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# A FRUITFUL TURNED DREADFUL

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***Abstract***

*Sub – surface water serves as the major water potential nowadays. As there is depletion of this source, recharging is being implemented under the name Rain Water Harvesting. Quantity of recharging water is given priority but at the same time the quality of recharging water is left unconsidered.*

*As there is no proper sewer system, the sewage is being released into the rain water harvesting pit and the recharging pit, thus it is being converted into a sewage collection pit. It has been proved that the leachate will contaminate the subsurface water. when the recharging pit itself forms a dump house, the leachate is generated. It gets diluted by the rainwater thereby the percolation becomes faster and hence contamination occurs at a faster rate.*

*Rainwater harvesting is implemented as law and people are not aware of the deterioration of the water quality. Hence a fruitful is being turned dreadful.*

## 1. INTRODUCTION

The word '**water**' is occupying very great space and time in the newspapers and electronic media over the last decade and its prominence is going to increase in the years to come. Water is one of the five elements constituting the universe, which has made possible the existence of all forms of life including human beings. Small battles have already started within the state and among different states of our country over the use of water. A free commodity was being obtained at the cost of nature and nowadays its demand has been raised to that of fuel.

## 2. RAINWATER HARVESTING AND ITS SCOPE

All the developments that are proposed nowadays look forward towards sustainable development. In the same way, 'Rain Water Harvesting' is the project paving the way for groundwater recharge, a sustainable development towards the problem of water scarcity in the near future.

**Scope Of Rainwater Harvesting**

- To maintain or augment the natural ground water as an economic resource.
- To combat adverse conditions such as progressive lowering of ground water levels, unfavourable salt balance and saline water intrusion.
- To provide a localised subsurface distribution system for established wells

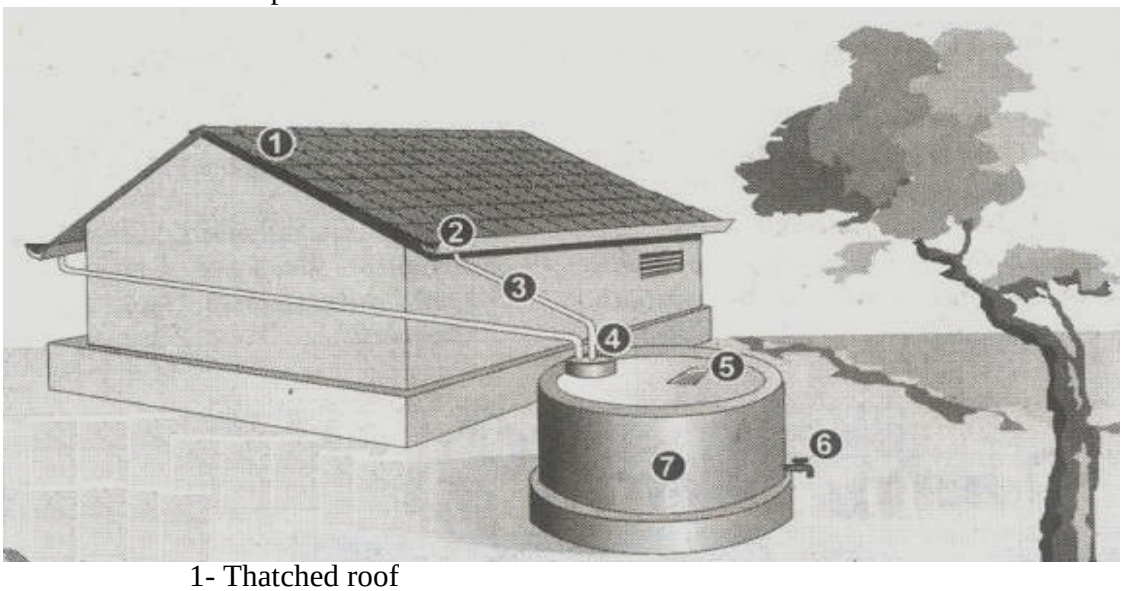
**3. GUIDELINES IN IMPLEMENTATION PATTERN**

Based on the type of building, the government has suggested implementation patterns. The patterns are described as follows.

**Individual Housing:**
From Tiled or Thatched Roof:

The rainwater from the roof is collected through storm water pipes and they are filtered through filter bed. The filtered water is collected in a sump. In case of thatched roof, a polyethylene roof covering shall be used to prevent the entry of leaves and straws.

