

BRIEFING NOTE 3

Building climate resilience

Climate change is a critical issue facing the countries of the Nile Basin. While individual weather events are difficult to attribute to climate change, their sum is already having adverse effects on socioeconomic conditions across the region. While climate change was not an overt focus of the Nile Basin Initiative's mandate when it was launched in 1999, it has emerged as a key challenge for countries of the Nile to take seriously.

The Nile Basin region is highly sensitive to a changing climate. Through the regional work of the NBI:

More and better data is available for modelling climate trends and impacts, and for forecasting weather events.

Studies and assessments have helped to prioritize regionally significant projects that offer best bet responses for building resilience and adaptive capacity.

Millions of people have been given mechanisms for coping with climate change impacts, through regional projects on integrated water resource management, flood preparation and early warning systems.

Climate change is being mitigated, through low-carbon power generation and increased efficiency of power transmission systems.

All NBI facilitated projects carefully consider climate change, which now forms one of the four key strategic directions that guide the NBI's work.

Why is climate change important to the Nile Basin?

The Nile Basin is characterized by high climatic diversity and varied distribution of its water resources: the Basin includes moist tropical forests and arid areas. There are periods of intense rainfall and high levels of evaporation through aridity, and only 4% of the total rainfall reaches the lower Nile. The region's key economic sectors include rain-fed and irrigated agriculture, livestock production and hydropower generation – all of which are highly sensitive to climate change impacts like increasing droughts, floods and irregular rainfall patterns. For the people of the Nile Basin this brings risks that affect their livelihoods and food security as well as access to and availability of electricity.

How is the climate affecting the region?

Stretching over 6,700 km, the Nile River flows through a rich diversity of landscapes and ecological regions, from the mountainous landscapes of the Blue Nile and the Victoria Basin forest-savanna mosaic of the White Nile, to the Nile Delta's flooded savanna.

The IPCC's 5th Assessment Report describes observed trends on temperature and rainfall in Africa:

- **Temperatures** – have increased by 0.5°C or more during the last 50-100 years over most parts of Africa, with minimum temperatures warming more rapidly than maximum temperatures.
- **Rainfall** – where there is sufficient data it suggests very likely decreases in annual precipitation along with irregular rainfall patterns.

The changes are likely to bring a range of impacts, including:

- **Variability and unpredictability of rainfall** – farmers cannot plan effectively and are more likely to have water stressed or failed crops, or run out of fodder for livestock. Economically and biologically important wetland ecosystems are likely to be degraded.
- **Hotter and longer dry seasons** – traditional crops suffer, reservoirs lose water through evaporation, downstream water users are at higher risk from water shortages and droughts, and increases in lake water temperatures negatively impact water quality and fishing.

- **More frequent and severe rainstorms** – could lead to increased storm damage to and siltation of hydropower infrastructure, reducing current power generation capacity and influencing future power development decisions.
- **Rising sea levels** - some areas like the Nile Delta are vulnerable to flooding and, consequently, loss of agricultural land and threats to coastal cities. A one meter sea-level rise could cause a loss of 4500 km² farmland, affect freshwater supplies, and displace over six million people.

This all results in significant economic impacts – in Kenya alone between 1997 and 2000 there were climate related losses of US\$5 billion, or more than 14% of GDP. There are real risks to farming, fisheries, and livelihoods which could exacerbate cross-border and rural-urban migration problems.

The Nile Basin Initiative (NBI) offers significant support to building resilience to these climate shocks and stresses across the region, both inherently through its portfolio of activities and through targeted strategy.

Climate change impacts manifest themselves in both shocks (rapid onset, like floods) and stresses (slow onset, like droughts and changing rainfall patterns).



How has Nile cooperation contributed to the response?

Nile Basin Initiative activities contribute to building resilience to climate change in the Nile Basin in a number of interlinked ways. Understanding variability in river flows is one of the first steps in understanding climate change impacts and planning how to respond to them. Developing this understanding and getting it into use has been at the heart of the NBI's technical work.



