

CHAPTER - 6

WATER RESOURCES

Fill in the blanks with suitable words:

- *Importance of irrigation*
- *Types of irrigation*
- *Multipurpose river valley projects*
- *Important hydro-electric projects of India*
- *National Electricity Grid*
- *Rain-water harvesting*

Water is an important natural resource. It is one of the basic requirements of human beings and it is a national property. This is being used for irrigation, hydro-electric power generation, industry, domestic use, transportation, fisheries and also for recreational purposes. The development of water resources has become very essential to satisfy the needs of growing population. As a natural resource, its judicious conservation is required.

The water resources on the surface of the earth are the rivers and lakes. Wells and springs are ground water resources. The availability of water varies from region to region and time to time. Rainfall in India uncertain, unreliable, unequally distributed. Agriculture depends on canals, tanks, well irrigation projects.

Irrigation means supply of water to agriculture from canals, wells and tanks artificially or manually. Irrigation is very essential in the regions of low rainfall. Irrigation is the most important development in the history of agriculture. With the available water for irrigation in India, a maximum of 140 million hectares can be irrigated. Upto 2006, the net irrigated area is only 62.2 million hectares. At present India has the largest area under irrigation in the world.

Do you know this?

- *The total volume of river water in India is 1869 billion cubic kilometers. Of this, usable water is only 690 million cubic kilometers.*
- *Available Ground water is 432 million cubic kms.*
- *The total available water volume is thus estimated at 1122 billion cubic kms.*
- *1 Hectare = 2.47 Acre.*

Types of Irrigation: India being known for a variety of physical features, we can see the variation in the distribution of water resource too. Besides, based on the water requirement for agriculture, distribution of rainfall, physical features, types of crops and the types of agricultural methods used, various types of irrigation are in use in different places. Based on the source of irrigation, these can be divided into : 1. Well irrigation 2. Canal irrigation and 3. Tank irrigation.

Do you know this?

India has the largest area under irrigation in the world and China ranks second.

1. Well irrigation: Well irrigation is the most important types of irrigation in India. It provides water to large areas of agricultural land. Supplying ground water by digging or drilling wells is called well irrigation. Well irrigation is more useful in low rainfall regions. Construction and maintenance of wells is easier. Well irrigation becomes essential where the canals and tanks are not available. There are two types of wells: 1. Open wells 2. Borewells.

Open wells : This type of wells are dug up in suitable agricultural land. Water is lifted from openwells through manual power or with the help of diesel or electric pump set.

Tube wells : Today in India's well irrigation system, role of borewells are very important. 59.7% of total well irrigation area and 33.7% of the total irrigated area comes under tubewell irrigation.

2. Canal Irrigation : Canal irrigation are very important system of irrigation in India. India is one of the important country in the world using canal irrigation. Vast areas of cultivable land can be irrigated by this method. India about 16.5 million hectares are under canal irrigation. This is the second most important irrigation type after well irrigation.

Do you know this?

Cusecs : This word refers to the water that flows per cubic feet per second.

There are two types of canals.

a. Flood canals b. Perennial canals directly

a. Flood canals: Water is drawn directly from the river through canals without the help of any dams. When the river level is high the excess water passes through the canals. These are called **flood canals**.

b. Perennial canals: Dams are constructed across the rivers and water is stored in the reservoirs. This water is provided for agriculture through canals, which are called **Perennial canals**. This type of canal networks can be seen in the states of Uttar Pradesh, Andhra Pradesh, Madhya Pradesh, Punjab, Rajasthan, Haryana and Bihar.

3. Tank irrigation: It is practice in India since ancient times. Small bunds are constructed across streams. Water is stored and supplied to cultivable areas through small canals or pipes. Tank irrigation is common in Andhra Pradesh, Tamil Nadu, Orissa and Karnataka. In addition, Madhya Pradesh, Rajasthan, Jharkhand and Uttar Pradesh also have tank irrigation.

MULTI-PURPOSE RIVER VALLEY PROJECTS

India has undertaken the construction of many river valley projects for the maximum utilisation of river water resources. These projects have other purposes besides providing water for agricultural use. Such projects are called multi-purpose river valley projects. The main aims of these projects are:

1. providing irrigation facility;
2. production of hydro-electric power;
3. prevention of floods;
4. creating facility for water transportation;
5. providing water for domestic and industrial use;
6. preventing soil erosion;
7. developing fisheries;
8. enhancing forest wealth.

