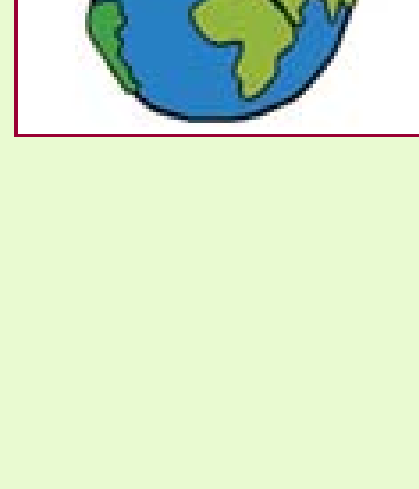


## HARVESTING RAINWATER



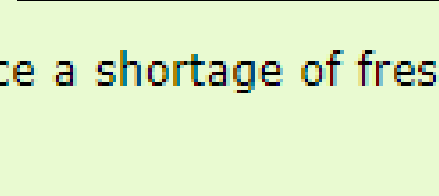
Water scarcity is a serious problem throughout the world for both urban and rural communities. More and more water is required for domestic, construction and industrial use. The rate of withdrawal is far in excess of the rate of recharging the water table. In India, water is considered divine and referred to as thirtha. But, there is nothing holy in our treatment of our water sources. Pollution and overexploitation have shrunk the availability of clean and potable water to a trickle.

Urbanization has resulted in overexploitation of ground water, reduction in open soil surface and water infiltration rate and a resultant deterioration in water quality. Apartments and industrial units face acute water shortage forcing them to spend considerable amounts of money to purchase water from municipal and private water suppliers. The rural scenario is equally grim. The population explosion necessitates a proportionate increase in food production, which in turn demands more land, more fertilizers and pesticides and more water.

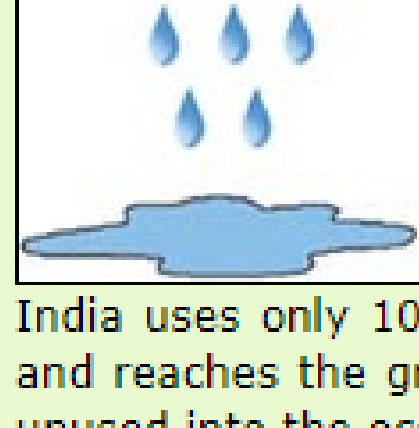
Water covers about 3/4 of the earth's surface, but only about 2% is fresh water, and a larger portion of it is polar ice. 86% of Asia's fresh water is used for agriculture, 8% for industry and 6% for domestic purposes.

Our country uses 83% of fresh water for agriculture.

Fresh water, once considered an inexhaustible resource, is now fast becoming a rare and scarce commodity. The water policy of the Government of India puts a norm of 180 litres per capita for our domestic needs. But it is not possible to supply even 100 litres per day even in urban areas. 30 million Indians spread out over an area of 7 lakh sq. km., mostly in the west and north west regions, face an acute scarcity of potable water especially in the summer months.



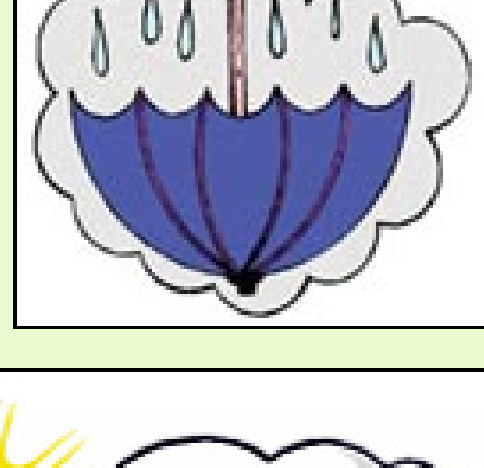
An United Nations estimate says that by the year 2025 two thirds of humanity will face a shortage of fresh water. At present one third of the global population is facing water stress.



