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INTEGRATED DEVELOPMENT FOR WATER SUPPLY AND SANITATION

# Water security through rainwater harvesting

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IN SRI LANKA, the present level of water supply coverage stands at 89 per cent in urban and 60 per cent in rural areas. (Minnatullah et al 1998). The objective of the government of Sri Lanka is to provide good quality drinking water to all by year 2010. Being an island nation located in the Indian Ocean, Sri Lanka receives a mean annual rainfall of 1200 mm. Thus, the country has an abundant supply of water. However, there is a large population both in the dry and wet zone where people have no access to adequate good quality water. Provision of adequate, quality water to this population is also becoming difficult due to technical, financial and institutional reasons. Contamination and drying up of small surface water springs have further aggravated the situation for most rural communities. In 1995, the Government, through the Community Water Supply and Sanitation Project (CWSSP) introduced Rainwater Harvesting (RWH) through roof surfaces for domestic use. RWH technology was first introduced in a wet zone village community of 200 families. The initial reaction to RWH technology was negative. However, it was later accepted by the community, with 73 per cent of the population adopting RWH as a source of domestic water.

This paper attempts to explain the improvement in water security of the RWH beneficiary community and show the benefits it has brought to a highland settler community in the central hills of Sri Lanka.

# Status of domestic water for highland communities

Despite having high rainfall, communities in most parts of central highlands do not have access to adequate quality water at homestead. Most of these people have to treck steep terrain 4-5 times a day to fetch water. The first RWH pilot project was set up in a village called Dematawelihinna, situated 2600 ft above sea level. The vegetation in the village was full of large canopy trees with well drained reddish brown earth soils making bulk of the soil type. The village receives a mean annual rainfall of 1751 mm and has five natural springs. The village community is mainly employed in the state and private sector companies as casual labourers and in low income earning categories. The average monthly income per household varies from Rs. 2000-5000 (US\$ 31-78). The village has a population of 204 families, of which 146 are beneficiaries of RWH Project.

According to the village elders prior to 1990 there was no shortage of water to the village. However, since 1990, with



the change in global weather pattern and indiscriminate deforestation in same parts of the central hills, natural springs started to dry-up, specially during the dry season. This situation aggravated annually and adequate water became a scarce commodity.

# Water problems

On a normal day villagers spend around 4-5 hours to fetch 4-5 pots (50-60 liters) of water. However during the dry period they collect water throughout the day including at nights. During this period, households may spend as much as 8 hours per day to collect water. It is a common sight to observe long lines of pots, sometimes 40-50 at a time at natural springs during this period. Water line conflicts is a common occurrence due to unusually large pots brought by some and contamination of spring water, sometimes by children with foreign objects.

#### Water management during scarcity times

Prior to using Rainwater form roof tops, households managed the collected spring water preciously. It was always the housewife or the elder daughter who was responsible for managing the water. These households cooked breakfast and lunch together, water use from washing rice, was used to clean cooking pots and plates, those who own cattle use the water form washing plates to feed cattle. Drinking water was always used sparingly. If drinking water was leftover it was collected for toilet use. All these water saving measures minimized the number of visits to springs thus saving time.

## Impact of water scarcity on social life

During the pre project period, social life of villagers were restricted due to lack of adequate water. This specially effected the women, who were responsible for carrying water. Women could not leave their households even for social or religious functions due to pre occupation in fetching water. They were unable to entertain friends and relations due to water insecurity. At times, young girls had to postpone their carrier development activities due to the responsibility of fetching water. When ever they went out of the village, they had to fetch water to compensate for their time of absence. Hence, it was water that governed their life style before receiving rainwater storage tanks. Besides being a pre occupation for women, fetching water effected children's education too during dry seasons. Often children too were part of the army that collected water, sometimes stretching into the night hours too. In such event children had to sacrifice daily studies, for which they were reprimanded by their teachers.

Though, there were no evidence of water borne diseases due to drinking contaminated water, other physical health problems such as back pains and ligament problems were often reported due to carrying heavy loads on their heads and hips while climbing steep terrain.

# Water supply option to highland settlers

To elevate the drudgery of fetching water, the Government suggested many conventional options to provide water to these highland settlers. Unfortunately, non of the conventional options, Viz: tube wells, dug wells or pump water supplies were feasible due to technical and financial reasons. In fact a feasibility study on a pump water supply was proved feasible technically, if the settlers were willing to pay Rs. 2000 (US\$ 310) for infrastructure and Rs. 140 (US\$ 2) on a monthly basis for operation and maintenance. This option, however, was rejected by the settler community due to financial limitations, this left RWH as the only option to provide adequate good quality water.

