

## 30A. METHODS OF WATER HARVESTING

- **Need for Water Conservation**

- Water is the most essential natural resource for life and there is no substitute for water.
- We need to develop water harvesting system for India's water security and overall sustainable development.
- The total fresh and sea water content of the earth is essentially fixed. About 97.3% of water is found in oceans and this salt water cannot be used for human consumption, irrigation or industry.
- Out of the 2.7% of fresh water, 1.98% (nearly 2%) is locked in ice caps so very little fresh water is available for our daily consumption.
- On an average, it receives about 1150 mm of rainfall annually; the average number of rainy days in a year is only 40.
- Water is one of our most poorly managed resources. When surface water such as rivers and lakes are inadequate to meet our demand then we have to depend on ground water.
- Due to rapid urbanization and deforestation recharging of ground water has diminished.
- In order to increase food production, we need more and more water for irrigation.
- A depleting water table and a rise in salinity due to irrigation is a serious matter.
- Throughout the world, Water crisis is brought about by:
  - population explosion.
  - deterioration of water quality due to pollution.
  - disappearance of traditional tanks and ponds.
  - rising needs of industries and agriculture for water
  - climate change caused drought.
- We have very long dry period in our country. So efforts are being done to retain more and more rain water for use during dry period.

- Rain water harvesting at local level are doing by simple methods of expanding water supply.

- The most important step in the direction of water conservation is to change people's attitudes and habits.

- The augmentation of ground water by **rain water harvesting**, is the need of the hour. It is an old technology, gaining popularity in a new way.

- **Traditional methods of water harvesting**

- Practice of Rain water harvesting was started during biblical times at around 4000 years ago in Palestine and Greece.
- In ancient Rome, residences were built with individual cisterns and paved courtyard to capture rain water.
- Rain water harvesting at local level is by either storing in ponds, tanks, lakes and recharging ground water

- **Rain Water Harvesting Existed in Ancient India**

- In ancient India, people believed that forests were the mothers of rivers and worshipped the sources of these water bodies. In forests, water seeps gently into the ground and this ground water in turn feeds wells, lakes, and rivers.

- The Indus Valley Civilization, that flourished along the banks of the river Indus along western and northern India about 5000 years ago, had sophisticated sewage system.

- Houses in parts of western Rajasthan were built with roof top water harvesting system.

- One of the oldest water harvesting systems is found about 130 km from Pune along Naneghat in the Western Ghats. A large number of tanks were cut in the rocks to provide drinking water to tradesmen.

- Large bund to create reservoirs known as khadin and other methods were applied to check water loss and store run off.
- **Modern Methods of Water Harvesting**  
There are two main techniques of rain water harvesting:

**Recharge to ground water is a new concept of rain water harvesting and the structures generally used are:**

Pits	Recharge pits are constructed for recharging the shallow aquifer
<b>Aquifer</b>	The aquifer is porous, water saturated layers of sand, gravel or bed rock that can yield significant or usable amount of water. These are constructed 1 to 2 m wide, 1 to 1.5 m deep which are back filled with boulders, gravels, coarse sand. Water from roof top is collected in Recharge Pit where boulders and charcoal filter the water.
<b>Trenches</b>	Trench may be 0.5 to 1 m wide, 1 to 1.5 m deep and 10 to 20 m long depending upon the availability of water. These are back filled with filter materials.
<b>Dug wells</b>	Existing dug wells may be utilized as recharge structure and water should pass through filter media before putting into dug well.
<b>Hand pumps</b>	The existing hand pumps may be used for recharging the shallow/deep aquifers, if the availability of water is limited. Water should pass through filter media to avoid choking of recharge wells.
<b>Recharge wells</b>	Recharge wells of 100 to 300 mm diameter are generally constructed for recharging the deeper aquifers and water is passed through filter media to avoid choking of recharge wells.
<b>Recharge Shafts</b>	For recharging the shallow aquifer which is located below clayey surface, recharge shafts of 0.5 to 3 m diameter and 10 to 25 m deep are constructed and back filled with boulders, gravels and coarse sand.
<b>Lateral shafts with bore wells</b>	For recharging the upper as well as deeper aquifers lateral shafts of 1.5 to 2 m wide and 10 to 30 m long depending upon availability of water with one or two bore wells is constructed. The lateral shaft is back filled with boulders, gravels and coarse sand

• **Diversion of run-off into existing surface water bodies and its benefits.**

- Construction activity in and around the city is resulting in the drying up of water bodies and reclamation of these tanks for conversion into plots for houses.
- Free flow of storm runoff into these tanks and water bodies can be used as harvesting system. The storm runoff may be diverted into the nearest tanks or depression, which will create additional recharge.
- In urban areas, the construction of houses, footpaths and roads has left little exposed

earth for water to soak in. In parts of the rural areas of India, floodwater quickly flows to the rivers, which then dry up soon the rains stop.

