

FORESTS AS A RESOURCE

Forests are renewable resources and play an important part in economic development of nation. They perform types of functions. Some of the important functions performed by the forests are:

1. Forests modify local climate.
2. Forests control soil erosion.
3. They regulate stream flow.
4. They support a variety of industries and provide livelihood for many communities.
5. They reduce wind force and influence air temperature.
6. The leaves of trees help to form humus.
7. They provide industrial wood, timber, fuel wood, fodder and several other minor products of great economic value.
8. They provide natural environment for wildlife.

TYPES OF FORESTS

For the purpose of administration forests are classified into three types:

1. **Reserved Forests:-** Are those which are permanently earmarked either to production of timber or other forest produce or in which right of grazing and cultivation is not allowed.
2. **Protected Forests:-** Are those forests where grazing of cattle is allowed and even farming is allowed conditionally.
3. **Unclassed Forests:-** Are those forests which consist largely of inaccessible forests or unoccupied wastes.

NATURAL VEGETATION OF INDIA (FOREST TYPES)

The forest covers in India at present are 76.5 million hectares of land. Forests are unevenly distributed and range between 86.9 percent in Andaman and Nicobar islands and 3.8 percent in Haryana, A.P, Manipur, Mizoram, Tripura and Andaman and Nicobar Islands have more than 60 percent of their areas covered with forest. Haryana, Gujrat, Punjab, Rajasthan, Delhi, and J&K have less than 10 percent of their areas under forest:

The various forest types of India are:

- a. Topical Rain – forests
- b. Tropical deciduous forests
- c. Tropical thorn forests and scrubs
- d. Tidal forests
- e. Alpine and tundra forests.

a) **Tropical Rain – forests:-** Trees in these forests do not have a distance of shedding leaves because the region is warm and wet throughout the year. As such these forests are ever

green. They are at their best where rain-fall is in excess of 200 centimeters with a short dry season. They are thus typical rain forests, such areas are confined to rainy slopes of Western Ghats, plains, of West Bengal and Orissa and North-eastern India. In these forests trees grow very vigorously, reaching heights of 60 metres and above. The number of species is too large and too mixed to exploit each one of them commercially. Some of the commercially useful trees of these forests are ebony, mahogany and rosewood.

b) **Tropical Deciduous Forests:-** These are also called the monsoon forests par excellence. This is so because they form the natural cover almost all over India, particularly between regions of 20 and 75 centimeters of rainfall. Economically they are very important. They need a lot of care as they are less resistant to fire. They are divided into two groups: (i) Moist and (ii) Dry deciduous. The former are found on the eastern slopes of the Western Ghats. Teak is an important species of this region. The moist deciduous are also found in the northern – eastern part of the peninsula i.e., around Chotanagpur plateau covering east Madhya Pradesh, south Bihar and west Orissa. They are also common along the Shiwaliks in the most important tree of the dry deciduous.

c) **The Thorn and Scrub Forests:-** These are confined to areas with rainfall under 75 centimeters. They are spread over northwestern part of the country from Saurashtra in the south to Punjab plains in the north. In the east they stretch to the northern Madhya Pradesh (mainly Malwa Plateau) and south west Uttar Pradesh covering Bundelkhand plateau. Kikar, babul, Khair, date scattered trees with long roots spread in a radial patterns are common features. These forests gradually fade away into scrubs and thorny bushes, which constitute the typical desert vegetation.

d) **Tidal Forests:-** The tidal areas along the coasts and rivers are covered by mangrove trees that can survive in both fresh and salt water – the major characteristic of the tidal areas. Sundari as well known mangrove.

FLORA

Plants of particular region or period, listed by species are referred to as 'flora'. India has 49,000 different species of plants. The secret of such diverse flora lies in the country's varied relief, land forms, terrain, soil, range of daily and annual temperature and varying amount of rainfall and duration of its regime.

FAUNA

Fauna refers to species of animals in a particular region. India has about 65,000 known species of fauna. Of these 40,000 are insects, 372 mammals, 1, 228 birds, 428 reptiles and 2,546 fishes.

NATIONAL PARK

A national park is a relatively large area where one or several ecosystems exist and where plant and animal species; geomorphologic sites and habitats are of special educative and recreative interest.

There are about 89 national parks in India. The national parks of Kashmir include Dachigam and Hemis Park at Leh and National Park at Kishtawar.

