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SAI RAM
ENGINEERING COLLEGE
INSTITUTE OF TECHNOLOGY
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SAIRAM
DIGITAL RESOURCES

YEAR
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SEM
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ENVIRONMENTAL SCIENCE AND ENGINEERING

UNIT NO 4

SOCIAL ISSUES AND THE ENVIRONMENT

**4.2 Water conservation, rain water
harvesting, watershed management –
resettlement and rehabilitation of people; its
problems and concerns, case studies**

SCIENCE & HUMANITIES



4.2 Water Conservation

Definition

The process of saving water for future utilization is known as water conservation.

Need for water conservation

1. Though the resources of water are more, the quality and reliability are not high due to changes in environmental factors.
2. Better lifestyle requires more fresh water.
3. As the population increases, the requirement of water is also more.
4. Due to deforestation, the annual rainfall is also decreasing.
5. Overexploitation of groundwater, leads to drought.
6. Agricultural and industrial activities require more fresh water.

Strategies of Water Conservation

The following strategies can be adopted for conservation of water.

1. Reducing evaporation losses:

Evaporation of water in humid regions can be reduced by placing horizontal barriers of asphalt below the soil surface, which increases the water availability and crop yield.

2. Reducing irrigation losses:

The water losses during irrigation can be reduced by the following methods.

1. Sprinkling irrigation and drip irrigation conserves water by 30-40%.
2. Growing hybrid crop varieties, which require less water, also conserve water.
3. Irrigation in early morning or later evening, reduces evaporation losses.

3. Re-use of water:

- a. Treated wastewater can also be used for ferti-irrigation.
- b. Grey water, from washings, bath-rooms, etc may be used for washing cars, watering gardens.

4. Preventing wastage of water:

Wastage of water can be prevented by

- a. Closing the taps when not in use.
- b. Repairing any leakage from pipes.
- c. Using a small capacity of taps.

5. Decreasing run-off losses:

Run-off on most of the soils can be reduced by allowing most of the water to infiltrate into the soil. This can be done by using contour cultivation or terrace farming.

6. Avoid discharge of sewage:

The discharge of sewage into natural water resources should be prevented as much as possible.

Methods of water Conservation

There are so many methods available for water conservation, of which the following are important methods.

1. Rainwater harvesting
2. Watershed management.

RAINWATER HARVESTING

Rainwater harvesting is a technique of capturing and storing rainwater for further utilization.

Need (or) Objectives of Rainwater harvesting

1. To meet the increasing demands of water.
2. To raise the water table by recharging the groundwater.
3. To reduce the groundwater contamination from the intrusion of saline water.
4. To reduce the surface runoff loss.
5. To reduce stormwater runoff and soil erosion.
6. To increase hydrostatic pressure to stop land subsidence.
7. To minimise water crisis and water conflicts

Concept of Rainwater harvesting

Rainwater harvesting involves collecting water that falls on the roof of a house during rain storms and conveying it through PVC or aluminium pipe to a nearby covered storage unit. The rainwater yield varies with the size and texture of the catchment area. A smoother, Cleaner and more impervious roofing material contributes to better water quality and greater quantity.

