

Using Available Water Resources to Fight Drought and Poverty in Ethiopia: A Modeling Approach

Agriculture is the backbone of Ethiopia's economy, which accounts for 46% of GDP and 85% of total employment. Ethiopian agricultural sector is highly dependent on rainfall (Fig. 1). Ethiopia is blessed with large amounts of water resources (Table 1); hence, often referred as "water tower" of East Africa. Nevertheless, Ethiopia has suffered a series of drought (Table 2), some led to famine. Therefore, there is a critical need to efficiently use the available water resources by developing agricultural water management techniques specific to the area, and by reducing nonproductive water losses from agricultural lands. Currently available crop growth and hydrological models can be used to making wise agricultural water management decisions.

How? Four steps

1. Reassess the performance of current agricultural water conservation measures adopted in the country, and identify those that showed positive result.
2. Using results from step one and the different environmental variables, validate and improve existing crop growth models (DSSAT and AquaCrop) and hydrological model (SWAT) specific to that area.
3. Use the improved and validated model to make a better agricultural water management decisions.
4. Repeat all the above three steps

Final outcome

- Help to provide extra water that can be used for supplemental irrigation during dry-spells, drinking water for animals (usually agriculture is a double farming practice in Ethiopia), and for domestic purposes
- Reduce both onsite and off-site effects of soil erosion
- Maintain more soil water in the agricultural fields

The big picture

- Use the available water resources to its maximum potential before it leaves the site, which subsequently help us fight poverty by increasing yield and rural income.

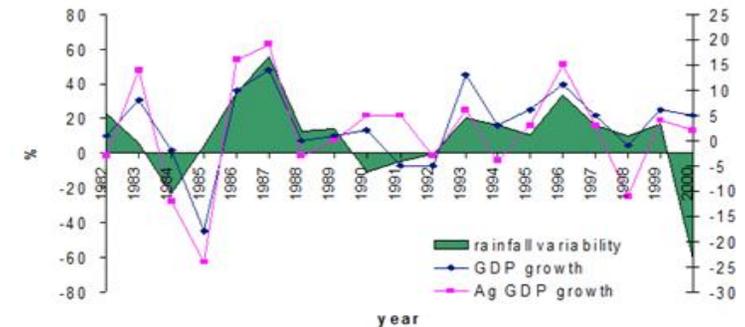


Figure 1. Rainfall variation around the mean and mean GDP growth (Source: World bank, 2006)

Table 1. Water resources of Ethiopia

Renewable water resources	Amount
Average precipitation	848 mmy^{-1}
Surface water resources	$122 \cdot 10^9 \text{ m}^3 \text{ y}^{-1}$
Ground water resources	$\sim 3 \cdot 10^9 \text{ m}^3 \text{ y}^{-1}$

Table 2. Number of affected people by natural disasters

Disaster	Date	Affected (no. of people)
Drought	2003	12,600,000
Drought	1983	7,750,000
Drought	1987	7,000,000
Drought	1989	6,500,000
Drought	2008	6,400,000
Drought	2009	6,200,000
Drought	1999	4,900,000
Drought	2005	2,600,000
Drought	1997	986,200
Flood	2006	361,600

Source: <http://www.preventionweb.net/english/countries/statistics/?cid=59>