BIOSPHERE RESERVE

A biosphere reserve is a multipurpose protected area to preserve the genetic diversity in the representative ecosystem. They are intended to protect and conserve the diverse flora and fauna in the country. The first such 5,500 sq. kms. The other Biosphere reserves are Nanda Devi, Nokrek, and Great Nicobar. Gulf of Mannar, Manas, Sunderbans, simplipal and Dibru – Saikhova.

WILDLIFE SANCTUARY

Wildlife Sanctuary is relatively large area where different species of animals are protected and conserved. The animals life in their natural environment and are secure. There are about 400 wildlife sanctuaries in various parts if India. Some of them are Sariska, Mount abu Manas, etc.

The Wildlife Sanctuaries in our State at over (Pahalgam). Ramnagar (Jammu); Nandi (Jammu); Surin Sar; Mansar (Jammu).

FOREST CONSERVATION

According to the National forest policy, the minimum desired areas under forest in the country should about 33%. But at present is only 22%. So, there is an immense need of conserving our forests. Depletion of forests by over – utilization affects the ecosystem. Forests are important for maintaining proper ecological balance. The depletion of forest leads to disappearance of wildlife as well as wild variety of plants. This leads to detoraition of genetic reserve. Indiscriminate cutting of trees leads to soil erosion on a large scale.

Forests can be conserved by the following methods:

- a. We must celebrate Van Mahotsave with zeal and vigorous and plant trees.
- b. Steps must be taken to meet requirements of fuel wood, fodder and minor forest produce and timber of tribal and rural population.
- c. There should be an increase in productivity of forest to meet the national needs.
- d. Steps should be taken to create massive people's movement with involvement of women to achieve the objectives and minimize pressure on existing forests.
- e. There should be encouragement of efficient utilization of forest produce and optimum substitution of wood.
- f. The extension of desert areas should be checked by forestry on the fringes.
- g. Natural heritage should be preserved and conserved.

WILDLIFE IN INDIA

The wildlife in India is rich and varied. India has more than 89,000 species of animals, 1200 species of birds and 2500 species of fish. In addition there are amphibians, reptiles, mammals and small insects and worms. The mammals include elephants, Indian bison,

rhinoceros, swamp deer, spotted deer, neelgai and the black buck. Among the cats there are tigers and lion. Among the birds there are pheasants, geese ducks, pigeons, cranes etc. in the rivers there are crocodiles and the gharials. In the upper reaches of Himalaya there are the snow leopard and the panda. India is the home of several species of monkey.

CONSERVATION OF WILDLIFE

Preservation of wildlife is very essential as a large number of species have become extinct. Many other species are at the verge of extinction. Depletion of forests has endangered wildlife. Reckless hunting of animals has also reduced their numbers. Many programmes have been started by the government to serve animals. The country has developed a network of 89 national parks, 490 sanctuaries and 13 biosphere reserves. There are 20 wetlands in the country. The wildlife week is observed in India during the first week of October every year. All these projects and programmes will go a long way in conserving and protecting wildlife and biodiversity in India.

WATER RESOURCES

Water is one of the most important resources. It is essential for the substance of life on the earth. We use water in all walks of life, the uses of water are:-

1. Water is used for domestic purposes like drinking, washing, bathing and cleaning.
2. Water is required for irrigating agricultural crops.
3. Water is used for various industrial purposes.
4. Water is used for the generation of electricity.
5. Fisheries are developed in water bodies.
6. Water is indispensable for disposal of ever growing municipal sewage and dirt of all sorts.

NEEDS OF IRRIGATION IN INDIA

India is a large country with a huge population of 100 crores. She needs more food raw materials to meet the needs of the increasing population. The solution to increasing food shortage lies in increasing the production from the cultivated area. Irrigation is necessary to increase agricultural production. Use of chemical fertilizers can also be increased only if adequate water is available. Irrigation also makes it possible rising of more than one crop from the same land in a year. The main factors responsible for the need of irrigation in India are:-

a. **Uncertain and Unequal rainfall:-** The distribution of rainfall over time is uneven in India . Most of the precipitation is received during three to four months and rest of the year is dry. Therefore, even in areas where the rainfall is not very low, there is a seasonal deficit of water. Rainfall also varies from one year to the other. Due to this high variability of rainfall, a large part of India to prove to droughts and famines. So, irrigation is necessary to prevent crop failures in India.

b. **Tropical Location of India:-** The tropical location of India also necessitates irrigation. In the tropical areas rate of evaporation is high. Therefore, any crop grown here requires more water.

c. **Vagaries of Monsoon:-** The monsoon winds give heavy rainfall in a short period. The water of the heavy rainfall flows to the rivers, as it cannot seep through the earth so soon. Such type of rainfall is not useful for agriculture. Thus, irrigation becomes very necessary for better production.

