 'Identification of hydrogeochemical processes in groundwater of Dawa River Basin, southern Ethiopia', *Environmental Monitoring and Assessment*, vol. 188, no. 8 (Aug. 2016), p. 481; and Lasage, R. et al., 'The role of small scale sand dams in securing water supply under climate change in Ethiopia', *Mitigation and Adaptation Strategies for Global Change*, vol. 20, no. 2 (Feb. 2015).

⁶³ Lasage et al. (note 62).

⁶⁴ Building Opportunities for Resilience in the Horn of Africa (BORESHA), 'Technical briefs and position paper', [n.d.], accessed 14 Oct. 2021.

⁶⁵ Woldemariyam and Ayenew (note 62).

⁶⁶ Lasage et al. (note 62).

⁶⁷ Altchenko, Y. and Villholth, K., 'Transboundary aquifer mapping and management in Africa: A harmonised approach', *Hydrogeology Journal*, vol. 21, no. 7 (2013).

⁶⁸ Altchenko and Villholth (note 67).

⁶⁹ World Bank, *Challenges and Opportunities for Water in Development in the Lowlands of Ethiopia* (World Bank: Washington, DC, 19 June 2020).

⁷⁰ van der Heijden, A. and van den Berg, H. (eds), *Regional Baseline Mapbook of Dolo Ado Woreda, Liben Zone Somali Region, Ethiopia* (Acacia Water/RACIDA/Cordaid: 2020).

⁷¹ Chome, N., 'Borderland infrastructure and livelihoods: A review of implications for the development of formal border crossings in Mandera County, Kenya', Research and Evidence Facility, Apr. 2021, p. 31.

⁷² Chome (note 71).

⁷³ BORESHA, *Mapping of Key Natural Resources in the Cross-border Area between Kenya, Ethiopia and Somalia* (BORESHA Consortium: Nairobi), [n.d.].

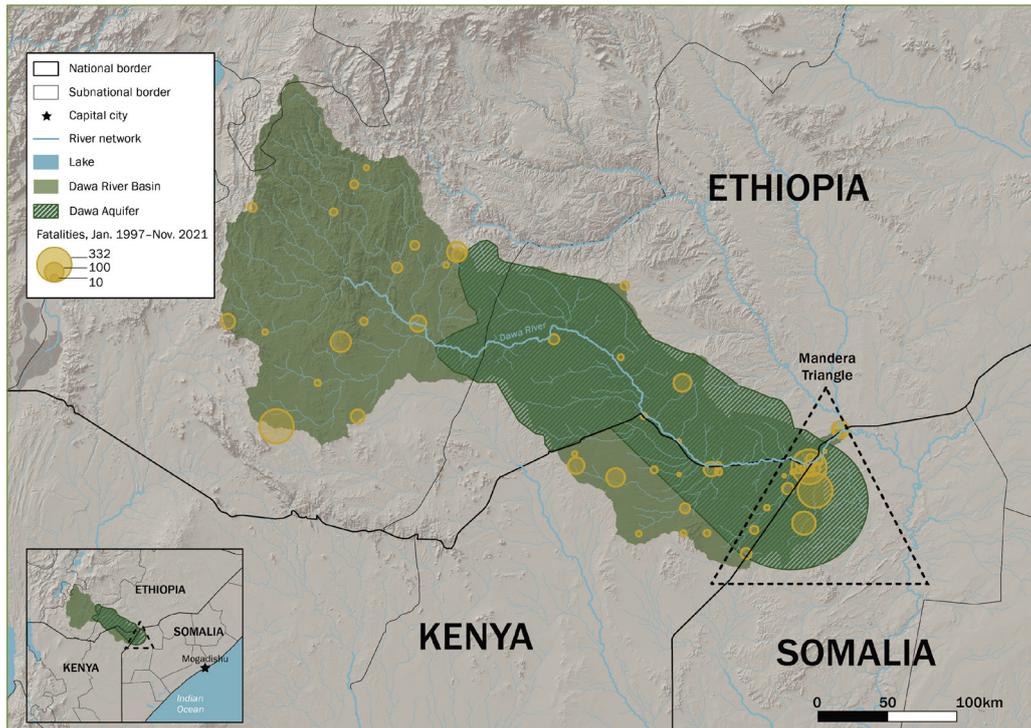


Figure 3.1. Map of the Dawa River and Aquifer, with fatality rates, Jan. 1997–Nov. 2021

Note: The figure shows fatality rates within the basin area only.

Sources: Based on data from Raleigh, C. et al., ‘Introducing ACLED: An Armed Conflict Location and Event Dataset: Special data feature’, *Journal of Peace Research*, vol. 47, no. 5 (Sep. 2010); Natural Earth, <<https://www.naturalearthdata.com>>; HydroSHEDS, <<https://www.hydrosheds.org>>; and Africapolis, <<https://africapolis.org>>.

Credit: José Luengo-Cabrera.

heavily affected due to their dependency on agriculture for their livelihood.⁷⁴ Further, many young men in the cross-border region do not practise pastoralism, depending instead on low-paying white-collar jobs.⁷⁵

Widespread poverty affects more than 350 000 people living in the Mandera Triangle.⁷⁶ Poverty levels are very high in Mandera County, Kenya, at around 89 per cent.⁷⁷ In Somalia, although subnational data is less clear, the national poverty rate is estimated at 69 per cent.⁷⁸ The Somali region of Ethiopia, which encompasses the Dolo Ado District, has a poverty rate of 22.4 per cent.⁷⁹ Although water use from the Dawa River remains limited, the river does sustain an agriculture-based economy in the Mandera Triangle.⁸⁰ It is used for small-scale, rain-fed systems and irrigation schemes for cash crops.⁸¹ In the highlands, populations depend mostly on crop production, while in the lowlands they rely on livestock production due to lower rainfall.⁸² During the rainy seasons, water is stored via sandy river beds, and during

⁷⁴ BORESHA (note 73).

⁷⁵ BORESHA (note 73).

⁷⁶ BORESHA (note 64).

⁷⁷ Kenyan Ministry of Agriculture, Livestock and Fisheries, ‘Climate risk profile for Mandera County’, Kenya County Climate Risk Profile Series, 1 Aug. 2018.

⁷⁸ UNHCR, ‘UNHCR Somalia Interim Livelihoods Strategy 2021–2022’, Apr. 2021.

⁷⁹ World Bank, *Ethiopia Poverty Assessment: Harnessing Continued Growth for Accelerated Poverty Reduction* (World Bank: Washington, DC, 1 Apr. 2020).

⁸⁰ Mohamed, A. E., ‘Managing shared basins in the Horn of Africa—Ethiopian projects on the Juba and Shabelle rivers and downstream effects in Somalia’, *Natural Resources and Conservation*, vol. 1, no. 2 (Sep. 2013).

⁸¹ Azza, N. and Olet, E., *The IUCN-IGAD BRIDGE Project: A Situation Analysis. Final Report* (IUCN BRIDGE Programme: Entebbe, 18 June 2015).

⁸² Mohamed (note 80).

Table 3.1. Summary of the Dawa River and Aquifer case study

Aspect	Details
Transboundary water source and water-sharing countries	The Dawa River and Aquifer are shared by Ethiopia, Kenya and Somalia
Basin communities in focus	Farmer and pastoralist communities from the Mandera Triangle (Mandera County in north-eastern Kenya, Dolo Ado District in southern Ethiopia, and Gedo Region in southern Somalia) Pastoralist communities in Borana Zone (Ethiopia) and Degodia (Somali region of Ethiopia)
Water-linked factors that triggered the dispute	Water scarcity linked to climate change Diminishing water quality caused by groundwater extraction and aquifer pollution Competing water development needs and unilateral development plans Lack of transboundary information sharing
Main brokers and supporters of water cooperation	Pastoralist and farmer households and communities Local government units at district and county levels International non-governmental organizations and donors (USAID, EUTF, UNDP, UNEP, IGAD–FAO Partnership Programme)
How water cooperation contributed to addressing the water-linked challenges identified above	External support led to local peace agreements around water points Local capacity building for joint and integrated water and resource management helped address the problems of unilateral water projects and competing water demands

EUTF = European Emergency Trust Fund for Africa; FAO = Food and Agriculture Organization; IGAD = Intergovernmental Authority on Development; UNDP = United Nations Development Programme; UNEP = United Nations Environment Programme; USAID = United States Agency for International Development.

the dry seasons it is obtained from hand-dug wells, scoop holes and boreholes.⁸³ In Mandera County, Kenya, smallholder farmers use local water pans (earthen reservoirs for harvesting and storing rainwater) and shallow wells to irrigate and cultivate large amounts of onions, tomatoes and watermelons.⁸⁴ The Dawa Aquifer also provides groundwater resources to the town of Rhamu, Mandera County, which are used for floodplain irrigation.⁸⁵

Drivers of conflict

Water demands on the Dawa River and Aquifer are rising and the three riparian states, Ethiopia, Kenya and Somalia, are expressing growing interest in developing their usage of them.⁸⁶ However, due to limited water availability, especially during the dry seasons, there is an imbalance between increasing demands and declining resources that is causing water tensions.⁸⁷ The absence of joint instruments to manage and negotiate the shared use of the river has contributed to a lack of cross-border information sharing and the unilateral construction of water projects that have aggravated interstate relations.⁸⁸ There is currently no joint authority or catchment committee for the Dawa–Genale Basin.⁸⁹ The ongoing civil war in Somalia and attacks by the Islamist

⁸³ van der Heijden and van den Berg (note 70).

