Indian Rivers and Water Resources

1. **The drainage system in India can be divided into two categories 1)Himalayan rives and 2) Peninsular rivers.**

2. **The Indus, the Ganga and the Brahmaputra are the Himalayan rives. The Ganga is joined by a large number of tributaries. The main tributaries of the Indus are Jhelum, Chenab, Ravi, Beas and Sutlej.**

3. **The Western Ghats are the water divide between the major peninsular rivers, which discharge their water in the Bay of Bengal. The Godavari is the largest peninsular river system.**

4. **Any area inflow = precipitation + surface flow + ground water flow.**

5. **The total amount of water added to the atmosphere from the evaporation and transpiration is called Evapotranspiration. A portion of the rainfall percolates into the soil and travels to the underground strata and recharges the aquifers.**

6. **Water reaches the root zone of crops either through rainfall or some process of irrigation. Water used for drinking, cooking, washing, cleaning and for raising of animals and it is a vital need. Besides daily use and agricultural use, water is very much required for industries too.**

7. **Current laws on ground water use are inappropriate because they have failed to strike a balance between access to groundwater and land ownership. As of now, they don't limit the amount of water that can be sourced the land owner.**

8. **Water is common resource which should enjoyed by all the people. Hence, underground water too is a 'public property'.**

9. **Drinking water is the first priority as well as a human right. Hence, it is instructed that panchayati raj institutions must have control over the use of ground water.**

10. **Protection and preservation of water resources require a collective action at the local level and appropriate laws and policies at the state and central levels. Through careful planning and social initiative, a small region can have a more judicious allocation of water for all is achievable.**

Key words:

1. **Flow Resources: A flow resource does not remain in one location and moves because of natural actions on the physical environment. It must be used when and where it occurs.**
   Ex. Running Water.

2. **Ground Water: Water beneath the Earth's surface is called ground water, which is get stored often between saturated soil and rock that supplies water to wells and springs.**

3. **Drainage: The process by which water waste is drained from an area.**

4. **Water Sharing Law: Laws pertaining to sharing of river waters.**

5. **Aquifer: A layer of rock or soil that can absorb and hold water.**

6. **Water Shed: A line of high land where streams on one side flow into one river and streams on other side flow into another river.**

7. **Catchment Area: Area around a river.**

8. **Drought: Scarcity of rain fall leading to dryness of land.**

9. **Percolation: To move gradually through a surface that has very small holes.**

Essay type Questions

1. What are the different inflow and outflow processes in the context of water resource?

1. **Different inflow processes are precipitation, surface flow and ground water flow. Inflow of an area= precipitation + surface flow + ground water flow.**

2. **Precipitation includes snow, dew, hail etc.**

3. **Surface flow includes rivers, streams, canals, and other flows on the surface.**

4. **Ground water flow is difficult to estimate, but it can be done. It is the water which we obtain through tube wells.**

5. **Evaporation, the turning of water in to vapor, takes place all the time in water bodies.**

6. **Living things also give off water into the atmosphere through their breathing process. This is called transpiration.**

7. **The total amount of water added to the atmosphere from both evaporation and transpiration is called Evapotranspiration.**

8. **Water that is available to a region not only based on the inflows, but also due to the water that is already available as 'stock' on the Earth's surface as well as in underground. The annual flows and stocks that recharge wells and tube wells is the water that is available for use.**

2. Among the inflow or outflow processes, which has most significant impact on the groundwater resources?

1. **During monsoon months, the surface flow increases substantially.**

2. **A portion of the rainfall percolates into the soil and travels to the underground strata and recharges the aquifers.**

3. **Some amount of the rain water directly reach the wells and bore wells and becomes available for immediate use and a portion of it goes into very deep aquifers and not available for immediate use.**

4. **Evaporation and transpiration are major out flow processes. Evaporation has the most impact.**

5. **Depending on comparative rates of inflow and out-flow processes, we can judge what happens to the stock of water over many years.**

6. **Inflows of ground-water depend on the green cover in the catchment areas.**

3. Make a list of challenges faced in the water resources in the Tungabhadra basin, identify the solutions that have been discussed in the content of these problems either in this chapter or elsewhere in different classes.
I. Challenges faced in water resources in the Tungabhadra basin:

1. **The industrial sector is one of the major state holders of water consumption in the Tungabhadra basin. The demand for water for industrial purposes has been on rise.**

2. **80% of the people in this basin are dependent on agriculture. Bore well irrigation is extended.**

3. **The lower portion of the basin, which is located in AP, is characterised by lower rainfall and drought conditions.**

4. **Inadequate green cover leads to faster water run-off as surface flow continues without getting a chance to recharge the underground system. Tungabhadra dam has gradually lost its water storage capacity.**

II. Solution:

1. **A Forestation should be encouraged.**

2. **Mining activity should be controlled.**

3. **An effective water resources management mechanism is required to the proper water consumption.**

4. **Change in cropping patter would have to be encouraged throughout the basin.**

4. How significant are the laws, public action, in the context of water resources? Write a short note on the ideas discussed in the last two sections of the chapter.