To reduce the cost the recharging water can be discharged into abandoned wells, which are not used as a dump house.




1- Thatched roof
2- Gutter
3- Storm Water pipe
4- Filter
5- Vent Hole
6- Tap
7- Storage Tank

**Implementation Pattern- Tiled Or Thatched Roof**

Terraced Houses

***a. Recharging Through Open Wells***

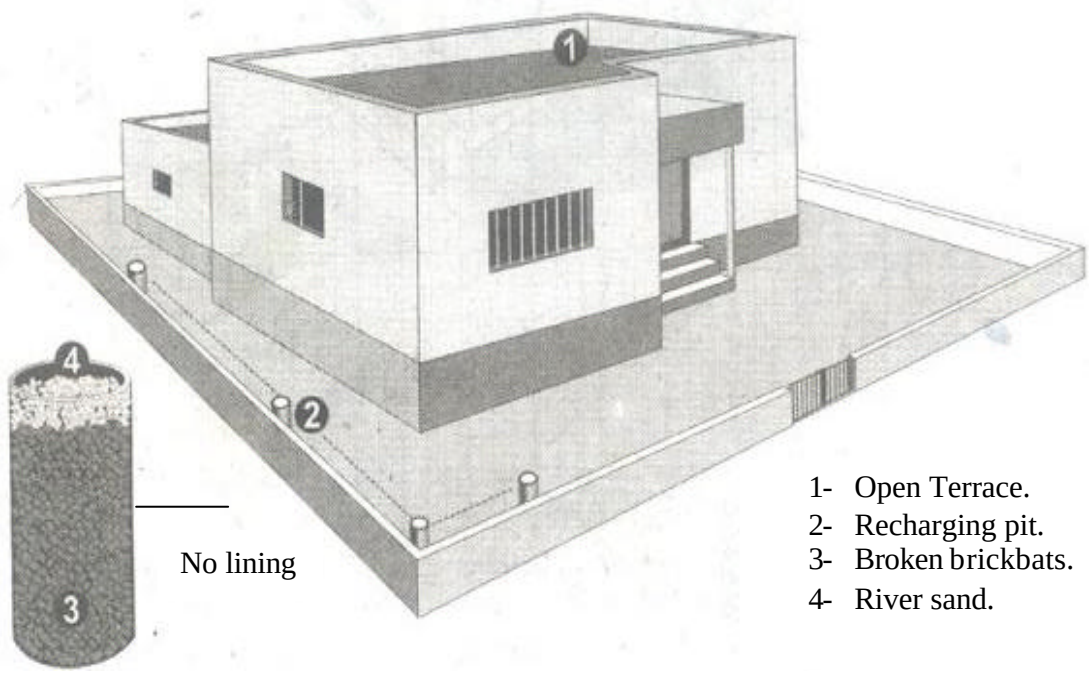
*Rainwater from the terrace is collected through storm water pipes and allowed to pass through a filter bed. The minimum size of the filter bed shall be 2'x2'x3'.*

It shall be packed with broken stone, pebbles for 1m depth, over which river sand shall be packed. The filter tank can be covered with concrete slab. This water can be discharged in to a sump or open well.

***b. Recharging Through Recharge Pit***

Recharging pits shall be constructed with a size of 3'x3'x4'6". It is

packed with filter media, with particle size increasing from top to bottom.




**Implementation Pattern – Terraced Roof**

Recharging pits are provided flush with ground level at intervals all around the building. Necessity of lining and covering the top of pit has not been mentioned.

The above method is suitable for sandy and gravel soils.

**For Mass Housing or Apartments:**

***Recharge Trench With Pebbles And Sand:***

a. Clayey soils

The recharge trench is of width 3.5’ and depth 6.5’.For a depth of 2.5’ at bottom, pebbles are packed and the rer th sand. Below the trench unlined bore well of diameter 150mm is he bore well shall be provided at an interval of 10’ to 15’

R.C.C.slab

Sand

Broken brickbats.

ern - Clayey Soils.

b. Sandy soils

In case of sandy soils, the trenches are provided all around the building with a width varying from 1’to 3’ and depth varying from 3’ to 4.5’. Filter media comprising of broken jelly and sand are provided. The top of the trench shall be covered with perforated concrete slab.

**On Road Side**

A Bore hole is drilled using an Auger and the recharging trench is packed with broken jelly. The top of the trench is provided with grating. This harvesting technique is adopted to collect the excess floodwater that is flowing on the road surface.