⁸⁴ SunCulture, 'Empowering lives of smallholder farmers in Mandera', Blog post, 25 Mar. 2021.

⁸⁵ Mohamed (note 80).

⁸⁶ Nanni, M., 'Water challenges in the IGAD region: Towards new legal frameworks for cooperation', *Water International*, vol. 41, no. 4 (June 2016).

⁸⁷ Azza and Olet (note 81).

⁸⁸ Krampe et al. (note 7).

⁸⁹ van der Heijden and van den Berg (note 70).

group al-Shabab have disrupted regional security and limited Somalia's capacity to commit to joint basin arrangements.⁹⁰

Declining resource and water availability

Climate change threatens livelihoods and resources around the Dawa River and Aquifer. Erratic rainfall and changes to rain-fed agriculture and irrigation have rendered many traditional coping strategies obsolete.⁹¹ Droughts in the early 1980s destroyed livestock and forced pastoralists to relocate in search of new livelihood options and resources for their herds. Rising temperatures and the increased frequency and intensity of droughts and floods, combined with locust invasions, have altered vegetation, constrained food security and exacerbated regional competition for resources. Flooding from the Dawa River, especially during periods of heavy rainfall, results in the destruction of crops and water infrastructure. The most recent extreme flood, in 2019, caused household food storage to be washed away.⁹² During droughts, the water level of the Dawa River falls low, leading pastoralists with insufficient water to irrigate their fields and suffer a consequent loss of income.⁹³ During severe droughts, the Dawa River can cease flowing entirely, leaving warm, scattered ponds that are ill-suited for irrigation or domestic purposes.⁹⁴ This increases pressures on scarce resources, especially when populations in the central rangelands (between the Dawa and Genale rivers) migrate towards the Dawa River to obtain water for their livestock.⁹⁵

As populations increase and the demand for water rises, water quality in the Dawa River is likely to deteriorate. To meet growing water demands, more groundwater wells will need to be drilled, which could attract animals and cause organic waste to accumulate around water points.⁹⁶ Communities that are compelled through climate change to transition away from nomadic lifestyles towards agriculture-based economies will probably increase their usage of agricultural fertilizers.⁹⁷ This transition could pollute aquifers even further.⁹⁸ Declining water quality can in turn exacerbate local grievances, contributing to greater risk of communal conflict over water.

Competing demands for water development

Competition for resources around the Dawa River is heavily influenced by the lack of coordination and agreement between Ethiopia, Kenya and Somalia. The three countries have never established a bi- or trilateral agreement to negotiate the development of the river.⁹⁹ As a result, all three intend to augment their water usage without basin-wide consensus. Before the start of its civil war in 1991, Somalia was the largest water user in the basin and it plans to return to that level.¹⁰⁰ Kenya has similarly expressed its intention to increase its usage of the Dawa River.¹⁰¹ Ethiopia developed a master plan for the Genale–Dawa Basin in 2007, without considering the detrimental effects on downstream water flows and irrigation schemes in Somalia.¹⁰² In the master plan, Ethiopia highlighted its intention to build 93 medium- to large-scale irrigation

⁹⁰ Krampe et al. (note 7).

⁹¹ Azza and Olet (note 81).

⁹² van der Heijden and van den Berg (note 70).

⁹³ van der Heijden and van den Berg (note 70).

⁹⁴ van der Heijden and van den Berg (note 70).

⁹⁵ van der Heijden and van den Berg (note 70).

⁹⁶ Woldemariyam and Ayenew (note 62).

⁹⁷ Woldemariyam and Ayenew (note 62).

⁹⁸ Woldemariyam and Ayenew (note 62).

⁹⁹ Krampe et al. (note 7).

¹⁰⁰ Nanni (note 86).

¹⁰¹ Nanni (note 86).

¹⁰² Nanni (note 86).

projects that would span 1 million hectares of land.¹⁰³ It also planned to construct nine large hydropower dams by 2035, which together would have a generation capacity of 1300 megawatts-electric (MW(e)).¹⁰⁴ Ethiopia hopes to export this energy to neighbouring countries to earn foreign currency.¹⁰⁵

The Genale–Dawa Basin has not yet been extensively developed, but this could change quickly. The Genale–Dawa III (GD-3) Multipurpose Hydropower Project was inaugurated in 2020, with a production capacity of 254 MW(e).¹⁰⁶ The project was developed with the external support of a Chinese engineering company, the China Gezhouba Group, and is operated by the Ethiopian Government.¹⁰⁷ It is used for water storage and to irrigate 15 000 hectares of land under Ethiopia’s Lower Genale Irrigation Development Project.¹⁰⁸ As part of the planned cascading system, Ethiopia also intends to construct two more hydropower projects in the Genale–Dawa Basin, GD-5 and GD-6.¹⁰⁹ Although these projects will have less impact on Kenya, which is located on the drier side of the basin, they will have a negative effect on Somalia, which considers the Juba–Shebelle Basin and therefore also the Dawa River (one of the main tributaries of the basin) as a breadbasket for its population.¹¹⁰ The initial filling of the dam reservoirs will decrease water availability to downstream agropastoralists, including in Somalia.¹¹¹

Political struggles and armed conflict

Regional dynamics have been influenced by political struggles and armed conflict over access to land and water. Decades of border conflicts in the Manderia Triangle pose a serious hindrance to transboundary basin cooperation. These conflicts are heightened by the involvement of armed groups such as al-Shabab, which has established itself as an important actor in the Manderia Triangle (especially on the Kenya–Somalia border), and has recruited many Kenyans into its ranks.¹¹² Manderia County in Kenya has suffered repeated attacks by al-Shabab on civil servants and telecommunication posts.¹¹³ Political struggles—such as the one between the Oromo Liberation Front, a political party that is mostly active in Ethiopia, and the Ethiopian Government—have also contributed to armed conflict in the region.¹¹⁴ Ongoing tensions between the Somali Government and forces linked to the Jubaland state government over the port city of Kismayo in south-eastern Somalia have further exacerbated regional insecurity.¹¹⁵ The Somali Government is also in competition with the Jubaland state security minister, Abdirashid Hassan Nuur (or ‘Janaan’), over control of Gedo Region in southern Somalia, which has had spillover effects on diplomatic relations between Kenya and Somalia, with the latter making accusations of Kenyan political interference in Somalia.

¹⁰³ Azza and Olet (note 81).

¹⁰⁴ Azza and Olet (note 81).

¹⁰⁵ Azza and Olet (note 81).

¹⁰⁶ NS Energy, ‘Genale–Dawa III Multipurpose Hydropower Project, Ethiopia’, [n.d.], accessed 24 Sep. 2021.

¹⁰⁷ NS Energy (note 106).

¹⁰⁸ Krampe et al. (note 7).

¹⁰⁹ NS Energy (note 106).

¹¹⁰ Krampe et al. (note 7).

¹¹¹ van der Heijden and van den Berg (note 70).

¹¹² Chome (note 71), p. 31.

¹¹³ Chome (note 71).

¹¹⁴ Chome (note 71).

¹¹⁵ Chome (note 71).

Drivers of resilience

The Dawa River and Aquifer encompass border regions in Ethiopia, Kenya and Somalia with limited infrastructure, intense transhumance activities and extreme vulnerability to the impacts of climate change, such as prolonged and frequent droughts.¹¹⁶ It is important to establish resources and services for the river that can enable an environment for cooperation on peace and water. Some of the initiatives that have been undertaken in the region to facilitate this include community water projects and nature-based solutions, external support for locally owned peace agreements, and capacity building to facilitate integrated and joint water management of the river and aquifer.

Community-based solutions

Construction and community management of shared infrastructure can improve social cohesion and intercommunal relations between the border states. For example, communities jointly build and manage water pans that serve populations on each side of the border.¹¹⁷ In 2021, a water pan was constructed in Malka Mari, in Kenya's Mandera County, which could help to mitigate conflict over water and pasture on the Ethiopia–Kenya border.¹¹⁸ After a consultation process with both the Garre community (Kenya) and the Degodia community (Ethiopia), the water pan was built with European Union (EU) funding.¹¹⁹ It is co-managed by the two communities through an eight-person committee, including elders, women and youth.¹²⁰ Although available information does not unpack the specific roles played by women and youth in the committee, their inclusion does indicate an attempt to integrate them into the decision-making processes. With a capacity of around 8.4 million litres, the water pan will help the border communities to harvest and store rainwater during the dry season. The water will be used solely for livestock and not for human consumption.¹²¹ By bringing the communities together around a shared water pan, the project seeks to pave the way for joint resource management.¹²² This approach is consistent with research on the role of water in generating cooperation and building peace between communities.¹²³

In Mandera County, Kenya, many farmers lack the financial or technical means to scale up their production and become competitive on the market.¹²⁴ To manage flooding from the Dawa River and increasing climatic extremes, farmers use traditional coping mechanisms, including drought-resistant crops, agroforestry, small-scale harvesting and fodder production.¹²⁵ SunCulture Ltd and Islamic Relief Kenya jointly implemented the Securing Water for Food (SWFF) project in 2016–19 to support farmers in Mandera through agro-solar irrigation systems.¹²⁶ The systems are powered by 300-watt solar modules and one-acre (0.4-hectare) drip-irrigation systems, and provide water-efficient solutions for high-density crop cultivation.¹²⁷

¹¹⁶ USAID, *Peace III Program 2018 Annual Report—Sustaining Peace: Impacts, Approaches and Institutions* (USAID/PACT/Mercy Corps: 2018).