IMPORTANT MULTI-PURPOSE RIVER VALLEY PROJECTS OF INDIA

1. Damodar River Valley Project: This is the first multi-purpose river valley project of independent India. This project is the joint venture between the states of West Bengal and Bihar. This river was causing large scale destruction to life and property in West Bengal and, as such, it was called 'Sorrow of Bengal'. To prevent destructions by the river, this project was taken up.

This project has a total canal network of 2495 kms and supplies water for 4.5 lakh hectares of land. Dams have been constructed across Damodar river and its tributaries at Tilaiyya, Maithan, Konar and Panchet hill. Thermal power stations have been established at Bokaro, Chandrapur and Durgapur. West Bengal and Jharkhand have been benefitted from this project.

2. Bhakranangal Project: It is the highest multi-purpose valley projects of India. This is the joint venture between Punjab, Haryana and Rajasthan state. Dams are constructed at Bhakra and Nangal of Himachal Pradesh across the Sutlej river. The dam at Bhakra is the highest (226 mts) in project has a canal network of about 3402 kms and provides irrigation to 14.6 lakh hectares. Delhi and Himachal Pradesh have benefitted from this project by way of getting irrigation and hydro-electric power. The reservoir created by this dam is called 'Govindasagar'.

3. Kosi Project: The main objective of this project was to prevent floods. Kosi was called Sorrow of Bihar. This is a joint project between India and Nepal. A dam is built across Kosi river at Hanumanagar on the border of India and Nepal. This project provides irrigation facility 8.75 lakh hectares of land. 50% of the hydro-electric power generated by this project is supplied to Nepal.

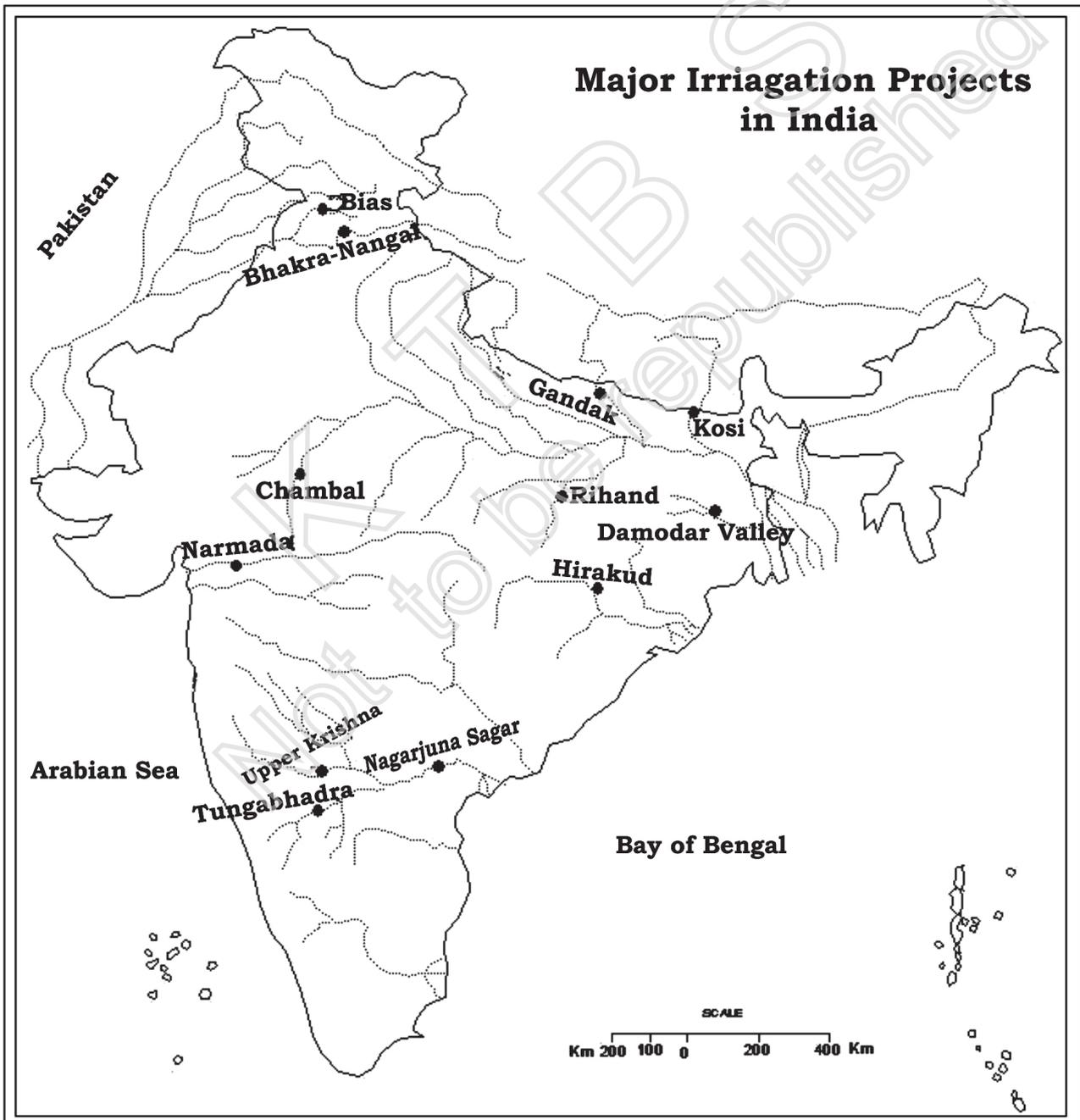
4. Hirakud Project: This project is constructed across the Mahanadi, in Orissa about 10 kms from Sambalpur. This river was known as Sorrow of Orissa an account of its frequent floods. Hirakud is the longest dam in the country, measuring 4801 mtrs in length. It provides irrigation facility to a total of 2.54 lakh hectares. This project provides irrigation facilities and hydro-electric power to Orissa, Jharkhand and Chattisgarh states.

