Water Harvesting Technologies a Challenge to Ethiopia: in Environmental/Ecological, Health Condition and its Economic Sustainability

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March 14-16 2005,

International Livestock Research Institute (ILRI) Addis Ababa, Ethiopia.

Outline of the presentation

1 Types of water harvesting techniques

2 Overview of WH technologies used in Ethiopia

3 Challenges

4 The way forward

Water harvesting techniques:

- Rainwater harvesting
- Floodwater harvesting
- Dry weather flow river diversion
- Groundwater harvesting

WH techniques: Rainwater harvesting

- Rainwater harvesting: It is a method for inducing, collecting, storing and conserving local surface runoff for agriculture in arid and semi-arid regions)
  - Water collected from roof tops, courtyards and similar compacted or treated surfaces (Domestic purposes and garden crops)
  - **Micro catchment** water harvesting: surface runoff from small catchment area and storing it in root zone of an adjacent infiltration basin. The basin is planted with a tree, a bush or with annual crops.

Rainwater harvesting contd.

- **Macro-catchment** water harvesting (harvesting from external catchments) - runoff from hill-slope catchments is conveyed to the cropping area located at hill foot on flat terrain. - Arid area

WH techniques: Flood water harvesting

- Flood water harvesting (Spate irrigation = large catchment water harvesting): the collection and storage of creek flow for irrigation use:
  - Classified into two:
    - Floodwater harvesting within stream bed - the stream is dammed as a result inundates the valley bottom of the flood plain. The water is forced to infiltrate and the wetted area can be used for agriculture and pasture improvement.
    - Floodwater diversion: the wadi water is forced to leave its natural course and conveyed to nearby cropping fields.

WH techniques: Dry weather flow river diversion

- Dry weather flow river diversion: commonly used in Ethiopian highlands where sustained base-flow is available in a river
  - Water harvesting part here is the construction of diversion structures (permanent or temporary) across/ on part of the river and canaling to an irrigation command area.

WH techniques: Groundwater harvesting

- Some consists of a horizontal tunnel that taps underground water in an alluvial fan, brings it to the surface due to gravitational effect. A tunnel may have an inclination of 1-2% and a length of up to 30 km.

- Groundwater dams Like subsurface dams / Sand storage dams: They obstruct the flow of ephemeral streams in a river bed; the water is stored in the sediment below ground surface and can be used for aquifer recharge.

- Shallow wells- hand dug shallow wells.

•Overview of common WH technologies used in Ethiopia

WH technique	*Water source*	*Uses*	*Category*	*Users*	*Regions*
Above ground tanker	Roof	Drinking	Modern	School, family	Oromiya, South
Under ground tanker	Roof	Drinking	Modern	School, hotel	Oromiya, South
Ponds	Surface Runoff	Domestic, livestock	Indigenous, modern	Community	Somali, Oromiya, South
Haffirs (emnabkment)	Runoff	Domestic, livestock	Indigenous	Family, individual	Somali
Cistern	Runoff	Domestic, livestock	Indigenous	Community	Yabelo
Birka (tank)	Runoff	Domestic, livestock	Indigenous	Family	Somali
Earthen dam	Runoff	Crop production	Modern	Community	Somali
Micro-dams	Runoff/stream	Irrigation	Modern	Community	Tigray,
Boreholes	Ground water	Domestic, livestock	Modern	Community	Somali
Shallow well	Ground water	Crop production	Indigenous	Family	Kemisie
Ella (deep well)	Ground water	Domestic, livestock	Indigenous	Community	Borena
Bench terrace	Runoff	Crop production	Indigenous	Individuals, family	Konso
Runoff diversions	Runoff	Crop production	Indigenous	Individuals, family	Konso

Challenges

1. Technical: WH – Tanks tried in Rift Valley soil but applied for different climatic, soil and topography conditions:

Succesful model farmer on the trial site in Adama: Drip irrigation for vegetable production (photo H. Rami, UN-OCHA, Sept. 2003)

Challenges

2. Technical: - WH – Tanks: Leakage problem:

Leaking from outside in: Hemispherical tank built on a slope in Dessie Zuria with groundwater seeping through the walls into the tank (photo H. Rämi, UN-OCHA, Oct.

Challenges

3. Technical: WH – Tanks catchment runoff guiding problems:

Never filled up: Tank built for poor women's cooperative in an area without water catchment (photo Rämi, UN-OCHA, Oct. 2003).

Challenges

4. Environmental/health: Safety aspect, mosquito over temperate and arid areas, drowning

Drowned: Like many rural people her child did not know how to swim and died in a pond (photo H. Rämi, UN-OCHA, Oct. 2003)

Challenges

3. **Economic sustainability**: Silt problems

Rapid siltation: Full silt trap due to lack of watershed treatment, Geteb Dawru watershed (photo H.Rämi, UN-OCHA, Oct 03)

Way forward

For sustainable agricultural development of the country, water harvesting technologies have their contribution. They can be constructed and managed by the community with minor technical know how. The right choice of the water harvesting technique for the specific locality is required.