¹¹⁷ USAID (note 116).

¹¹⁸ EEAS, 'EU-funded RASMI project hands over water pan to border communities in Mandera County', 2 Jan. 2021.

¹¹⁹ Peace III and Regional Approaches for Sustainable Conflict Management and Integration (RASMI) programme managers and field officers, Interview with authors, Video call, Sep. 2021.

¹²⁰ EEAS (note 118).

¹²¹ USAID (note 116).

¹²² EEAS (note 118).

¹²³ Swain, A., 'Water and post-conflict peacebuilding', *Hydrological Sciences Journal*, vol. 61, no. 7 (May 2016).

¹²⁴ SunCulture (note 84).

¹²⁵ SunCulture (note 84).

¹²⁶ SunCulture (note 84).

¹²⁷ SunCulture (note 84).

These sustainable water solutions enable farmers to spend more time with their families and on other economic activities.

Nature-based projects such as sand dams have also proven to be effective for community-based water storage.¹²⁸ This local adaptation strategy has helped communities to cope with growing water scarcity, by providing more drinking water and reducing travel time to water sources.¹²⁹ In Ethiopia's Borana Zone, communities receive training from local NGOs and take part in the construction and management of the sand dams.¹³⁰ The dams harvest rainwater by storing water in the sandy riverbeds that accumulate during the rainy seasons. During the dry periods, they supply communities with water via wells, pools and scoop holes.¹³¹ Along the Dawa River, most sand dams are located upstream where river run-off due to flash floods and rainfall is greater. One study found that constructing many sand dams to meet current and future water demands would have limited downstream impact.¹³² Enhancing water access would reduce the risk of communal conflict over water and potentially increase the likelihood of cooperation between communities.¹³³

External support

Informal peace agreements between the border communities must be rooted in local dynamics that include dispute-resolution mechanisms based on traditional systems of conflict management and that take into account the differentiated impacts on women and men.¹³⁴ By drawing on these customary systems and empowering local women and men to create their own peace agreements, external programmes can help to increase regional resilience.

The Peace III and Regional Approaches for Sustainable Conflict Management and Integration (RASMI) projects are two programmes implemented successively in the region by Pact, an international development NGO, to promote cross-border peace-building at the local level.¹³⁵ Peace III was funded by USAID and ran from 2014 to 2018.¹³⁶ The programme facilitated peace dividend projects that enabled communities to cooperate around their shared cross-border resources, including the Dawa River and Aquifer.¹³⁷ In 2017 it supported the Dukana–Dilo–Maikona Declaration, which mediates relations between the Gabra (Ethiopia) and Borana (Kenya) communities and their shared water for livestock.¹³⁸ Resource-sharing agreements can alleviate water stress and reduce the need for women and girls to travel across the border to water cattle during the dry season.¹³⁹ However, the sustainability of resource-sharing agreements between communities is still to be tested amid changing water availability due to climate change and population growth.

¹²⁸ Lasage et al. (note 62).

¹²⁹ Lasage et al. (note 62).

¹³⁰ Lasage, R. et al., 'ADAPTS: Adaptive water management at a local scale—Ethiopia case study', Mar. 2011.

¹³¹ Ritchie, H., Eisma, J. A. and Parker, A., 'Sand dams as a potential solution to rural water security in drylands: Existing research and future opportunities', *Frontiers in Water*, vol. 3 (2021), p. 31.

¹³² Lasage, R., de Vries, A. C. and Alemu, S. S., *The ADAPTS Programme in Ethiopia—Synthesis Report* (Institute for Environmental Studies: Amsterdam, 2012).

¹³³ Döring, S., 'From bullets to boreholes: A disaggregated analysis of domestic water cooperation in drought-prone regions', *Global Environmental Change*, vol. 65 (Nov. 2020).

¹³⁴ Mwenda, M., Krampe, F. and Maihack, H., *Climate Security in the Horn of Africa: Perspectives on Addressing Climate-Related Security Risks from the Horn of Africa* (Fredrich Ebert Stiftung: Berlin, June 2020).

¹³⁵ USAID (note 116).

¹³⁶ USAID (note 116).

¹³⁷ USAID (note 116).

¹³⁸ USAID (note 116).

¹³⁹ Abrahams, D., 'Conflict in abundance and peacebuilding in scarcity: Challenges and opportunities in addressing climate change and conflict', *World Development*, vol. 132 (Aug. 2020), p. 9.

RASMI is funded by the EU Emergency Trust Fund for Africa (EUTF) from 2017 to 2021.¹⁴⁰ It supports conflict-resolution activities in the Mandera Triangle, including by strengthening women's engagement in peace processes and collaborating with the Mandera Women for Peace and Development Forum to train women leaders and empower women's networks.¹⁴¹ Women are important agents for peace in the region through their efforts to influence policy change in local governments and institutions, and through their cooperation with their cross-border counterparts to exchange early-warning information on potential violence.¹⁴² Women leaders working with the RASMI project have been to schools across the Mandera Triangle to educate youth on the topics of substance abuse, education and violent extremism.¹⁴³ They have also visited young people playing in football fields, which are often fertile grounds for armed group recruitments.¹⁴⁴

Capacity building for joint basin management

In order to promote regional cooperation, it is important to strengthen the local capacities of women and men and build confidence around joint water cooperation. The Support for Effective Cooperation and Coordination of Cross-border Initiatives (SECCI) project is funded by the EUTF, and implemented by the UN Development Programme (UNDP) and the UN Environment Programme (UNEP) from 2018 to 2021.¹⁴⁵ SECCI addresses instability in the region by promoting cross-border trade, private-sector development and transboundary resource management between the three states. It strengthens regional frameworks for cross-border cooperation through local participation and multi-stakeholder consultations. UNEP also provides governments with expertise on water management and diplomacy.¹⁴⁶

The IGAD–Food and Agriculture Organization (FAO) Partnership Programme similarly strengthens resource management, trade and peacebuilding between the border countries of the Dawa River.¹⁴⁷ The programme runs from 2016 to 2021 and is funded by the Swiss Agency for Development and Cooperation. It focuses on enhancing the resilience of border communities and their participation in joint dialogues; and it builds local capacities to respond to droughts and resulting food insecurity.¹⁴⁸

By promoting transboundary resource management and strengthening local capacities to respond to climate shocks, projects such as SECCI and the FAO Partnership Programme help the three riparian countries to jointly manage the Dawa River and Aquifer and build confidence in cooperative opportunities.

Lessons learned

When managed jointly and equitably, the Dawa River and Aquifer can benefit cross-border communities in Ethiopia, Kenya and Somalia and help build local resilience. Community-based projects such as sand dams and water pans have proven to be effective ways to bring local populations together around their joint water needs. External programmes that strengthen cross-border resource capacities and local resilience to climate change also help mitigate the risks of conflict and facilitate cooperative water schemes. These local drivers of resilience reduce the conflict risks

¹⁴⁰ Pact, 'Women for peace in the SEEK and RASMI projects', 26 June 2019.

¹⁴¹ Peace III and RASMI programme managers and field officers (note 119).

¹⁴² Pact (note 140).

¹⁴³ Pact, 'In Mandera Triangle, women leaders stem violent extremism among youth', 13 June 2019.

¹⁴⁴ Pact (note 143).

¹⁴⁵ EUTF, 'Collaboration in cross-border areas of the Horn of Africa', [n.d.], accessed 12 Oct. 2021.

¹⁴⁶ EUTF (note 145).

¹⁴⁷ IGAD, 'IGAD–FAO Partnership Program (PP)', [n.d.], accessed 12 Oct. 2021.

¹⁴⁸ IGAD (note 147).

in the region and can enable the neighbouring states to derive joint benefits from the Dawa River, protect its critical ecosystems and resources, and facilitate closer cross-border cooperation.¹⁴⁹ Looking ahead, because there is limited information and data on the availability and use of the Dawa River and Aquifer, creating joint instruments to oversee and measure the shared water resources will be critical to cooperative scenarios.

¹⁴⁹ Sadoff and Grey (note 11).

