Chapter 5

Promoting Integrated Watershed Management

The World Bank is actively engaged in integrated management of Africa’s watersheds, through policy dialogue, technical assistance and financial support, with a particular emphasis on the management of trans-boundaries water resources, though vehicles such as the Cooperation in International Waters in Africa (CIWA) program. This component of the business plan intends to scale up support to four selected basins (the Niger, Lake Chad, Zambezi, and Victoria basins), with the goal of strengthening the ability of riparian countries in these basins to manage their water resources for sustainable development in a climate-resilient way.
5.1 NIGER RIVER BASIN

The World Bank will support climate-resilient development in the Niger River Basin through the preparation of a Climate Resilience Investment Plan (CRIP) and the cofinancing of its implementation (table 5.1).

Sectoral Background and Development Challenges

Nine countries in West and Central Africa—Benin, Burkina Faso, Cameroon, Chad, Ivory Coast, Guinea, Mali, Niger and Nigeria—share the Niger River Basin. Its surface area, which spans nearly 1.5 million square kilometers, is marked by a mosaic of climates, ecosystems, human settlements, and agricultural production systems. The population in the basin is highly vulnerable. Seven of the 10 basin countries are among the 20 poorest countries in the world, and 4 are landlocked. Most of the countries in the Niger Basin have predominantly rural populations that rely on rain-fed agriculture, pastoralism, and other natural resource-based livelihoods. Food security and social well-being depend mostly on unpredictable and extreme rainfall patterns, particularly in the Sahel part of the basin.

Climate change is exacerbating these challenges. The Niger Basin is already experiencing variability of extreme precipitation and a long-term trend of increasing aridity and decreasing precipitation. There is considerable uncertainty about the implications of climate change for the hydrological cycles in the basin (as in much of West Africa), with some projections suggesting drying conditions and others pointing to wetter ones. This uncertainty underscores the importance of strengthening the capacity of institutions in the Niger Basin to plan water resources investments.
that can deliver the intended development benefits under a wide range of future climates.

**Initiatives to Address the Challenges and Enhance Resilience**

Between 2002 and 2008, the Niger Basin Authority (NBA) and its member states undertook a Shared Vision process for the sustainable development of the region. Major outcomes included the Niger Basin Water Charter (approved in 2008) and a Sustainable Development Action Plan (SDAP) (approved in 2007). The SDAP calls for the development of socioeconomic infrastructures, the preservation of ecosystems in the basin, capacity building and stakeholder participation, and an $8.2 billion investment program.

Several donors—including AFD, AfDB, GIZ, and the World Bank—support the NBA and its member states. The World Bank has provided financial support of $451.5 million in lending to countries in the basin through the Niger Basin Water Resources Development and Sustainable Ecosystems Management Program ($444 million) and the Niger River Basin Management Project ($7.5 million, under the Cooperation in International Waters in Africa Fund). It is preparing a third operation, the Economic and Environmental Rehabilitation of the Niger River in Mali project ($55 million).

Building on existing and well-established support for cooperative water and natural resources management and development in the basin, the World Bank,
in collaboration with a variety of partners, will support climate-resilient development in the basin through a combination of infrastructure development and institutional strengthening. Specific support will be guided by the CRIP, which is under preparation, under the leadership of the NBA, with the full involvement of the riparian countries. The plan, as adopted by the riparian countries, will be presented at the COP21 meeting, along with initial information on funding pledges.

**Expected Outcomes**

The CRIP will achieve the following outcomes:

- Improve information to support water management and development decisions by riparian countries, so that they can better predict and harness available water resources in view of increased variability and changing rainfall patterns.
- Identify institutional needs for information sharing, increase the sustainability of water-storage infrastructure, mitigate the impacts of climate variability, generate low-carbon energy, and ensure results and impacts at the grassroots level.
- Develop multipurpose infrastructure for energy, irrigation, transport, and minimum flows.
- Develop run-of-river dams to provide low-carbon energy sources.
- Optimize water storage, in order to improve redistribution and maintain low flows.
- Equip rural poor with small-scale storage options to help withstand water shocks.
- Undertake collective action for erosion control, pollution abatement, fisheries management, and ecosystem conservation.
- Scale up the use of sustainable land management and affordable irrigation solutions to enhance the resilience of millions of people.

**Climate-Related Benefits**

The main aims of the CRIP are to strengthen the overall resilience of the basin population (through job creation, for example) and to help reduce the climate vulnerability of people and ecosystems to water stress conditions; flooding; deterioration of water quality; degradation of soil, grazing land, and ecosystems; and rising sea level.

**Financing Plan**

The funding envelope of the CRIP is estimated at $3.1 billion, about $600 million of which has been identified. A rough estimate of investment preparation financing is $50 million. IDA resources can provide the initial
foundation for implementing the plan, but other funding sources will need to be tapped (table 5.2). COP21 will give the Niger Basin countries the opportunity to present their climate resilience needs before the international community, including donors of climate funding, in hopes of attracting financing.

Following COP21, investment packages to be submitted to the Green Climate Fund will be defined and donor roundtables organized to identify other sources of funding for the various components of the CRIP. Cofinancing of the first follow-up donor roundtable has already been secured from the Infrastructure Consortium for Africa (ICA).

Given that preinvestment preparedness is underdeveloped, resource mobilization efforts will target both preparation and investment finance. They will seek to leverage resources from both traditional and new sources.

