AGWATER SOLUTIONS
Improved livelihoods for smallholder farmers

JANUARY 2010

This briefing note is a summary of the situation analysis conducted in Ethiopia in 2009.

# ETHIOPIA SITUATION ANALYSIS

## Introduction

This situation analysis covers nearly all regional states of Ethiopia and is based on secondary data, field observations, household interviews in selected locations and interviews with key informants including members of the Ministry of Water Resources (MoWR)[1], Regional Water Resource Bureaus (RWRBs), the Ministry of Agriculture and Rural Development (MoARD), Regional Bureaus of Agriculture and Rural Development (RBoARD), the Ministry of Finance and Economic Development (MoFED), the Ethiopian Institute of Agricultural Research (EIAR) and Higher Learning Institutions (e.g., Mekele and Hawasa universities).

The results of the situation analysis are summarized here concentrating on existing environmental, social and political conditions across Ethiopia as well as on the agricultural water management (AWM) solutions currently in use and those that have potential to improve agricultural production and farmers' livelihoods. The AWM solutions described here were shared at the National Consultation Workshop and priority solutions were selected by participants. For more on this please see the National Consultation Workshop Brief which is also available on the website.

## The Context

### Agroecological Zones and Farming Systems

Ethiopia is divided into 32 agroecological zones delineated by biophysical conditions (MoA, 2000) which are significantly influenced by altitude, which ranges from -155 to +4,000 meters above sea level.

Rainfed agriculture dominates in Ethiopia. However, rainfall distribution and intensity vary spatially, tending to decrease from southwest to northeast (Cheung et al. 2008). Rainfall also varies temporally resulting in incidents of drought every 4-5 years (Osman and Sauerborn 2008). These rainfall patterns affect crop and livestock production and contribute to volatility in food prices, which ultimately affects overall economic development (FAO 2005).

Subsistence farming is a typical feature of agriculture in Ethiopia. The midlands and highlands are dominantly characterized as mixed farming systems where livestock and crop production are almost equally important and highly integrated. In the lowlands, pastoral systems dominate and agro-pastoral systems are only practiced in a few areas. Single cropping is the norm but double

cropping is practiced along rivers and as alley cropping in some parts of the county (e.g., in Bale highlands).

### Natural Resources

According to MoARD (2009), the potential irrigable land in Ethiopia is between 3.7 and 4.3 million hectares but the actual irrigated area is estimated at just 7-10% of this. Of this area approximately 55% is traditional irrigation schemes, 20% is modern small-scale, and 25% is medium- and large-scale irrigated commercial farms (private and state-owned). Field assessments in small-scale irrigation projects indicate, however, that some irrigation schemes are not functional due to shortage of water, damaged structures and poor water management.

### Gender Differentiation in Farming Activities

In Ethiopia, women play an important role in agriculture. In pastoral areas, predominantly in the Rift valley (Afar, Borena, Somali, and some parts of the Southern Nations, Nationalities and People's Region [SNNPR]) women tend small ruminants, lactating cows and sick animals, while men are responsible for cattle and camels. Women also construct and manage mobile huts, grow homestead crops and engage in daily labor.

In other parts of the country, land cultivation with draft animals or hand hoes is commonly the responsibility of men, while weeding, planting and harvesting are the duties of women and children. An interview with a regional expert

suggests that housewives engage in 85% of animal-rearing and in 30-40% of crop production activities. However, the household income is often controlled by men, and women lack access to productive assets such as arable land and basic farm tools, especially in the regions of Benshangul Gumuz, Gambella, Somali and Afar. Female illiteracy is also high at 76% compared to 51% for men (UNOCHA 2005) but there have been efforts by the government to increase female literacy and empower women.

### AWM Policy and Management

Several policy reforms in Ethiopia have targeted agricultural production, principally the Agricultural Development-Led Industrialization (ADLI) policy, which is the guiding framework for economic development. Anchored in this policy are the Rural Development Policy and Strategies (RDPS), which are designed to ensure effective utilization of resources to promote agricultural growth; and the Participatory Demonstration and Training Extension Systems (PADETES) program for agricultural extension.

Several policies recognize, and try to address, the severity of the consequences of erratic rainfall and frequent occurrence of drought problems, for example the Rural Development Strategy of Ethiopia and the Water Resources Management Policy. The goal of this latter Policy is to enhance efficient, equitable, and optimum utilization of water resources for socio-economic development on a sustainable basis. The Policy prioritizes human and livestock needs, and development of small-scale irrigated agriculture. It stresses the use of water for irrigation as a means to arrest food insecurity and provide water for livestock and household consumption.

Consequently, the current policy environment looks conducive to the improvement of AWM systems (FAO 2005) as:

- irrigation is being integrated within the ADLI;
- fairness and transparency are being promoted in the management of irrigated agriculture;
- a reasonable share of the GDP is intended to be committed to the development of irrigation; and
- user-based management of irrigation systems is encouraged, especially considering the needs of rural women.

