Technology Fact Sheet for Adaptation
B.1. Technology: Rain Water Harvesting (*Haffir*) [i]
Sector: Water Resources
Subsector: Seasonal Water Resources

B.1.1 Introduction

Water harvesting is the capture, diversion, and storage of rain water for different uses, mainly for drinking and in irrigation where water becomes available to the crop and thereby enables economic agricultural production.

B.1.2 Technology Characteristics

Haffirs are manmade ground reservoirs in the earth at suitable locations to store water for drinking purposes for both human and livestock uses. The concept is that water running in natural streams during the rainy season is diverted at certain suitable locations into these *haffirs*. The size of the *haffir* ranges from 100,000 m3 for large ones to 30,000 m3 for small ones. Guide bunds are required to divert the water into the *haffir*. As water in the haffirs is used for human drinking, filters are always associated with the *haffir* for clean potable water.

B.1.3 Country Specific Applicability and Potential

- Construction of *haffirs* and their management requires skill and institutional organization.
- Consultancy in design of the *haffir* and its implementations is necessary.
- Training and skills development of state staff and local communities for the operation and maintenance of the water harvesting projects represents one of the core elements for sustainably.

B.1.4 Status of Technology in Country

Haffirs are wide spread in different areas of Sudan. Rain water harvesting is one of the priority programs for rural socio-economic development in the country. Rain water is not only important for drinking, it is also important in agriculture and pasture as most of the livelihood of the rural people depend on farming and animal rearing. Compared to other means of development, rain water harvesting is cheap to develop with high socio-economic returns. After thorough investigations, technical experts in the country have come to the conclusion that many water harvesting techniques can be used to avail water for drinking and farming on small scale all over the targeted area. *Haffirs*, small dams, reservoirs in natural depressions and contour bunds, inter alia, can be used.

B.1.5 Opportunities and Barriers

Financing constraints constitute one of the significant impediments facing socio-economic development in the country. This is particularly so for rainwater harvesting development. Despite the difficulties facing Sudan's economy in the short run, broad indications such as stringent austerity measures, revival of the agriculture sector, gold mining and significant inflow of direct Arab and foreign investments suggest that the economy will improve gradually in the long run. Improvement of the economy will lead to better livelihood prospects and services for the people of Sudan and in particular water supply and augmentation.

Rainfall characteristics (intensity, duration, distribution) are the most unpredictable variable. Regarding the cost, *haffirs* cost much less than dams.

B.1.6 Benefits to Economic/Social and Environmental Development

Economic Benefits:

- Increase the income of farmers
- Increase food production and productivity generally

Social Benefits:

- Enhanced availability of and access to water
- Improved living conditions of both pastoralists and farmers
- Promote peace and stability
- Enhance settlements and reduces the competition for water between farmers and pastoralists

B.1.7 Climate Change Mitigation Benefits

Haffirs strengthen the resilience of local communities to climate change

B.1.8 Financial Requirements and Costs

Construction of haffir: 20-25 Sudanese pounds (9-11 USD) per unit (M^3)
The capacity of designed Haffir range from 30,000 M^3- 200,000 M^3
Average cost 0.75-1 Million Sudanese Pounds (370,000 – 450,000 USD)

Additional Costs to Implement Adaptation Technology compared to "business as usual":
For human water consumption, the water stored in *haffirs* needs to be treated. For this purpose slow sand filtration techniques are usually adopted. However, filter costs (slow sand filter/rapid sand filter/ pressure sand filter) are not estimated. An elevated tank with a reasonable capacity is usually provided to withdraw clean water.

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[i] **This fact sheet has been extracted from TNA Report – Technology Needs Assessment for Climate Change Adaptation - Sudan. You can access the complete report from the TNA project website http://tech-action.org/**