**Key Partners**

The World Bank will deploy comprehensive resources, including both IDA and other parts of the World Bank Group (IFC advisory and investment, MIGA guarantees) to support the objectives outlined above. The African Development Bank is a key partner in this initiative. Other partners also

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount ($ million)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic sources</td>
<td>50</td>
<td>Domestic funds are required as co-funding to IDA credits</td>
</tr>
<tr>
<td>IDA</td>
<td>450</td>
<td>$50 million is in the pipeline for the Mali Niger River Economic and Environmental Rehabilitation Project; $400 million has been requested from the Niger Basin COM Chair to complete phase 2 of the Adaptable Program Loan for Water Resources Development and Sustainable Ecosystem Management (APL WRM-SEM)*</td>
</tr>
<tr>
<td>Private sector</td>
<td>0</td>
<td>Private sector will be targeted for longer-term funding; no private sector funding is expected for the fast track</td>
</tr>
<tr>
<td>Climate finance (GCF, GEF, CIF, and so forth)</td>
<td>50</td>
<td>Given the dearth of information and the difficulty of articulating the additionality of interventions, the financing plan assumes that adaptation-specific interventions constitute about 10 percent of total financing needs</td>
</tr>
<tr>
<td>Other development finance (bilaterals, multilaterals)</td>
<td>400</td>
<td>ADB, KfW, and other partners financing the Integrated Development and Adaptation to Climate Change Program (PIDACC)</td>
</tr>
<tr>
<td>To be determined</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td><strong>Total fast track</strong> (resources raised by 2020)</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td><strong>Longer term</strong> (additional resources raised by 2024)</td>
<td>1,500</td>
<td></td>
</tr>
</tbody>
</table>

*a. The request was included in the letter from the president of the Niger Basin Council of Ministers to President Kim (November 11, 2014) for Phase 2 of the APL WRM-SEM program. The letter included a proposal for interventions in nine Niger riparian countries as a second phase of APL1 in the amount of $400 million.*
include Agence Française de Développement (AFD) and the German development agencies active in supporting the basin. The Bank will also try to involve emerging partners in the sector, including other multilateral institutions, bilateral donors, the Green Climate Fund, and private sector investors.
5.2 LAKE CHAD BASIN

The World Bank will support climate-resilient development in the Lake Chad Basin through technical work, investment financing, policy dialogue, and resource mobilization. These efforts will be grounded in existing documents, such as the Water Charter and the Five-Year Investment Program, which will be updated, scaled up, and operationalized (table 5.3).

Sectoral Background and Development Challenges

Lake Chad is a large body of water in the Sahel region of Africa, at the southern fringe of the Sahara Desert. It is a very complex hydrosystem from an ecological, social, and political standpoint. Its active hydrological basin spreads over 815,000 square kilometers. Chad, Niger, Nigeria, and Cameroon are the lake's riparian states. The basin is home to about 50 million people, many of them among the poorest in the world.

Over the past 50 years, the Lake Chad area has experienced significant climate, hydrological, ecological, and social changes. The lake's surface, including its marshlands, shrunk significantly, from an average of about 20,000 square kilometers in the 1960s to about 8,000 square kilometers today. As a result, in the early 1970s, the lake transitioned from its original state characterized by one body of open water, to a very different one, dominated by marshlands and of much smaller size.

Throughout the last century, and particularly since the 1970s, fishers, farmers, and herders from different ethnic groups migrated to the lake's shores to exploit its rich natural resources and to flee droughts, famine, and
Accelerating Climate-Resilient and Low-Carbon Development

conflicts in other parts of the region. Since the 1980s, armed criminal
groups, and more recently, Islamic extremists, have taken refuge around
the lake.

These changes have created both opportunities and threats. On the positive
side, thanks to migrants’ know-how and the fertile land freed up by the
lake's shrinkage, the lake area has been able to provide livelihoods to about
2 million settlers around its shore. It has also become a net exporter of food,
contributing to the food security of about 15 million people in the lake's hin-
terlands, including two growing regional metropoles (N'Djamena, Chad and
Maiduguri, Nigeria).

On the negative side, navigability has been reduced, insecurity is hamper-
ing development efforts, and the lake is fragile and vulnerable to deteriora-
tion. Access to the lake's natural resources is subject to increasing disputes.
Contamination from pesticides is starting to affect fisheries and livestock
production. The risk of hydrocarbon contamination is rising as oil
exploitation in the region is increasing. The sustainability of current produc-
tion systems is not guaranteed, and several Ramsar protected wetlands may
be at risk.

Despite its socioeconomic and ecological significance and very weak
development indicators, the Lake Chad area has attracted relatively little
investment from its riparian states or donors. In the face of the additional
pressure that climate change exerts on the region's fragile natural resources,
there is an urgent need to identify sustainable management options that will
meet the development needs of the local population. Key issues to address
include the following:

- Is there scope for promoting further transformation of the lake for
  productive activities, or would doing so undermine the lake’s ecosystem
  services and therefore the livelihoods that depend on them?

### TABLE 5.3 Support to the Lake Chad Basin: At-a-glance Summary

<table>
<thead>
<tr>
<th>Activity</th>
<th>Expected outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Assess priority development and climate resilience issues in Lake Chad</td>
<td>Fast track (by 2023)</td>
</tr>
<tr>
<td>- Prepare a priority action plan, to be endorsed by the Lake Basin Commission</td>
<td>Longer term (by 2026)</td>
</tr>
<tr>
<td>- Implement selected priority actions included in the plan</td>
<td>- Consensus built around Lake Chad assessment, vision, and action plan to reach the vision</td>
</tr>
<tr>
<td></td>
<td>- Water Charter ratified and operationalization begun</td>
</tr>
<tr>
<td></td>
<td>- First set of investments ($300 million) to increase the resilience of people and ecosystems around the lake to climate change and other stressors implemented</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main partners</th>
<th>Resource mobilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Chad Basin Commission and its member states, AFD, European Union, GIZ</td>
<td>Fast track (by 2020)</td>
</tr>
<tr>
<td></td>
<td>Longer term (additional funds by 2024)</td>
</tr>
<tr>
<td></td>
<td>$300 million</td>
</tr>
<tr>
<td></td>
<td>$500 million</td>
</tr>
</tbody>
</table>
• Does water contamination from pesticides and oil exploitation pose a potential threat to the lake?
• Is there scope for expanding irrigation, given the modification of the hydrological cycle that climate change will bring about?
• If drying trends continue, should interbasin transfer from the Congo Basin be considered?
• How much groundwater can be safely used?

The socioeconomic and ecological importance of the lake and the challenges it faces call for policy and investment action at the regional and national levels as well as sustained military action to reestablish peace. The Lake Chad Basin Commission (created in 1964 to sustainably and equitably manage the basin’s water resources, preserve its ecosystems, and promote regional integration); the basin states; and donors have key roles to play.

