Case study 4

10,000 litre partially below ground brick built tank, Sri Lanka

Background

This tank was built by Mr G. Victor A. Goonetilleke in the hill town of Kandy , Sri Lanka. Mr Goonetilleke decided to build his RWH tank after experiencing difficulty in sinking a well to sufficient depth to have a reliable perennial source of groundwater at the site of his newly built home. Drilling through the bedrock was too costly and there was no guarantee of securing a reliable supply. After 6 years of carrying water during the dry season Mr Goonetilleke started to research the idea of building a tank to store the rainwater that fell on his roof. There was very little encouragement from friends and neighbours who said that the water would provide an ideal site for mosquito breeding and algae growth. At the time there were no organisations to give advice on

the benefits and drawbacks of roofwater harvesting. Three years after first contemplating the idea of a RWH tank, and after many helpful discussions with an Australian Radio Ham who convinced Mr Goonetilleke that RWH was a viable technolgy (and widely used in Australia), he decided to go ahead and build.

Technical details

The tank

Once the decision was made to build then certain design choices presented themselves. The determining factors for the tank capacity were:

1. sufficient capacity to store 100 litres of water for a period of 60 days

2. sufficient capacity to hold two bowser loads of water during the dry season it is possible to purchase bowsers of water, but storage is required for this purpose. Each bowser contains 5,000 litres of water, but are not always available immediately upon request.

It was therefore decided to build a tank which would hold 10,000 litres. The next choice was what kind of tank to build. Mr. Goonetilleke had 3 obvious choices:

1. an underground tank - this type of tank needs excavation, care is needed to prevent roots penetrating the tank, contamination from ground can occur if not properly sealed, leaks are hard to detect and, finally, a strong cover is required to prevent children or animals from falling in. This type of tank does have the advantage, however, of being unobtrusive and benefitng from the support of the surrounding ground, making it cheaper to build.
2. a surface level tank these require more space and can be ugly, but water is easier to extract under the influence of gravity and leakage is easier to detect. Covers need not be so sturdy, as little weight will be placed upon them.
3. an overhead tank this type of tank is good in as much as little space is needed at ground level and the water is pressurised due to the head of water. They are, however, expensive and it is difficult to transport water

from the catchment system to the tank.

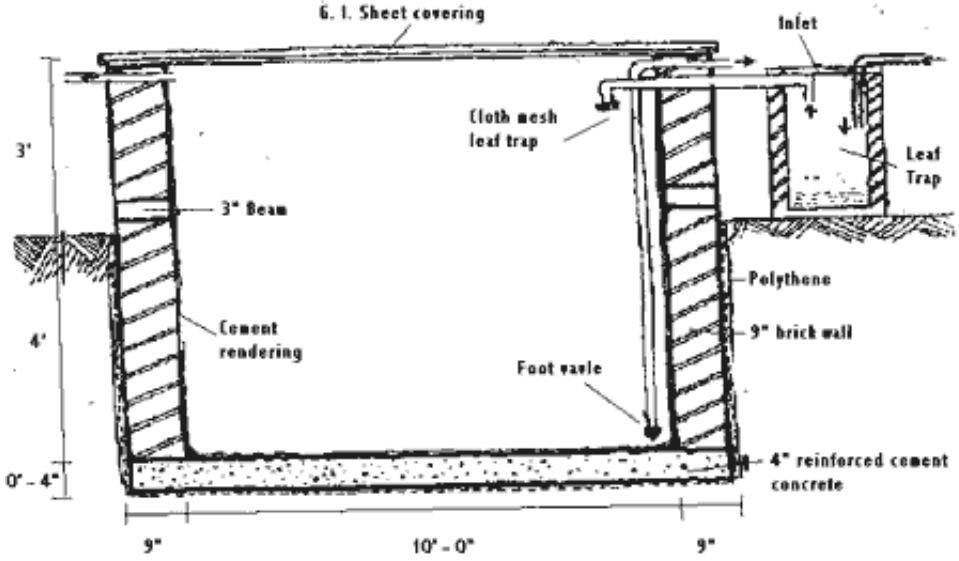

Figure 1 sketch of 10m^3 brick-built tank.

The decision was made to build a tank which combined the advantages of the below ground and the surface tanks. Figure 1 shows a plan of the tank which

was eventually built, partly below ground with 3 foot walls protruding from the surface of the ground. The next choice was what material to use for constructing the tank. Locally available plastic tanks were expensive and so Mr Goonitelleke decided to hire a mason to build a brick tank with a concrete base. Bricks are available locally.

