ROHINI COLLEGE OF ENGINEERING AND TECHNOLOGY

ROHINI COLLEGE OF ENGINEERING AND TECHNOLOGY
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AI 3019

SUSTAINABLE AGRICULTURE AND FOOD SECURITY

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ROHINI COLLEGE OF ENGINEERING AND TECHNOLOGY

UNIT - 1

SUSTAINABILITY OF NATURAL RESOURCES

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The major river basin is the Ganga-Brahmaputra-Meghna, which is the largest with a catchment area of about 11.0 lakh km2 (more than 43% of the catchment area of all the major rivers in the country).

Available, created and utilized –River basins:

Available River Basins

Available river basins refer to the total area of land that drains water into a particular river system. This includes:

1. Watershed area: The total area of land that drains water into a river or stream.

2. River length: The total length of the river from its source to its mouth.

3. River discharge: The volume of water that flows through the river per unit time.

Created River Basins

Created river basins refer to the modifications made to the natural river basin to increase its utility and productivity. This includes:

1. Irrigation systems: Man-made systems that divert water from the river to irrigate crops and support agriculture.

2. Reservoirs and dams: Structures built to impound water, regulate flow, and generate hydroelectric power.

3. Canals and waterways: Artificial waterways that connect the river to other water bodies or facilitate navigation.

Utilized River Basins

Utilized river basins refer to the actual use of the river basin's resources, such as:

1. Agriculture: The use of river water for irrigation, crop growth, and livestock production.

2. Hydroelectric power: The generation of electricity from the energy of moving water.

3. Drinking water supply: The use of river water as a source of drinking water for human consumption.

4. Industrial uses: The use of river water for industrial processes, such as manufacturing, mining, and oil refining.

5. Recreation and tourism: The use of river basins for recreational activities, such as boating, fishing, and rafting.

Watersheds and Utilizable surface water:

A watershed refers to an area of land that comprises a set of streams or rivers that drain into a larger water body like an ocean or a river. Watersheds are also referred to as the dividing ridge between drainage areas. Watersheds come in all sizes; some watersheds are small like an inland lake, whereas some watersheds comprise thousands of miles of land which includes rivers, streams, reservoirs and so on.

Watersheds hold great significance in irrigation, due to which there are several methods of proper watershed management. Through watershed management, one can implement plans and projects that sustain and enhance watershed functions. Watershed functions include capturing, storing and recharging groundwater, filtering out water pollutants, and securing the release of rainwater to avoid floods during heavy rainfalls.

What is the difference between a River Basin and a Watershed?

Both river basins and watersheds are areas of land that drain to a particular water body, such as a lake, stream, river or estuary. In a river basin, all the water drains to a large river. The term watershed is used to describe a smaller area of land that drains to a smaller stream, lake or wetland. There are many smaller watersheds within a river basin.

Utilizable surface water

Utilizable surface water refers to the amount of surface water that can be used for various purposes such as drinking water, irrigation, industrial uses, and hydroelectric power generation. Here are some key aspects of utilizable surface water:

Sources of Utilizable Surface Water

1. Rivers: Rivers are a primary source of utilizable surface water.

2. Lakes: Lakes, reservoirs, and ponds are also important sources of utilizable surface water.

3. Wetlands: Wetlands, such as marshes and swamps, can also be a source of utilizable surface water.

Factors Affecting Utilizable Surface Water

1. Climate: Climate plays a significant role in determining the availability of utilizable surface water.

2. Geology: The geology of an area can affect the availability and quality of utilizable surface water.

3. Land use: Land use patterns, such as deforestation and urbanization, can impact the availability and quality of utilizable surface water.

Uses of Utilizable Surface Water

1. Drinking water: Utilizable surface water is used for drinking water supply.

2. Irrigation: Utilizable surface water is used for irrigation in agriculture.

3. Industrial uses: Utilizable surface water is used for various industrial purposes, such as manufacturing and mining.

4. Hydroelectric power generation: Utilizable surface water is used for hydroelectric power generation.

Challenges and Opportunities

1. Water scarcity: Increasing demand and climate change can lead to water scarcity, affecting the availability of utilizable surface water.

2. Water pollution: Pollution from agricultural runoff, industrial effluents, and domestic waste can affect the quality of utilizable surface water.

3. Sustainable management: Sustainable management practices, such as water conservation and efficient use, can help maintain the availability and quality of utilizable surface water.

Overall, utilizable surface water is a vital resource that requires careful management and conservation to ensure its sustainability for future generations.

There are three types of surface water: perennial, ephemeral, and artificial. Perennial, or permanent, surface water persists throughout the year and is replenished with groundwater when there is little precipitation. Ephemeral, or semipermanent, surface water exists for only part of the year. Ephemeral surface water includes small creeks, lagoons, and water holes. Artificial surface water is found in artificial structures, such as dams and constructed wetlands.

Utilizable water in future

Agricultural Practices. Global water demand for agriculture—the single largest consumer of water—is projected to increase by 19 percent from current levels by 2050. By 2040, about 40 percent of all irrigated agriculture is expected to face extremely high water stress.

Irrigation and planting practices are often inefficient and unsustainable; globally about half of the water withdrawn for irrigation does not reach the intended crops or is oversupplied through practices such as flood irrigation and does not result in crop production. In addition, poor soil and planting or other agriculture techniques such as tilling, reduce water infiltration into the ground and increase evaporation.

Agricultural wastewater runoff is the most prevalent global water quality challenge. The discharge of large quantities of nitrogen and phosphorus into waterways promotes toxic algal blooms and reduces oxygen, causing die-offs of fish and other aquatic organisms.

Difference between Ground water and Surface Water:

There are a couple of different types of water that are able to meet the water supply needs that a community has, which include surface water and groundwater. Surface water includes any freshwater that’s sent into wetlands, stream systems, and lakes. On the other hand, groundwater exists in subterranean aquifers that are situated underground. Most groundwater is obtained from snowmelt and rainfall that gets into the bedrock via the surrounding soil. As this water flows downward, it will settle between cavities and fractures that are found in rock layers.