Topography
3. TOPOGRAPHY

Gobindsagar reservoir is one of the biggest and the deepest reservoirs of India situated in the foot hills of Shivaliks, located at latitude 31°25' North and longitude 76°25' East. It lies in Bilaspur and Una districts of Himachal Pradesh, India. Himachal Pradesh is one of the culturally and geologically Himalayan states of the Indian Union, which lies in the western Himalayas, occupying an area of 55,673 km² and situated between latitudes 30°22' and 33°10' North and longitudes 70°46' and 79°00' East. It is bounded on Northwest and North by the state of Jammu and Kashmir and on the East by Tibet, on the Southeast by State of Uttar Pradesh, on the South by Haryana and on the Southwest by Punjab. (Fig. 1) (Johal, 1998).

![Fig. 1. Districts of Himachal Pradesh.](image-url)
Gobindsagar came into existence with the construction of 225.6 m. High concrete straight gravity dam on the river Satluj at village Bhakra in 1963. It is one of the tallest dams built with the purpose of irrigation, generation of hydroelectric power, protection from floods and for fish production. The useful life of the dam has been estimated to be over 400 years. The dam was dedicated to the nation by India's First Prime Minister Jawahar Lal Nehru who described this Dam as one of the temples of modern India. Water spread area of Gobindsagar is 16867 hectares at full storage level, 5063 at dead storage level with an average level of 10965 (Table 1). Mean depth of reservoir is 188.98 meters at full storage level, 117.35 m at dead storage level with an average level of 153.17 m (Katiha et al., 2000). For the completion of this reservoir 366 towns and villages were submerged in addition to large forest tracts, rocks and boulders (Jhingran, 1991). The reservoir receives a number of rivulets like Lunkhar, Sir, Gambhar, Gamrola and Ali (Fig. 2). Lunkhar and Sir arms of the reservoir are important from the fisheries point of view.

Water level in the reservoir changes periodically. During the Southwest monsoon, the water level rises at a rate of about 0.5 - 2.0 m daily. After the retreat of monsoon, it falls at the same rate (Srivastava et al., 1985). Due to periodic change in water level, there is no growth of aquatic weeds. The construction of dam across a river introduces a number of changes in the natural situation. Certain changes occurred behind the dam i.e. in the reservoir area. The Satluj was fast flowing, shallow and well-oxygenated hill stream, which was supporting some species of fish, which live only in moving water at no great depth. The construction of the dam converted the flowing
water course into a broad area of deep and relatively still water. Such ecological change effects all kinds of organisms living in that body of water including the fish (Chakraborti, 1998). The river Satluj on which the dam has been constructed is the most important of five major tributaries of the Indus system. It rises as Longchhen Khabab river from Rakas lake near the holy Mansarover in Tibet. It flows for a considerable distance before entering Himachal Pradesh near Shipkila. The river Satluj flows along a Southwestern course in Himachal Pradesh. This river has carved spectacular gorges. It flows at the base of Shimla ridge and then enters the lower hills in Bilaspur area where the gigantic Bhakra dam has been erected across it. The Satluj river then enters the plains of Punjab and finally drains in to the Indus in Pakistan. The upper tracts of the Satluj valley are under a permanent cover of snow. Alpine, subalpine, temperate and subtropical climates are found at different elevations (Negi, 1991). The water of the reservoir is warmer as compared to the water in the river Satluj in the upstream. Ecologically, the reservoir has been divided into three zones, i.e., warm water Lunkhar khud, warm at surface and cool at deep bottom in lentic zone and cold water lotic zone in Bilaspur (covering 26.0, 42.0 and 32.0% of the area respectively (Srivastava et al., 1985; Sugunan, 1995).

Fig. 2. Gobindsagar Reservoir, Himachal Pradesh, India.
Table 1. General features of Bhakra Dam and Gobindsagar Reservoir.

**The Dam**
1. Location  
   Bilaspur - Bhakra
2. Name of river  
   Satluj
3. Tributaries  
   Lunkhar khud, Sir khud, Gambhar khud, Ali khud and Gamrula
4. Water source  
   snow melt & monsoon run off
5. Dam type  
   Concrete straight gravity type
6. Height of the dam (m)  
   226
7. Elevation of the dam  
   560
   (m above MSL)
8. Year of commissioning  
   1959
9. Geographical ordinates  
   31° 25’N; 76° 25’ E
10. Purpose  
   Multi-purpose
11. Catchment area (km²)  
   56980

**The reservoir**
12. Water spread area (ha) at
   
   i) full storage level  
   16867
   ii) dead storage level  
   5063
   iii) average level  
   10965
13. Mean depth (m) at
   
   i) full storage level  
   188.98
   ii) dead storage level  
   117.35
   iii) average level  
   153.17
14. Total length (km)  
   96.56
15. Widest stretch (km)  
   6.0
16. Shoreline development index  
   12.26
17. Volume development index  
   4.04
18. Annual water level fluctuation (m)  
   450 – 507
19. Max. water level fluctuation (m)  
   70.0
20. Gross storage capacity (million m³)  
   9868
21. Live storage capacity (million m³)  
   7771
22. In flow (million cusecs)  
   4.4 – 8.0
23. Out flow (million cusecs)  
   4.9 – 7.0