SOURCES OF IRRIGATION IN INDIA

India is an agricultural country and its total irrigated area constitutes about 30 % of the total cultivated area of the country. India stands next only to China in its total irrigated area. The Indian farmers employ various methods and sources of irrigation. The methods and sources are:-

i) **Tanks:-** The people of India have been using tanks for irrigation from very early times. Tanks are natural hollows to collect rainwater. The tanks may be man-made also. Water collects in the tanks naturally through rains. These tanks are used during dry periods. About 8% of total irrigated area is irrigated by tanks.

Tank irrigation is quite important in Oceanic plateau because its surface is rocky and uneven and not suited for wells or canals. Deep and rocky cuts are available for storing water for tank irrigation.

ii) **Wells :-** Rain water gets absorbed into the ground and is held by the porous layers of the sub-soil. The water stored up in the ground is called ground – water. The farmers in India have been using this water for irrigation since early times by digging wells. This source of irrigation is used mainly in the alluvial plains where owing to the soft nature of soil, wells are easy to dig. Irrigation by wells is done in U.P, Punjab, Haryana, Rajasthan, Gujarat, Maharashtra etc. there are about 50 lac wells in India. About 40 % of irrigation in India is done through wells.

WELL	TUBE WELL
1. It is a man – made deep, broad pit dug into the soil with human efforts to bring underground water on surface.	1. It is a long, narrow, hollow dug in the ground with the help of boring machines.
2. Water is drawn out by animal labour or manual labour.	2. Water is pumped out with the help of pumping sets by power.
3. It is an old water method of bringing found water to the surface.	3. It is a new method of bringing ground water to the surface.
4. Its mouth is generally open.	4. Its mouth is closed.

iii) **Canals:-** Canals are the main source of irrigation in India. Canal irrigation is extended to those places which are large level plains of deep fertile soil. Canals are long water channels taken out from rivers to carry water places far away from the river. The river water is collected at a suitable place at a higher level by building a dam or reservoir across. The river

and is diverted into a channel. The water is distributed to the fields through local channels. Canal irrigation is most prevalent in Punjab, Haryana, and Uttar Pradesh. Now a day, about 40 % of the net irrigated area is being irrigated by canals.

Perennial canals: These canals are developed by diverting water from rivers and supply the water from rivers. They supply water for irrigation throughout the year. Their main source is glaciers. These canals are found in Northern India.

Inundation canals: These canals have water during the rainy season only and dry up during the summer. They divert the flood water of rivers for irrigational purposes.

PERENNIAL CANALS	INUNDATION CANALS
1. They are developed by diverging water from rivers that arise from snow covered mountain peaks.	1. They divert the flood water of rivers for irrigational purposes.
2. They do not generally involve the construction of big river dams.	2. They involve the construction of dams.
3. These canals are suitable for irrigation in all the seasons.	3. These canals go dry when the flood water recede or when rainy season ends.
4. They are permanent source of irrigation.	4. They are non-permanent sources of irrigation.

WATER BUDGET

India is a vast country with limited resources of water. In order to meet inadequacy and irregularity of water availability, she has to plan for her water use. This planning is called water budget. It ensures the availability of water in a certain region and in a certain quantity and its utilization in a certain purpose in the region. Water budgeting is the right answer to the maximum and optimum utilization of water resources. The water resources of India are estimated at 16.7 crore hectare metre of water in irrigation. Keeping in view, her limitations and the level of technological and financial resources, she has planned to use it in phased manner fully by the end of 2010.

In 1951, area under irrigation was 2.26 crore hectares. By end of 1984 – 85, it has risen to 6.75 crore hectares. It has further risen to 14.9 crore hectares in 1994 – 95. Hence, we have to make tireless efforts to achieve the target of bringing 163 crore hectares of land under irrigation by the end of 2010.

Multi-purpose river project is the project, which serves several purposes simultaneously. For examples, irrigation generation of electricity, flood control, fish – breeding etc.

A multipurpose river valley project realizes the following objectives:

1. **Flood control and projection of soil:-** Multipurpose projects help in controlling floods and protecting soil. Water is controlled in large dams which prevents it from flowing in case of huge quantities. This protects the soil from being washed off.