How are we going to face the problem? How are we going to increase the ground water level? The main source is precipitation, in the form of rain or snow. The annual rainfall in India is 400 million hectare metre (mham.). This rainwater can be used to recharge the ground water, by adopting a simple technique called rainwater harvesting. Rainwater harvesting means making use of each and every drop of rainwater to recharge the groundwater, by directing the rainfall to go into the well or under the ground, without wasting the rainwater.

India uses only 10-20 percent of its annual rainfall. When it rains, only a fraction of the water percolates and reaches the ground water aquifers, while the major part of the rainfall drains out as run-off and goes unused into the ocean. Further, lack of adequate storage facilities necessitate water being let into the sea to prevent breaching and flooding. The increasing numbers and depth of borewells and wells and their unrestricted use threaten India's ground water resources.

The problem of ground water depletion in the city and elsewhere can be best tackled by harnessing every drop of rainwater for the purpose of artificial recharge of the water table.



In India owing to erratic monsoon rains, sudden and heavy downpours result in flash floods and voluminous flow in the rivers. Ultimately the water is let into the sea, even though many parts of the country have little or no drinking water for almost six months in a year. Village women walk miles to fetch a pot of drinking water while city dwellers lose sleep and time waiting in serpentine queues for a bucket of water. Access to sufficient clean water is everyone's right.



### Artificial Recharging

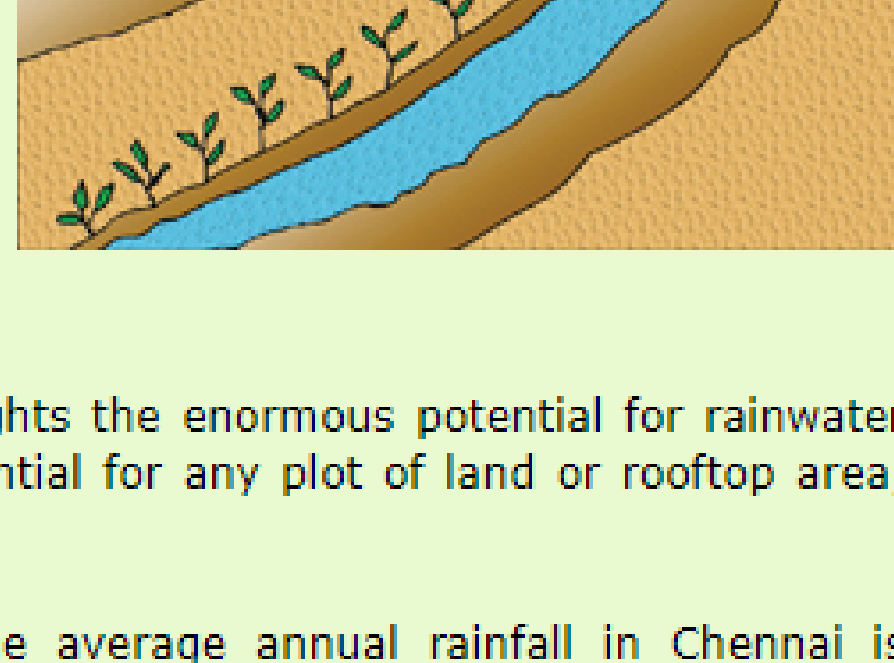
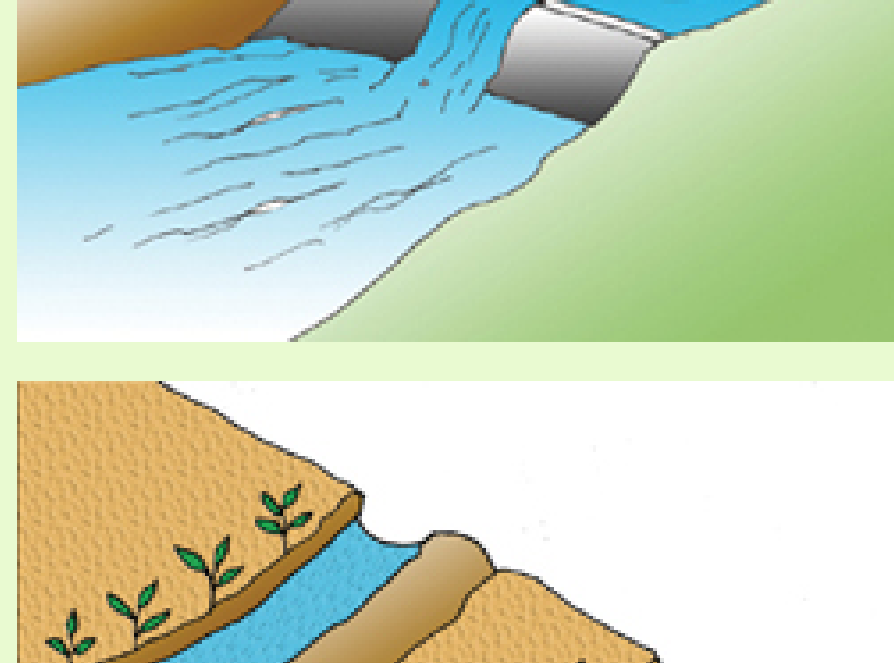
Artificial recharging to augment ground water resources has become a necessity and we should therefore develop and popularize some of the cost effective rainwater harvesting methods in urban and rural areas. The main objectives of rainwater harvesting are