4. The Bahr el Ghazal Basin and the Baggara Basin Aquifer

Basin context

Sudan and South Sudan share transboundary surface water and groundwater resources that, prior to South Sudan's independence from Sudan in 2011, fell primarily within the former borders of Sudan.¹⁵⁰ Transboundary water resources are important for both countries: 96 per cent of Sudan's renewable water is generated in upstream countries, while that figure stands at 60 per cent for South Sudan.¹⁵¹ Before 2011, almost two-thirds of the Nile Basin fell within Sudan. The deep Nubian Sandstone Aquifer—one of the largest aquifers in the world—under the north-west of the country and the Umm Ruwaba system under the centre and south of the country contributed to substantial groundwater reserves.¹⁵² Groundwater in Sudan and South Sudan is an important and increasingly used resource, with the Umm Ruwaba formation a particularly good source of near-surface water.¹⁵³ Mataras (irrigation wells) and wadis (seasonally dry rivers) are notably used to access groundwater, but the sustainability of groundwater access is questionable, with anecdotal reports suggesting falling groundwater levels.¹⁵⁴ More than 80 per cent of the population of Sudan and South Sudan use groundwater on a regular basis for domestic purposes.¹⁵⁵ Around 20 per cent of freshwater resources within the pre-2011 borders of Sudan were generated internally by precipitation.¹⁵⁶ Only the Bahr el Ghazal and Lake Chad basins within these pre-2011 borders received significant input from precipitation.¹⁵⁷ While Sudan depends primarily on Nile waters for irrigation, the rainy season in South Sudan provides additional resources.¹⁵⁸ The Bahr el Ghazal Basin and the Baggara Basin Aquifer are two important water resources that now fall across the north-south border between Sudan and South Sudan (see figure 4.1), having become partitioned between the two countries in 2011.¹⁵⁹

The Bahr el Ghazal Basin is a sub-basin of the Nile and is among the biggest tropical wetlands in the world (see table 4.1).¹⁶⁰ It can also be considered as linked to the Sudd Wetland.¹⁶¹ The catchment of the Bahr el Ghazal covers an area of approximately 645 000 km² and is an important tributary of the White Nile system.¹⁶² The Bahr el Ghazal wetlands are seasonally flooded, supporting biodiversity and pastoral livelihoods.¹⁶³

¹⁵⁰ UNEP, *Sudan: Post-conflict Environmental Assessment* (UNEP: Nairobi, June 2007).

¹⁵¹ FAO (note 10).

¹⁵² UNEP (note 150).

¹⁵³ UNEP (note 150).

¹⁵⁴ UNEP (note 150).

¹⁵⁵ Abiye, T. A. and Mmayi, P., 'Groundwater as a viable resource under climate change in the Nile Basin: A rapid hydrogeological assessment', *South African Journal of Geology*, vol. 117, no. 1 (June 2014).

¹⁵⁶ UNEP (note 150).

¹⁵⁷ UNEP (note 150).

¹⁵⁸ Wendl, A. K., 'International water rights on the White Nile of the new state of South Sudan', *Boston College International and Comparative Law Review*, vol. 39, no. 1 (2016).

¹⁵⁹ UNEP, *South Sudan: First State of Environment and Outlook Report 2018* (UNEP: Nairobi, 2018).

¹⁶⁰ El Moghraby, A. I., 'Bahr el Ghazal: Nile River Basin (Sudan and South Sudan)', *The Wetland Book* (Springer: 2018).

¹⁶¹ Sosnowski, A. et al., 'Remote regions, remote data: A spatial investigation of precipitation, dynamic land covers, and conflict in the Sudd wetland of South Sudan', *Applied Geography*, vol. 69 (Apr. 2016); and UNEP (note 56).

¹⁶² Gabr, S. and El Bastawesy, M., 'The Implications of the topographic, hydrologic and tectonic settings on the development of Bahr El-Ghazal catchment, South Sudan', *International Journal of Water Resources and Arid Environments*, vol. 2, no. 2 (2013).

¹⁶³ Awulachew, S. B. et al. (eds), *The Nile River Basin: Water, Agriculture, Governance and Livelihoods* (Routledge: Abingdon, 2012).

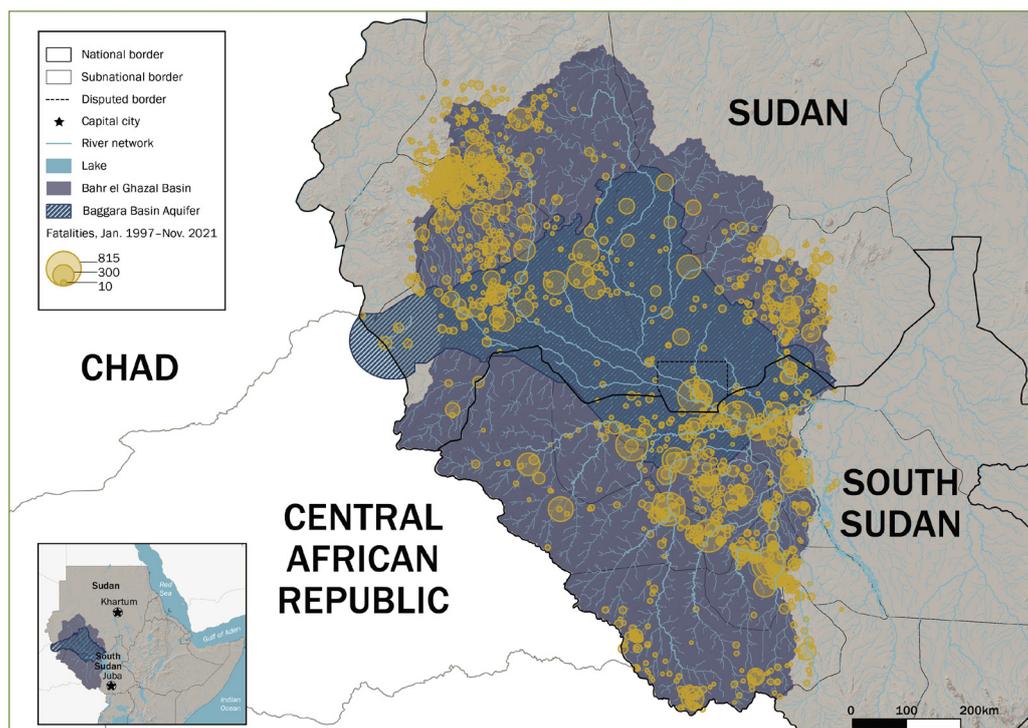


Figure 4.1. Map of the Bahr el Ghazal Basin and Baggara Basin Aquifer, with fatality rates, Jan. 1997–Nov. 2021

Note: The figure shows fatality rates within the basin area only.

Sources: Based on data from Raleigh, C. et al., ‘Introducing ACLED: An Armed Conflict Location and Event Dataset: Special data feature’, *Journal of Peace Research*, vol. 47, no. 5 (Sep. 2010); Natural Earth, <<https://www.naturalearthdata.com>>; HydroSHEDS, <<https://www.hydrosheds.org>>; and Africapolis, <<https://africapolis.org>>.

Credit: José Luengo-Cabrera.

The Baggara Basin Aquifer is composed of the major Nubian Sandstone and Umm Ruwaba Aquifer formation.¹⁶⁴ The Baggara Basin Aquifer falls within the Nile Basin and is shared between Sudan, South Sudan and the Central African Republic, with the majority of it located in Sudan.¹⁶⁵ Approximately 3.6 million people live in the basin area.¹⁶⁶ The Baggara Basin, with a total area of approximately 239 000 km², is an important source of groundwater.¹⁶⁷ The aquifer is almost totally confined, with groundwater levels ranging from 10 to 75 metres in different areas.¹⁶⁸ Groundwater in a confined aquifer is covered by an impermeable ground layer, and its recharge is generally influenced by lakes, precipitation and rivers that can occur at substantial distances away.¹⁶⁹ The mean annual recharge is roughly 185 mm³, largely through precipitation in South Sudan.¹⁷⁰ Water is accessible through boreholes.¹⁷¹ To date, there is no established framework to share the Baggara Basin’s resources.¹⁷² As of October

¹⁶⁴ Altchenko and Villholth (note 67); and CGIAR Research Program on Water, Land and Ecosystems (WLE) and International Water Management Institute (IWMI), ‘Transboundary aquifer mapping and management in Africa’, 2014.

¹⁶⁵ Nile Basin Initiative, ‘Groundwater in the Nile Basin’, [n.d.], accessed 15 Oct. 2021.

¹⁶⁶ International Groundwater Resources Assessment Centre (IGRAC), ‘AF53–Baggara Basin’, Transboundary Aquifer Information Sheet, Dec. 2020.

¹⁶⁷ Altchenko and Villholth (note 67); UNEP (note 159); and Nile Basin Initiative (note 165).

¹⁶⁸ Omer, A. M., ‘Groundwater potential and sustainable management in the Nile valley: An overview’, *Scientific Journal of Review*, vol. 5, no. 2 (Feb. 2016); and IGRAC (166).

¹⁶⁹ McCarthy, J. et al., *Climate Change 2001: Impacts, Adaptation and Vulnerability* (IPCC: Cambridge, 2001).

¹⁷⁰ IGRAC (166).

¹⁷¹ Abiye and Mmayi (note 155).

¹⁷² UNEP (note 159).

Table 4.1. Summary of the Bahr el Ghazal Basin and Baggara Basin Aquifer case study

Aspect	Details
Transboundary water source and water-sharing countries	The Bahr el Ghazal Basin and the Baggara Basin Aquifer are shared by Sudan and South Sudan; the Central African Republic accesses a small part of the Baggara Basin Aquifer
Basin communities in focus	Pastoralist and agro-pastoralist communities on the border between Sudan and South Sudan
Water-linked factors that triggered the dispute	Diminishing water access due to conflict and a militarized border Pollution Drought
Main brokers and supporters of water cooperation	Local peacebuilding actors International NGOs and donors (e.g. UNDP and PACC)
How water cooperation contributed to addressing the water-linked challenges identified above	Increased access to local water sources (e.g. boreholes) contributed to reducing tensions over water Efforts to restore local dispute-resolution mechanisms mitigated conflict risks to a degree Improved social cohesion

NGO = non-governmental organization; PACC = Peace and Community Cohesion; UNDP = United Nations Development Programme.

2021, Sudan and South Sudan signed an MOU on water management.¹⁷³ While potentially politically influential, its implication is uncertain at the time of writing.

