



WATER • INFRASTRUCTURE • ECOSYSTEMS

WISE-UP to climate

Water Infrastructure Solutions from Ecosystem Services
underpinning Climate Resilient Policies and Programmes



‘**WISE-UP to climate**’ is a project that demonstrates natural infrastructure as a ‘nature-based solution’ for climate change adaptation and sustainable development. The project will develop knowledge on how to use combinations of built water infrastructure (eg. dams, levees, irrigation channels) together with natural infrastructure (eg. wetlands, floodplains, watersheds) for poverty reduction, water-energy-food security, biodiversity conservation, and climate resilience. WISE-UP will demonstrate the advantages of combined built and natural infrastructure approaches using dialogue with decision-makers to agree acceptable trade-offs. WISE-UP will run over a four-year period and link ecosystem services more directly into water infrastructure development in the Tana (Kenya) and Volta (Ghana-Burkina Faso) river basins.

Project Components

-  **Project Coordination** – led by IUCN & **Basin leads** – ACCESS in the Tana Basin (Kenya) / Water Research Institute (WRI-CSIR) in the Volta Basin (Ghana/Burkina Faso), working with the Volta Basin Authority
-  **Ecosystem infrastructure investment analysis** – led by IWMI, BC3 and University of Manchester
 -  **Eco-hydrological functions** of infrastructure in the context of sustainable adaptation (IWMI)
 -  **Economic valuation** and benefits of natural infrastructure (BC3)
 -  **System impact modelling** and trade-off analysis (University of Manchester)
-  **Political economy** of water infrastructure decisions and governance – led by ODI
-  **Action learning** with stakeholders to strengthen applications of evidence and tools in policy making, infrastructure decisions and consensus building – led by IUCN
-  **Capacity Building & Communications** for integrating built and natural water infrastructure and sharing results – led by ACCESS/CSIR/IUCN

Climate change adaptation

Water security is vital for growth, poverty reduction and climate change adaptation – issues of highest priority on the policy agenda for many developing countries. Built water infrastructure is an asset to store and regulate water to support social and economic development and facilitate adaptation to climate change. Yet competing policy narratives argue that built water infrastructure can degrade ecosystem services that the poor rely on most.

Climate change will dramatically change the way that infrastructure is planned, financed and used in the future. Less water and more erratic rainfall present challenges for large water storage in terms of technical performance, the return on investment, and the sharing of benefits.

WISE-UP will support new policies and strategies for water infrastructure that will better and more coherently address and integrate policy goals for growth, poverty reduction and climate adaptation. The project will provide critically-needed knowledge and tools for managing the trade-offs between built infrastructure and the ecosystem services provided by natural infrastructure.



Combining built and natural infrastructure

Like built infrastructure, natural ecosystems also perform infrastructure-like functions. For example, rivers convey water from one location to another, some wetlands filter contaminated water, some mangroves protect shorelines from storm surges, floodplains store flood waters and lakes store large volumes of water for water supplies. Yet, they are not built infrastructure; this natural infrastructure has evolved independently of people, through natural processes.

Working with nature can optimise the performance and financial benefits of built infrastructure. Built infrastructure should be selected and designed in balance with nature as infrastructure performance depends not just on management practice and operational rules but also on ecosystem services. For example, dams benefit from forests that stabilize soils and hold back erosion upstream. Lakes and wetlands regulate flows and store water, thereby reducing volumes of water that must be stored in built reservoirs and hence cutting the cost of built water storage investments. Well-functioning natural infrastructure is necessary for built infrastructure to perform its functions better, to realise projected benefits and to secure returns on investment.

WISE-UP aims to develop knowledge on how to use mixed portfolios of built water infrastructure and natural infrastructure for poverty reduction, water-energy-food security, biodiversity conservation, and climate resilience. WISE-UP aims to demonstrate the advantages of using dialogue with decision-makers and stakeholders to identify water system trade-offs and balance investment decisions in order to meet multiple societal goals.

Project structure

Using the Tana and Volta as demonstration basins, the implementing partnership of WISE-UP brings together a multi-disciplinary team of expertise. Its structure is highly interlinked – progress and outputs rely on collaboration between partners.

Under the ecosystem infrastructure investment analysis, IWMI is exploring the eco-hydrological functions of built and natural infrastructure in the context of climate adaptation through a range of techniques, including modelling, ecosystem service mapping and the development of “benefit functions” linked to hydrological functions. BC3’s economic valuation work will assign monetary value to different system impacts and natural infrastructure investments. This information will facilitate analysis of the economic costs and benefits associated with infrastructure, management and climate shifts. The University of Manchester’s river basin impact modelling and trade-off analysis integrates IWMI and BC3’s outputs to generate the set of best available (i.e. most efficient and robust) combined built and natural infrastructure investment options for an uncertain future. Each combination of built and natural infrastructure provides a different balance of benefits which is then represented graphically for stakeholders to discuss.

PROJECT STRUCTURE



Future land use changes, population growth, irrigation expansion, planned infrastructure, and urban-rural demographic shifts to 2050 will be taken into account in this work.

The political economy research on decision logics and political drivers, complements the ecosystem infrastructure investment analysis by bringing a deeper understanding of why and how basin stakeholders make the investments decisions they do. This analysis allows the project to target the correct institutions and stakeholders (including brokers of information and networks of influence) that are key to more effective application of evidence and influence of change.

The basin leads, WRI-CSIR and ACCESS, work alongside the other partners to help ground truth the research. They develop in-country skills and capacities for sharing results, aiming to strengthen understanding and ownership of data and tools under WISE-UP.