**Initiatives to Address the Challenges and Enhance Resilience**

In 2012 the Lake Chad Basin Commission developed a water charter that refines and complements the principles of and responsibilities for the integrated, equitable, and shared management of water and other natural resources, in order to achieve the sustainable development of the Lake Chad Basin. Since then all member states except the Central African Republic and Nigeria have ratified the charter, but most of its principles still need to be made operational.

The commission also developed a five-year investment program for 2013–17. Its objective is to reduce poverty and improve the living conditions of the people in the basin by improving natural resource management and associated production systems. The plan calls for spending of about $904 million. It was presented at a donors’ roundtable on April 4–5, 2014, in Bologna, Italy, but most of its activities remain unfunded.

The reengagement of the World Bank in support of Lake Chad development was recently approved in the form of a technical assistance, with financial support from the Cooperation for International Waters in Africa (CIWA) catalytic funds. This support will assist riparian countries and the Lake Chad Basin Commission in better understanding the future of the lake and defining a framework for future engagement based on broad consensus. This ongoing technical assistance is intended to provide the strategic foundation for a long-term engagement in the Lake Chad Basin and to guide the preparation of a long-term, multiyear, multicountry program.

Technical assistance includes two components. The first involves strengthening information/knowledge of and building consensus over the challenges facing Lake Chad and their underlying causes (providing answers to some of the questions raised above). The second supports the Lake Chad Basin Commission and its member states in crafting a shared vision for the lake’s development based on the assessment developed in phase 1, as well as in
preparing a climate resilience action plan to achieve the vision. It is expected that the following activities will be well advanced, or completed, by the COP21 meeting:

- a donor mapping, as a first step toward identifying the Bank’s value added in reengaging and drawing lessons from donors’ projects or programs under implementation
- a framework document for the Lake Chad Climate Resilience Action Plan (Chad-Res), including an assessment of the lake’s current situation, a long-term development vision for the lake, and priority actions to reach that vision
- consultations around the Chad-Res Framework document, to increase country buy-in and support from the international donor community and coordinate and finance the investments proposed
- endorsement of the Chad-Res Framework document by the commission’s ministerial council, before its presentation at COP21.

**Expected Outcomes**

The following outcomes are expected within three years of the COP21:

- development and adoption of the Operational Action Plan for Climate Resilience in Lake Chad, which will include the findings of technical work on improved understanding of the lake’s hydro-system, ecosystems, and productions systems and reflect the consensus built on the challenges facing the lake, their underlying causes, and the actions necessary to address them
- mobilization of resources by development partners to fund the Climate Resilience Action Plan
- implementation of the Climate Resilience Action Plan in two phases (the first through 2020, the second through 2025), to enhance the resilience of Lake Chad populations, production systems, and ecosystems to climate change and other stressors and improve the living conditions of the people living on the shores of Lake Chad.

**Climate-Related Benefits**

The proposed actions are expected to increase the resilience of the people and ecosystems around the lake to climate change and other stressors and to maintain or even increase the lake’s contribution to food security in its hinterlands. More sustainable fishing, agriculture, and cattle-raising practices will make the lake’s population less vulnerable to drought or other hazards.

**Financing Plan**

Table 5.4 describes the financing plan.
Key Partners

Key partners include the Lake Chad Basin Commission and its members (including the four riparian countries and the Central African Republic), and technical and financial partners (including AFD, AfDB, the European Union, and GIZ). AFD and the World Bank are supporting the preparation of the assessment, vision, and climate-resilience action plan.
5.3 ZAMBEZI RIVER BASIN

The World Bank will support climate-resilient development in the Zambezi River Basin through technical work, investment financing, policy dialogue, and resource mobilization (table 5.5). This support will be integrated as part of the Zambezi River Basin Program, which is financed through a series of projects under the multidonor trust fund for Cooperation in International Waters in Africa (CIWA) and the World Bank.

Sectoral Background and Development Challenges

The Zambezi River Basin is one of the most diverse and valuable natural resources in Africa. Its waters are critical to sustainable economic growth and poverty reduction in the region. In addition to meeting the basic needs of more than 30 million people and sustaining a rich and diverse natural environment, the river plays a central role in the economies of the eight riparian countries (Angola, Botswana, Malawi, Mozambique, Namibia, Tanzania, Zambia, and Zimbabwe). It provides important environmental goods and services to the region and is essential to regional food security and hydro-power production.

The river and its tributaries are subject to strong seasonal variation in the hydrological regime. The cycle of floods and droughts has devastating effects on the people and economies of the region, especially the poorest members of the population.

The basin is likely to be severely affected by climate change, as a result of the effects of higher temperatures and decreased rainfall on evaporation and run-off, according to most of the models vetted by the IPCC (2013). In other parts
of Africa, great uncertainty persists about the pattern of future changes in precipitation. In contrast, the vast majority of models for the Zambezi River Basin project very significant drying trends, with declines in runoff of 40 percent or more by midcentury.

Sustained economic growth of more than 6 percent a year in many of the riparian states is providing new opportunities and increasing development pressure on the resources of the basin. The combined GDP of the Zambezi River Basin riparian states is estimated at more than $100 billion. Despite this increasing prosperity, poverty is persistent across the basin, and coefficients of inequality in some of the riparian states are among the highest in the world.

The Multi-Sector Investment Opportunity Analysis identified more than $16 billion in investments at the prefeasibility or feasibility stage of preparation. Reflecting the dual nature of the regional economy, new investments in large infrastructure coexist alongside a parallel, subsistence economy that is reliant on environmental services provided by the river.

### Initiatives to Address the Challenges and Enhance Resilience

The World Bank is part of a multidonor initiative to support climate-resilient cooperative development in the Zambezi River Basin. The program is guided by an Integrated Water Resources Management (IWRM) Strategy for the
Zambezi River Basin (ZAMSTRAT), which provides a guiding vision, along with prioritized activities and projects. The initial phase of support to the Zambezi River Basin Committee (ZAMCOM) focuses on strengthening four key areas:

- regional cooperation and integration, by supporting ZAMCOM’s legal establishment, financial sustainability, delivery of key functions, and establishment of effective partnerships with key institutions throughout the basin
- water resources management, by supporting the public availability of basin-wide data and information, analytical tools for planning for and managing extreme events, and harmonized national transboundary legislation
- water resources development, by supporting a common investment planning framework and advancing investment opportunities with regional benefits
- stakeholder engagement and coordination, by establishing partnerships and effective strategic communications.