The tank has a 4", 10 foot square, concrete base which is reinforced with ribbed steel bar. Polythene was laid underneath the concrete and brought up to ground level. The walls of the tank are of 9" brickwork. A 4" concrete ringbeam was cast at ground level to give added strength. The gap between the walls and the excavated pit were lined with concrete to allay fears of root penetration. The wall was then continued to 3 foot above ground level. The inside of the tank and exposed external walls of the tank were rendered no waterproofing additive was added. The tank was covered with some galvanised steel sheets. A pump was fitted to pump water to a header tank situated in a tower near the house (which also houses an old 200 litre oil drum which collects rainwater for irrigating the garden). The overflow from the main tank goes into a shallow ditch where there is a flourishing stand of bamboo.

The total cost of the system was around Rs. 25,000 (US$550), but Mr Goonetilleke says that minimum cost was not the primary objective.

The roof and guttering

The roofing material is asbestos sheeting with an area of about 2000 square feet being used for catchment which is half the total roof area. S-lon brand, PVC, U-channel guttering is used to catch the water and the downpipe leads to a 1" PVC pipe (not ideal but it was freely available at the time) which then transports the water to the tank. The first flush system is a simple connector which enables the pipe to be diverted to the garden pond. The filtration system is simply a piece of mesh and some discarded mosquito net, but the aim is to improve on this.

Maintenance

During the 4 years the tank has been in use there has been no need for any major repair. The tank is cleaned once or twice a year and the cover is swept of leaves and dust regularly. Internal inspection of the tank is easy because of the low walls.

Uses for the harvested water

The water is used for mainly for washing and bathing and is occasionally used for drinking, but is then boiled. During the dry season waste (grey) water is used for watering the plants. There is little need to be overly conservative with the water because it is possible to order a bowser when the water level gets low (4500 litres at a cost of approximately US$7.00), although so far this has not been necessary.

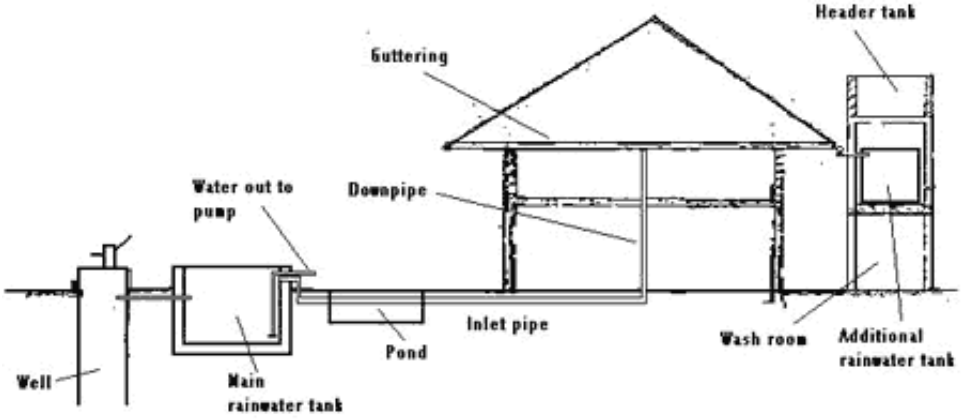

Figure 2 Sketch showing the whole scheme including the water tower

Mr. Goonetilleke gives the following suggestions for improved awareness of RWH techniques:

- better information dissemination and educational awareness should be carried out at all levels.
- where possible, credit and technical advice should be made available in conjunction with other incentives.
- more concern should be given to the improper application of treated water there is no need for water to be of exceptionally high standards if it to be used for clothes washing or bathing.
- architects should be aware of the principles of RWH and incorporate the technique in the house design where this is appropriate.
- care and attention are necessary (moreso than money), to maintain and improve the quality of harvested water.
- there are many myths associated with the concept of RHW which can be easily dispelled when the technology is put into practice.

Source: Mr. G. Victor A. Goonetilleke, Rainwater Harvesting, a case from

Pilyandala, Proceedings of the Symposium on Rainwater Harvesting for Water Security, February 1998, Lanka Rainwater Harvesting Forum and the Open University of Sri Lanka.

(return to top of document)

(return to Case Studies main page)

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