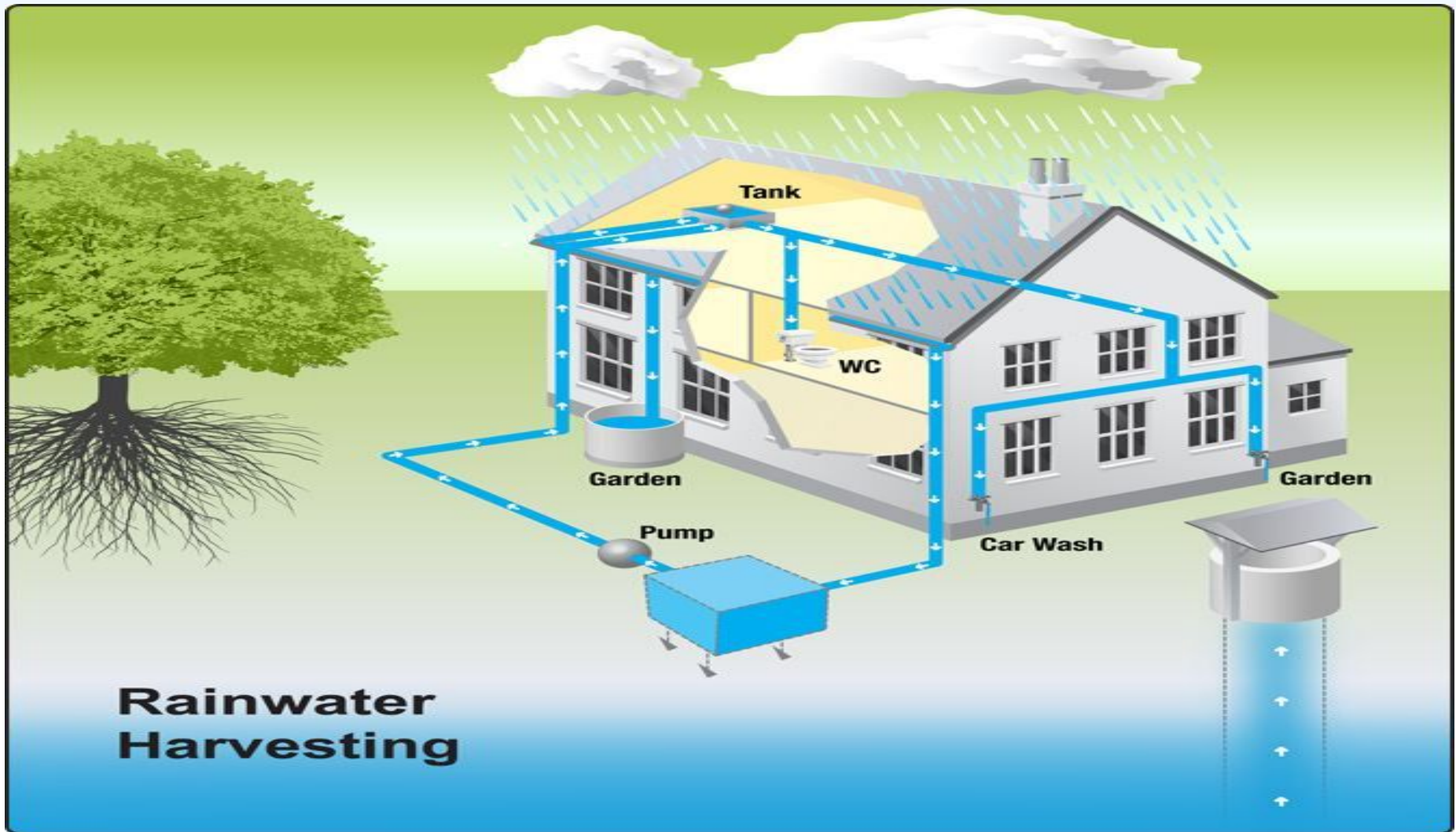
Method (or) Type of water harvesting

Before adopting a rainwater harvesting method, the soil characteristics, topography, rainfall pattern and climatic conditions should be understood. The most common method of rainwater harvesting is roof top rainwater harvesting.

Roof Top Rainwater Harvesting Method

It is the method of collecting rainwater from the roof of the building and storing it in the ground for our future use.

It is the low cost and effective technique for urban houses and buildings. The rainwater from the top of the roofs, road surfaces, play grounds, openlands is diverted into the surface tank or recharge pits through a delivery system, which can be later used for several purposes. Also, it can be used to recharge underground aquifers by diverting the water from stored water to dug-well or



Advantages of Rainwater harvesting

1. Reduction in the use of current for pumping water.
2. Mitigating the effects of droughts and achieving drought proofing.
3. Increasing the availability of water from wells.
4. Rise in groundwater levels.
5. Minimising the soil erosion and flood hazards.
6. Upgrading the social and environmental status.
7. Future generation is assured of water.

Watershed Management

Watershed

It is defined as the land area from which water drains under the influence of gravity into a stream, lake, reservoir or other body of surface water.

Watershed Management

The management of rainfall and resultant runoff is called watershed management. It also involves conservation, regeneration and proper use of water.

Factors affecting Watershed

1. The watersheds are found to be degraded due to uncontrolled, unplanned, and unscientific land use activities.
2. Overgrazing, deforestation, mining, construction activities also affect and degrade various watersheds.
3. Droughty climates also affect the watershed.

Example

Our water regimes in Himalayan ranges are threatened resulting in the depletion of water resources due to damage of reservoirs, irrigation systems and misuse of slopes of the mountains. A vast hydroelectric power potential can be harnessed from himalayan watersheds only if proper control measures are taken.

Need (or) Objectives of watershed management

1. To minimise the risks of floods, droughts and landslides.
2. To develop rural areas in the region with a clear plan for improving the economy of the region.
3. To manage the watershed for developmental activities like domestic water supply, irrigation, hydropower generation, etc.,
4. To generate huge employment opportunities in the backward rain-fed areas to ensure livelihood security.
5. To promote social forestry and horticultural activity on all suitable areas of land.
6. To protect the soil from erosion by runoff.
7. To raise the groundwater level.

Concept of watershed management

Watershed is not a technology but a concept which integrates construction management and budgeting of rainwater through simple but discrete hydrological units.

Watershed management techniques

In watershed management, various civil structures were constructed in the catchment area to improve groundwater storage.

1. Trenches (pits): Trenches were dug at equal intervals to improve ground water storage.
2. Earthen dam or stone embankment: To check the run-off water, earthen dam must be constructed in the catchment area.
3. Farm pond: A farm pond can be built to improve water storage capacity of the catchment area.
4. Underground barriers (Dykes): Underground barriers should be built along the nullahs to raise the water table.

Maintenance of watershed or components of integrated watershed management

1. Water harvesting: Proper storage of water in watersheds is done with provisions that the water can be used in dry seasons in low rainfall areas.