- To conserve the surface run-off during monsoons
- To recharge the aquifers and increase availability of ground water
- To improve the quality of ground water where required
- To overcome the problem of flooding and stagnation of water during the monsoon season
- To arrest salt-water intrusion

Various methods are available to recharge the water table by increasing the rate of infiltration. The artificial recharge can be achieved by obstructing the flow of water, by storing the water, by spreading the water or by injection through wells and borewells.

The following are some methods used to recharge the ground water

- Pebble bed method
- Percolation pits
- Recharge wells
- Ridges and furrows
- Check dams
- Gully control/stone wall structures
- Contour bunding, trenching
- Land flooding



### How much water can be harvested ?

The following is an illustrative theoretical calculation that highlights the enormous potential for rainwater harvesting. The same procedure can be applied to get the potential for any plot of land or rooftop area, using rainfall data for that area.

Consider a building with a flat terrace area of 100 sq.m. The average annual rainfall in Chennai is approximately 1100 mm (44 inches). In simple terms, this means that if the terrace floor is assumed to be impermeable, and all the rain that falls on it is retained without evaporation, then, in one year, there will be rainwater on the terrace floor to a height of 1100 mm.

Area of plot = 100 sq.m.  
Height of rainfall = 1.1 m (1100 mm or 44 inches)  
Volume of rainfall over the plot = Area of plot x Height of rainfall  
= 100 sq.m. x 1.1 m = 110 cu.m.(1,10,000 litres)