5. Tungabhadra project : Irrigation and generation of hydroelectric power are the main objectives of this project. It is established jointly by Karnataka and Andhra Pradesh states. This dam is built across Tungabhadra river at Mallapur near Hospet in Bellary district. It provides hydro-electric power and irrigation facility to 5.5 lakh hectares in Andhra Pradesh and Karnataka. The reservoir is called 'Pampasagara'.

6. Nagarjunasagar Project : This dam is constructed at Nandikonda village of Andhra Pradesh across the river Krishna. Irrigation and generation of hydroelectric power are its main objectives. This provides irrigation facility to a total of 8.30 lakh hectares.

7. Upper Krishna : This is a major project of Karnataka. This project provides irrigation and drinking water to Bijapur, Bagalkot, Raichur and Gulbarga districts. It is constructed across the river Krishna near Alamatti of Bijapur district. This has resulted in the formation of Lal Bahadur Shastri reservoir. Another dam is built near Narayanapura. The name of the reservoir is 'Basavasagara'. Together they provide irrigation facility to a total of 6.47 lakh hectares. Recently, hydro-electric power generation has also started.

8. Narmada Valley Project: Narmada Project Authority was established since this project is entangled with many controversies right from its inception. The dam is constructed between Gujarat



and Madhya Pradesh and a decision was arrived at by the NPA on the distribution of water. Narmada river has totally 23 dams across its length and Sardar Sarovar, Narmada Sagar and Narmada Upper Projects are the main ones. This project provides irrigation facility and hydro-electric power to North Gujarat, Rajasthan and a few areas of Maharashtra state.

INDIA'S MAJOR HYDRO-ELECTRIC POWER PROJECTS

Hydro-electric power is the second important source of power in India. Hydro-electric power is generated to an extent of 13.9% of the total power generated in 2011. It is estimated that India has a potential to generate 410 billion kw of hydro-electric power. But presently only 106.68 billion kw power is being generated. The following states have important hydro-electric power generation centres.