The first phase of the program involves assisting in the development of a pipeline of projects and investments that are expected to be implemented in accordance with the strategic plan for the basin being developed with support from CIWA. One investment in the pipeline is the Batoka Gorge hydroelectric scheme, envisaged as a 2,400 MW run-of-river plant upstream of the Kariba Dam. The project is being developed by the Zambezi River Authority, an entity run jointly by Zambia and Zimbabwe.

**Expected Outcomes**

The potential outcomes envisaged under the program of support over the next 10–15 years are substantial and include the following:

- Poverty will be reduced throughout the basin, as a result of expanded development, and sustainable water resources management.
- Energy security will be enhanced, through $10.7 billion worth of hydropower investments that yield an additional 35,300 GWh a year of firm energy and an additional 60,000 GWh a year of average energy.
- Agricultural production will increase, enhancing regional food security, through an additional 343,000 hectares increasing the amount of irrigation to 775,000 hectares a year (85 percent located in Malawi, Zambia, and Zimbabwe).
- Employment will increase, particularly in the agricultural sector, with more than 500,000 jobs created.
- Economic resilience will increase and growth benefits will be sustained, through reduced exposure to floods (avoiding average losses on the order of more than $1 billion a year) and adaptive measures to climate change.
• Regional transport costs and travel times will be reduced, through investments in bridges and navigation.
• Water supplies will be secured to meet urban and industrial demand (more than 1,000 million cubic meters of water a year is proposed to be delivered to Botswana, Malawi, Zambia, and Zimbabwe).
• Environmental restoration of the Zambezi Delta and improved fisheries production will be achieved, through the systematic introduction of basin-wide environmental flows in the delta.
• The contributions of tourism and mining to GDP will increase, through integrated, sustainable development.
• Fisheries production will be enhanced, through improved management of water resources.

In the lead-up to COP21 (or shortly thereafter), the design framework for the Zambezi Water Information Management System and a consultative framework for development of the strategic plan for the Zambezi River Basin will be developed.

Within three years of COP21, it is expected that the following outcomes will have been achieved:

• The Zambezi Water Information Management System will be operational, allowing the exchange of data among the eight riparian states.
• A strategic plan will be guiding investments by the riparian states.
• Feasibility studies will have been conducted, financing secured, and construction launched on strategic investments.

Climate-Related Benefits

The climate-related benefits from the development of information management systems and tools, along with the strategic plan, are expected to be substantial. Activities will provide a context for assessing climate resilience and introducing appropriate mitigation and adaptation measures toward more resilient, low-carbon growth trajectories.

The development of low-carbon hydropower resources in the Zambezi River Basin will help balance the regional power mix and provide for low-carbon development and clean energy options. Development of these hydropower resources within the context of the strategic plan will provide a series of climate-resilient investment options; improve adaptation measures related to disaster preparedness and enhanced economic and social resilience; and introduce mitigation measures relating to climate-smart agriculture to improve food security.

Financing Plan

Table 5.6 describes the financing plan.
The Zambezi River Basin Program is guided by member states within the basin through the ZAMCOM Technical Committee, composed of senior officials and the ZAMCOM Secretariat. The committee provides the reference point for support from international cooperating partners (ICPs). A consultative forum of ICPs has been established in accordance with the agreed principles of the SADC framework. The Zambezi-ICP Partnership (ZICP) is a strategic advisory body to the ZAMCOM Secretariat that acts as an interface for policy and technical dialogue between the ZAMCOM organs and the ICPs. ZICP has a range of tasks. One of them is to serve as a resource mobilization mechanism by sharing information on funding gaps and providing a forum for open dialogue, networking, and confidence building, in order to create a shared understanding by the ZAMCOM Secretariat, the ICPs, and other stakeholders on strategic issues related to implementation of the Zambezi Strategic Plan.

Active partnerships include the multi-donor trust fund for Cooperation in International Waters in Africa (CIWA), hosted by the World Bank, and bilateral partnerships with AfDB, DANIDA, DFID, GIZ, and SIDA, among others.

### TABLE 5.6 Support to the Zambezi River Basin Program: Resource Mobilization Plan

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount ($ million)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic sources</td>
<td>30</td>
<td>Based on 5 percent of IDA pipeline FY15–18</td>
</tr>
<tr>
<td>IDA</td>
<td>120</td>
<td>Water sector support to riparian states</td>
</tr>
<tr>
<td>Private sector</td>
<td>225</td>
<td>20 percent potential participation in large hydropower projects</td>
</tr>
<tr>
<td>Climate finance (GCF, GEF, CIF, and so forth)</td>
<td>612</td>
<td>GEF ($12 million) and GCF ($600 million) (both figures to be confirmed)</td>
</tr>
<tr>
<td>Other development finance (bilateral, multilateral)</td>
<td>130</td>
<td>Based on commitments within the context of the Zambezi River Basin Program</td>
</tr>
<tr>
<td>To be determined</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total fast track (resources raised by 2020)</strong></td>
<td><strong>1,117</strong></td>
<td>Includes community investment projects that have been informed by the Zambezi Strategic Plan, followed by advancement of investment preparation, and development of integrated information management system</td>
</tr>
<tr>
<td><strong>Longer term (additional resources raised by 2024)</strong></td>
<td><strong>3,600</strong></td>
<td>Provisional estimate of large infrastructure investment, to be confirmed based on feasibility study carried out in accordance with defined strategic plan</td>
</tr>
</tbody>
</table>

**Key Partners**

The Zambezi River Basin Program is guided by member states within the basin through the ZAMCOM Technical Committee, composed of senior officials and the ZAMCOM Secretariat. The committee provides the reference point for support from international cooperating partners (ICPs).
5.4 LAKE VICTORIA BASIN

The World Bank already supports the Lake Victoria Environment Management Program (LVEMP), which promotes various climate-resilient solutions to the environmental challenges in the Lake Victoria Basin. Through the design of a new phase of LVEMP, a climate-resilient development strategy will be drafted as the basis for a model multisector regional adaptation program in an area of critical environmental and social importance (table 5.7).