Assuming that only 60% of the total rainfall is effectively harvested,

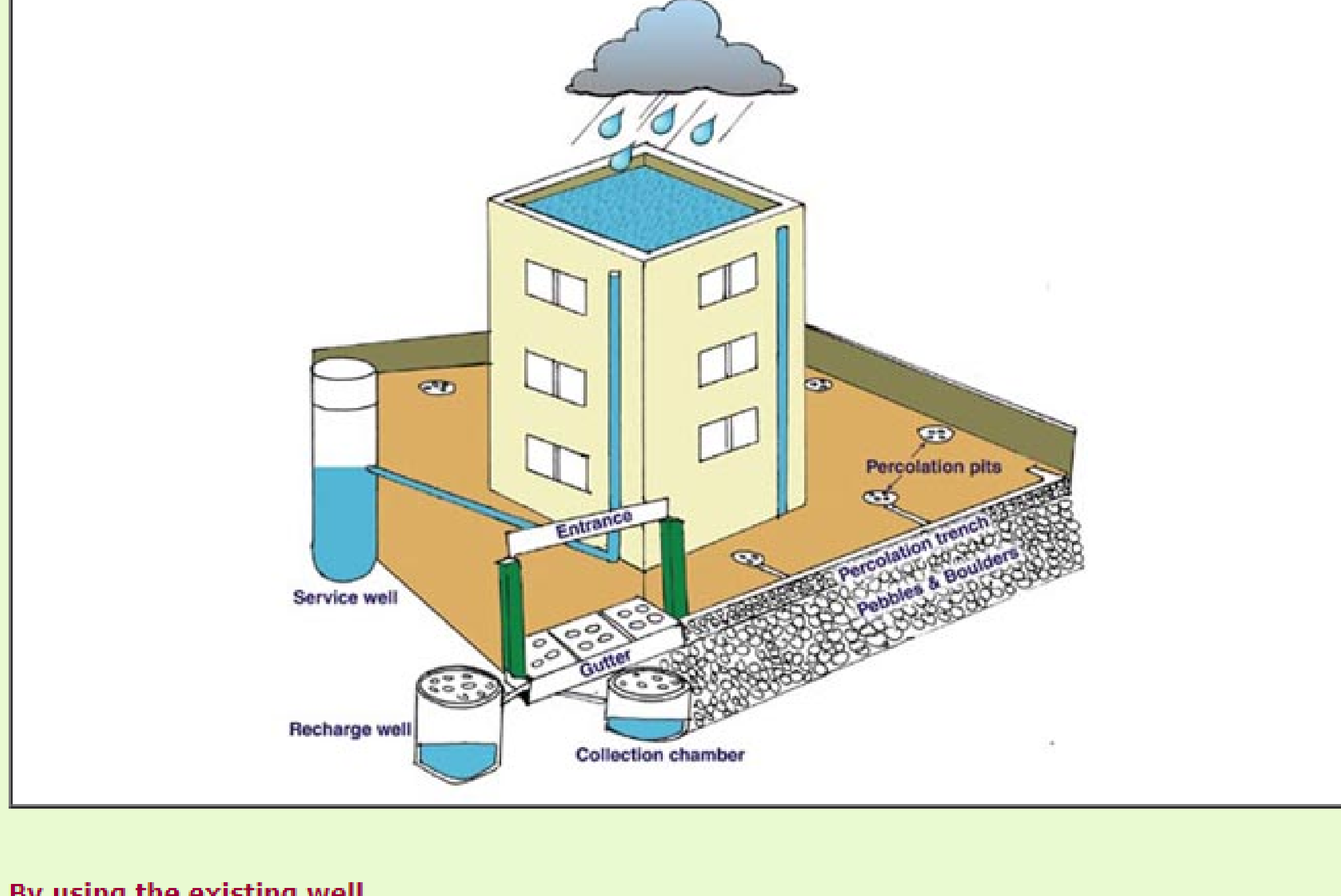
volume of water harvested = 66,000 litres

This volume is about four times the annual drinking water requirement of a five member family. The average daily water requirement per person is 10 litres according to IS 1172: Indian Standard Code of Basic Requirements for Water Supply, Drainage and Sanitation.

Adapted from A Water Harvesting Manual for Urban Areas - Case Studies from Centre for Science and Environment, New Delhi.

### Rainwater harvesting

The main aim of water harvesting is to conserve rainwater in the areas where it falls so that it may satisfy local needs. Harvesting rainwater and recharging the water table can be achieved through the following methods.



#### By using the existing well

The run-off water from rooftops can be led into the existing well through pipes and a small settling pit to filter the turbidity and other pollutants. In this cost-effective process we not only conserve the precious rainwater but also help to increase the local ground water table. Even an abandoned well can be used for this purpose.