1. **Water is a collective pool of resource and regulation of water resources is not easy as consumption of one person affects what is available for others.**

2. **Each farmer competes to go deeper than their neighbour for better access to water and soon all tube wells in an area up to certain depth will dry up. Water use for any region, whether small watershed or river basin has to take into account all the inflows and out flows.**

3. **The current laws about groundwater in many states are both outdated and in appropriate.**

4. **There are limits as to how much water land owners can take out.**

5. **Due to this, the water sourcing and consumption have become problematic issues.**

6. **The example set by the people of Hiware Bazar village in water conservation is an inspiration to all.**

7. **Water resources require both collective action at the local level and appropriate laws and positive at the state and central levels.**

Short Answer Questions

1. Create a table to describe Major Rivers in India with the following items: direction of flow, countries or region through which they pass through and relit features of the areas.

Sl. No.	River	Direction of flow	Countries or Regions	Relief features
1.	Indus	West	Tibet, India, Pakistan	Kailas range
2.	Ganga	East	India, Bangladesh	Gangotri
3.	Brahmaputra	West	Tibet, India, Bangladesh	Chemayungdung
4.	Godavari	East	Maharashtra, AP	Triambak, Nasik
5.	Krishna	East	MP, Gujarat	Mahabaleshwar
6.	Narmada	West		Amarkantak

2. Identify and list arguments that world support or oppose use of ground water in various contents, such as agriculture, industry etc.

1. **A portion of the rainfall percolates in to soil and travels to the underground strata and recharges the aquifers. Through open wells and tube wells groundwater is used to irrigate the crops.**

2. **There is a fall in the ground water level is Punjab and Haryana due to excessive use of ground water during 'Green Revolution'.**

3. **Water is required for manufacturing processes and this demand often competes with agricultural use.**

4. **The use of underground water for agriculture increases its productivity.Equitable distribution of underground water to the various classes of farmers has to be done, which works as an insurance against drought and stabilisation of agriculture production, which in turn results in generation of employment in rural areas.**

5. **The excessive use of ground water led to decline of ground water levels and sea water intrusion in coastal areas. Industrial waste is largely responsible for high level of pollutants found in ground water.**

3. There has been various ways in which changes occurred in the context of water resources. Describe the positive as well as negative social changes that got reflected in this chapter?

1. **Planning for water use for domestic purpose is needed, in order to increase the water availability. Water is considered as common pool resource. Water for industrial use is increasingly competing with domestic and also agricultural usages.**

2. **The positive social changes are,**
   a) Advanced technology in agriculture.
   b) Recycling procedures of industrial wastes.
   c) Construction of irrigation dams and hydel projects etc.,

3. **The negative social changes are.**
   a) Urbanization
   b) Expansion of industrial activity and water pollution.

4. Which aspects of forming practices were regulated in the context of Hiware Bazar to improve the water conservation?
Following are the innovations of Hiware Bazar people in farming practices and water conservation -

1. **The soil and water conservation works in Hiware Bazar were implemented on common lands and on pirate grass lands.**

2. **Continuous Contour Trenches (CCTs) were dug on the hill slopes to arrest the erosion of soil, harvest water and encourage growth of grass.**

3. **A number of water harvesting structures such as check dams. Percolation tanks and loose boulder structures were also built in the village.**

4. **Tree falling was completely stopped through kurhad bandi, which literaaly means 'axe ban'.**

5. **The villagers had prohibited digging bore wells for the purpose of irrigation.**

6. **Water intensive crops such as sugar cane were prohibited. Selling of land to outside land lords and industrialists was banned.**

7. **Plantation on forest lands and roadsides were taken up extensively.**

5. In what ways is water brought and sold in your area and for what purposes? Do you think there should be some checks and balances for this? Discuss.

1. **The water in our area is supplied by municipal corporation/village panchayath through pumps.**

2. **We pay the money to the owner of boring pumps to get water for our fields, which is one of the ways of securing water for agricultural purposes.**

3. **Drinking water is also supplied by local companies after purification. They charge Rs. 10 to Rs. 20 for refill.**

4. **There should be some checks and balance for both these supplies.**

1. On a map of India identify and mark the Himalayas and the Western Ghats.

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