As of 2013, approximately 8 million people lived in the border region between Sudan and South Sudan, as well as millions of cattle.¹⁷⁴ The border region is used by multiple ethnic groups, including Nilotic groups (e.g. the Dinka and Nuer) and Baggara Arab pastoralists (e.g. the Misseriya and the Rizeigat).¹⁷⁵ These groups rely on different sources of livelihood, such as farming, agro-pastoralism and pastoralism.¹⁷⁶ Access to pasture and water is important for these local livelihoods, but has been increasingly jeopardized due to the impacts of conflict and environmental factors.¹⁷⁷ Women and men can experience different impacts in these circumstances. For example, research on Fulbe pastoralism in Sudan notes that women engaged in pastoralism are responsible for procuring food for their households, and they participate in natural resource management. Drought and conflict have contributed to decreased access to services, land and livestock, and increased domestic responsibilities for women. Gender inequalities limit women's ability to access resources and participate in decision making. The political, social and economic marginalization they experience as pastoralists compounds these challenges.¹⁷⁸

Populations in both countries experience high rates of poverty. As of 2021, the poverty rate in South Sudan was approximately 82 per cent.¹⁷⁹ In Sudan, the basin areas of the Bahr el Ghazal and the Baggara Basin Aquifer have the highest poverty rates in the country, with between 51 and 67 per cent of households in South Kordofan State living in poverty, and at least 35 per cent of households elsewhere in the region.¹⁸⁰ Available

¹⁷³ Radio Dabanga, 'Sudan and South Sudan sign MoU on water management—South Sudan', ReliefWeb, 8 Oct. 2021.

¹⁷⁴ Abdalla, A. J., 'People to people diplomacy in a pastoral system: A case from Sudan and South Sudan', *Pastoralism: Research, Policy and Practice*, vol. 3, no. 12 (2013).

¹⁷⁵ El Moghraby (note 160); and Abdalla (note 174).

¹⁷⁶ Saeed, A., *Failed Governance and Political Turbulence in Abyei Area of Sudan*, Sudan Working Paper SWP 2015:1 (Chr. Michelsen Institute: Bergen, 2015); Craze, J., *Dividing Lines: Grazing and Conflict along the Sudan–South Sudan Border* (Graduate Institute of International and Development Studies: Geneva, July 2013); and Abdalla (note 174).

¹⁷⁷ Craze (note 176); and Pantuliano, S., 'Oil, land and conflict: The decline of Misseriyya pastoralism in Sudan', *Review of African Political Economy*, vol. 37, no. 123 (Mar. 2010).

¹⁷⁸ Osman, E. I., *Pastoral Women in Town: The Case of the Migrant Fulbe in Sinja, Sudan*, Sudan Working Paper no. 3 (Chr. Michelsen Institute: Bergen, 2020).

¹⁷⁹ World Bank, 'South Sudan: Overview', [n.d.], accessed 11 Nov. 2021.

¹⁸⁰ World Bank, *Mapping Poverty in Sudan* (World Bank: Washington, DC, Aug. 2019).

data notes that women and girls aged 15 years and above experience comparatively higher rates of unemployment in both Sudan and South Sudan.¹⁸¹

Drivers of conflict

Since the independence of South Sudan, border areas have been a source of contestation between the two countries, particularly because of the oil reserves that lie on either side of the Sudan–South Sudan border.¹⁸² The border region is a source of fresh surface water, pasture and oil, and conflict risks in the Bahr el Ghazal Basin and the Baggara Basin Aquifer regions are influenced by incompatible local and national interests over resources.¹⁸³ The history of the border region is complicated, with many issues, interests and divisions between actors affecting the conflict dynamics.¹⁸⁴ Some of the overlapping drivers of conflict there include the impact of national governance on local livelihoods and communities; how the protracted conflict influenced deteriorating community relationships and traditional conflict-resolution mechanisms; and the effects of environmental degradation due to climate change and oil exploration.

National governance and local effects

The protracted civil war between the northern and southern regions of Sudan—the 1983–2005 Second Sudanese Civil War—officially ended with the 2005 Comprehensive Peace Agreement (CPA).¹⁸⁵ The CPA, however, did not adequately address issues related to the border between the north and the south—which eventually became the border between Sudan and South Sudan—an area that had been significantly affected by the war.¹⁸⁶ The 1200 km boundary was partly aligned with the Bahr el Arab River, a 750 km tributary to the White Nile.¹⁸⁷ The impact that the border demarcation would have on traditional livelihood patterns was largely unconsidered.¹⁸⁸ Local groups that had coexisted for generations were faced with a new border, which posed particular problems for pastoralist communities accustomed to traditional travel routes.¹⁸⁹ What was once an internal administrative boundary became an international and militarized border.¹⁹⁰

While the CPA nominally promised uninterrupted access to traditional grazing areas for pastoralists, northern pastoralists encountered increasing difficulties in crossing the border, especially after the independence of South Sudan in 2011.¹⁹¹ In the years immediately following the CPA, northern pastoralists were compelled to pay substantial taxes to access the south.¹⁹² The agreement stipulated respect for ‘traditional’ rights, but did not clarify how secondary rights—or seasonal rights to certain areas—would be negotiated or respected. Communities increasingly claimed

¹⁸¹ UN Women, Women Count, ‘Sudan’, [n.d.], accessed 28 Nov. 2021; and UN Women, Women Count, ‘South Sudan’, [n.d.], accessed 28 Nov. 2021.

¹⁸² El Moghraby (note 160).

¹⁸³ Abdalla (note 174); and Concordis International and United States Institute of Peace, *More than a Line: Sudan’s North–South Border*, Concordis International Sudan Report (Concordis International: Sep. 2010).

¹⁸⁴ Saeed (note 176); Craze (note 176); and Concordis International and United States Institute of Peace (note 183).

¹⁸⁵ UNEP (note 150); and United Nations Mission in Sudan, ‘Comprehensive Peace Agreement between the Government of the Republic of the Sudan and the Sudan People’s Liberation Movement/Sudan People’s Liberation Army’, signed 9 Jan. 2005.

¹⁸⁶ Concordis International and United States Institute of Peace (note 183).

¹⁸⁷ Abdalla (note 174).

¹⁸⁸ Concordis International and United States Institute of Peace (note 183).

¹⁸⁹ Abdalla (note 174); and Concordis International and United States Institute of Peace (note 183).

¹⁹⁰ Abdalla (note 174).

¹⁹¹ Craze (note 176).

¹⁹² Pantuliano (note 177).

areas on the basis of 'dominant' or non-negotiable rights, reshaping traditional formations of resource access among border communities.¹⁹³

National-level governance decisions also contributed to perceptions of political marginalization and tensions among different groups. In Abyei, the site of one of the most contentious conflicts on the border, international and national negotiations over the region have failed to meaningfully involve the Ngok Dinka and Misseriya in decisions that affect their lives and livelihoods. This has contributed to increasing tensions between the two communities.¹⁹⁴ The CPA assessed Abyei to be the territory of the Ngok Dinka, leading to fears among the Misseriya that their access to pasture and water would be restricted.¹⁹⁵ In the border states of South Kordofan (Sudan) and Unity (South Sudan), the Misseriya have expressed feelings of marginalization since the CPA, due to loss of traditional homeland and political influence after South Sudan's independence.¹⁹⁶

Deterioration of traditional conflict-resolution mechanisms

The long history of conflict between Sudan and South Sudan has contributed to both the deterioration of community relations and the undermining of local dispute-resolution mechanisms. Extended conflict prompted many men to join militias in order to protect their communities, and thus ally with actors in the civil war. These militias were exploited by different actors during the 1983–2005 Second Sudanese Civil War and the 2013–18 South Sudanese Civil War, and the associations of the different militias contributed to negative community relations.¹⁹⁷ During the 1983–2005 civil war, groups of northern pastoralists associated themselves with militias that displaced communities along the border. The Sudanese Government also backed militias made up of individuals from border communities, encouraging them to attack their counterparts across the border. These impacts, as well as the proliferation of small arms, contributed to deteriorating relationships and increased suspicions between communities.¹⁹⁸

In Abyei, for example, while the Misseriya and the Ngok Dinka traditionally used the same resources, national interests, particularly surrounding the discovery of significant oil reserves, caused the relationship between the communities to deteriorate.¹⁹⁹ Conflict between the two groups has been intense, with 469 deaths related to their fighting recorded between 1989 and 2020.²⁰⁰ A referendum on whether Abyei should belong to Sudan or South Sudan was supposed to be held in 2011, but Sudan prevented it by sending armed government forces to occupy the zone. Tensions have remained high since and the situation is unresolved, impacting the lives of local women and girls, and men and boys.²⁰¹ Groups with competing interests have been accused of supporting the resettlement of the Dinka or the Misseriya to increase their claim on the area.²⁰² The Sudanese Government allegedly backed the permanent settlement of the Misseriya in Abyei in order to give Sudan an advantage

¹⁹³ Craze (note 176).

¹⁹⁴ Craze (note 176); and Saeed (note 176).

¹⁹⁵ Pantuliano (note 177).

¹⁹⁶ Concordis International and United States Institute of Peace Peace (note 183).

¹⁹⁷ Krause, J., 'Stabilization and local conflicts: Communal and civil war in South Sudan', *Ethnopolitics*, vol. 18, no. 5 (Oct. 2019).