#### Through percolation pits

Percolation pits (1m x 1m x 3m) may be dug a little away from the building. The pit is then filled with brick jelly/pebbles followed by river sand for the purpose of better percolation. The top layer of sand may be cleaned and replaced once in two years to remove the settled silt for improving the percolation.

#### Decentralized percolation trenches

This method can be adopted by those who reside in houses with large open areas. Run-off water from the rooftop can be diverted into bare soil/ garden in the premises. Apart from this a longitudinal trench of 1.0m depth and 0.5 m width may be dug at the periphery of the plot and filled with pebble stones and sand in order to store the excess run-off during rainy season that will eventually percolate into the ground.

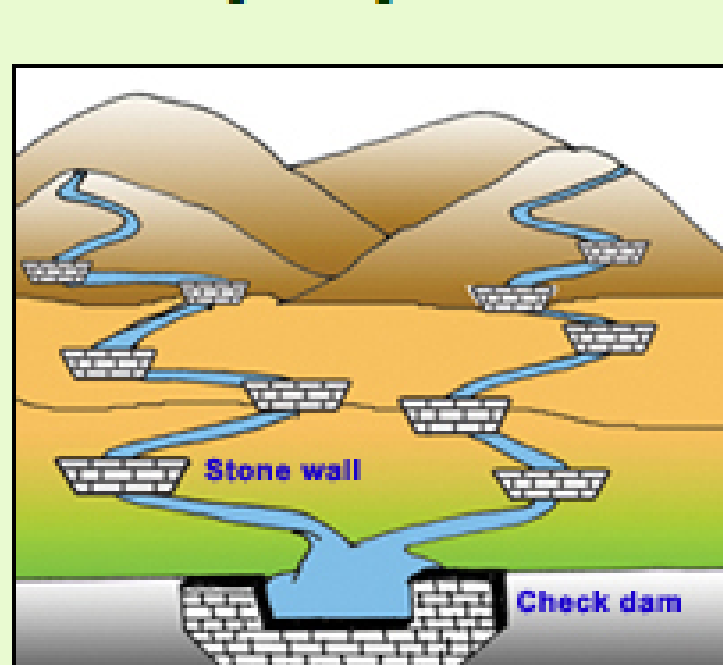
#### Other methods of utilizing rain water

- Run-off should be diverted into suitably designed structures near pavements, parking lots, parks, play grounds, etc.
- Rainwater can also be stored in underground storage tanks (water sumps) for a few months and used directly for washing, flushing and other domestic purposes. Industries, multistoried buildings, various offices, etc., can implement this cost effective method, as they depend mostly on ground water for their needs.

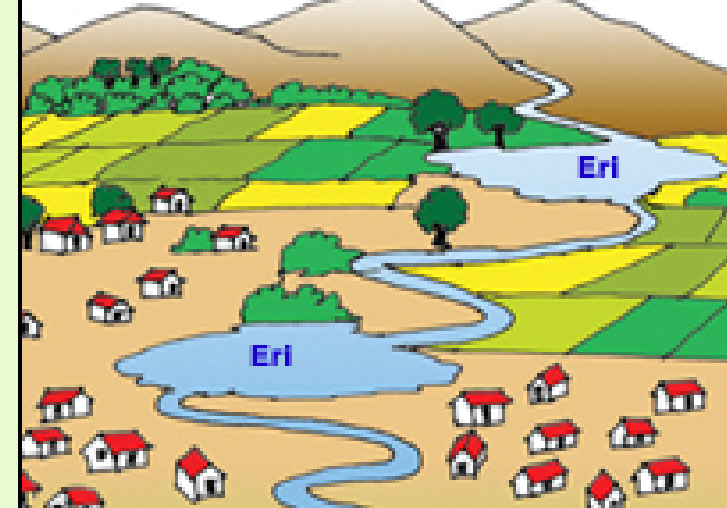
Harvesting and conserving water is every individual's duty. Every drop of rainwater is precious - save it. It might be the very drop that will quench your thirst one day.

