



NILE BASIN INITIATIVE
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THE GEDAREF-ADIGRAT AQUIFER

GROUNDWATER PROJECT

THE GEDAREF-ADIGRAT AQUIFER

The Gedaref-Adigrat aquifer is one of the three transboundary aquifers selected as a case study under the Nile Basin Initiative (NBI)'s Groundwater Project – 'Enhancing Conjunctive Management of Surface Water and Groundwater Resources in Selected Transboundary Aquifers: Case Study for selected Shared Groundwater Bodies in the Nile Basin.' The other two are the Kagera and Mt Elgon aquifers respectively.

The Gedaref-Adigrat aquifer is shared by Ethiopia and The Sudan.

Total aquifer area: 52 Km²
Aquifer area in Ethiopia: 27 Km²
Aquifer area in The Sudan: 24 Km²



Management issues and threats/problems to be addressed by the project

- * Lack of shared monitoring systems and standardised database
- * Demand (from non-conventional water use sectors- e.g. mining, irrigation) rapidly catching up with available renewable groundwater resource, threatening water availability
- * Low degree of natural recharge owing to low rainfall in the area as a result of climate change.
- * Conflict over scarce water sources
- * Unsafe sources (unprotected hand dug wells, river bed excavations, haffirs) widespread source of domestic water in both countries
- * Water level decline in the aquifers and water quality degradation (mainly pollution from fertilisers and salinization, increased population demand)

Barriers to effective utilisation and protection to be addressed by the project

- * Insufficient knowledge on the shared aquifer system and its connectivity to surface waters
- * Lack of governance mechanism for shared aquifers
- * Policy differences between Ethiopia and The Sudan or different administrative jurisdictions in the aquifer system
- * Lack of appropriate policies, legislation and management institutions on shared resources.
- * Capacity gap to address technical groundwater issues at the national and regional levels
- * Low awareness and sensitization among the relevant institutions and the public at large on the environmental issues and the threats of climate change on the ecosystem and biodiversity
- * with scenario analyses
- * Improve water governance through the development of action plans on groundwater resources governance, management and protection, for inclusion in national, sub-basin frameworks: – also including consideration of conjunctive usage of surface and ground water resources
- * Improve policy legislation
- * Targeted pilot projects to explore conjunctive use of surface and ground waters and links to biodiversity conservation and climate change adaptation
- * Improve operational and technical capacity through targeted local, national and sub-regional trainings as well as through South-South and North-South exchange programmes and awareness raising workshops incorporating women and marginalised groups

Project focus areas

- * Undertake studies to generate knowledge and enhance understanding about availability of groundwater resources in the Gedaref-Adigrat aquifer's underlying watersheds as well as generating hydrological models
- * Communication and awareness raising about the benefits, challenges, opportunities of groundwater as well as the environmental issues and the threats of climate change on the ecosystem and biodiversity

Selected pilot projects and key stakeholders

| Pilot | Country | Stakeholders |
|---|-----------|--|
| Managed Aquifer Recharge (MAR) in Gederef-Adigrat. Sandstone aquifer system | Ethiopia | Local District (Woreda) Level Natural Resources Bureaus; Tigray Region Agriculture Bureau; Humera Town Water Utility; Representatives of pastoral communities; Indigenous communities; Private Irrigators; Ministry of Agriculture – SLM PMU; Ministry of Water Basin Authority; IDPs; Farmers; Women representatives; Kefta-Shiraro National Park |
| | The Sudan | Gedaref town water utility, Gedaref district water directorate, pastoral community representatives, Miners, Irrigators |
| Use of advanced remote sensing for monitoring and management of shared groundwater aquifers | Ethiopia | Groundwater Directorate under the Basin Development Authority - Ministry of Water, Irrigation and Energy Ethiopian Mapping Authority Local universities as required |
| | The Sudan | Water Resources Technical Organ (WRTO), Ministry of Water, Irrigation and Electricity Local universities as required |

Relevance of the project to national development priorities

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|-----------|--|
| Ethiopia | Groundwater is included in the five-year development strategic plan (GTP III) with the expansion of groundwater irrigation and improvement drinking water supplies largely dependent on groundwater sources (through 2.4. billion USD investments).The new Climate Resilient WASH program (2017) intends to tap into deep regional aquifers to reach marginalized communities (e.g. pastoralist communities) in arid environments. |
| The Sudan | The project is supportive of the Sudan Water Policy and Agriculture and Food Security Plan |

