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AFFORDABLE WATER SUPPLY AND SANITATION

Spill-water recycling

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"ALL OUR LABORATORIES are devil's paradise unless they serve the poor." Gandhiji.

In order to serve the poor, our laboratories must generate innovative technologies or modify the existing ones to suit location-specific requirements and transfer the new technologies to rural areas. This paper presents one such effort made to tide over the twin problems of water stagnation around the community source on the one hand and shortage of water on the other.

Waste-water stagnation around a community water source is caused primarily by the spill-over from water pitchers. A rural family around Gandhigram collects 8 to 20 pitchers of water every day (1992). On an average, while filling a pitcher, two litres of water gets spilled. Accordingly, at a source serving 50 families, around 800 to 2000 litres of water gets spilled. Day in and day out, when the activity is continued, this water accumulates, creating serious environmental problems - water stagnation around the source leading to contamination of water at source and mosquito breeding.

Figure 1. Spill-water stagnating around a hand-pump

The spill-water is not heavily contaminated; it contains primarily the mud and the dirt on the feet of the water carrier. Therefore this water can be easily and inexpensively purified and made available for uses other than drinking and cooking, thereby effecting considerable conservation of water resources.

Principle

The technology of recycling spill-water is very simple. If the spill-water, after separation of bigger-sized foreign materials, is allowed to move slowly through a filter column of graded granite chips, a major portion of the solid impurities would get trapped in the filter medium by gravitational force and statical blockage and the water that is let out would be clear and usable.

Since bacteria have greater attraction towards silt and dirt rather than to water, they will also be held up in the filter bed thus resulting in improvement in water quality.

Procedure

Figures 2 and 3 show a spill-water recycling unit at a water source.

Three units with provision for inlet and outlet slots form the system for recycling the waste-water. The first unit is designed to remove solids and silt; the second unit facilitates filtration by forced flow through graded granite chips placed in order; and, the third unit collects the filtered water. The supernatent water from the third unit can be taken by a pipe-line to a convenient place for storage and use.

Construction

The construction of a spill-water recycling unit is simple. The device consists largely of simple masonry structures which can be prefabricated. The precasting of the units can be done using very simple techniques. Ferro-cement skeletons of the units can be fabricated using mild steel rods / wires, preferably welded or tied together with wires to the desired dimensions. Chicken-wire-mesh is spread over the structure so as to retain the cement plaster in shape. This moulded structure has to undergo the usual watering, curing etc., before it is ready to be installed.

The unit can be installed at convenient locations considering the elevation and slope required for steady and slow movement of water. By adjusting the length and breadth of the filter column the technology can be further adapted to locational requirements.

The units need to be cleaned and recharged periodically. The methods are very simple, like back-washing and disposal of muddy water. The leach pit connected to the first unit facilitates easy disposal of muddy water through absorption by surrounding soil.

Effect of recycling

Eighty per cent of the water wasted at a source can be easily realised for reuse with this technology.

Effect of recycling on water quality

Parametres	Before recycling	After recycling	Reduction of impurities in %
Bacterial count (MPN/100ml)	$1609x10^4$	$240x10^4$	85.08
Total solids (gms/100ml)	0.0245	0.0125	48.97

The filter medium acts both as a mechanical barrier and as a biological one and facilitates purification of the water fed into the system.

A spill-water recycling unit is basically a community project. So, before installing a unit, the readiness of the community to maintain the system through regular cleaning is to be ascertained. One way of ensuring regular maintenance of the spill-water recycling unit is to enjoin it on the personnel employed under the social forestry programme or similar economic programmes requiring water.

Several communities around Gandhigram have accepted the concept and technology of spill-water recycling and are using the recycled water for laundering and pisciculture. In an institution at Gandhigram recycled spill-water from a single hand-pump has been used for watering trees and about 300 saplings could be nurtured in this dry area where, normally, water had to be procured from outside even for essential requirements. Several other organisations have also sought assistance in installing spill-water recycling units.

Conclusion:

Since water which would otherwise have been wasted is conserved and reused, the technology becomes relevant and meaningful for environmental upgradation.

Reference

1. Kamalamma, N. and WVarma Raja, E.K.N. (1992). Spill-Water Recycling. Gandhigram Rural Institute, Gandhigram.
2. Kamalamma, N. (1993). Soakpit and Spill-water Technology. Gandhigram Rural Institute, Gandhigram.

Figure 2. Sectional view of the filter.

Figure 3. Isometric view of the filter.