Way forward

Choice of a water harvesting techniques under rural settings are:

1st River diversion / Spate irrigation /	Obvious, canaling
2nd Shallow wells with recharge	Locating is difficult
3rd Groundwater storage	Labor intensive
3rd Clay lined ponds	Good workmanship, clay
4th Plastic lined ponds	relatively expensive
5th Concrete lined ponds	Expensive, may fail

Clay lined pond

Sustainable: Large clay lined community pond, Dawro Watershed

Sustainability proved

Sustainable and cheap: Community pond in clay soil built during the Derg time (photo H. Rämi, UN-OCHA, Oct 02)

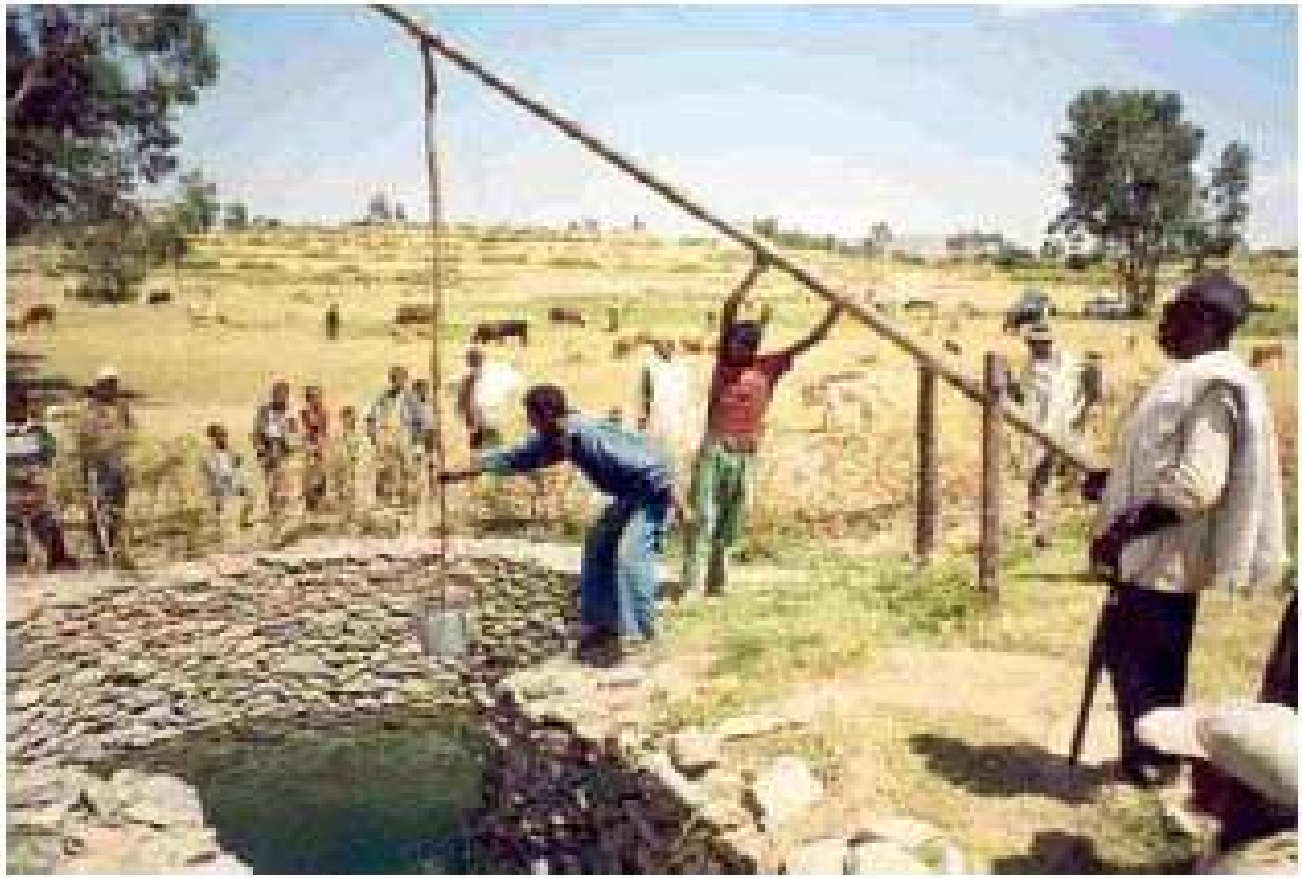
Plastic lining

Cheaper than concrete: Plastic lined pond Alamata

Shallow wells

Overflowing: Shallow well built in Meket nearby roof-water harvesting tanks (photo H. Rami, UN-OCHA, Oct. 2003)

Traditional, wells



Groundwater discovered while excavating ponds:

River diversion

Potential to be exploited: Perennial river running through Ibnat (photo H. Rämi, UN-OCHA, October 2003)

Pumped river side irrigation, Wabi Shebele river

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Thank you for listening