The Ethiopian Water Sector Strategy has created an enabling environment in the areas of financing of water resources management and development; trans-boundary river management; stakeholder participation and gender mainstreaming. As part of the Strategy, water harvesting, small-scale irrigation development and reclaiming wetlands are emphasized.

### Water Management

Water management is undertaken by several key organizations. The MoWR, is responsible for feasibility studies (technological, socio-economic and hydrological), planning, development, management, utilization and protection of the country's water resources. The RWRBs are mandated in regional water resource development, scaling up and diversification of AWM and designing irrigation technologies. The MoARD and the RBoARD are in charge of water management (irrigation extension), including water harvesting for smallholders, maintenance of irrigation schemes and provision of agricultural inputs and irrigation equipment. Pond construction, watershed management and diversions are the main technologies they use.

In addition, in each region, there are Water Construction Enterprises whose main purpose is to undertake feasibility studies and construction. After construction, the AWM technologies are transferred to RBoARD for implementation. RBoARD draft and enforce by-laws, including those covering Water User Associations (WUAs). In contrast, the development of small-scale irrigation is usually undertaken by communities themselves, sometimes in collaboration with NGOs or the government.

Despite the pro-AWM policies and the comprehensive structure for management, water resources remain poorly developed and the utilization of the existing AWM schemes is inefficient. To mitigate the problems and improve water productivity, a process is under way to devolve responsibilities to regional and lower levels and to give them more autonomy in irrigation development and water management.

## AWM Solutions

In Ethiopia, a number of different AWM solutions have been identified and are described below.

### River and Stream Diversion AWM

River and stream diversions of various scales are the most common AWM practices in the midlands and highlands of Ethiopia wherever perennial rivers or streams exist. Traditional diversions are often used for small plots while those developed by the government or NGOs provide opportunities for irrigation at community level. Diversions are generally regarded as less costly than other AWM solutions.

### Micro-dams or Reservoirs

Micro-dams are concentrated in areas where there are insufficient perennial rivers or streams for diversions but where the topography facilitates damming; this includes the midlands and highlands; and areas of SNNPR (due to low evaporation). Micro-dams are also promising in Tigray and Amhara. The dams are usually made of earth and stone and are often used with appropriate water-lifting devices to irrigate areas of 100-200 ha and, hence, investment costs can be high. Siltation, seepage and water-logging are some of the problems experienced if the irrigation canals are not maintained properly.

## Groundwater and Hand-Dug Wells

There are ample groundwater resources in the midlands and highlands of the SNNPR (Guraghe, Silte, Hadya, Kambata Tambaro and Gamogofa), Oromia, east Hararge and parts of Amhara for hand-dug wells for irrigation. Shallow wells tend to be developed and managed by private households for irrigation of small areas and sometimes for domestic use. In the Raya and Kobo valleys, in northern Ethiopia, wells are fitted with pressurized pumps and used to irrigate large areas.

## Lake and River Pumping

Pumping takes place from the Zeway, Awash, Koka, Abaya and Hawassa lakes and from the Kelafo, Mustahil, Ferfer, Dolo, Cherati and Hargel rivers in the Somali Region, in Gambela along the Baro River, and in Ilu District of Oromia along the Teji River. Farmers who have good access to markets often use motorized pumps to produce horticultural crops such as onion, tomato and green pepper. However, price fluctuations are a constraint. Some concerns relate to over-abstraction and water quality. For example, Lake Haromaya has dried out, mainly due to sedimentation and excessive pumping, and Lake Zeway is under threat from over-utilization, which is endangering the biodiversity of the ecosystem.

## Rainwater Harvesting and Ponds

Traditional ponds (*birka*) and sand-water are often used for livestock in dry land areas such as Somali and in the agro-pastoral communities of southern Tigray, Afar and Borena. Since 2002, rainwater harvesting has been implemented by the government, particularly in drought-prone areas. Adoption of pond technology for small-scale irrigation is, however, not uniform across the country. In a few areas such as in Tigray, SNNPR (Alaba Special Woreda), East and Hararghe zones of Oromia (especially Gursum District) and the neighboring Somali, farmers have widely adopted the technology. However, in many instances technical problems have resulted in failure because the potential of water catchments was not considered prior to construction and the ponds themselves were not properly shaded, well-cemented or covered with plastic sheets, leading to water loss.

## Spate Irrigation

Spate irrigation is the collection and diversion of flood water from upstream catchments to irrigate the downstream. It is mainly practiced on lowland plains and is a traditional form of irrigation in the Raya Valley of Tigray, Kobo area of Amhara Region, in the Afar escarpment and in the lowlands of south Omo zone in SNNPR. As the lowland plain area is moisture-stressed, farmers collect seasonal floods running down from the highlands and divert it to their farmlands via simple furrow systems.

## Soil and Water Conservation

Soil and water conservation activities, supported by the Productive Safety Net Program (PSNP), are designed to reclaim eroded areas and gullies. In rehabilitated areas, water percolation has resulted in downstream recharge so that in Tigray, a considerable number of farmers have benefited from it. The out-scalability of this program seems promising but the technical and financial support of the government or NGOs is critical.