Sectoral Background and Development Challenges

The Lake Victoria Basin is a major population and poverty center in Africa and a transboundary natural asset of global importance. The area covers about a ninth of the land area of the East African Community but is home to about a third of its population below the poverty line.

The lake supports the world’s largest freshwater fishery, with a total annual landed catch value estimated at about $500 million in revenues, about half of which are export revenues. The establishment of the Nile perch fishery in the 1980s and 1990s provided a resource boom that drew in poor and disadvantaged people from neighboring countries. The fishery provides livelihood for 3 million people. Large rural populations are also dependent on the degraded lands in the upper basin, particularly in Burundi, Rwanda, and the Kenya highlands.

The waters of the lake and its catchment area provide 90 percent of Uganda’s hydropower; most of the hydropower for Burundi and Rwanda; and the water supply to major urban centers, including Kampala, Kigali, Mwanza and Kisumu.
The basin is also of biological importance. The largest African Great Lakes—Victoria, Tanganyika, and Malawi—are unique in the number of endemic vertebrate species they support. The Afro-montane forests of the highlands on both sides of the basin support some of the most diverse terrestrial habitats in the world. Protected areas cover 25 percent of the basin's land area and include some of the most iconic parks in Africa, including Serengeti and Virungas.

The Lake Victoria Basin is also a global example of environmental degradation. Introduction of the Nile perch was associated with the mass extinction

<table>
<thead>
<tr>
<th>TABLE 5.7 Support to the Lake Victoria Basin Program: At-a-Glance Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activities</strong></td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>Develop the Lake Victoria Basin climate-resilient development strategy</td>
</tr>
<tr>
<td>Support sustainable land and water management, including climate-smart agriculture and sustainable rural energy systems</td>
</tr>
<tr>
<td>Protect the ecological infrastructure, including riparian buffer zones, wetlands, forests, water towers, national parks, and fish nursery grounds, and monitor climate-related processes affecting the lake's ecology (for example, water hyacinths and water quality)</td>
</tr>
<tr>
<td>Promote resource-efficient production systems and green and resilient livelihoods with the private sector</td>
</tr>
<tr>
<td>Improve hydro-met services and strengthen infrastructure resilience, including maritime safety, lake transport infrastructure, and urban storm water management</td>
</tr>
<tr>
<td>Adoption of a formal climate-resilience policy document and a financing roadmap by the Sectoral Council of Ministers for the Lake Victoria Basin</td>
</tr>
<tr>
<td>Development and adoption of a basin model and monitoring and evaluation system to guide watershed investments</td>
</tr>
<tr>
<td>Implementation of systematic watershed management plans by at least three countries</td>
</tr>
<tr>
<td>Creation of a database of key natural assets, including environmental and livelihood services</td>
</tr>
<tr>
<td>Creation of a monitoring system of real-time water quality and water hyacinths</td>
</tr>
<tr>
<td>Inducement of at least $200 million in private sector investments in resource-efficient production and green supply chains</td>
</tr>
<tr>
<td>Improvement of hydro-met forecasting in at least three countries</td>
</tr>
<tr>
<td>Establishment of an infrastructure resilience inventory</td>
</tr>
<tr>
<td>At least $500 million of climate-resilience investments made, targeting at least 1 million beneficiaries of sustainable land management and diversified livelihoods in rural areas</td>
</tr>
<tr>
<td>Significant reductions in nutrient loading to Lake Victoria</td>
</tr>
<tr>
<td>Rehabilitation of key ecological infrastructure in at least three countries</td>
</tr>
<tr>
<td>Improvement in resilient infrastructure and response systems to climate and ecological emergencies in at least four countries</td>
</tr>
<tr>
<td>Inducement of at least $400 million in private sector investments in resource-efficient production and green supply chains</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Main partners</strong></th>
<th><strong>Resource mobilization</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>East African Community, including all five constituent governments (Burundi, Kenya, Rwanda, Tanzania, and Uganda); Lake Victoria Basin Commission (LVBC) and Lake Victoria Fisheries Organization (LVFO); Nile Basin Initiative (NBI) and Nile Equatorial Lakes Subsidiary Action Program (NELSAP); DFID, KfW, and other bilateral development agencies; the Nordic Development Fund, the Pilot Program for Climate Resilience, and Cooperation for International Waters in Africa (CIWA); private sector</td>
<td>Fast track (by 2020)</td>
</tr>
<tr>
<td>$550 million</td>
<td>Longer term (additional funds by 2024)</td>
</tr>
<tr>
<td>$500 million</td>
<td></td>
</tr>
</tbody>
</table>

The basin is also of biological importance. The largest African Great Lakes—Victoria, Tanganyika, and Malawi—are unique in the number of endemic vertebrate species they support. The Afro-montane forests of the highlands on both sides of the basin support some of the most diverse terrestrial habitats in the world. Protected areas cover 25 percent of the basin's land area and include some of the most iconic parks in Africa, including Serengeti and Virungas.
of endemic native fish species; perch stocks themselves have now declined to probably less than half of their peak levels, as a result of increased fishing and other environmental stresses.

Environmental degradation within the basin poses increasingly broad threats to livelihoods and welfare. Loss of forest cover and erosion of soils has chronic impacts on land productivity; where gullies destroy land, property, and even lives, the impacts are acute. The flow of sediments and other pollutants into the basin’s rivers and ultimately the lake reduces the supply of potable water and causes algal blooms that are unpleasant for lakeshore communities and limit the tourism potential of the region.

One of the most striking indicators of poor ecological health is the rapid colonization of the lake by water hyacinth. Infestations of this invasive floating plant periodically block access to kilometers of lakeshore, preventing use of the lake for transport and fishing and posing serious health and safety risks to local inhabitants.

Initiatives to Address the Challenges and Enhance Resilience

The LVEMP program aims to reduce a range of environmental pressures on the Lake Victoria Basin and improve the welfare of its inhabitants. It supports increased climate resilience in a variety of ways.