2. Afforestation and Agroforestry: Afforestation and agroforestry help to prevent soil erosion and retention of moisture in watershed areas.

Example: In high rainfall areas woody trees are grown in between crops to reduce the runoff and loss of nutrients of soil.

3. Reducing soil erosion: Terracing, bunding, contour cropping, strip cropping are used to minimize soil erosion and runoff and loss of nutrients of soil.

4. Scientific mining and quarrying: Due to improper mining, the stability of hills get disturbed resulting in landslides and rapid soil erosion. Planting soil binding plants, contour stretching at an interval of 1 meter on overburden dump in the mined area are recommended for minimizing the destructive effects of mining in watershed areas.

5. Public participation: People's cooperation and participation is essential for watershed management. People must be motivated for protecting a freshly planted area and maintaining a water harvesting structure, implemented by the government.

6. Minimising livestock population: Livestock population, present in the surrounding villages of the watershed should be reduced.

RESETTLEMENT AND REHABILITATION OF PEOPLE

Resettlement and Rehabilitation is one of the most serious problems caused by developmental activities. Though the developmental projects raise the quality and standard living of the people of the country, there is over-exploitation of natural sources and degradation of the environment. Besides this, the native people are directly affected.

Causes of displacement of people

There are so many factors which contribute to the large scale displacement of native people. However, the following are some important factors.

1.Due to developmental activities: This includes construction of dams, mining activities, roads,airports,ports,urban expansion etc., These activities cause large scale displacement of local people from their home and loss of their traditional profession or occupation.

Dams in India

In our country, a number of big and medium dams have been constructed under different valley projects. The most important social consequences was the displacement of millions of tribals from their home land to urban areas as refugees.

Example

- i) Hirakud dam: It has displaced more than 20,000 people residing in about 250 villages.
- ii) Tehri dam: It has displaced more than 10,000 residents of Tehri town.

Other problems on construction of dams

- i) Submergence of valuable forest cover.
- ii) Water logging and its adverse effects.
- iii) Extinction of wildlife and plant species.
- iv) Possibility of an earthquake.

1. Due to Disaster: Disaster may be natural or manmade.

a. Natural Disaster: It includes, earthquakes, floods, droughts, landslides, avalanches, volcanic eruptions, etc.,

b. Manmade disaster: It includes, industrial accidents, nuclear accidents, dam burst, etc.,

c. Due to conservation initiatives: These include national park, sanctuary, forest reserve, biosphere reserve, etc.,

RESETTLEMENT

Resettlement is simple relocation or displacement of the human population. This process does not focus on their future welfare.

REHABILITATION

Rehabilitation involves making the system to work again by allowing the systems to function naturally. It includes replacing the lost economic assets, safeguard employment, provide safe land for building, restore social services, repair damaged infrastructures, etc.,

Rehabilitation issues

In India, most of the displacements have resulted due to land requirements by the government for various reasons. The government has the land acquisition act, 1897 for this purpose, which empowers, the government to serve notice to the people to vacate their land. Provision of cash compensation in lieu of the land vacated exists in the act.

CASE STUDIES

Sardar Sarovar dam

River Narmada flows through Madhya Pradesh, Maharashtra and Gujarat and merges in Arabian Sea. The Sardar Sarovar dam is situated in the Narmada Valley.

Issue

As a result of construction of the dam, about 573 villages consisting 10 lakh people would be homeless and 45,000 hectares of forest and 2,00,000 hectares of cultivated lands would be submerged in Maharashtra.

The affected tribal people must be given adequate compensation in the form of land, jobs, cash compensation, etc., and care should be taken to improve their life.

Now the Gujarat government has planned to increase the height of Sardar Sarovar dam from 100m to 110.64m. The height of the dam has become a controversial issue as there is no proper rehabilitation scheme for the affected people.

Narmada Bachao Andolan (NBA) was initiated against the construction of the dam and is led by Smt. Medha Patkar. She is constantly working for the affected tribals.

Narmada Control Authority (NCA) also asked Madhya Pradesh and Maharashtra governments to give status of resettlement and rehabilitation of the people displaced by the Narmada dam project.

Tehri Dam Project

The dam is being constructed across the rivers Bhagirathi and Bhilanganga, close to the Gashwal town of Tehri. The dam would submerge nearly 100 villages, including Tehri, a historical village, 85,600 families will have to be relocated.

The region of Tehri is vulnerable to earthquakes. The dam is also structurally incapable of withstanding the water, which would kill thousands of people. Due to the above reasons, the people nearer to that area were resettled in some other place.

Pong dam

The pong dam was constructed on Beas river in Himachal pradesh and punjab. The water is utilised to irrigate Rajasthan. Therefore, Rajasthan agreed to provide land to the people in the area of Indira gandhi canal. Out of 30,000 families uprooted due to the pong dam, only 16,000 were considered eligible for allotment, as there were only 16,000 were considered eligible for allotment, as there were only bonafide cultivators. The rest of the 14,000 families are questionable, punjab, which is one of the beneficiaries of the dam is not involved in rehabilitation.

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