## Motorized Water-Lifting Pumps

Motorized pumps are often used to lift water from rivers, lakes, ponds or hand-dug wells when gravity irrigation is difficult. They are typically used for high-value crops as, for example, in Haramaya District of Hararge and Zeway Dugda in Oromia. The trend of using motor pumps for irrigation is increasing in almost all parts of the country because the technology is easy to operate and can be used by individual households. It is also being encouraged under the Water Sector Development Program (2003). Accordingly, the BoARD and NGOs have been importing thousands of motor pumps free of all duties and taxes. The government has been selling them for 6,500 birr (≈US$640) through cooperative associations so as to reach farmers who may otherwise not be able to afford them and because landholdings are so small that collective use of the pumps is assumed to be advantageous. However, cooperatives are often criticized for being less efficient in resource management than private operators, which can increase the risk and maintenance cost to individual farmers and possibly cause social conflicts.

## Other Irrigation Systems

Sprinkler systems were recently introduced in Golgol Raya of Tigray and Kobo area of Amhara. Drip irrigation, treadle pumps, rope-and-washer, and wind mills are just in the adoption process in some pockets of Ethiopia, particularly, Oromia Region (in the east Showa, west Arsi and east Harage zones) and in SNNPR (Sidama, Gurage and Alaba). Despite their introduction there is little evidence of the availability of good-quality systems in the local markets. The technical and financial feasibility of these AWM solutions needs further research.

# AWM Modalities

Four major AWM modalities have been identified in Ethiopia as described below:

- **Individual-based AWM:** In almost all parts of the country, traditional small-scale ponds, hand-dug wells and stream or river diversions are developed and managed by individual farming households for irrigation and domestic use.
- **Community-based AWM (an AWM solution owned by a community that has an exclusive use right):** In this modality, community members engage in private farming using commonly owned AWM interventions. Local WUAs are often established and formulate by-laws for the water use. Households in the community have the right to use the AWM technologies for irrigation or domestic purpose as long as they comply with the by-laws. The major AWM interventions in this category include: river and stream diversions, micro-dams, communal groundwater

infrastructure, group or communal pumps for abstracting lake water, group or communal ponds, and spring and spate irrigation.

- **Cooperative-based AWM:** This modality is a recent development and refers to associations of farmers who own communal land, pool farm inputs and share the product according to their labor and resource contribution. The members of the cooperative have an exclusive right to the AWM technologies. Cooperative-based irrigation subsystems are mainly practiced around big water sources like Lake Tana in Amhara Region, Gewane and Awash in Afar Region, Zeway in Oromia and Lake Hawasa in SNNPR.
- **State-community partnership:** In cases where water development demands high investment (e.g., dams), the government takes responsibility for construction and the state and community form a partnership to manage them. This is common in Tigray Region, and in Oromia where the Fantale Dam was recently constructed.

## Conclusion and Recommendations

A number of AWM systems were identified in this study with different solutions being practiced in various parts of the country, either as traditional systems or with the support of the government or NGOs. The three AWM solutions identified as having the most potential for out-scaling are river or stream diversions, groundwater harvesting (shallow wells) and lake or river pumping.

Farmers' demand for AWM solutions appears to be high, which will be an important factor for uptake. Some other factors that need to be considered given the agroecological and socioeconomic conditions are:

- **Functionality:** Due to poor management many AWM systems are not functioning optimally. Engaging farmers from the planning stage through to management and operation will improve sustainability and mitigate conflicts over water use.
- **Technical knowledge:** Farmers lack adequate knowledge of, and access to, irrigation technologies and, therefore, extension will be an important part of any AWM solution.
- **Financing:** Credit facilities need to be improved to allow poor farmers to gain access to AWM solutions.
- **Market Access:** Access to markets and improved irrigation are linked. Developing markets and roads, the capacity of farmers to select and grow high-value crops and negotiating for good prices will enhance AWM, improve livelihoods and reduce poverty.
- **Gender:** The role of women in AWM is vital and they should have a fair share in decision making on AWM solutions.
- **Sustainability:** The sustainability of AWM solutions depends on the availability of water resources; therefore, strong interventions that guarantee sustainable land and water management are required. Detailed studies to determine the optimum utilization of water sources should also be undertaken before launching interventions.

## Next Steps

Since the situation analysis was conducted a number of case studies have been undertaken on specific AWM solutions. These will be published as briefs on the project website as soon as they are completed, and stakeholder consultations will be established to share findings and receive comments.

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[1] Since undertaking this study, the MoWR has changed to the Ministry of Water and Energy and the MoARD has become the Ministry of Agriculture.


This briefing note is based on a report by Beyene Tadesse. The original report was compiled from regional reports by Worku Tessema and Gebrehaweria Gebregziabher. These reports are internal but if you would like to request a copy please contact the Project Secretariat (awmsolutions@cgiar.org)