### VARIOUS METHODS OF RAINWATER HARVESTING

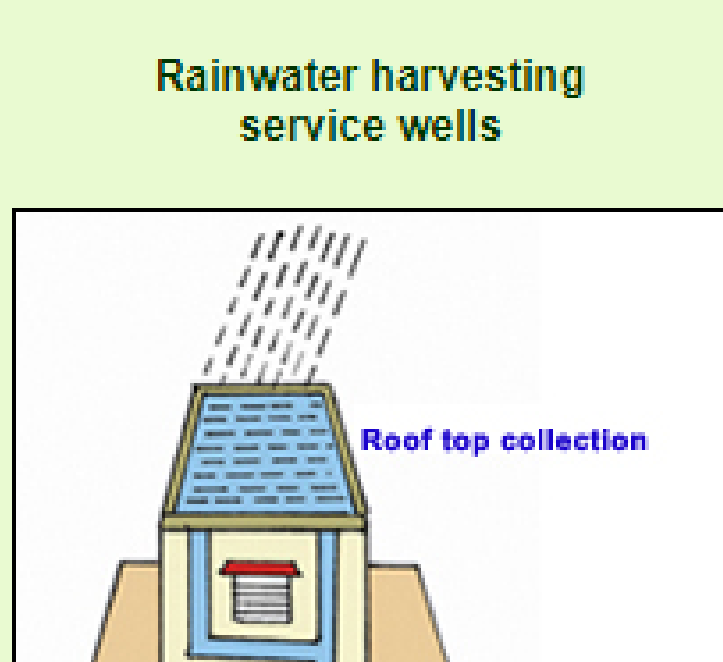
#### Rainwater harvesting through watershed management



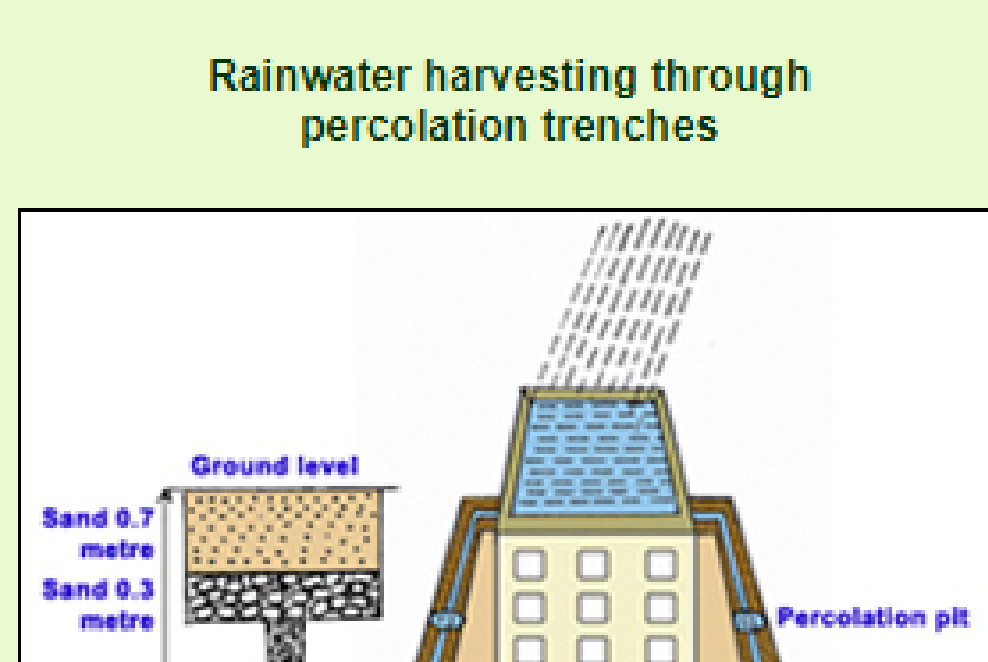
#### Traditional water harvesting through eris (lakes)