LVEMP includes three main components. The first—strengthening institutional capacity for managing shared water and fisheries resources—builds the capacity of the regional, national, and local institutions responsible for coordination, research, management of resources, and enforcement of environmental standards in order to harmonize policy and regulatory standards and undertake ecosystem monitoring and applied research. It includes monitoring water quality and water hyacinth outbreaks and, in the long run, strengthening hydro-met information systems.

The second component—point source pollution control and prevention—focuses on the management of major urban pollution sources from sewage and industrial sources. Improved sanitation, wastewater management, and cleaning of urban drainage channels reduce flood impacts; programs that promote cleaner production by private industries are achieving considerable efficiencies in the use of water and energy resources. This component also includes navigation safety investments that help reduce a frequently fatal climate risk to users of the lake.

The third component—watershed management—is being implemented through community-driven investments in more sustainable land management, rehabilitation of key ecological infrastructure (particularly riparian buffer zones and wetlands), and diversification of sustainable livelihoods. These interventions yield more productive and resilient agriculture and livelihoods for people living within the particularly vulnerable catchments. Downstream they modulate hydrological flows and sedimentation (which increase flood and drought risk) and reduce the nutrient loading into the
lake (which affects fisheries, potable water supplies, and even [through water hyacinth infestation] access to the lake and the hydrological balance).

The current phase of the LVEMP was extended until the end of 2017 in order to allow for preparation of a follow-on investment phase to begin in FY18. In accordance with the Africa Climate Business Plan, the objective is to use this design period to strengthen the climate-resilience components of the next phase and develop an explicit climate resilience strategy for the Lake Victoria Basin as a basis for attracting additional funding. Key initiatives would include the following:

- Development of a Lake Victoria Basin climate-resilient development strategy for eventual adoption by the Sectoral Counsel of Ministers for the Lake Victoria Basin of the EAC. The strategy would be accompanied by a financing roadmap assessing external funding sources.
- Expansion and development of more systematic programs of sustainable land and water management based on erosion and sediment transport models and watershed monitoring and evaluation systems for improved targeting of available resources and prediction and verification of environmental and livelihood impacts to encourage additional investment. In addition to climate-smart agriculture, potential interventions would include sustainable rural energy systems to reduce pressure on forests from unsustainable wood fuels. The LVEMP has been piloting the introduction of biodigesters in cattle-rearing areas as an incentive to increase stall feeding and reduce pressure on forests. Taking this intervention to scale depends on improving its financial returns by reducing installation costs and finding ways to commercialize excess gas. Rwanda provides an example of licensed production of wood fuels from wood lots that could revolutionize charcoal production elsewhere.
- Protection of ecological infrastructure, including riparian buffer zones, wetlands, forests, water towers, national parks, and fish nursery grounds. This effort would start with a comprehensive assessment of ecological assets within the basin, their environmental and livelihood functions, and the pressures they face. It would include development of remote sensing–based monitoring systems for water quality and water hyacinth spread, building on pilot work conducted with the European Space Agency. These ecological processes are influenced by climate factors and may eventually be amenable to hydro-met-linked forecasting rather than just monitoring after the fact.
- Partnering with the private sector to promote green industries. This effort would involve expansion of existing program in resource-efficient production, coupled with new initiatives to promote green supply chains and develop nature-based enterprises in support of watershed management and resilient livelihoods. Given the scale of the sustainability challenges within the basin, it is critical to actively engage the private sector. So far the resource-efficient production project under LVEMP has leveraged about $30 of private sector investment for every $1 of project expenditure.
• Enhancement of hydro-met knowledge and forecasting services for improved disaster response and infrastructure resilience. This effort would include the modelling of potential climate-induced impacts on lake levels to identify climate threats to coastal infrastructure (including new port infrastructure under the Lake Victoria Transport Project) and assess the vulnerabilities of urban and transport infrastructure to flooding. Navigation safety programs are expected to be expanded under the transport project but will require parallel investments in weather forecasting to improve effectiveness.

**Climate-Related Benefits**

Recent climate change and extremes have had significant impacts on agricultural production within the basin and caused periodic flooding in numerous areas within it. There is considerable uncertainty over the impacts of future climate change within, but the importance of the balance between direct evaporation and precipitation over the lake and rapid water-level changes in the past suggests they could be severe. Because the lake is large enough to act as a regional climate driver, significant impacts to it could have effects throughout large areas of central Africa and the Sahel.

The effects of climate change and environmental stresses are mutually reinforcing. Land degradation and loss of natural habitats increase the impacts of rainfall extremes both upstream (through reduced retention of soil moisture and nutrients) and downstream (through siltation, flooding, and gully formation). The effects of climate change on fisheries are likely to be exacerbated by overfishing and pollution, through stresses on key nursery grounds and changes in the thermocline and nutrient cycles. Inadequate urban waste management increases the risk of and from flooding, through storm drainage channels blocked with refuse and the health risks from polluted floodwaters.

The climate resilience development strategy will provide a model for integrated rural and urban resilience, achieving the following:

• improving the land management and ecological infrastructure of key watersheds and their climate-buffering ability
• enhancing the health and resilience of important fisheries
• promoting the diversification of rural livelihoods
• improving the design of port and lakeshore infrastructure
• increasing the efficiency of use of climate-affected water and energy resources by local industries
• reducing key risk factors to urban flooding
• strengthening emergency response.

**Expected Outcomes**

The climate-resilient development strategy is expected to substantially increase the volume and coordination of adaptation investments within the basin. Rural resilience interventions could reach 1 million beneficiaries
by 2025, significantly reducing the nutrient loads reaching Lake Victoria and improving a range of key natural assets.

Better information and monitoring systems would allow millions of basin inhabitants to adapt better to climate-related events, including storms and floods as well as induced water quality and water hyacinth events. Assessment of infrastructure vulnerabilities could safeguard new port investments and lead to significant improvements in flood management (for example, improvement and maintenance of storm-water drainage) in urban centers with several million inhabitants.

**Financing Plan**

Table 5.8 describes the financing plan.

