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COIMBATORE

DEPARTMENT OF CIVIL ENGINEERING

19CET305-IRRIGATION AND WATER RESOURCE ENGINEERING

III YEAR / VI SEMESTER

Unit 4 : WATER RESOURCES & NETWORK DESIGN



Water Resources in India

- Water Resources of India accounts for about 2.45 per cent of world's surface area, 4 per cent of the world's water resources and about 16 per cent of world's population.
- The total water available from precipitation in the country in a year is about 4,000 cubic km.
- The availability from surface water and replenish able groundwater is 1,869 cubic km.
- Out of this only 60 per cent can be put to beneficial uses. Thus, the total utilisable water resource in the country is only 1,122 cubic km.



Surface Water Resources in India

- There are four major sources of surface water.
- These are rivers, lakes, ponds, and tanks. In the country, there are about 10,360 rivers and their tributaries longer than 1.6 km each.
- The mean annual flow in all the river basins in India is estimated to be 1,869 cubic km.
- Due to topographical, hydrological and other constraints, only about 690 cubic km (32 per cent) of the available surface water can be utilised.
- Water flow in a river depends on size of its catchment area or river basin and rainfall within its catchment area



- India : Physical Environment” that precipitation in India has very high spatial variation, and it is mainly concentrated in Monsoon season.
- Given that precipitation is relatively high in the catchment areas of the Ganga, the Brahmaputra and the Barak rivers, these rivers, although account for only about one-third of the total area in the country, have 60 per cent of the total surface water resources.

Groundwater Resources

- The total replenish able groundwater resources in the country are about 432 cubic km.
- Table 6.1 shows that the Ganga and the Brahamaputra basins, have about 46 per cent of the total replenish able groundwater resources.



Table 6.1 : Basinwise Ground water Potential and Utilisation in India (Cubic Km/Year)

S. No.	Name of Basin Ground Water Resources	Total Replenishable Utilisation (%)	Level of Groundwater
1.	Brahmani with Baitarni	4.05	8.45
2.	Brahmaputra	26.55	3.37
3.	Chambal Composite	7.19	40.09
4.	Kaveri	12.3	55.33
5.	Ganga	170.99	33.52
6.	Godavari	40.65	19.53
7.	Indus	26.49	77.71
8.	Krishna	26.41	30.39
9.	Kuchchh and Saurashtra including river Luni	11.23	51.14
10.	Chennai and South Tamil Nadu	18.22	57.68
11.	Mahanadi	16.46	6.95
12.	Meghna (Barak & Others)	8.52	3.94
13.	Narmada	10.83	21.74
14.	Northeast Composite	18.84	17.2
15.	Pennar	4.93	36.6
16.	Subarnrekha	1.82	9.57
17.	Tapi	8.27	33.05
18.	Western Ghat	17.69	22.88
	Total	431.42	31.97

Source: Ministry of Water Resources, Govt. of India, New Delhi;

<http://wrmin.nic.in/resource/awresource1.htm>



- The level of groundwater utilisation is relatively high in the river basins lying in north-western region and parts of south India.
- The groundwater utilisation is very high in the states of Punjab, Haryana, Rajasthan, and Tamil Nadu. However, there are States like Chhattisgarh, Odisha, Kerala, etc., which utilise only a small proportion of their groundwater potentials.
- States like Gujarat, Uttar Pradesh, Bihar, Tripura and Maharashtra are utilising their ground water resources at a moderate rate.
- If the present trend continues, the demands for water would need the supplies. And such situation, will be detrimental to development, and can cause social upheaval and disruptions.



WATER RESOURCES IN TAMIL NADU

Tamil Nadu constitutes 4 percent of India's land area and is inhabited by 6 percent of India's population, but has only 2.5 percent of India's water resources.

More than 95 percent of the surface water and 80 percent of the ground water have already been put into use.

Major uses of water include human/animal consumption, irrigation and industrial use.

The demand for water in Tamil Nadu is increasing at a fast rate both due to increasing population and also due to larger per capita needs triggered by economic growth.

The per capita availability of water resources however, is just 900 cubic meters when compared to the national average of 2,200 cubic meters.

Agriculture is the largest consumer of water in the State using 75 per cent of the State's water resources.

The State is heavily dependent on monsoon rains. The annual average rainfall is around 930 mm (47 percent during the north east monsoon, 35 percent during the south west monsoon, 14 percent in the summer and 4 percent in the winter).



Surface Water Resources of Tamil Nadu:

- The total surface water potential of the state is 36 km or 24864 M cum.
- There are 17 major river basins in the State with 61 reservoirs and about 41,948 tanks.
- Of the annual water potential of 46540 million cubic metres (MCM), surface flows account for about half.
- Most of the surface water has already been tapped, primarily for irrigation which is the largest user. 24lakh hectares are irrigated by surface water through major, medium and minor schemes. The utilisation of surface water for irrigation is about 90 per cent.



Ground Water Resources of Tamil Nadu:

- The utilisable groundwater recharge is 22,423 MCM. The current level of utilisation expressed as net ground water draft of 13.558 MCM is about 60 per cent of the available recharge, while 8875 MCM (40 per cent) is the balance available for use.
- Over the last five years, the percentage of safe blocks has declined from 35.6 per cent to 25.2 per cent while the semi-critical blocks have gone up by a similar percentage. Over-exploitation has already occurred in more than a third of the blocks (35.8 per cent) while eight blocks (2 per cent) have turned saline.
- The water level data reveals that the depth of the wells ranges from an average of 0.93 metres in Pudukkottai district to 43.43 metres in Erode. According to the Central Groundwater Board, there has been a general decline in groundwater level in 2003 due to the complete desaturation of shallow aquifers. There has been a considerable failure of irrigation wells in Coimbatore District.