Expected benefits

- * Reduced demand through the application of measures to use the aquifer's water resources more efficiently
- * Reduced pressure on other national and transboundary water resources where available (e.g. River Nile)
- * Flow of data including on water levels, abstraction rates and water quality
- * Assessment and sensitivity to the fragile ecosystem
- * Experience sharing on common issues
- * Enhanced capacity of personnel from Ethiopia and The Sudan in multi-disciplinary fields
- * Improved awareness among the relevant institutions and the public at large on the environmental issues and the threats of climate change on the ecosystem and biodiversity
- * Better institutional and legal system to achieve a rational management of the shared groundwater resources
- * Suitable agricultural practices and water conservation techniques
- * Environmental protection particularly in the groundwater recharge zones
- * Contribution to other multi-lateral environmental agreements including the RAMSAR Convention, Agreement on the Conservation of African-Eurasian Migratory Water Birds
- * Contribution to gender equality and equity

Groundwater project - Background and rationale

The importance of groundwater in the Nile Basin countries is reflected in the proportion of population (>70% of rural population) that is dependent on it in many parts of the Nile Basin. Groundwater is one of the most important sources of drinking water for people as well as livestock and wildlife watering. There is an increasing usage of groundwater for other economic activities including in irrigation agriculture, fisheries, mining, industries, etc.

The resource also plays a key role in addressing the Sustainable Development Goal 6 targets for drinking water and accessed through multiple delivery mechanisms (e.g., boreholes, springs, reticulated systems, dug wells) has a vital role to play.

Groundwater holds the promise of closing the growing gap between water demand and water supply as well as buffering the effects of climate change and variability in the Nile Basin.

Regardless of its importance and the promise it holds however, the resource is under human or naturally induced climatic and non-climatic pressures. There is ample evidence that groundwater is under threat from unsustainable exploitation; climate change (affecting aquifer water levels, recharge and changes in groundwater storage), and pollution (urban - e.g., heavy metals and sanitation contaminants pollution and issues associated with high fluorides or salinisation). These in turn are impacting safe water availability, causing changes in quantity and quality of groundwater-dependent ecosystems and affecting groundwater-surface water interaction.

The threats on transboundary aquifers are more severe because of lack of common groundwater governance and management mechanisms.

The pressure is felt more in the small transboundary constellation of aquifers of critical local importance such as the Mt Elgon (shared between Kenya and Uganda), Kagera (shared among Burundi, Rwanda Tanzania and Uganda), and Gedaref-Adigrat (shared between Ethiopia and The Sudan).

Overall project objective

To strengthen the knowledge base, capacity and cross-border institutional mechanisms for sustainable use and management of selected transboundary aquifers in the Nile Equatorial Lakes and Eastern Nile sub-basins.

Specific project objectives

- * Improve knowledge and understanding of groundwater resources in the Nile Basin;
- * Strengthen overall water resources management nationally and basin-wide;
- * Respond to climate change impacts through effective risk-reduction adaptation measures - e.g. conjunctive use and management of surface water and groundwater;
- * Ensure a healthy ecosystem and strengthened livelihood.

Quick Facts

Executing agencies

- * Nile Basin Initiative (Nile-SEC, ENTRO and NELSAP CU)
- * United Nations Development Program (UNDP)
- * The Geographic Institute of Burundi (IGEBU), Ministry of Environment and Livestock – Burundi
- * Groundwater Directorate under the Basin Development Authority, Ministry of Water, Irrigation and Energy - Ethiopia
- * Transboundary Waters Department, Ministry of Water, Sanitation and Irrigation - Kenya
- * Rwanda Water and Forestry Authority, Ministry of Environment - Rwanda
- * Water Resources Technical Organ (WRTO), Ministry of Water, Irrigation and Electricity – The Sudan
- * Directorate of Water Resources under Ministry of Water - Tanzania
- * Directorate of Water Resources Management, Ministry of Water and Environment – Uganda

Project Duration: 2020 -2025

Overall Project Budget: USD 31,179,452

Project financing:



Burundi



Ethiopia



Kenya



Rwanda



The Sudan



Tanzania



Uganda

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