Bridging the knowledge and data gap

The NBI commissioned studies to better understand the use and management of the Nile resource, as well as the vulnerability to climate change of its various member countries. Notable among these are:

- the comprehensive regional assessments (CRAs) carried out in the Eastern Nile region (ENTRO);
- the multi-sector investment opportunities assessment (MSIOA) carried out in the Nile Equatorial Lakes region (NELSAP);
- the several river-basin monographs prepared by NELSAP; and
- the Basin-wide climate-change assessments carried out by the Water Resources Planning and Management (WRPM) Project.

These studies have enabled the preparation of best practice guides (e.g. on efficient water use for agriculture and watershed management) which have been widely disseminated to users in the Nile region.

The NBI's web-based Nile Information System (Nile-IS) allows users to access information on water resource,

socioeconomic and vulnerability assessments, as well as river flow and meteorological data. This information can be used for modelling and forecasting future trends in the Nile River's levels and flows, allowing for better prepared and informed responses to droughts and floods.

Such knowledge and data sets are of immense value to climate modelling and to the countries as they work out their own responses to climate change.

For example, ENTRO facilitated the Flood Preparedness and Early Warning (FPEW) project. As a result, over 2 million people in the eastern Nile region now suffer less devastation to their lives and property from floods. And a landmark strategic Basin-wide water resources monitoring network is under design, which will link up information to help prepare for, and respond to, weather events across the basin – an important measure for responding to the longer trends of climate change impacts.

How has Nile cooperation contributed to the response? continued

A photograph of a woman in a green and blue shawl carrying a large woven basket on her head, walking through a grassy field. Other people are visible in the background, some standing and some walking. The scene is outdoors with a clear sky.

“The availability of hydrological information and modelling data on climate change simulations has raised the awareness of policy makers of the adverse effects of climate change.”

The NBI's dialogue processes have also been valuable to enable national climate resilience planning on the basis of regional knowledge.

Strengthening basin planning tools

The NBI and its partners have developed tools to improve basin planning. For example, the world-class, Basin-wide planning tool – the Nile Basin Decision Support System (DSS). The DSS comprises an information management system, a regional river basin modelling system, and a suite of analytical tools to support multi-objective analysis of investment alternatives. It is already accessible and is in use to help the countries better understand how the availability of water might change in the future, so that they may plan their development accordingly.

The NBI is also developing a climate specific portal and other tools, to help the countries better understand the range of possible changes and impacts they may face with future climate variability.

Offering a mechanism for transboundary actions

To be effective and ensure a sustainable outcome, a response to climate change requires transboundary action: interconnecting power grids, hydrometeorological monitoring networks, dams and reservoirs, and

catchment-level river basin management. The NBI has provided an independent and regional institution for countries to work through transboundary issues that support their response to climate change. Regional projects taking forward these kind of actions are already being implemented.

Promoting watershed management

The NBI promotes watershed management activities such as tree planting, agroforestry, streambank rehabilitation, soil conservation, and runoff and drainage management. These offer protection of both land and water resources, building increased resilience to climate-related events such as droughts, floods and landslides. They also reduce deforestation, store carbon and contribute to climate change mitigation. Watershed management also takes steps to improve the resilience of wetland ecosystems.

One of the NBI's early projects, the Nile Transboundary Environmental Action Project, implemented community microprojects located along transboundary river courses, demonstrating best practices in watershed management and real local resilience benefits. This has informed development and implementation of larger watershed management projects prepared by both ENTRO and NELSAP.



Expanding the region's water and power infrastructure for adaptation and mitigation

Through both ENTRO and NELSAP, the NBI has supported the identification, preparation, and implementation of investment projects that are aiming to improve the region's adaptive capacity to climate change impacts.

Projects are being designed to help the Nile Basin countries better cope with climate variability. Projects are already helping countries to predict and manage responses to floods and droughts by planning and preparing investments in water storage infrastructure, to help them better cope with future climate variability. Watershed management and irrigation projects are working to ensure there is adequate water for farming and for hydro-power when it is needed.

