

31A. WATER CONSERVATION AT DIFFERENT LEVELS

- **Different Methods of Water Conservation**

India, being an agricultural country, its economic development is linked with agriculture. According to Indian Meteorological Department (IMD), there are only 40 rainy days in India, and hence a long dry period.

Due to overexploitation of water resources, it has become scarce in many parts of our country. Hence conservation of water is of great importance to the economic, social and cultural development in India.

- **Conservation Techniques**

- Monsoon, however, is erratic and the duration and the amount of rain fall are highly variable in different parts of our country. Hence, surface runoff needs be conserved.
- The techniques for conservation of surface water are:

- (a) **Conservation by Surface Water Storage**

- ❖ Construction of various water reservoirs have been one of the oldest measures of water conservation.
- ❖ The scope of storage varies from region to region depending on water availability and topographic condition.

- (b) **Conservation of Rain Water**

Rainwater storage systems are a simple method of capturing rainwater, traditionally from roofs, for use as an alternative water supply source and to reduce consumption of scheme water. When installed and maintained in accordance with recommended guidelines, they can provide a high quality source of water.

- (c) **Ground Water Conservation**

- ❖ Groundwater is sustainable and reliable source of water supply, is relatively less vulnerable to pollution and free of pathogens. It needs little treatment before use.

- There are no conveyance losses in underground based water supplies.

- It is impossible to tap the entire ground water resources.

- The ground water potential is only 490 BCM.

- Due to limited availability of ground water, it is very important to us to use it economically and judiciously and conserve it to the maximum.

- Some techniques of Ground Water Management and Conservation are as follows :

- (i) Artificial Recharge

- (ii) Percolation Tank Method

- ❖ Percolation tanks are constructed across the water course for artificial recharge.

- (d) **Catchment Area Protection (CAP)**

- Also called watershed protection or management plans. These form conserve and protect the quality of water in a watershed.

- It helps in withholding runoff water temporarily by a check bund constructed across the streams in hilly terrains to delay the run off so that greater time is available for water to seep underground.

- Such methods are in use in north-east states, in hilly areas of tribal belts. This technique also helps in soil conservation.

- Afforestation in the catchment area is also adopted for water and soil conservation.

- (e) **Inter-basin Transfer of Water**

- Areas in western and peninsular regions have comparatively low water resources: cultivable land ratio.

- Northern and eastern region which are drained by Ganga and Brahmaputra have substantial water resources.

- Diverting water from region with surplus water to water deficit region can be adopted

- Ganga-Cauveri link would enable to transfer of vast quantities of Ganga basin flood water running out to sea, to west and south west India.

- The transfer of the surplus Ganga water would make up for the periodical shortage in Sone, Narmada, Godaveri, Krishna and Cauveri rivers.

(f) Adoption of Drip Sprinkler Irrigation

- Drip irrigation is an efficient method of irrigation in which a limited area near the plant is irrigated by dripping water.
- It is suitable method for water scarce areas. This method is particularly useful in row crop.
- About 80% water consumption can be reduced by this method, whereas the drip irrigation can reduce water consumption by 50 to 70 %.

(g) Management of Growing Pattern of Crops

- The crop selection should be based on efficiency of the crop to utilize the water.
- Some of the plants suitable for water scarce areas are:
 - (i) plants with shorter growth period; Spinach, Baby Carrots, Radish, Cucumbers, Beets.
 - (ii) high yielding plants that require no increase in water supply; e.g.. Asparagus, Beans, Broccoli, Cabbage.
 - (iii) plants with deep and well trenched roots; eg. eggplant, beans, tomatoes and peppers
 - (iv) plants which cannot tolerate surface irrigation.e.g. Strawberry, Alfalfa.

(h) Reducing Evapotranspiration

- Evapotranspiration losses can be reduced by reducing the evaporation from soil surface and transpiration from the plants, in arid zones, considerable amount of water is lost in evaporation from soil surface.
- This can be prevented by placing water tight moisture barriers or water tight mulches on the soil surface.
- Non-porous materials like papers, asphalt, plastic foils or metal foils can also be used for preventing evaporation losses.
- Transpiration losses can be reduced by reducing air movement over a crop by putting wind breaks and evolving such types of crops which possess xerophytic adaptations.

(i) Recycling of Water

- The wastewater from industrial or domestic sources can be used after proper treatment, for irrigation, recharging ground water, and even for industrial or municipal use.
- If agricultural lands are available close to cities, municipal waste water can be easily used for irrigation.
- **Conservation of Water in Domestic Use**
- A general awareness among the people about the importance of water and its availability, and need for conservation can help in minimizing wastage to a large extent.
- Some of the ways at household level can be
 - Reduce wastage-leaking pipes
 - Closing of taps when not in use.
 - Use low flush toilets-reducing the amount of water used each time the lavatory is flushed.
 - Use bowls to wash vegetables, dishes instead of running tap.
 - Greater use of recycled water Instead of using potable or treated water
 - Use washing machine or dish washer when it is fully loaded.