*4. MALFUNCTIONING OF THE RAINWATER HARVESTING SCHEME*

It has been mentioned that unless the recharging pit is closer to a sewer line or any disposal point, it can be constructed flush with the ground surface.

**Sewer line, Recharge pit - closer**

The ground water recharging system is enforced as a law. Hence people have constructed the recharge pit for the law's sake. As proper drainage facilities are not provided throughout the rural areas, psychologically the people have the tendency to turn their drainage channel towards the recharge pit to minimise the land usage. Hence the recharge pits are converted into soak pits.

The details of the lining of the recharging pits has not been prescribed. When the recharging pits are closer to the sullage disposal point, the penetration of such waste takes place at a faster rate and hence the ground water is subjected to contamination.

In villages where open dumping in low lying areas is a practice, without knowing the significance they start dumping the waste in the pit provided for recharge.

Solid Waste Dump House

*5. POLLUTANTS TO THE GROUND WATER*

Recharging pit adjacent to sullage disposal points pollutes the ground water by increasing the nitrate, chloride and sulphate concentration, which are produced as by-products of decomposition of organic matter.

Organic and inorganic wastes in the dump house decompose and form the leachates. As water percolates through the waste during the downpour, it dissolves soluble compounds and the degradation products of chemical and biochemical reactions that take place in the waste. Especially, the domestic solid waste gives rise to highly polluting leachates. Leachate can pollute groundwater if water moves through the recharge pit.

When the recharge pit is converted into a soak pit, the decomposition of the sullage gives rise to BOD, COD, Iron, Manganese, Chlorides and Nitrates. The recharging through this pit increases the rate of penetration of the pollutant into the ground water, which is unavoidable.

The recharge pit constructed on either side of the highway becomes the most dreadful polluting source to the ground water. Pollution of an aquifer by spilled LNAPLS can increase by slow dissolution in ground water. A single spill has the potential to contaminate a very large volume of ground water. LNAPLS (Light Non Aqueous Phase Liquids) are petroleum products, which will pollute the ground water at relatively shallow depth.

Road side Recharge pit

*6. FOR SUSTAINABLE DEVELOPMENT*

The ground water forms an important source of water supply, and to prevent depletion from this, ground water recharge is necessary. At the same time precautionary steps have to be taken to prevent the entry of the pollutant in to the source. Ground water tends to move very slowly and as such it may take many years to affect the sources of water before the polluted water shows up in the well. At the same time, it may take many years to rehabilitate contaminated aquifers even after the source of the pollution have been eliminated. This long delay can force abandonment of wells and may require costly development of alternative water supplies.

Precautionary steps include,

- Not only enforce the recharge of ground water as law, but educated people about the do's and don't's of the recharge, and the consequence they would face if the ground water is polluted.
- Recharge pit has to be raised about 1 foot above ground level to reduce the surface pollutants entering the ground water.
- Filter media provided has to be revived according to the geological condition of the particular area.
- It should be made compulsory that all the recharge pit has to be covered by a mesh to prevent the dumping of solid waste in to it there by leachate pollution can be prevented.
- Disposal arrangement for both sewage as well as solid waste in all areas has to be properly planned and executed.

**7.CONCLUSION**

"Water itself is not bothered about its future and it is only we who shall bother about its future." India is still a developing country where valuable programmes are implemented under poverty. Rainwater harvesting system is a valuable system where recharge of ground water is aimed for. Due to negligence and ignorance of the people we can not reap the entire benefits for

which the programme is intended. By rectifying the above situation we can aim for better sustainable development in recharging the ground water.

Hence, it is in the hands of the budding engineers and environmentalists to educate the people and to come up with innovative technology for a prosperous India.

**8.References:**


1. Dr.G.N.Pradeep Kumar, M.I.S.H., M.Thiruvengadam and K.Rama Raoh "Experimental study on dispersion of conservative pollutant through porous media." in Indian water works association journal, June – Sep 2003.
2. T.I.Eldho " Ground water contamination – the challenge of pollution control and protection" in Indian water works association journal, April – June 2001.
3. Sri B. Srinivasa Reddy, Presidential address at the 35th Annual Convection IWWA at New Delhi "Water: its Future" in Indian water works association journal, April – June 2003.
4. David Keith Todd, "Ground Water Hydrology".
5. Pamphlets of "Tamil Nadu Water Supply and Drainage Board".
6. Reviews in all Leading News paper.