Action learning

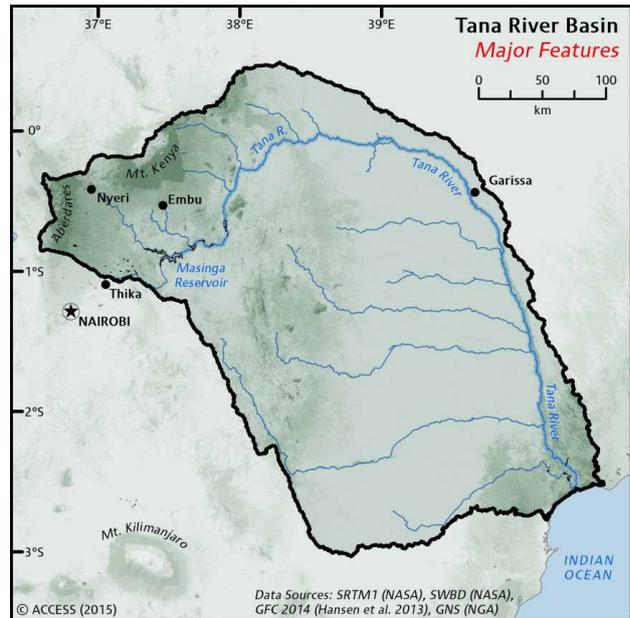
The Action Learning process, led by IUCN, engages basin stakeholders directly from the start putting them in the driver's seat to actively guide project research and direction. The process is designed to operate at the interface between the development of new scientific evidence and the identification of the political dynamics and economic drivers shaping decision making and policy. This is critical to better understand how to make information and innovative tools practical, useful and trusted – how to take science into policy circles and decision making processes. It helps us shape the future stages of research and field work, and allows WISE-UP to continually evaluate the relevance of its work.

WISE-UP to climate working with basin stakeholders

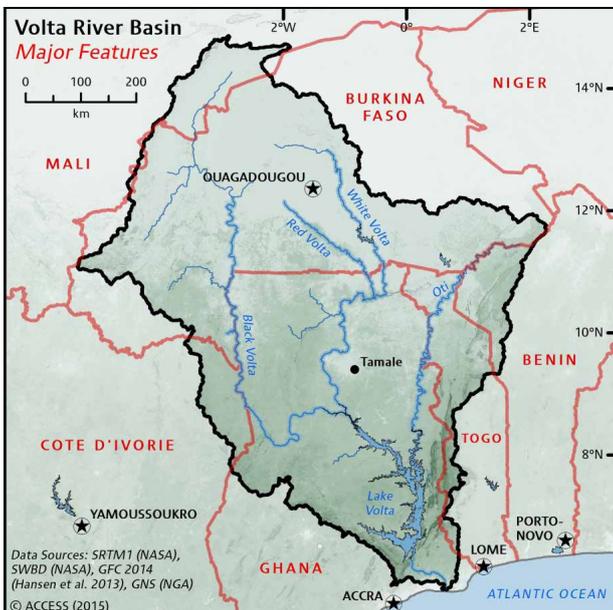
+ THE TANA

The Tana River, Kenya's longest river, flows for approximately 1000km draining a catchment of 126,026km². Growing competition amongst water users is projected to intensify with the development of new hydropower plants, climate variability, as well as increasing urban, agricultural, and ecosystem demands. The Tana River is the only river providing water to the lower delta carrying sediment and nutrients to support the health of beaches and marine parks, critical contributors to Kenya's national economy.

A critical challenge will be to adapt water management to climate change impacts while finding ways of equitably and efficiently balancing competing water demands. In the Tana River basin, long-term climate resilient and sustainable solutions satisfying all water users and water developers will need to be implemented in order to avert conflict, livelihood losses, ecosystem degradation and economic hardship. Results from WISE-UP will provide policymakers, water users and scientists with evidence of solutions to integrate built and natural infrastructure options into development plans to ensure climate-resilient water infrastructure development and manage the associated trade-offs.



Map of the Tana River Basin



Map of the Volta River Basin

+ THE VOLTA

The Volta River Basin in West Africa covers 417,000km² and is shared by six countries: Ghana, Burkina Faso, Mali, Côte d'Ivoire, Togo and Benin. Water resources in the basin are under stress, as a result of increasing demand due to high population growth, variability of rainfall and runoff, and uncoordinated water resources development. Flooding, water shortages and pollution, loss of biodiversity, waterborne diseases, and proliferation of aquatic weeds affect the region's poor disproportionately.

The critical water resource challenges in the basin can be addressed through better mechanisms for coordination amongst riparian States, through increased water storage for subsistence farmers, by reducing waterborne disease, and supporting biodiversity, and deriving maximum benefits from hydropower through existing and planned hydropower plants. WISE-UP in the Volta Basin will provide analysis, information and tools to help governments, basin agencies, and stakeholders assess options for climate-resilient water infrastructure development and the associated trade-offs.

Natural Infrastructure for Water Management

Investing in nature for multiple objectives



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PARTNERSHIP

The implementing partnership of WISE-UP brings together a wide variety of expertise. Resource scientists, engineers, computer modellers, economists, governance and political economists, water managers and climate change specialists will work with stakeholders to jointly build the project's knowledge base. WISE-UP is a global partnership that brings together the Ghana Water Research Institute – Council for Scientific and Industrial Research (CSIR), The African Collaborative Centre for Earth System Sciences (ACCESS) – University of Nairobi, the International Water Management Institute (IWMI), the Overseas Development Institute (ODI), the University of Manchester, the Basque Centre for Climate Change (BC3), and the International Union for Conservation of Nature (IUCN).

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