¹⁹⁸ Craze (note 176).

¹⁹⁹ Concordis International and United States Institute of Peace Peace (note 183); Gebrekidan, G. Z., 'Tribal conflict over natural resources on the Sudan–South Sudan border: The case of the Abyei territory', *Acta Humana*, vol. 9, no. 1 (Mar. 2021); Saeed (note 176); and Craze (note 176).

²⁰⁰ UCDDP, 'Misseriya–Ngok Dinka', [n.d.], accessed 15 Oct. 2021.

²⁰¹ Rolandsen, Ø. H., 'Trade, peace-building and hybrid governance in the Sudan–South Sudan borderlands', *Conflict, Security and Development*, vol. 19, no. 1 (Jan. 2019).

²⁰² Gebrekidan (note 199); Concordis International and United States Institute of Peace Peace (note 183); and Craze (note 176).

in a referendum.²⁰³ Government armed forces have also fostered the belief among the Dinka and Misseriya populations that they require protection to ensure their respective rights to the land or opportunities to graze.²⁰⁴

As well as impacting on group relations, the conflict has deteriorated the mechanisms traditionally used to solve communal conflicts. When pastoralist groups such as the Misseriya travelled south, they were compelled to negotiate resource access with the Sudan People's Liberation Army (SPLA)—the southern rebel group—rather than the local communities that they traditionally worked with. This dynamic continued after the CPA and led to the involvement of military and government actors in grazing negotiations.²⁰⁵ For grazing passages between certain border states, government administrators took the place of traditional chiefs in conflict-resolution mechanisms in 2011, reducing the local capacity to effectively resolve disputes.²⁰⁶

While customary dispute-resolution mechanisms worked to resolve disputes, including over trespassing onto farm areas and abductions, the presence of past or active military personnel as government administrators sidelined traditional chiefs.²⁰⁷ In other communities along the border, annual peace conferences were held by border communities to prevent and mitigate conflict over grazing and water access, but conflict dynamics complicated their consistent success.²⁰⁸ In South Sudan, war led to competition over authority not only between traditional leaders and state actors, but between traditional leaders and those who had taken on leadership roles in displaced communities.²⁰⁹ In Darfur, Sudan, a history of government interests and biased involvement has also diminished the ability of traditional conflict-resolution mechanisms to successfully address conflict between tribes.²¹⁰ If disputes involve members of a stronger group supported by the government, those individuals may feel exempted from punishment.²¹¹

Degrading natural resources

Water scarcity is not the main cause of national-level conflict. Rather, political and economic interests linked to oil are considered to be more significant driving factors.²¹² However, while state interests are tied up in oil, local communities have been more concerned with access to the land and resources crucial to their livelihoods.²¹³ Given the importance of water to local livelihoods, it is necessary to recognize the role water insecurity may play as a risk multiplier in a fragile environment.²¹⁴

Environmental degradation due to the compounding impacts of climatic change and oil exploration has contributed to tensions over land and water between local groups across the Sudan–South Sudan border.²¹⁵ Oil exploration has contributed to environmental degradation in the area through oil spills, road construction, and the

²⁰³ Gebrekidan (note 199).

²⁰⁴ Saeed (note 176).

²⁰⁵ Craze (note 176).

²⁰⁶ Abdalla (note 174).

²⁰⁷ Abdalla (note 174).

²⁰⁸ Wassara, S. S., *Interests of Border Communities in Water and Pastures: Will They Influence Nile Water Policies of the Two Sudans?*, UNISCI Discussion Papers no. 33 (UNISCI: Madrid, Oct. 2013).

²⁰⁹ Wassara, S. S., *Traditional Mechanisms of Conflict Resolution in Southern Sudan* (Berghof Foundation for Peace Support: Berlin, Mar. 2007).

²¹⁰ Tubiana, J., Tanner, V. and Abdul-Jalil, M. A., *Traditional Authorities' Peacemaking Role in Darfur* (USIP: Washington, DC, 2012).

²¹¹ Tubiana, Tanner and Abdul-Jalil (note 210).

²¹² Selby, J. and Hoffmann, C., 'Beyond scarcity: Rethinking water, climate change and conflict in the Sudans', *Global Environmental Change*, vol. 29 (Nov. 2014).

²¹³ Kimote, J. and Deng, P., *UNDP South Sudan: Peace and Community Cohesion (PACC) Project—Summative Evaluation, Final Report* (UNDP: New York, Jan. 2020); and Pantuliano (note 177).

²¹⁴ Sadoff, C., Borgomeo, E. and de Waal, D., *Turbulent Waters: Pursuing Water Security in Fragile Contexts* (World Bank: Washington, DC, 2017).

²¹⁵ Pantuliano (note 177).

release of toxic, untreated ‘produced water’ (generated alongside extracted crude oil).²¹⁶ Produced water has been found to cause severe health problems for people and livestock, with some research stating that chemical contaminants found in oil wells have also been found in shallow wells used for drinking water.²¹⁷ Thus, poor management of the oil sector and its associated environmental degradation have contributed to grievances among local communities.²¹⁸

The impact of climate change on available resources is an additional stress on conflict dynamics and human insecurity.²¹⁹ In South Sudan, rising temperatures correspond with decreasing precipitation and evapotranspiration. Climate change is likely to affect the water tables in boreholes, reduce access to potable water, impact rainy seasons and reduce wetlands, among other impacts. These dynamics in turn may contribute to increased competition over water.²²⁰ In Sudan, rainfall is diminishing and becoming more erratic, temperatures are rising and extreme precipitation events are becoming more frequent.²²¹ The impacts of climate change, population growth and environmental degradation, among other factors, are all contributing to increased water stress.²²²

Drivers of resilience

Water is a crucial resource for the communities in the Bahr el Ghazal and Baggara basins, yet conflict dynamics have historically complicated and continue to complicate peaceful access to necessary resources. Water security is important not only for local livelihoods, but it may also influence increased stability in the border region.²²³ Initiatives that improve cooperation over water include community-driven cooperation, external support for cooperation, and infrastructure and adaptation support.

Community-driven cooperation

In the absence of effective and nationally supported transboundary governance, members of local groups, including the Dinka Malaul and the Misseriya, have worked outside state administrations to hold informal dialogues to build peace. Discussions have focused on disarming pastoralists and delineating migration routes around water points and farmland.²²⁴ Other local groups, including traditional authorities and youth and church-led initiatives, have also worked with community peacebuilding, and their local knowledge and expertise is crucial.²²⁵ Research notes how youth in different states in South Sudan have contributed to community peacebuilding and addressed concerns about water and food insecurity, among other challenges.²²⁶ Women from Ngok Dinka and Misseriya communities have met to discuss peacebuilding and

²¹⁶ Patey, L., ‘Lurking beneath the surface: Oil, environmental degradation, and armed conflict in Sudan’, eds P. Lujala and S. A. Rustad, *High-value Natural Resources and Peacebuilding* (Earthscan: London, 2012), p. 564.

²¹⁷ Patey (note 216); and Tiitmamer, N., ‘Remediating South Sudan’s war-induced petroleum environmental damage: Environmental baseline conditions and current impacts’, Policy Brief, Sudd Institute, 24 June 2020.

²¹⁸ Patey (note 216); and James, L. M., *Fields of Control: Oil and (In)Security in Sudan and South Sudan* (Small Arms Survey, Graduate Institute of International and Development Studies: Geneva, 2015).

²¹⁹ UNEP (note 159); Broek, E., Seyuba, K. and Tarif, K., ‘Abyei offers lessons for the region on climate-related security risks’, SIPRI WritePeace blog, 23 Sep. 2021; and UNEP, *Sudan: First State of Environment and Outlook Report 2020* (UNEP: Nairobi, Oct. 2020).

²²⁰ UNEP (note 159).

²²¹ UNEP, *Sudan: First State of Environment and Outlook Report 2020* (note 219).

²²² UNEP, *Sudan: First State of Environment and Outlook Report 2020* (note 219); and UNEP (note 159).

²²³ Sadoff, Borgomeo and de Waal (note 214).

²²⁴ Abdalla (note 174).

²²⁵ Jok, J. M., ‘Lessons in failure: Peacebuilding in Sudan/South Sudan’, eds T. McNamee and M. Muyangwa, *The State of Peacebuilding in Africa* (Palgrave Macmillan: Cham, 2021).

