Rainwater harvesting in Ethiopia: an overview

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RAINFALL is normal in Ethiopia, but annual rainfall ranges between 400 and 1300 mm (table 1). Hararghe and Tigrai experiences high variations in the rainfall, and they are drought prone regions. The seasonal rainfall is influenced by the movement of the Inter Tropical Convergence Zone (ITCZ) which influences the location of the low and high pressure fronts and the air (wind) movement in the tropics. Moreover, the rainfall is strongly correlated with altitudinal variations.

Ethiopia’s agriculture is predominantly rainfed with a potential of nearly 3.5 million ha of land suitable for irrigated agriculture. The population has grown dramatically over the last three decades, increasing from 2.5 million in the 1960s to nearly 60 million in 1998 leaving a pressure on the agricultural land, forests and the environment at large. Coupled with this and as a result of localized and global climatic anomalies, Ethiopia experiences pervasive land, water and environmental degradation which leaves the country to recurrent crop failures and severe food shortages which at times upsets the political and economic setting of the country.

Paradoxically, Ethiopia is very well known for its enormous water resources potential. It is still known as the water tower of Africa, the source of the Blue Nile and many transboundary rivers. Indeed there are very many rivers with high annual flow rates, and most of the runoff harvested leave the country through these transboundary rivers. The major river basins with high run-offs include Blue Nile (48. per cent), Omo-Gibe (16 per cent), Baro - Akobo (11 per cent), Genalle-Dawa (5 per cent) and Awash.
Rainwater harvesting practices

Rainwater Harvesting is when the precipitation is collected from a small/large surface area (catchment) and directed through channels to a storage facility or to a near by field or retained at the site itself (in-situ). The rain-water harvesting techniques most commonly practiced in Ethiopia to day are run-off irrigation (run-off Farming), flood spreading (spate irrigation), in-situ water harvesting (ridges, micro basins, etc.) and roof water harvesting. These techniques, though dates back in the antiquity, their importance has not been recognized until very recently, it was following the devastating drought and famine of the 1980s.

Run-off farming

Run-off irrigation is widely used in Hararghe for the production of major crops in the area; sorghum, and chat (Chat edulis). The technique is based on the use of runoff produced from the adjacent upland farms, and made to be diverted for use back in the farm at a lower elevation. This technique is well adapted for crop production in the highlands of Hararghe with altitudes in the range between 1700 and 2500 masl. In these areas, crop productivity has been significantly increasing, and production is getting stabilized even at bad seasons. Every bit of runoff from the farm is harvested and it is used for irrigation, and it is now becoming a common practice in Alemaya District. During the early part of the season, one or two run-off irrigation improves the establishment of the crop stand and the last season runoff (again three or four irrigation) will bring the crop to full maturity. The practice is now a days increasingly becoming a reliable technique for stable crop production even under highly erratic and unreliable conditions.
WATER SUPPLY (GENERAL): GETACHEW

importance of this technique is being very well recognized and it is spreading at an encouraging pace.

Water harvesting ponds
Traditional ponds have been used in Ethiopia for millennia, some estimates it as early as 560 BC (Fattovich, 1990). They are used to harvest rainwater for both human and livestock watering in most rural areas, particularly in the arid and semi arid areas where annual rainfall is less than 600 mm. Ponds are simple to construct and it can be managed by the community. Approximately 15 to 20 per cent of the people and over 80 of the livestock in Ethiopia uses water from either rivers/streams and ponds.

There are an estimated over 2000 traditional ponds in Ethiopia (quite a small number compared to over 2 million ponds in the United States). They are used primarily for domestic water supply and livestock watering. The size of the ponds range from 650 M³ to several thousands, and they serve for 3 to 6 months only. In Dalocha alone, Silte District, Gurage Zone, about 150 traditional ponds are used for human and livestock watering. The most common type of pond is the excavated type. The distribution of these ponds generally is in the arid and semi arid areas where the Sahilian climatic condition prevails. Traditional ponds are major sources of water in the rift valley where ground water is deep and other sources of water are not feasible.

These days, the use and promotion of ponds even for livestock watering is increasingly becoming difficult and challenging by the spread of deadly childhood malaria, and for this reason most NGOs are unable to promote and support pond construction due to environmental constraints.

Roof water harvesting
Large scale and modern water supply schemes in rural Ethiopia remains a challenge owing to the unique and rugged terrain, and the scattered settlement pattern of the rural people. One technique that appeals today that can be of significant importance in the development of the subsector is roof water harvesting at household level. This technique is so important in the rural areas [in the highlands] where the terrain is rugged, and the villages and hamlets are scattered. In such areas it is difficult to think that communities can be served by a centralized water supply schemes, at least it is expensive. Other sources require long walk and time for women and children to fetch water.