An example is the Kagera river basin management project. It supports the installation and refurbishment of hydrology centers across the Kagera Basin to improve reporting of hydrological data. The improved data availability helps to better support weather forecasting with information for agricultural planning, and drought and flood preparedness. The project has also helped the countries to rank and select water storage projects, and helps the countries take the prioritised options forward.

Projects that are generating additional power (such as the Rusumo Falls hydroelectricity project) and improving connectivity of electricity supplies (such as the Ethiopia-Sudan interconnection project) mean that regional power supplies are less at risk from localized weather events that might for example reduce the availability of hydropower.

Projects are also working to mitigate climate change. As a low-carbon source of energy generation and an alternative to reliance on woodfuel and charcoal, hydropower expansion is being invested in. Projects aim to produce and trade power more efficiently, and to make more efficient use of natural resources. This reduces the reliance on more costly, high-carbon energy sources. In the coming decade, 70% of the regional interconnected grid is expected to be based on hydropower, averting emissions of two million tons of CO₂ in the Nile equatorial lakes region alone.

A strategic response on climate

Behind all of this work is the NBI's strategic direction on climate change, which has evolved quickly. NBI has made real progress in how it considers climate change, advancing from early studies such as the CRAs which considered climate change in a general and non-specific way, to more detailed and strategic consideration of climate change adaptation, resilience and mitigation across all of its work. In dealing with immediate problems, the NBI has also built the foundation for integrating future climate change issues into all its work.

ENTRO now has a climate change strategy, and an action plan for climate-proofing all its projects. NELSAP has developed criteria for mainstreaming climate adaptation in all its investment projects. And the NBI as a whole has climate at the heart of its approach to achieving its goals: as well as having a climate change strategy (which focuses on water resource management for adaptation and low carbon growth strategies), climate change adaptation and mitigation is the final of four 'key strategic directions' in the Nile Basin Sustainability Framework which guides all NBI work.

What are the key messages?

- Climate change places added pressures on a region already facing real challenges to its development.
- The Nile Basin's key economic sectors include rain-fed and irrigated agriculture, livestock production and hydropower generation – and all of these are highly sensitive to and threatened by changing climate.
- Understanding variability of weather and river flows is at the heart of the NBI's technical work and this directly supports resilience building.
- NBI studies have helped countries analyze strategic options for better coping with variability in river flows, and joint investment projects have a real role to play in adaptation.
- Planning and information tools such as the DSS, the Nile-IS and hydro-meteorological monitoring networks are practical applications that have increased the capacity of land use planning.
- Improved data availability has helped to better support weather forecasting with information key to agricultural planning, drought and flood preparedness.
- Integrated Water Resource Management has proven to be an effective adaptation mechanism to build resilience to climate change.
- Investments in the power sector are contributing to the mitigation of climate change, exploring low-carbon energy generation, increasing efficiency of transmission systems and reducing energy waste.
- The NBI is strategically working to consider climate change and build knowledge on climate vulnerabilities, as one of the key ways to ensure that management and development of the Nile resource brings sustainable and equitable benefits, whatever the future climate is.

This note forms one of a series of briefing notes prepared to mark the completion of the Nile Basin Trust Fund (NBTF). The Nile Basin Trust Fund was opened in 2003 at the request of Ministers responsible for water affairs in the Nile countries, and was administered by the World Bank on behalf of ten donors.

The series of briefing notes highlight the achievements of the Nile Program, a set of projects and sub-programs that have been supported by Nile riparian countries, the Nile Basin Trust Fund and other donors in parallel to the NBTF, largely implemented by the Nile Basin Initiative (NBI).

NBI Member States



Nile Basin Trust Fund Partners

Administered by: **WORLD BANK GROUP**

Co-financed by:



For more information



Nile Basin Initiative Secretariat
P.O. Box 192 Entebbe, Uganda
Tel. +256 414 321 424
Email nbisec@nilebasin.org
Web www.nilebasin.org
Facebook Nile Basin Initiative
Twitter @nbiweb

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