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REACHING THE UNREACHED: CHALLENGES FOR THE 21ST CENTURY

Rainwater harvesting and empowerment of women

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INDIVIDUAL COMMUNITIES HAVE long practised rain water harvesting on a small scale, as a traditional method to improve availability of water. Over the past few years increased attention has been directed towards water harvesting systems, as a possible supplement or alternative to ground water sources. Yet its potential has only marginally been utilised. Water harvesting systems largely focus on the technology of roof-top catchment area and storage. Rain water collected effectively can save communities the strain of trekking to distant and unsafe water sources.

This paper deals with our experience of rain water harvesting in Nagercoil, which is situated about 180 kms. from Trivandrum towards Kanyakumari. Nagercoil has a hilly terrain. Water is available at a great depth and it also has problems of excess iron / fluoride associated with it. The habitations at Nagercoil were in small clusters. These clusters were spaced far apart. The above parameters made conventional systems uneconomical.

Rain water harvesting was selected as the appropriate technology for this area on the following basis.

Handpumps though cost effective could not be considered for this area, the poor quality of water would need treatment plants which the community was ill-equipped to maintain. Nagercoil was fortunate to have a biannual rainfall.

The second step was to select the material in which this water would be stored. A quick look at the existing material indicated:

Type of Tank	*Cost per litre*
M.S. Sheet	Rs.2.50 to 3.00 or $.07 - .08
Reinforced concrete	Rs.2.75 to 3.50 or $.08 - .1
HDPE	Rs.3.50 to 4.00 or $.1 - .12
Ferro Cement	Rs.1.00 to 1.50 or $.02 - .04
Brick masonary	Rs.2.00 to 3.00 or $.05 - .08
Glass fibre reinforced plastic	Rs.4.00 to 4.50 or $.12 - .13

Based on the above ferro cement was selected for the containers.

The initial structures were mostly $10m^3$ in capacity with a few $5m^3$ structures where the roofs were small. If we assume that an individual needs 5 litres of water per day for drinking, and an average family has 5 members, then the family's drinking requirement is 25 litres per day. A $5m^3$ structure can provide drinking water to a family for 200 days, while $10m^3$ is adequate for a complete year.

The initial 60 structures were constructed by the masons, while women worked as head load carriers, helping in mixing of sand and cement.

A visit to Auriville Ashram resulted in the idea that women presently working as head load carriers be trained in masonry skills. This was discussed with the women and they responded eagerly. Auriville Ashram Pondicherry was willing to train women provided they came to the ashram for a 15-day stretch. This posed difficulties as most of the women had small children or family members dependent on them.

At this stage CAT (Centre for Appropriate Technology) the NGO group from Nagercoil which had supported this activity, undertook the responsibility of training twelve women in masonry skills. The engineer and mason from CAT guided and encouraged by their Chief Executive conducted the training over a 15-day period. During this period they learnt to construct doors, roofing sheets and water retaining ferro-cement tanks.

This small group of women gained skills in the construction, maintenance and repair of their own structures and were subsequently able to find employment themselves as masons. UNICEF supported the training by paying the women Rs.35 or US$1 per day during the training period. At the end of the training each group of three women was provided with trowels (small and medium), long strip, pan, sieve, wire tying key, tamping rod, chisel, bar bending key, mesh cutter, spirit level and plumbing bob. This entire set per group cost Rs.1000 / or $29.

UNICEF supported training enabled several communities to provide themselves with safe drinking water in addition to enhancing the confidence and status of the women involved.

The entire process of construction consisted of prefabricated moulds which were assembled at site. Chicken wire mesh was wound around this structure. Cement plaster was applied and once the plaster had set the mould was removed and plastering was done from the inside. The women's group was comfortable with this method of construction.

A few simple inputs like numbering the mould pieces helped in assembly, light roofing material was used instead of GI sheets to keep the moulds lighter and they preferred to use a long piece of tubing filled with water for establishing levels rather than a spirit level and tape.

The initial structures were not very tidy but certainly capable of holding water. In all this group constructed about 60 structures. Two women masons went on to find full time employment for low cost housing. Rain Water Harvesting developed as a community project with participation from beneficiaries. The beneficiaries contribute

Table 1. Abstract of cost

Item No.	*Sub heads of estimate and items of work*	*Qty.*	*Rate Per (Rs.)*	*Amount (Rs.)*
1.	Bricks for sump & side wall	80	1.50 - No.	120.00
2.	Cement	11.2	130/- - bag	1456.00
3.	Gravel 40 mm size	0.87	150/- - m^3	130.50
4.	Gravel 20 mm size	0.27	200/- - m^3	48.00
5.	Sand	1.23	250/- - m^3	307.50
6.	Chicken mesh	33.3	25/- - RM	832.50
7.	Tap 12 mm dia.	1	45/- - No.	45.00
8.	G.I. pipe 12 mm dia.	1	35/- - mts	35.00
9.	G.I. pipe 20 mm dia.	0.5	43/- - mts	21.50
10.	Coupling (12 mm & 20 mm)	one each	lump sum	40.00
11.	Ply 20 mm size	1	740/- - No.	740.00
12.	Labour charges: i) Mason for 4 day ii) Beldar for 4 days	 4 4	 80/- - day 35/- - day	 1280.00 560.00
			TOTAL	**6102.76**

10m^3 structure costs Rs.6103/- or $180 per family.

labour for construction of sump, take total responsibility for curing of the structure and provide the filter unit that must be installed between the roof and the tank.

All harvester surfaces, being exposed to atmosphere throughout the year are subject to contamination by dust, insects and birds. The first flush of the new rains should be run to waste. Tanks should be fully enclosed to prevent evaporation. All apertures should be screened to prevent the access of mosquitoes, rodents, lizards and other life.

Modifications were made to the initial design by providing a byepass which would need to fill up first before the water was diverted to the storage tank.

It was found that the use of moulds further cuts down the cost of reinforcement and the cost of ferro-cement structure worked out between 60 / 65 paise per litre, which is almost half the cost envisaged earlier.

Enclosed is an abstract of the cost developed in 1995.

To enhance the confidence of the users in the quality of water provided, they were encouraged to use the vials developed by All India Institute of Public Health & Hygiene, Calcutta. These vials are very simple to use and by a change in colour from yellow to black the beneficiary can know if the water sample has been contaminated. In case the sample is contaminated chlorination is suggested at the rate of 4 mg / litre.

In conclusion rain water harvesting can be used where ground water is not available or of poor quality. Difficulty in drilling due to terrain conditions. As a supplement to existing system which may be overburdened.

There is no cut off point for rain water harvesting. Rainfall can be collected to last for a year, six months or just the peak summer period.

The benefits of this scheme could be assessed with the following parameters:

- Employment and / or building up of local skills through the water harvesting system.
- Increased local self reliance in water supply.
- Increase in local organisation capacity and community cooperation in developing and managing their own service.
- Time saved in collecting water, which can be invested elsewhere.
- Lower management and maintenance costs.