The roof water harvesting in Ethiopia has the advantage of being low cost, relatively simple in design (household technology), less laborious and it saves time. It provides adequate water during the rainy season, a period when the rural people are busy with the farm activities and when there is shortage of labour. They are more appropriate in areas where there are no rivers, ground water sources around, and where rainwater is the only feasible means of providing a water supply. The quality of water is also reported as good compared to other water sources in the rural areas.

The emergence of this technique these days is due to the increasing shortage of water from the conventional sources, shallow wells, perennial springs, rivers/streams

In earlier times, roof water harvesting practices were confined to urban areas only. However, its use in the rural areas are increasingly becoming important these days as more people in the rural areas are having corrugated roof houses. This is particularly evident in Hararghe case where projects are being initiated. The cost at household level for 2 to 3 m³ capacity set up will cost in the range between US$ 75 and 88. For example a 15 m³ capacity circular ferrocement tank with its accessories costs approximately US$ 1500.

Water conservation for agriculture
Today quite a significant portion of the cultivated land are protected against soil erosion by soil bunds (a structure of approximately 30 cm height). The major conservation structures commonly practiced in Ethiopia include soil bund, stone bund, fana yaju and grass strips. They are constructed in contour or graded depending on the rainfall of the area. For high runoff areas graded structures are used. These structure are not only reducing soil erosion but also conserve water in situ. Constructing level terraces is a well established traditional practice in Konso. Other traditional water conservation methods in cultivated lands include open and tide ridges practiced in Hararghe, Wollo and Tigrai. Micro basins are also used for growing tree plants. In North Shewa, runoff from farm lands are stored in large pits for later use, for irrigating tree plants using watering cans.

Institutions involved in the promotion of rainwater harvesting
NGOs are the ones in the forefront in the promotion and development and use of small scale rainwater harvesting schemes for both household and agricultural uses. It is a strategy towards enhancing household food security, a national strategy drawn by the government over its Five Year Development Plan (1996-2001). Several international and indigenous NGOs are implementing rainwater harvesting in Eastern Hararghe, East Shewa, Tigray, Wolo and Gondar

The government has established commissions in four regions; Tigray, Amhara, Oromia and Southern Nations and Nationalities People’s Regional states. Commission for Sustainable Agricultural and Environmental Rehabilitation (COSAER) is mandated to promote, develop and manage the regional land and water resources sustainable for agricultural uses. The government through its Regional states is also engaged in large scale water harvesting scheme as part of this plan. Over the five year plan, there was a plan to construct approximately 500 micro dams each in Tigray and Amhara Regional States. In 1997/98 alone, the Amhara
Regional State was able to achieve only 3 earth dams, and six diversion structures in Wollo and Gondar zones only (From CO-SAERAR leaflet published in 1998, Bahir Dar). The two regions are now recognizing that these are ambitious plans, and they are considering for revision. However, the plans clearly indicates the seriousness and commitment on the side of government to under take every available means to develop water resources to improve the food security situation in the regions.

The Government plans are water harvesting from large size (macro) catchments and it is quite different from that of the NGO projects which are small scale [micro] in size. The later objective is on the development of small scale [farmers] water harvesting projects both for crop production and household water supply purposes.

The Ministry of Agriculture through its extension program was also promoting water conservation activities particularly in moisture stress areas. In the 1980s, it was supporting limited roof water harvesting projects financed by IFAD.

With regard to the institutions capacity building, recently there were two workshops held to promote rainwater harvesting techniques and enhance its use widely in the rural areas. The workshop was supported by SIDA (East African Regional Bureau) in cooperation with Water Action, an indigenous NGO. Following these workshops, a rainwater harvesting committee was established, and efforts are being made to strengthen and upgrade the committee to a level of Association, Ethiopian Rainwater Harvesting Association.

**Recommended strategies for development**

Population growth in Ethiopia and shortage of resources demanded the people to intensive forms of development, and rain water harvesting for both domestic water supply and for agricultural purposes is increasingly becoming important. The following strategies are recommended for sustainable use of rainwater harvesting:

- Focus on small scale rain water harvesting schemes that are now being promoted by NGOs.
- Multisectoral approach to the conservation, use and management of rain water.
- Involve the grass root in local decision making, planning and management and use of the resources.
- Promote run-off farming for a sustainable household food security.
- There are rich indigenous knowledge in different parts of the country and they should be researched and documented.
- Create adequate interest among policy makers, planners and water project managers.

**References**