²²⁶ Ensor, M. O., ‘Youth, climate change, and peace in South Sudan’, *Peace Review*, vol. 25, no. 4 (Oct. 2013).

development in Abyei.²²⁷ Indeed, women in South Sudan and Sudan have played significant roles in community and country-level peacebuilding, although they have faced challenges when engaging in formal roles.²²⁸

Thus, despite the political uncertainties, it seems local dispute-resolution mechanisms can be restored and strengthened as a conflict-management tool over water in the basin. However, should local communities remain aligned with national-level, politicized government interests, successful peacebuilding may continue to be difficult.²²⁹

External support for cooperation

Institutional capacity, access to appropriate human and financial capital, and appropriate information and data are important factors in achieving water security.²³⁰ Although Sudan and South Sudan share the Bahr el Ghazal Basin and Baggara Aasin Aquifer, among other transboundary resources, there are no agreements in place on how to share them.²³¹ Transboundary agreements have the potential to improve development and stability in certain contexts.²³² While negotiations over the transboundary Nile waters were largely disregarded in national dialogues surrounding resources during the CPA, this was arguably due to recognition of the regional importance of the Nile.²³³ Some research suggests that the SPLM recognized the controversial dynamics of negotiating access to Nile waters, and prioritized smoother relations with other neighbouring Nile riparian states during its move for independence.²³⁴

Understanding how local women and men use transboundary renewable resources is relevant to the sustainable regulation of access. Regional organizations, as well as multilateral organizations such as the UNDP, could assist local communities with gender-disaggregated data collection.²³⁵ Collection of data disaggregated by gender, age, ethnicity and disability, among other identity markers, will help contribute to gender-responsive and more equitable and effective policies to address water usage.²³⁶ Notably, there is little data on groundwater distribution, hydrology, rates of extraction and the impacts of human use.²³⁷ Of the Nile's sub-basins, the Bahr el Ghazal Basin is the least monitored, with only one hydrometric station.²³⁸ Improved understanding of how communities on each side of the border depend on water resources could contribute to more successful negotiations and agreements.²³⁹

²²⁷ United Nations Peacekeeping, 'Ngok Dinka and Misseriya women support peacebuilding efforts in Abyei', 20 Feb. 2017.

²²⁸ Ayuel Mayen, A., 'Women in peace making processes in South Sudan', Policy Brief, Sudd Institute, 18 Apr. 2013; Ahmed Yahia, A., 'Why have women been excluded from peace-building in Sudan?', *The Guardian*, 26 Aug. 2014; and Soma, E., *Our Search for Peace: Women in South Sudan's National Peace Processes, 2005–2018* (Oxfam: 2020).

²²⁹ Wassara (note 208).

²³⁰ Sadoff, Borgomeo and de Waal (note 214).

²³¹ UNEP, *Sudan: First State of Environment and Outlook Report 2020* (note 219); and UNEP (note 159).

²³² Sadoff, Borgomeo and de Waal (note 214).

²³³ Salman, S. M. A., 'The new state of South Sudan and the hydro-politics of the Nile Basin', *Water International*, vol. 36, no. 2 (Mar. 2011); and Wendl (note 158).

²³⁴ Salman (note 233); and Wendl (note 158).

²³⁵ Wassara (note 208).

²³⁶ United Nations-Water Decade Programme on Capacity Development (UNW-DPC), United Nations University, *Gender-disaggregated Data on Water and Sanitation*, Expert Group Meeting, UN Headquarters, New York, 2–3 Dec. 2008 (UNW-DPC: Bonn, June 2009); and United Nations, Committee on the Elimination of Discrimination against Women, General recommendation no. 37 on gender-related dimensions of disaster risk reduction in the context of climate change, CEDAW/C/GC/37, 7 Feb. 2018.

²³⁷ UNEP, *Sudan: First State of Environment and Outlook Report 2020* (note 219); and UNEP (note 159).

²³⁸ Nile Basin Initiative, Nile Basin Water Resources Atlas, 'The Bahr el Ghazal Sub-basin: Current monitoring network', [n.d.].

²³⁹ Wolf, A. T., *Regional Water Cooperation as Confidence Building: Water Management as a Strategy for Peace* (Adelphi/Environmental Change and Security Project/Mesoamerican Center for Sustainable Development of the Dry Tropics: Berlin/Washington, DC/Nicoya, 2004).

Rebuilding the capacity for local conflict resolution is of further importance. The Peace and Community Cohesion (PACC) project, managed by the UNDP from 2017 until 2020, aimed to help mitigate local-level conflict by supporting stakeholder communities to forge inclusive and cooperative processes and by empowering them to recognize and address conflict drivers in their own communities.²⁴⁰ The project bolstered peacebuilding and local social cohesion, with the understanding that this can contribute to overcoming broader transboundary challenges. Mitigating disputes over water and land can help to limit the potential for these conflicts to expand into larger cycles of violence.²⁴¹ The PACC project facilitated intercommunal dialogues in response to the recurring tensions during cattle migration in the Sudan–South Sudan border region.²⁴² It has also assisted the creation of community-level peace committees that include youth and women in efforts to strengthen a culture of dialogue and interdependence. The project has worked to increase the number of communities with collective dialogue mechanisms to resolve resource conflicts, such as the joint border peace committee for the Dinka Malual of Northern Bahr el Ghazal and the Rizeigat/Misseriya of East Darfur. Concurrently, the project augmented water infrastructure, such as boreholes, to increase livelihood opportunities, thus creating incentives for community cooperation. More frequent contacts and peaceful interactions between and within communities can promote cooperation over water sharing.²⁴³

Infrastructure and adaptation support

Infrastructure that supports local adaptation by women and girls, and men and boys to changing environmental conditions needs to sustainably orient itself around local needs and livelihoods. For example, in the early 1980s, construction of the Jonglei Canal began as a way to offset the loss of water from evaporation and evapotranspiration in the Sudd Wetland areas, thereby improving access to Nile waters for the growing populations of northern Sudan and Egypt.²⁴⁴ Civil war halted work on the canal in 1984. However, if the canal were to be completed, it would probably have negative effects on the wetland environment and detrimental impacts on the livelihoods of local populations.²⁴⁵

Groundwater access and local water points can mitigate potential tensions over scarce water access between pastoral groups.²⁴⁶ Boreholes drilled through the PACC project in Aweil, Northern Bahr el Ghazal, have contributed to increased access to water for women and men, as well as livestock, and reduced cases of violence along transhumance routes.²⁴⁷ The project has also leveraged community water infrastructure (including boreholes) to foster social cohesion and community interdependencies around infrastructure maintenance and repair.

The Baggara Basin serves as a groundwater source in the border region between Sudan and South Sudan.²⁴⁸ Improved irrigation systems, local water governance and transboundary water management would therefore likely contribute to lower levels of related disputes in the area.²⁴⁹ It should be noted that local water conflict often

²⁴⁰ Kimote and Deng (note 213).

²⁴¹ PACC project staff members, Interview with authors, Video call, Sep. 2021.

²⁴² Kimote and Deng (note 213).

²⁴³ Kimote and Deng (note 213).

²⁴⁴ UNEP (note 159); and Sosnowski et al. (note 161).

²⁴⁵ UNEP (note 159); and UNEP (note 150).

²⁴⁶ Awulachew (note 163); and Doring, S., 'Come rain, or come wells: How access to groundwater affects communal violence', *Political Geography*, vol. 76, no. 1 (Oct. 2019).

²⁴⁷ Kimote and Deng (note 213).

²⁴⁸ Abiye and Mmayi (note 155).

²⁴⁹ UNEP (note 159).

occurs near boreholes, especially if water availability and access is inadequate.²⁵⁰ This highlights the need for equitable and inclusive community access to potable water. However, governance with a focus on local community needs and participation surrounding access to groundwater is necessary, as unregulated groundwater abstraction can contribute to overextraction of accessible groundwater.²⁵¹

Lessons learned

The resources in the Bahr el Ghazal Basin and the Baggara Basin Aquifer are crucial to the livelihoods of many populations. Inclusive and community-driven solutions and local peacebuilding work are therefore essential in the context of protracted conflict and fragility. A range of initiatives towards infrastructure and adaptation support demonstrates that external support by international actors can help build community resilience. External support could also include financing and technical assistance for data collection on the Baggara Basin Aquifer and Bahr el Ghazal Basin. There is also a need for improved water governance at the transboundary level, prioritizing the needs of cross-border communities.²⁵²

²⁵⁰ Seter, H., Theisen, O. M. and Schilling, J., 'All about water and land? Resource-related conflicts in East and West Africa revisited', *GeoJournal*, vol. 83 (2018).

²⁵¹ Taher, T. et al., 'Local groundwater governance in Yemen: Building on traditions and enabling communities to craft new rules', *Hydrogeology Journal*, vol. 20, no. 6 (Sep. 2012); Ide (note 16); and UNICEF, *Running Dry: The Impact of Water Scarcity on Children in the Middle East and North Africa* (UNICEF: Aug. 2021).

²⁵² Wassara (note 208).

5. Water cooperation and resilience: Constraints and entry points

Constraints on water cooperation and resilience

This report has identified several water cooperation initiatives in the Horn of Africa, and some of the proposed initiatives have been developed into concrete action plans to benefit the local populations and the national economies. However, institutional, political and security constraints on enhancing water cooperation remain. Findings from the case studies on the Sio–Malaba–Malakisi Basin, the Dawa River and Aquifer, and the Bahr el Ghazal Basin and the Baggara Basin Aquifer demonstrate that context-specific drivers of fragility, conflict and violence are active. Lessons learned from the case studies point to the following interrelated constraints on water cooperation and resilience.

1. Weak bottom-up drivers of water cooperation

The cross-border communities in this study have much to gain from improved water management, but water cooperation at the local level has rarely been initiated and sustained by communities. Indeed, the local interactions analysed in this report were driven by top-down initiatives (e.g. the SMM Investment Programme) and donor-driven interventions. This finding is surprising because cross-border communities in the studied cases gain ample benefits from cooperation. Joint management of infrastructure and shared watershed usage appear promising in terms of their potential contribution to development, peace and stability. Despite the potential benefits, however, for local populations of women and men in fragile and vulnerable contexts, brokering a deal with another community for resource sharing may be seen like a risky option for solving their own resource problems.²⁵³ Thus, this sense of risk may be a factor in weak bottom-up drivers of water cooperation.