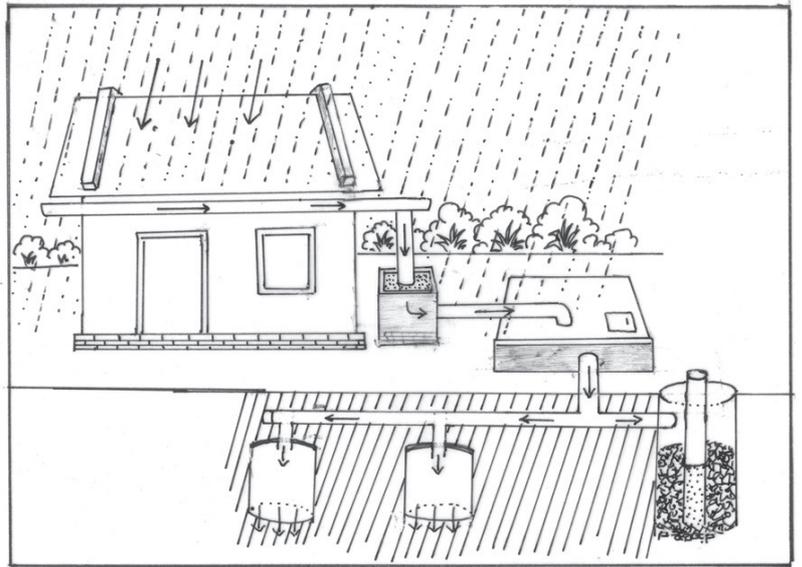
1. **Karnataka:** Shivanasamudra, Tungabhadra, Jog, Bhadra, Alamatti, Kali (Supa Dam).
2. **Andhra Pradesh:** Nagarjunasagar, Srisailem project, Ramapadasagar Project, Sileru project.
3. **Tamil Nadu:** Mettur project, Paikara project, Periyar project, Kundha project, Moyar project, Kodayar project etc.
4. **Madhya Pradesh:** Banasagar, Gandhisagar, Panchyोजना.
5. **Maharashtra:** Tata hydro-electric power project, Beera project, Vaitarana project, Koyna project.
6. **Orissa :** Hirakud project, Kolaja project, Rangali project, Naraja project.
7. **Bihar :** Kosi project, Suvarnarekha project, Tawa project.
8. **Gujarat :** Kakrapara project, Kadana project, Ukai project.

In addition to the above, many other power projects are found .

National Power Grid: India generates power from various sources. All the states do not have sufficient electric power supply at all times. Hence, to supply power from surplus states to deficit states, a National Power Grid is established. With its help, excess power from any state can be supplied to any other power deficit state.

Rain Water Harvesting:

Water is very precious. Although India has vast water resource, it is most unevenly distributed. Rainfall is confined to the rainy season. Even in areas of heavy rainfall, water shortage is seen during the summers. The only solution to the drought condition prevailing in India is 'Rain Water Harvesting'. Collection of rain water is called "Rain Water Harvesting".



There are two types of water Harvesting : 1.Collection of water at the place of rainfall. eg.roof tops of houses and buildings 2.Collection of flowing rainwater eg. building bunds and collecting water.

- Using the water collected from roof tops reduces the dependence on the public water supply.
- Digging ponds in agricultural areas and collecting water.
- Building check dams to prevent the flow of water and allowing it to percolate to increase of the ground water table. This is called recharging.
- Not only individuals, even communities can engage themselves in constructing bunds or digging small ponds to collect the rain water.

In Karnataka, conservation of rainwater has been in practice from ancient times. Tanks, lakes and ponds are all methods of conserving water. Failure to pay attention to these traditional methods has resulted in drought condition and water scarcity. By protecting and managing properly these, the water problem in the country can be reduced.

EXERCISES

I Fill in the blanks with suitable words:

1. Damodar river was called, Sorrow of _____ .

2. _____ river is called Sorrow of Bihar.
3. Biggest irrigation project of Karnataka is _____.
4. Hydroelectric project is constructed at _____ on the river Cauvery.
5. Hirakud project is built across _____ river.

II Answer the following after discussing them in groups:

1. What is irrigation?
2. What are the types of irrigation?
3. What is multi-purpose river valley project? What are its objectives?
4. Write a short note on Bhakra Nangal project.
5. Name the hydro-electric power projects of Karnataka.
6. 'Rain water harvesting is compulsory today'. Why?
7. What is National Power Grid?

III Match the following projects in 'A' with states 'B':

A	B
1. Bhakra Nangal Project	a. Bihar
2. Tungabhadra Project	b. Himachal Pradesh
3. Hirakud Dam	c. Karnataka
4. Kosi Project	d. Orissa

IV Activity:

- List out the uses of multi-purpose river valley projects of India.
- Visit out a rain water harvesting project of your place and get more information.

V Project Work:

1. List the various types of irrigation facilities around you and learn the use of these methods.
2. Write about an irrigation project which you have seen.