The initial reaction to RWH by the community was negative, they posed questions like quality of water due to roof cathement and mosquito breeding in stagnant water. However, with the construction of the first surface Ferrocement tank people began to realise the benefits, thus, responded positively henceforth.

# Institutionalized rainwater harvesting for highland settlers

Having realized that RWH can be the only option available, the Government, under CWSSP implemented the Rainwater Harvesting project to provide adequate good quality water to the Dematawelihinna highland settlers. The approach adopted by the CWSSP was totally participatory and demand driven (Heijnan and Mansur 1998). Rainwater tanks of 5m<sup>3</sup> capacity was given, only to those who opted and were willing to contribute 20 per cent of construction cost. Two types of 5m<sup>3</sup> tanks were introduced for rainwater storage. A surface Ferro-cement tank which cost Rs. 8600 (US\$ 134) and an underground brick-dome tank which cost Rs. 6500 (US\$ 102). The community was expected to provide unskilled labour for construction and install their own roof gutters and down pipes. However, later experiments conducted by development NGOs in drier parts (Rainfall less than 1200 mm per year) of Sri Lanka, community contribution has been much as 50 per cent in some instances (Ariyabandu 1999). This incidentally indicates that with greater need people were willing to contribute more for good quality, adequate and accessible water. At present there are 146 RWH units constructed in Dematawelihinna and over 4000 such units in the District of Badulla where Dematawelihinna is only a small village.

#### Improving water security through RWH

As mentioned earlier, the settlers in Dematawelihinna had to toil hard to fulfill their daily water requirement. At this stage their average water consumption was 28 lpcd (liters per capita day). Since getting rainwater tanks, the average consumption has increased to 42 lpcd. Which means the water consumption of the Dematawelihinna community has increased by as much as 50 per cent. (Table 1).

However, when water used for washing cloths and "Other Purposes" (For animals and small scale home gardening) are excluded the difference in per capita



Table 2. Water use pattern of benef. and nobenef. of RWH units (1pcd)		
Activity	Non-Ben. (1pcd)	Benf. (1pcd)
Drinking	4	4
Cooking	7	7
Washing Face etc.	5	6
Toilet Purposes	6	8
Washing Cloths	4	11
Othor Purposos	0	6

consumption is only 3 liters (13 per cent increase). Hence, it can be concluded that buck of the rainwater is used for washing cloths and "Other Purposes". (Table 2).

The above information was generated form a 15 day continuous monitoring of water use from a 20 household sample in Dematawelihinna. The monitoring was conducted during the dry season, hence, the information represent a typical water use pattern of beneficiaries during the dry season.

The increase in water availability due to RWH has increased the water security for these people. Water security in this instance has been defined as, 'Adequate, timely availability of water to satisfy basic entitlement of people'. The increase water security has given the Dematawelihinna beneficiary community a sense of assurance of water. This assurance has reversed the life style of women from one of toil and hardship to one of leisure, having adequate time for entertainment and social visits. Increased water security has reduced the number of visits to fetch water form natural springs. The time saved due to assured water varies between 40 to 135 minutes per day. (ibid 1999). Much of the time saved is invested in improving quality of life. Mothers, specially, have adequate time to spend with their families and children have adequate time for studies and entertainment. Though the RWH tanks were designed to last a 50 day dry period at 20 lpcd for a family of five, these

same tanks in Dematawelihinna have been used throughout the year mainly due to judicious water use and intermittent rainfall in the area. Thus, the community is now assured of a source of water at homestead available at any time and can be accessed by any body irrespective of age and sex.

## Conclusion

Rainwater Harvesting Units of 5m<sup>3</sup> capacity has given the Dematawelihinna highland settlers the security of water, which has added quality to their otherwise toiled lifestyle. The improved water security has given the users time for leisure and productive use.

This pilot test has proved that Rain Water Harvesting can be a viable option to water short settlers in any part of Sri Lanka. However, demand driven participatory methodology couple with appropriate and adequate roof area (Average 60m<sup>2</sup>) should sustain the RWH as a feasible water supply option in rural Sri Lanka.

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