Technology Fact Sheet for Adaptation

Rainwater Harvesting from Rooftops for Drinking and Household Uses [i]

Rainwater Harvesting from Rooftops for Drinking and Household Uses

12. **Sector** – Water

13. **Technology characteristics**

13.1 Introduction

This technology involves harvesting and storing rain water from roof tops of houses/schools/hospitals/industries/other institutions as an alternative water source. This could provide about 30% of drinking and non-potable water (cooking, washing, agriculture) demand per household and specially addresses the water shortage in the dry zone and the intermediate zone. This technology contributes to adaptation for climate change in following ways(1).

- Reduces water stress during droughts
- Diversification of water supply
- Reduce the dependence on ground water and surface water.
- Recharge ground water aquifers.
- Reduce drinking of ground water containing pollutants
- Storm water control and capture (e.g. collection of rain water from roof tops of flats in Colombo can mitigate flooding)

13.2 Technology characteristics/Highlights

- Low-cost
- Simple technology

13.3 Institutional/ organisational requirements

- Awareness programs and initial training required should be given by experts.
- Construction and repairs should be done/managed by households.
- Technical advice should be given whenever necessary by skilled persons.
- Arrangements should be provided to test quality of stored water in a regular basis

14. **Operations and maintenance**

14.1 Endorsement by experts

3.1.1 Operations

Major components required for this technology are as follows:

- **Catchment area**-

  Catchment area is the roof surface consists of tiles/asbestos/zinc/aluminium/cement. Painted roofs can be used if the paint is non-toxic. Roofs made out of organic materials are not good.
- **Transport system for water** - gutters and pipes (PVC/aluminium)
- **How to prevent reaching contaminants present on the roof into the storage tank:**
  - Close the down pipe with an end cap or valve and discard the first flush.
  - Rain water will be passed through a plastic mesh for screening and then pass through a filter unit (e.g. rubbles, charcoal, coarse sand and rubbles arrange from bottom to top in the filter unit) before collecting in the storage tank.
  - Chemical disinfections can be added to preserve water
- **Storage tank** - Ferrocement tanks/plastic tanks or cheaper alternatives could be used as ground/underground or surface storage tanks.
- **Method for drawing water from the storage tank** - Depending on the type of tank, tap or pump can be used.

20 m^3 - partial underground tank at Maha Oya school(2)

Household surface tank at Komari(2)

Maintenance(3)

- Storage tank should be closed using a lid and should not allow sun light to enter.
- The whole rainwater collecting system should be cleaned at least 2-3 times per year, especially prior to the monsoon/ after a long period of dry weather/ after strong winds.
- Catchment surface and gutters have to be kept free of bird droppings, leaves and rubbish.
- The filter should be changed once in every three months.
- If RWH for piped systems is to be promoted, certain modifications may be necessary.

14.2 Adequacy for current climate

Negative consequences of the adaption option in the current climate:

- Mosquitoes can breed in lidless tanks
- Algae will grow in sunlit water
- Roofs that are inaccessible for cleaning get dirty

14.3 Size of beneficiaries groups

About 100% of population

15. Costs

15.1 Cost to implement adaptation options

Capital cost : Rs. 42000/= per 5 m^3 tank[(3)] (The cost of storage tank depends on its size, quality etc.)

Maintenance cost : Rs. 5000/=

Additional costs to implement adaptation option, compared to "business as usual"

Additional cost is required to:

- Increase the capacity of the tank – depends on the size

Monitoring of water quality – Rs. 3000/= per year

16. Development impacts , indirect benefits

16.1 Economic benefits

- **Employment** – medium (construction, cleaning)
- **Investment -**
  - Medium
  - If suitable roof is available, gutters, pipes and storage tanks are the capital requirements.
  - Operation life of a rooftop rainwater harvesting is 20 years

16.2 Social benefits :

- **Income**
  - Medium
  - Decrease the expenditure for purchasing water from other sources
  - Income through employment (construction etc)
  - Home gardening

- Reduce cost & energy

- **Education**
  - Awareness programs to change public and community attitudes
  - Initial training required should be given by experts.
  - Technical advice should be given whenever necessary by skilled persons
  - School education on this subject – High
  - Research requirement - Medium
- **Health**
  - Medium effect; Decrease in waterborne diseases

16.3 Decrease in waterborne diseases

Environmental benefits

- Impact on ground water quality and quantity –medium (this technology can reduce the pressure for ground water withdrawal)
- Impact on surface water quality and quantity – medium
- Impact on flash flood forming – High
- Release of GHG – very little

17. Local context

17.1 (i) Opportunities

- *UDA* (Amendment) *Act*. no. 36 of 2007[5]
- In Sri Lanka, about 60% of the rain water (around 60 billion m^3) tend to run off finally ending in the sea[7].
- Save time for fetching water and cost
- Improved water quality
- High fluoride concentrations in drinking water and resultant diseases (e.g. Dental fluorosis) have become a common geo-environmental problem in the dry zone in Sri Lanka. Rainwater harvested from roof runoff is a good solution for this problem
- When other water sources are far away from home/degraded quality/unreliable/expensive
- Continuous supply of water
- Reduce flash flood due to rain storms

(ii) Barriers

- Severe droughts
- Inadequate or unsuitable roofing
- Lack of space for appropriate storage containers
- Areas having extreme air pollution (e.g. urban areas)

17.2 Status

- In Sri Lanka, at present supply of water through roof top rain water harvesting is less than 2%
- Capacity of the household water tank in wet zone is normally 5000L and in dry zone it is about 8000L(3).
- Millenium Information Technologival Ltd., Malabe, Maharagama Divisional Secretariat are a few examples for large scale applications(3)
- 20000L and 58000L storage tanks are currently being used in Ampara and Galle respectively(3).
- The roof size, roof material and the rain fall determine run-off rain water content

17.3 Acceptability to local stake holders

Because of the following reasons this technology will be acceptable to stakeholders.

- Low-cost and absence of fluoride and other contaminants in harvested water
- Control flash flood due to rain storms

18. References

(1) Technologies for climate change adaptation-The water sector; Mark Elliot, Andrew Armstrong, Josep Lobuglio and Jamie Bartram, UNEP, (ISBN 978-87-550-3902-5); 2011

(2) Lanka Rain Water Harvesting Forum, 2005

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(4) Water for rural life- 21st March 2009 (The Island, 21-03-2009) http://www.island.lk/2009/03/21/features1.html

(5) *UDA* (Amendment) *Act*. no. 36 of 2007

(6) Development through rainwater harvesting - Sustainable social and economic development for resettlements in North and East through rainwater harvesting (Daily News, 19-09-2009) http://www.dailynews.lk/2009/09/19/fea01.asp

(7) Sri Lanka Water development report-2010, K.A.U.S. Imbulana, N.T.S. Wijesekera, B.R. Neupane and V.K. Nanayakkara; ISBN 978-955-8395-02-

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