

This briefing note summarizes the preliminary case study findings for discussion and comment

Ethiopia has large reserves of groundwater that could be used to drive agricultural growth. Better hydrogeological mapping, changes to existing policy, and capacity building are needed to harness this untapped resource.

The Opportunity

The Ethiopian government plans to develop nine irrigation projects. In the coming five years, 8,000 hectares will be developed as a pilot study using groundwater. The Directorate of Groundwater Development Studies and Management of the Ministry of Water and Energy will drill more than 90,000 test wells, 28,000 monitoring wells and 370,000 meters of production wells. This ambitious effort will require additional institutional and human capacity development, technology procurement and transfer as well as more up-to-date and reliable hydrogeological data and maps.

The Research

This brief is based on a comprehensive review of past and current literature and data available from regional and state water bureaus on groundwater.

Main Findings

Groundwater potential in Ethiopia is shaped by complex geological formations and the diversity of the topography, climate and soil. Recent studies indicate that groundwater reserves may be far greater than the commonly used estimate of 2.5 billion cubic meters (BCM). Studies for irrigated agriculture in Kobo, Raya, and Adaa Bechoo suggest that regional aquifers are deep and water movement crosses surface basin boundaries. It is estimated that the groundwater reserve of the Kobo Girana Valley alone is in the order of 2.5 BCM, that of Raya 7.2 BCM and Adda Bechoo 965 million cubic meters.

Agricultural use of groundwater is low. Assessment of data from 8,000 boreholes from federal and regional water bureaus indicates that over 80 percent of groundwater use is for domestic water supply. Most wells are shallow and have low yields in the order of less than 10 liters per second.

The coverage and scale of the available geological and hydrogeological data and maps are not adequate for managing groundwater (Figure 1). The available groundwater database is not widely used by experts and institutions. A new groundwater database known as ENGWIS is under development.

GROUNDWATER MANAGEMENT IN ETHIOPIA

Based on a report by Gebrehaweria Gebregziabher

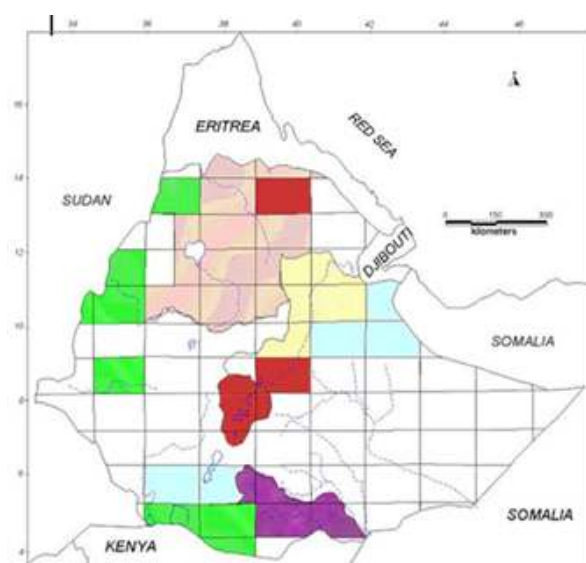


Figure 1. Areas with hydrogeological maps at the required scale of 1:250,000 (colored patches)

Capacity for deep well drilling is hampered by the lack of reliable hydrogeological data, the high cost of equipment, high drilling costs and poor quality installations and severe shortages of skilled personnel. There are few hydrogeologists and engineers available with experience in assessment and development of groundwater for agricultural purposes.

Human resources for management and development of groundwater in regional and state water bureaus are insufficient. One-third of the available job positions remain vacant. The capacity gap widens even further at local levels of administration. At the technical level, there is a severe shortage of qualified drillers and a high demand for hydrogeologists, electricians and mechanics as well as water supply engineers and hydrologists.

Solutions

- To fill the need for reliable data and maps, groundwater studies should focus first on the conceptualization of the groundwater system before making estimates based on local information. More studies are needed to better understand the regional groundwater system in terms of flow hydraulics and the subsurface geological system. Government and donor agencies need to cooperate more closely to establish and promote the use of a single source of data and information.
- The government currently allows private and public well drilling companies to import drilling rigs tax free. However, the initial capital cost of a drilling rig can be up to 800,000 USD and there is a chronic shortage of spare parts. Government-backed loans, in-country parts depots and public-private partnerships would provide a much needed stimulus to a struggling industry.
- Public universities and training institutions have a pivotal role to play in building capacity. Public universities offering geology degrees, such as Addis Ababa University, Mekelle University and others, could accommodate more hydrogeology courses in their programs. Vocational training institutions need support to meet the emerging demands for skilled labor in the drilling industry.
- The institutional framework governing groundwater under which various state agencies, NGOs and other actors operate is not clear and needs revision. Existing policy supports groundwater assessment, development and operation mainly for shallow wells with no explicit reference to drinking or irrigation water supply. Recent development strategies such as the Poverty Alleviation and Sustainable Development Programme and the Water Centred Development Strategic Framework include managed groundwater development to contribute to national growth and development.



Deep well drilling rig

Potential Impact

Investment in irrigation, particularly in small-scale and household level irrigation, has been identified as a core strategy to delink agricultural production in Ethiopia from uncertain rainfall, improve crop production, and induce the use of modern inputs such as fertilizers and improved seeds which further enhance agricultural productivity. With more smallholder farmers using motorized pumps to irrigate, groundwater will play an increasingly important role in achieving those goals.

These findings and recommendations are preliminary and are reproduced here for the purposes of discussion. The AgWater Solutions Project welcomes all comments and suggestions. These should be directed to AWMSolutions@cgiar.org, please write "Ethiopia" in the subject line.