• Reduce the Loss of Water

- Mulching i.e. the application of organic or inorganic materials which slows down the surface run-off, improves soil moisture, reduces evaporation losses and improves soil fertility.
- Fields should not be left bare for long periods of time; soil should covered by crops, that slow down run-off and minimize evaporation losses.
- Cover crops protect soil; allow water to penetrate the soil more easily which improves its water-holding capacity.
- Ploughing helps increase water absorption and reduce evaporation, erosion, and compaction.
- Shelter belt of trees and bushes along the edge of agricultural fields slow down the wind speed and reduce evaporation and erosion.

- Contour farming is adopted in hilly areas and in lowland areas for paddy fields, for conserving soil and water.
 - Use of Salt-resistant varieties of crops has been also developed recently.
 - Desalination technologies such as distillation, electro-dialysis and reverse osmosis can also be adopted.
 - **Reuse of wastewater**
 - Wastewater is a resource rather than a waste since it contains appreciable amount of nitrogen, phosphorus and potash.
 - Stabilization ponds can be used for fish/aquaculture. The effluent can also be used for cultivation of short-term and long term, ornamental, commercial and fodder crops.
 - **Benefits of Reuse**
 - Make up for the shortage of water supply (reduces demand on good quality water).
 - Reduces the wastewater discharge thus reducing water pollution.
 - Results in cost reduction.
 - Reuse in municipal public areas such as watering lawns, parks, play grounds
 - Flushing toilets in hotels and residential districts;
 - Reuse of the treated wastewater for urban landscape purposes.
 - Treated waste water can also be used for groundwater recharging.
 - **Untreated Water**
 - Water or grey water can also be reused for various purposes.
 - Grey water is defined as untreated household wastewater, which has not come into contact with toilet waste.
 - It can originate from the shower, bath, bathroom, washing basin, clothes washing machine and laundry trough.
 - **Watershed Management**
 - Watershed management is a technique for conservation of water and soil in a watershed.
 - This is the region from which surface water draws into a river, a lake, wet land or other body of water.
 - Forests and their associated soils and litter layers are excellent filters as well as sponges, and water that passes through this system is relatively pure.
 - Erosion can be prevented by the maintenance of continual cover.
 - Deforested land sheds water swiftly, causing sudden rises in the rivers levels..
 - Waters from forested areas are low in foreign substances and are relatively high in oxygen and low in unwanted chemicals.
 - The air above a forest, as contrasted with grassland, remains relatively cool and humid on hot days, so that showers are more frequent.
- Role of Individual and Community in Overcoming Water Scarcity**
- 1. Examples of individual and community efforts to overcome water scarcity:**
- **One example is** Gandhigram, a coastal village in Kutch district, villagers formed a village development group, Gram Vikas Mandal.
 - The Mandal took a loan from the bank and the villagers contributed voluntary labor (Shramdan).
 - A check dam was built on a nearby seasonal river, which flowed past the village.
 - **Two example are:**
 - The coastal city of Bhavnagar was facing a severe drinking water shortage, Prof. Vid�ut Joshi then Vice Chancellor of the university initiated the digging of a percolation tank in the university premises.
 - About 650 students, 245 teachers and other employees of the university worked as voluntary labour. During the following monsoon, all the bore wells in university as well as those in the adjoining areas were recharged.
 - **Artificial Recharge to Groundwater**
 - Any man-made scheme or facility that enhances seepage water to an aquifer may be called to be an artificial recharge system.
 - But the groundwater potential is getting reduced due to certain adverse effects of urbanization.
- Some of which are:**
- More dependence on ground water use.