**Key Partners**

The World Bank will deploy IDA resources through the regional LVEMP program and related operations. Trust fund resources (such as funds from the Nordic Development Fund and CIWA) will augment this support. Pilot Program for Climate Resilience (PPCR) investment planning processes are supporting efforts in Rwanda and Uganda.

The private sector is considered a key source of finance (LVEMP has already leveraged levels of private finance that are comparable to IDA investment).

**TABLE 5.8 Support to Lake Victoria Basin Program: Resource Mobilization Plan**

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount ($ million)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic sources</td>
<td>50</td>
<td>Co-financing of IDA credits</td>
</tr>
<tr>
<td>IDA</td>
<td>200</td>
<td>Primarily from the next phase of LVEMP (deliverable in FY18), but additional contributions may be available from the Lake Victoria Transport Project and other rural and urban investment projects</td>
</tr>
<tr>
<td>Private sector</td>
<td>200</td>
<td>Relatively modest expenditure on technical assistance on resource-efficient and cleaner production has already leveraged nearly $100 million in private sector investment under the existing LVEMP program; private sector financing is expected to expand significantly as a wider range of industries and interventions is included in the program</td>
</tr>
<tr>
<td>Climate finance (GCF, GEF, CIF, and so forth)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Other development finance (bilaterals, multilaterals)</td>
<td>100</td>
<td>AfDB, DFID, KfW, USAID, and other bilateral institutions</td>
</tr>
<tr>
<td><strong>Total fast track</strong> (resources raised by 2020)</td>
<td>550</td>
<td></td>
</tr>
<tr>
<td><strong>Longer term</strong> (additional resources raised by 2024)</td>
<td>500</td>
<td></td>
</tr>
</tbody>
</table>
Experience suggests that private sector investments in resource efficiency and more resilient livelihoods will grow to at least $300 million by 2025.

The East African Community, including member governments and technical institutions (particularly the Lake Victoria Basin Commission), is a key counterpart. The Nile Basin Initiative and the Nile Equatorial Lakes Subsidiary Action Program (NELSAP) will also be engaged in developing strategies, models, and basin information systems.

A range of development partners currently fund or are interested in supporting related activities within the basin or the African Great Lakes more broadly. They include AfDB, DFID, KfW, SIDA, and the US government. These potential sources of funding, as well as traditional and emerging sources of climate finance, including the GEF and the GCF, will be actively pursued.
The basin is also of biological importance. The largest African Great Lakes—Victoria, Tanganyika, and Malawi—are unique in the number of endemic vertebrate species they support. The Afro-montane forests of the highlands on both sides of the basin support some of the most diverse terrestrial habitats in the world. Protected areas cover 25 percent of the basin's land area and include some of the most iconic parks in Africa, including Serengeti and Virungas.

The Lake Victoria Basin is also a global example of environmental degradation. Introduction of the Nile perch was associated with the mass extinction of native species. This event highlighted the importance of managing the basin's ecosystems to maintain biodiversity and support sustainable development.
of endemic native fish species; perch stocks themselves have now declined to probably less than half of their peak levels, as a result of increased fishing and other environmental stresses.

Environmental degradation within the basin poses increasingly broad threats to livelihoods and welfare. Loss of forest cover and erosion of soils has chronic impacts on land productivity; where gullies destroy land, property, and even lives, the impacts are acute. The flow of sediments and other pollutants into the basin’s rivers and ultimately the lake reduces the supply of potable water and causes algal blooms that are unpleasant for lakeshore communities and limit the tourism potential of the region.

One of the most striking indicators of poor ecological health is the rapid colonization of the lake by water hyacinth. Infestations of this invasive floating plant periodically block access to kilometers of lakeshore, preventing use of the lake for transport and fishing and posing serious health and safety risks to local inhabitants.

**Initiatives to Address the Challenges and Enhance Resilience**

The LVEMP program aims to reduce a range of environmental pressures on the Lake Victoria Basin and improve the welfare of its inhabitants. It supports increased climate resilience in a variety of ways.

LVEMP includes three main components. The first—strengthening institutional capacity for managing shared water and fisheries resources—builds the capacity of the regional, national, and local institutions responsible for coordination, research, management of resources, and enforcement of environmental standards in order to harmonize policy and regulatory standards and undertake ecosystem monitoring and applied research. It includes monitoring water quality and water hyacinth outbreaks and, in the long run, strengthening hydro-met information systems.

The second component—point source pollution control and prevention—focuses on the management of major urban pollution sources from sewage and industrial sources. Improved sanitation, wastewater management, and cleaning of urban drainage channels reduce flood impacts; programs that promote cleaner production by private industries are achieving considerable efficiencies in the use of water and energy resources. This component also includes navigation safety investments that help reduce a frequently fatal climate risk to users of the lake.

The third component—watershed management—is being implemented through community-driven investments in more sustainable land management, rehabilitation of key ecological infrastructure (particularly riparian buffer zones and wetlands), and diversification of sustainable livelihoods. These interventions yield more productive and resilient agriculture and livelihoods for people living within the particularly vulnerable catchments. Downstream they modulate hydrological flows and sedimentation (which increase flood and drought risk) and reduce the nutrient loading into the
Accelerating Climate-Resilient and Low-Carbon Development

Lake (which affects fisheries, potable water supplies, and even [through water hyacinth infestation] access to the lake and the hydrological balance).