#### Rainwater harvesting service wells



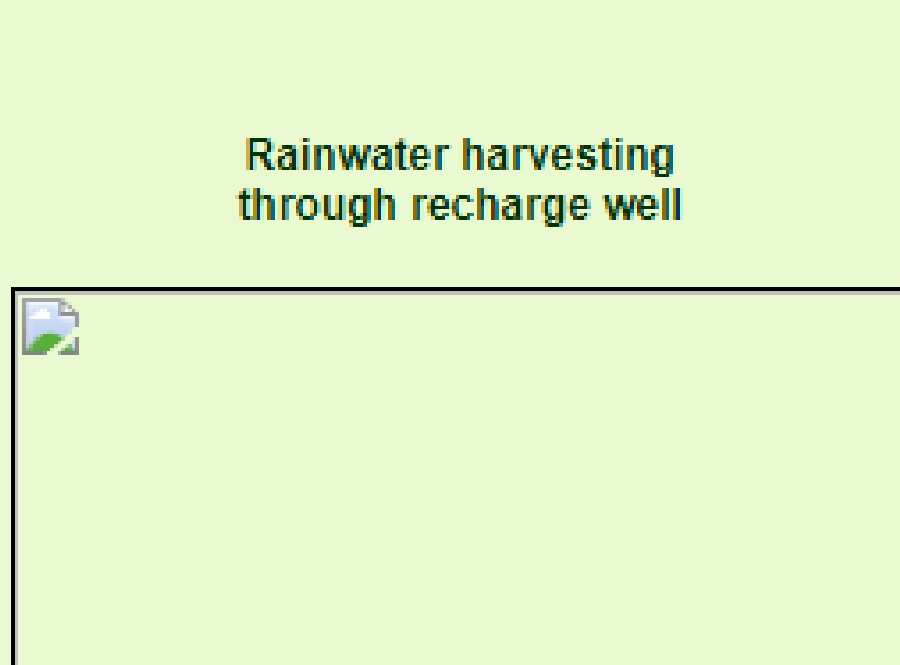
#### Rainwater harvesting through percolation trenches



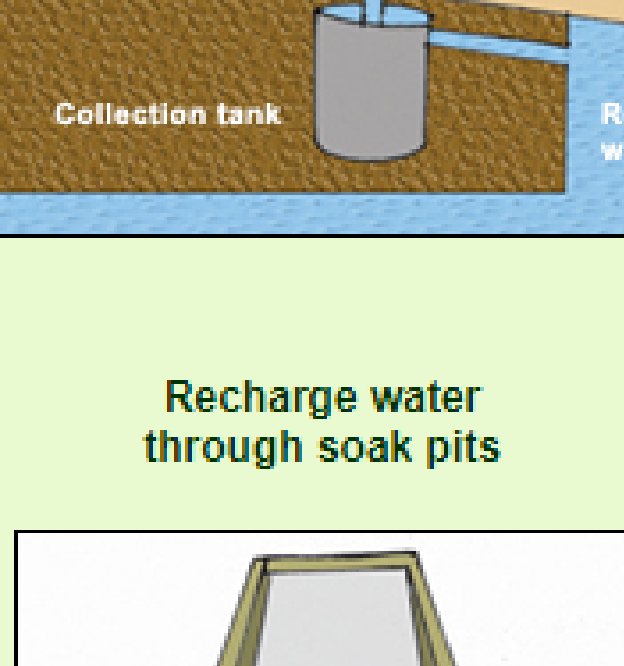
#### Rainwater harvesting through pebble bed



#### Rainwater harvesting through recharge well



#### Recharge water through soak pits



#### Recharge ground water by pebble beds