- Over exploitation of groundwater.
- Increase in run-off, decline in well yields and fall in water levels.
- Reduction in open soil surface area.
- Reduction in infiltration and deterioration in water quality.
- Methods of Artificial Recharge in Urban Areas
- Water Spreading.
- Recharge through pits, trenches, wells, shafts.
- Roof-Top collection of rainwater.
- Road-Top collection of rainwater.
- Induced recharge from surface water bodies.
- Benefits of Artificial Recharge in Urban Areas
 - Improvement in filtration and reduction in run-off.
 - Improvement in groundwater levels and its quality.
 - Promotion of rain water harvesting.
 - Promotion of bunds at village level.
 - Promotion of reuse and recycling of wastewater.
 - Steps to protect water quality.
 - Drought-proofing the future.
- **Government's Efforts on Water Conservation**
 - National Water Policy, 2002 strongly emphasize conservation of water.
 - Efforts to retain rain water on land through various schemes.
 - Construction of large number of dams on various river systems.
 - Interlinking of rivers (proposed)
 - Promotion of bunds at village level
 - Promotion of rain water harvesting
 - Promotion of reuse and recycling of waste water
 - Steps to protect water quality
 - Drought –proofing the future
- Revival of traditional rain harvesting systems, have transformed some of the areas from places of economic backwardness to areas of abundance. They are also highly sustainable
- **Permanent conservation measures may include:**
 - Subsidizing use of water-efficient faucets, toilets and showerheads
 - Public education and voluntary use reduction.
 - Billing practices that impose higher rates for higher amounts of water use.
 - Building codes that require water-efficient fixtures or appliances.
 - Leak detection surveys and meter testing, repair and replacement.
 - Reduction in use and increase in recycling of industrial water.
- **Temporary cutbacks may include:**
 - Reduction of system-wide operating pressure.
 - Water use bans, restrictions, and rationing.
- (i) **What can an individual do to conserve water**
 - Use only the amount you actually need.
 - See that there are no leaks in the toilet tank. You can check this by adding colour to the tank. If there is a leak, colour will appear in the toilet bowl within 30 minutes.
 - Do not leave the tap running while you are brushing your teeth or soaping you is your face.
 - Avoid flushing the toilet unnecessarily.
 - Put a brick or any other device that occupies space to cut down on the amount of water needed for each flush.
 - When washing the car, use water from a bucket and not a hosepipe.
 - Do not throw away water that has been used for washing vegetables, rice or dals use it to water plants or to clean the floors, etc.
 - Make sure that your home is leak –free. Many homes have leaking pipes that go unnoticed.
 - Encourage your family to keep looking for new ways to conserve water in and around your home.
 - Try to do one thing each day that will result in saving water. Don't worry if the savings are minimal every drop counts'! You can make a difference.
 - Form a group of water conscious people and encourage your friends and neighbours to be part of this group. Promote water conservation in community newsletters and on

bulletin boards. Encourage yours friends, neighbours and co-workers to also contribute.

You can also save water by adopting several methods:

Activity	Method adopted	Qty. used Ltr.	Methods to be adopted	Qty. required Ltr.	Qty. saved Ltr.
Brushing teeth	Running tap for 5 minutes	45	Tumbler or glass	0.5	44.5
Washing hands	Running tap for 2 minutes	18	Half filled wash basin	2.0	16.0
Shaving	Running tap for 2 minutes	18	Shaving mug	0.25	17.75
Shower	Letting shower run while soaping staying under shower too long	90	Wet down, tap off, soap up, rinse off	20.00	70.00
Flushing toilet	Using old fashioned large capacity cistern	13.5 or more	Dual system short flush liquid waste full flush solid waste	4.5 9.0	4.5 or more
Watering plants	Running hose for 5 minutes	120	Water can	5.0	115.00
Washing floor	Running hose for 5 minutes	200	Mop and bucket	18.0	182.00
Washing car	Running hose for 10 minutes	400	Buckets (two)	18.0	382.00

Tarun Bharat Sangh

- The work of Tarun Bharat Sangh (TBS), and its founder Shri Rajendra Singh in the districts of Rajasthan can easily be over-simplified as water-shed management.

- It is a two-step programme:

First revive vegetation on barren hill slopes and **Second**, build small water catchments in the valleys and the plains.

The efforts resulted in:

- dead rivers begin to flow.
- agriculture possible round the year.
- impoverished villagers, labouring in cities returned, and families re-united.
- with enough water and fodder, income from animal husbandry begins to flow.
- nutrition levels rise and public health improves.



Check Yourself

1. An area that contributes water to a stream or a water body through run-off is called as:
 - a. Lateral shaft
 - b. Pit
 - c. Cistern
 - d. Watershed
2. The method of irrigation in which a limited area near the plant is irrigated by dripping water is called:-
 - a. Sprinkler irrigation
 - b. Drip irrigation
 - c. Furrow irrigation
 - d. Localized irrigation
3. Untreated household waste water has not come into contact with toilet waste is known as-
 - a. Black water
 - b. Fresh water
 - c. Grey water
 - d. Stale water
4. In a hilly terrain, erosion threat can be tackled by-
 - a. Single stem harvesting
 - b. Mulching
 - c. Water shed protection
 - d. Catchment area protection
5. Application of organic or inorganic material to the surface of the soil for improving fertility and health of soil is called:
 - a. Mulching
 - b. Low tillage
 - c. Ploughing
 - d. Foraging

Ans: 1:d 2:b 3:c 4:a 5:a



Stretch Yourself

1. How do forests help to reduce risk of flood?
2. List any two benefits of artificial recharge.
3. When was National Water Policy come in existence?
4. Expand TBS.
5. Name the two main techniques of rain water harvesting



Test Yourself

1. Mention the attributes of ground water.
2. How does drip sprinkler irrigation technique is helpful for water conservation in agriculture?
3. Describe the role of antitranspirants in water conservation.
4. Discuss the contribution of Shri Rajendra Kumar Singh in water harvesting.
5. How can an individual conserve water?