The current phase of the LVEMP was extended until the end of 2017 in order to allow for preparation of a follow-on investment phase to begin in FY18. In accordance with the Africa Climate Business Plan, the objective is to use this design period to strengthen the climate-resilience components of the next phase and develop an explicit climate resilience strategy for the Lake Victoria Basin as a basis for attracting additional funding. Key initiatives would include the following:

- Development of a Lake Victoria Basin climate-resilient development strategy for eventual adoption by the Sectoral Counsel of Ministers for the Lake Victoria Basin of the EAC. The strategy would be accompanied by a financing roadmap assessing external funding sources.
- Expansion and development of more systematic programs of sustainable land and water management based on erosion and sediment transport models and watershed monitoring and evaluation systems for improved targeting of available resources and prediction and verification of environmental and livelihood impacts to encourage additional investment. In addition to climate-smart agriculture, potential interventions would include sustainable rural energy systems to reduce pressure on forests from unsustainable wood fuels. The LVEMP has been piloting the introduction of biodigesters in cattle-rearing areas as an incentive to increase stall feeding and reduce pressure on forests. Taking this intervention to scale depends on improving its financial returns by reducing installation costs and finding ways to commercialize excess gas. Rwanda provides an example of licensed production of wood fuels from wood lots that could revolutionize charcoal production elsewhere.
- Protection of ecological infrastructure, including riparian buffer zones, wetlands, forests, water towers, national parks, and fish nursery grounds. This effort would start with a comprehensive assessment of ecological assets within the basin, their environmental and livelihood functions, and the pressures they face. It would include development of remote sensing–based monitoring systems for water quality and water hyacinth spread, building on pilot work conducted with the European Space Agency. These ecological processes are influenced by climate factors and may eventually be amenable to hydro-met-linked forecasting rather than just monitoring after the fact.
- Partnering with the private sector to promote green industries. This effort would involve expansion of existing program in resource-efficient production, coupled with new initiatives to promote green supply chains and develop nature-based enterprises in support of watershed management and resilient livelihoods. Given the scale of the sustainability challenges within the basin, it is critical to actively engage the private sector. So far the resource-efficient production project under LVEMP has leveraged about $30 of private sector investment for every $1 of project expenditure.
• Enhancement of hydro-met knowledge and forecasting services for improved disaster response and infrastructure resilience. This effort would include the modelling of potential climate-induced impacts on lake levels to identify climate threats to coastal infrastructure (including new port infrastructure under the Lake Victoria Transport Project) and assess the vulnerabilities of urban and transport infrastructure to flooding. Navigation safety programs are expected to be expanded under the transport project but will require parallel investments in weather forecasting to improve effectiveness.

**Climate-Related Benefits**

Recent climate change and extremes have had significant impacts on agricultural production within the basin and caused periodic flooding in numerous areas within it. There is considerable uncertainty over the impacts of future climate change within, but the importance of the balance between direct evaporation and precipitation over the lake and rapid water-level changes in the past suggests they could be severe. Because the lake is large enough to act as a regional climate driver, significant impacts to it could have effects throughout large areas of central Africa and the Sahel.

The effects of climate change and environmental stresses are mutually reinforcing. Land degradation and loss of natural habitats increase the impacts of rainfall extremes both upstream (through reduced retention of soil moisture and nutrients) and downstream (through siltation, flooding, and gully formation). The effects of climate change on fisheries are likely to be exacerbated by overfishing and pollution, through stresses on key nursery grounds and changes in the thermocline and nutrient cycles. Inadequate urban waste management increases the risk of and from flooding, through storm drainage channels blocked with refuse and the health risks from polluted floodwaters.

The climate resilience development strategy will provide a model for integrated rural and urban resilience, achieving the following:

• improving the land management and ecological infrastructure of key watersheds and their climate-buffering ability
• enhancing the health and resilience of important fisheries
• promoting the diversification of rural livelihoods
• improving the design of port and lakeshore infrastructure
• increasing the efficiency of use of climate-affected water and energy resources by local industries
• reducing key risk factors to urban flooding
• strengthening emergency response.

**Expected Outcomes**

The climate-resilient development strategy is expected to substantially increase the volume and coordination of adaptation investments within the basin. Rural resilience interventions could reach 1 million beneficiaries
by 2025, significantly reducing the nutrient loads reaching Lake Victoria and improving a range of key natural assets.

Better information and monitoring systems would allow millions of basin inhabitants to adapt better to climate-related events, including storms and floods as well as induced water quality and water hyacinth events. Assessment of infrastructure vulnerabilities could safeguard new port investments and lead to significant improvements in flood management (for example, improvement and maintenance of storm-water drainage) in urban centers with several million inhabitants.

**Financing Plan**

Table 5.8 describes the financing plan.

**Key Partners**

The World Bank will deploy IDA resources through the regional LVEMP program and related operations. Trust fund resources (such as funds from the Nordic Development Fund and CIWA) will augment this support. Pilot Program for Climate Resilience (PPCR) investment planning processes are supporting efforts in Rwanda and Uganda.

The private sector is considered a key source of finance (LVEMP has already leveraged levels of private finance that are comparable to IDA investment).

**TABLE 5.8 Support to Lake Victoria Basin Program: Resource Mobilization Plan**

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount ($ million)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic sources</td>
<td>50</td>
<td>Co-financing of IDA credits</td>
</tr>
<tr>
<td>IDA</td>
<td>200</td>
<td>Primarily from the next phase of LVEMP (deliverable in FY18), but additional contributions may be available from the Lake Victoria Transport Project and other rural and urban investment projects</td>
</tr>
<tr>
<td>Private sector</td>
<td>200</td>
<td>Relatively modest expenditure on technical assistance on resource-efficient and cleaner production has already leveraged nearly $100 million in private sector investment under the existing LVMEP program; private sector financing is expected to expand significantly as a wider range of industries and interventions is included in the program</td>
</tr>
<tr>
<td>Climate finance (GCF, GEF, CIF, and so forth)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Other development finance</td>
<td>100</td>
<td>AfDB, DFID, KfW, USAID, and other bilateral institutions</td>
</tr>
<tr>
<td><strong>Total fast track</strong> (resources raised by 2020)</td>
<td><strong>550</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Longer term</strong> (additional resources raised by 2024)</td>
<td><strong>500</strong></td>
<td></td>
</tr>
</tbody>
</table>
Experience suggests that private sector investments in resource efficiency and more resilient livelihoods will grow to at least $300 million by 2025.

The East African Community, including member governments and technical institutions (particularly the Lake Victoria Basin Commission), is a key counterpart. The Nile Basin Initiative and the Nile Equatorial Lakes Subsidiary Action Program (NELSAP) will also be engaged in developing strategies, models, and basin information systems.

A range of development partners currently fund or are interested in supporting related activities within the basin or the African Great Lakes more broadly. They include AfDB, DFID, KfW, SIDA, and the US government. These potential sources of funding, as well as traditional and emerging sources of climate finance, including the GEF and the GCF, will be actively pursued.