This finding could also be linked to limited data availability and the case-selection method (see box 1.1). Only looking at project documentation, it is difficult to identify local needs and how local actors drive cooperation processes. The case-selection method used international donor-financed projects to identify local cooperation initiatives. There is limited information available on local civil society and its involvement in water management, including its engagement with women and other vulnerable populations. Identification of local stakeholders, such as community-based organizations and informal social networks, may enhance understanding of the restraints on and entry points for water cooperation embedded in communities.

2. Weak institutional arrangements for transboundary water management

Disputes over water access in transboundary settings can be complex, and basin-wide frameworks for water cooperation can help to reduce tensions and resolve conflict if it emerges. A major institutional difficulty arises when there is no bilateral or multilateral agreement on cooperation or shared use of water. As the case studies in chapters 2–4 show, the form of potential transboundary governance framework can vary, ranging from bilateral MOUs to basin-wide or border agreements. Yet the most important question is not the form but whether an inclusive framework for cooperation actually exists.

Updating existing institutional frameworks is also an important task to strengthen cooperation in response to combatting global climate change. Water resource chal-

²⁵³ Abrahams (note 139), pp. 8–10.

allenges are bound to get worse because climate change affects freshwater availability and variability, adding another level of uncertainty to transboundary water management.

3. Limited knowledge of transboundary aquifers

There is limited research on transboundary groundwater in the Horn of Africa and how it can be jointly managed. This report covers two important transboundary aquifers: the Dawa Aquifer and Baggara Basin Aquifer. Existing research about these crucial water sources is scarce, and this limits communities' understanding of the sustainability of groundwater sources and how to sustainably manage them. For example, drilling additional boreholes may increase water access for some communities in the short term, but it may negatively affect the water availability for other communities. In such situations it is also important to identify whether women and other marginalized segments of the population have equal access to water from these boreholes. With the current levels of data collection and sharing, it is difficult to make informed decisions and provide the necessary support for sustainable transboundary aquifer management.

4. Intercommunal tensions and militarized borders

Cross-border tensions and militarized conflict are major obstacles to cooperation and sources of stress over water. Militarized border conflict causes tensions between water-sharing states and hampers dialogue on cooperative frameworks. Intercommunal conflict with links to armed groups has destabilized the existing local conflict-resolution mechanisms. Notably, the border between Sudan and South Sudan in the Bahr el Ghazal Basin has become increasingly militarized, which makes resolution of conflict over water harder. The militarization is partly caused by the competing national interests over natural resources such as oil, which further hinders the potential for cooperation.

Entry points for water cooperation and resilience

The dynamics on the ground in the Horn of Africa are fast changing. Drawing lessons from complex transboundary settings and contexts of fragility, conflict and violence is a challenging task. An additional challenge comes from the limited information available on water-sharing communities in the border regions studied in this report. Acknowledging these limitations, and linked to the constraints outlined above, there are four possible entry points for the international policy community in terms of building resilience through water cooperation.

1. Highlight the concrete mutual benefits of water cooperation

As mentioned earlier, one of the major constraints for building resilience is weak bottom-up drivers of cooperation at the local level. Strengthening local drivers of cooperation, both female and male, can be aided by national, transboundary and external actors. Recognizing the benefits of cooperation is a first step in engaging in cooperation across all the case studies. There is a need to highlight the concrete mutual benefits of water cooperation to governments, local authorities and cross-border communities. Assessment of the mutual benefits of water sharing has been a useful tool to inform the policy dialogue between riparian governments.²⁵⁴ The benefits for local populations can be equally highlighted, because this helps in understanding how communities can share the gains from cooperative water use. In such an analysis, the

²⁵⁴ Sadoff and Grey (note 11).

gendered benefits for men and women, as well as other vulnerable populations, should be considered and highlighted. It is important to recognize the diverse and context-specific needs of men and women from these fragile, conflict-affected communities. More research could also be done to reveal the agency of women and men from local communities in water management and intra- and inter-community cooperation, as this would be highly beneficial in informing external support.

Another dimension that needs to be considered in future research is the potential for civil society engagement in water cooperation. Exploring various forms of partnership with civil society actors could suggest potential entry points for national governments and external actors working on water management. Finally, it is necessary to unpack local politics and the perceptions of cooperative initiatives partially supported by external organizations. Growing attention has been given to the local politics surrounding external initiatives for peacebuilding during recent years, and this has revealed patronage, contestation and competition.²⁵⁵ Similar dynamics might be relevant and provide useful insights for promoting water cooperation at the local level.

2. Support institutional frameworks and processes

The analysis of the case studies in this report shows that the Horn of Africa faces significant shortcomings in governance arrangements, echoing the findings of previous research.²⁵⁶ Weak institutional arrangements for transboundary water management at basin and regional levels are important constraints that need to be overcome. At the time of writing, the MOU between Kenya and Uganda over the SMM Basin has not yet been finalized and adopted; the riparian states of the Dawa River and Aquifer are competing over water development, with Ethiopia keenly interested in implementing its unilaterally developed basin plan; and Sudan and South Sudan lack an agreement on water sharing in the Bahr el Ghazal Basin and Baggara Basin Aquifer. These complex institutional challenges signal a point of entry for external actors with an interest in supporting equitable and inclusive water cooperation in the region, such as international donors, NGOs and RECs (e.g. IGAD). Indeed, a range of external partners are now equipped with the experience and knowledge to support transboundary water governance. Implementing intergovernmental processes, however, would require long-term financial investment.

Furthermore, the Horn of Africa could benefit from a regional water-sharing protocol similar to that established for Southern Africa by the 2000 Southern African Development Community (SADC) Revised Protocol on Shared Watercourses.²⁵⁷ IGAD, the REC for the Horn of Africa, has an important role to play in enhancing institutional arrangements on water cooperation among its eight member states. In 2015, IGAD drafted a regional policy on water resources and it is currently facilitating negotiation of a regional transboundary water protocol based on the IGAD Regional Water Policy.²⁵⁸ Such a water protocol might be particularly useful for resolving disputes in transboundary water basins that currently lack cooperative frameworks. The protocol should also have gender and social inclusion perspectives to ensure that the differences in terms of obstacles and benefits are noted and addressed.

²⁵⁵ Autesserre, S., *Peaceland: Conflict Resolution and the Everyday Politics of International Intervention* (Cambridge University Press: Cambridge/New York, 2016).

²⁵⁶ Krampe et al. (note 7).

²⁵⁷ Southern African Development Community (SADC), Revised Protocol on Shared Watercourses in the Southern African Development Community, signed 7 Aug. 2000, entered into force 22 Sep. 2003.

²⁵⁸ Nanni (note 86).

3. Assist research on groundwater

Data availability is a significant constraint for cooperation between cross-border communities on transboundary aquifer management, with access to disaggregated data particularly challenging. The case studies covering the Dawa and Baggara aquifers show that local women and men are dependent on transboundary aquifers. In this respect, external partners could assist technically and financially with the development of the region's research capacity and facilities. Development of accessible information tools and open platforms could be useful for the local communities to jointly monitor and manage their resources.

4. Strengthen local capacities for dispute resolution

Both top-down and bottom-up approaches are necessary in the promotion of cooperation. However, when political constraints impede efforts to reach a water-sharing agreement between governments, strengthening local dispute-resolution mechanisms (outside state institutions) can help to achieve change. The local, bottom-up approach should make sure to consider the dimensions of gender and social inclusion.

Local agreements can be as important as or better than basin-wide agreements for responding to water scarcities and climate change-related water pressures. Community-based water solutions, such as the use of sand dams and water pans in the Dawa River Basin, can be particularly useful in building resilience. In all the basins studied, empowering community-based organizations (including women and youth organizations) to become key actors is essential in strengthening communities' capacity for dispute resolution. External actors have an important role to play in supporting the bottom-up, community-led initiatives for building climate-resilient communities in fragile, conflict-affected and violent settings.

In order to overcome local-level tensions and the militarization of border areas, international policy actors should strengthen local women and men's capacity for conflict resolution. As mentioned above, this report mostly draws on existing research, which is scarce and often lacks granularity about local stakeholders and contexts. Thus, prior to programming support, it calls for more in-depth analysis by international policy actors of local stakeholder dynamics and local and gender-specific indicators associated with fragility.

As a region, the Horn of Africa requires substantial investment to meet the deepening challenges of climate change, such as declining water resources and extreme weather events.²⁵⁹ The international community is now paying more attention to strengthening climate adaptation as part of its peacebuilding efforts, based on an understanding that peacebuilding and climate change adaptation can reinforce each other.²⁶⁰ However, there is a clear need for further research on identifying initiatives that ensure the equitable participation of both women and men in water management.²⁶¹ Indeed, both further investment and further research is needed across the region.

²⁵⁹ Mwenda, Krampe and Maihack (note 134).

²⁶⁰ United Nations Climate Change, 'Statement by António Guterres at Security Council debate on climate and security', 23 Sep. 2021; and Matthew, R. and Hammill, A., 'Peacebuilding and adaptation to climate change', in eds D. Jensen and S. Lonergan, *Assessing and Restoring Natural Resources in Post Conflict Peacebuilding* (Earthscan: London, 2012), p. 17.

²⁶¹ Similar initiatives have been considered in labour participation, e.g. International Labour Organization, 'Leveraging the cooperative advantage for women's empowerment and gender equality', Cooperatives and the World of Work no. 1, 2014.

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