- If this water can be held back and allowed to seep into the ground for recharging the ground water supply. This becomes a very popular method of conserving water especially in the urban areas.
- Rainwater harvesting essentially means collecting rainwater on the roof of building and storing it underground for later use.

- Realizing the importance of recharging of ground water, the Government of India and many state governments NGOs and other institutions are taking steps to encourage rain water harvesting in the country.
- Town planners and civic authority are introducing by laws making rainwater harvesting compulsory in new buildings. **No water or sewage connection would be given if a new building did not have provisions for rain water harvesting.**
- Some of the benefits of rainwater harvesting are as follows:
  - Increases water availability;
  - Check the declining water table;
  - It is environmentally friendly;
  - Improves the quality of groundwater through the dilution of fluoride, nitrate, and salinity;
  - Prevents soil erosion and flooding especially in urban areas.

#### **Rain water harvesting: a success story**

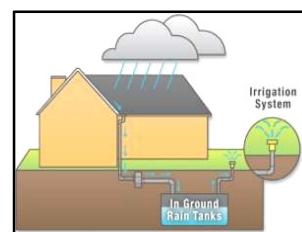
- 1. The River Ruparel in Rajasthan, receives **very** little rainfall. The water level in the river began declining due to extensive deforestation and agricultural activities along the banks and, by the 1980s, a drought-like situation was seen.
- The women of the area took the initiative of building johads (round ponds) and dams to hold back rain water. Now , due to water conservation, water is available throughout the year.

#### **CASE STUDY**

- Mr. Rajendra Singh is a well-known water conservationist from Rajasthan. Also known as waterman of India. He runs an NGO called Tarun Bharat Sangh.
- He has solved the water problem in Rajasthan to a large extent by using the technique of **rain water harvesting**, his methods helped in preventing floods restored soil and wild life. Details will be discussed in lesson-31 of this module.

#### **• RAINWATER HARVESTING AT HOUSEHOLD LEVEL**

- All you need for a water harvesting system is rain, and a place to collect it.
- Rain is collected on rooftops and other surfaces, and the water is carried down to where it can be used immediately or stored.
- You can direct water stored to plants and lawn of your house .



- Rain water stored in a tank
- Rain Water harvesting system has four main components.
  - (a) Rainwater collection
  - (b) Storage
  - (c) Distribution
  - (d) System maintenance

##### **a) Rainwater collection**

- The catchment of a water harvesting system is the surface which directly receives the rainfall. It can be a terrace, a lawn or open ground
- The amount of water you will be able to harvest depends on the size of your catchment area.

##### **b) Storage**

- Storage systems can vary in complexity depending on one's needs. An effective system can involve a 250 litre drum fed by rooftop gutters and downspouts.
- **Debris and leaves** should be filtered before storing the water by placing screens or coarse mesh over gutters or downspouts.
- Water kept in tanks or cisterns should also be covered to minimize algal growth and eliminate the potential for mosquito breeding. Placing floating lids on storage tanks is an effective solution.

**c) Distribution**

- Gutters, a narrow channel which collects rainwater from the roof of a building and diverts it away from the structure, typically into a drain and downspout is a vertical pipe for carrying rainwater from a rain gutter to ground level.
- Many people store harvested rainwater and then distribute it later through their regular drip irrigation system.

**d) System maintenance**

- Water harvesting systems require occasional maintenance, but this is easily accomplished.
- Debris screens over gutters should be cleaned periodically and storage tanks should be drained and cleaned when it is convenient to do so.



### Check Yourself

1. How many rainy days occur in India?
  - a. 40
  - b. 50
  - c. 60
  - d. 80
2. Structure used in Madhya Pradesh to collect rain water for irrigation of crops during dry season is termed -----.
  - a. Haveli
  - b. Ahar
  - c. Cistern
  - d. Tal Talai
3. Out of the following ,which one is the oldest water harvesting system in India?
  - a. Rajasthan
  - b. Golkunda in Karnataka
  - c. Naneghat in Western Ghats (Near Pune)
  - d. Ajamgarh, Uttar Pradesh
4. Water in tanks or cistern is kept covered to-
  - a. Prevent mosquito breeding
  - b. Increase algal growth
  - c. Aesthetic sense
  - d. Prevent people from staling water
5. Rain water harvesting means:
  - a. Improve quality of ground water
  - b. Check declining the water table
  - c. Increase water availability
  - d. All the above

**Ans:** 1.a.      2.a.      3.c.      4.a.      5 d



### **Stretch Yourself**

1. Define the concept of rain water harvesting
2. Why do we need water harvesting?
3. List any four ancient methods of water harvesting
4. Define recharge well and recharge shafts
5. How does rain water harvesting helps in agriculture?



### **Test Yourself**

1. How does rain water harvesting system works?
2. Mention the benefits of rain water harvesting.
3. How can you done water audit of your home or your school?
4. Which methods are being used in modern trends of water harvesting?
5. Mention the methods of artificial recharge in urban areas.