2. **Irrigation:-** Dams help in storing water, which can be utilized for irrigation in dry season. The stored water can also be carried over to distant areas through canals.

3. **Afforestation:-** Multipurpose projects provide facility for afforestation. Trees are systematically planted around reservoir. This helps in the conservation of both water and soil. The afforestation also avoids silting of dams, lakes, river channels and irrigation of canals.

4. **Generation of electricity:-** Multipurpose projects are generally used for the generation of hydroelectricity. They store water and this stored water is made to fall from a height and rotates the turbines to generate electricity.

5. **Navigation:-** Multipurpose projects provide us man-made lakes, reservoirs and canals. These water bodies are used for navigation.

6. **Fisheries:-** The lakes, reservoirs and canals provide ideal conditions for the breeding of fish. Fish hatcheries are developed in these water bodies.

MULTI-PURPOSE PROJECTS OF INDIA

a) **BHAKRA –NANGAL PROJECT:-** This is the biggest multipurpose river valley scheme, its estimated cost was Rs. 241.51 crores. The Bhakra Nangal Project is the joint endeavour of Punjab, Himachal Pradesh, Haryana and Rajasthan. Under this project two dams have been constructed over the river Sutluj. They are the Bhakra Dam and the Nangal Dam.

The Bhakra Dam is constructed on the Sutluj River in Chandigarh. It is the highest dam in the world. Its height from the river bed is 226 metres. The dam is 518m long and has a man-made lake called Gobind Sagar reservoir. Its water storing capacity is 7.8 lakh hectare metres of water.

The Nangal Dam is 13 kms below the Bhakra at Nangal. The Dam is 277m long 28m high. Under this project 11kms long canal and 3100 kms long distributaries irrigating 14 lakh hectares of agricultural land. The project generates 1204 MW of electricity.

Bhakra Nangal provides electricity to Punjab, Haryana, H.P and Delhi. The project has helped in developing the industries of these areas. This project has facilitated in the development of forests and fishing.

b) **THE DAMODAR VALLEY PROJECT :-** Damodar Valley Corporation is a joint venture of Bihar and West Bengal. It has been built on the river Damodar. This project also consists of a series of dams built on the distributaries of the rivers Konar, Bokaro, Maithon and Tilaiya. These rivers used to create havoc in Bengal but now the rivers have been harassed and floods are checked. This project irrigates 3, 94, 000 hectare metres of land. The

main canal of this project provides the navigable facilities upto a distance of 136 Kms. The project provides about 104 MW of electricity which has helped the growth of industry. Three thermal power stations also come under the project.

c) **THE INDRA – GANDHI PRIYADARSHANI CANAL OR RAJASTHAN CANAL:-** Indra – Gandhi canal has been constructed to utilize water of the Sutlej, Beas and Ravi for irrigation of land in Sri Ganga Nagar, Bikaner and Jaisalmer districts of Rajasthan. The dam built on the Sutlej impounds 670000 hectare metre water. This canal is the longest canal of the world. The main canal is 468 Km long nad its water fetching canal is 215 Kms in length. It irrigates about 4.02 lakh hectares. It has changed the desert land into green land.

d) **HIRAKUND DAM PROJECT:-** Hirakund dam stands on the Mahanadi in Orissa . That is the longest dam of the world. It has a length of 4801 metres with 21 Kms long dykes on both sides of the river. Its reservoir stores 8900 cubic metres of water. Its canals irrigate 2.51 lakh hectares of agricultural land. The total power generation capacity of its power house is 270 MW of hydro electrical energy every year. It supplies power Roushila Steel Plant.

e) **THE TUNGBHADRA PROJECT:-** It is a joint venture of Andhra Pradesh and Karnataka built on the Tungabhra, a tributary of the Krishna River. Its dam is 50 metre high and 2.5 km long. Its irrigation potential is about 4.97 lac hectares of agricultural land. The electricity produced by this project has promoted industry both in A.P. and Karnataka. It has also facilitated growth of fisheries.

f) **NAGARJUNA SAGAR PROJECT:-** This project is built on the Krishna river in A.P. the dam has 34.14 metres long dykes on both sides. There are two canals, irrigating 8.64 lakh hectares of agricultural land. This project irrigates about 8, 67,000 hectares of land. It provides thousands of K.W. of electricity.

MAJOR HYDROELECTRICITY PROJECTS OF INDIA

- i) The Bhakra Nangal project, with its four stations at Nangal , Bhakra, Gangwal, and Kotla has an installed capacity of 1.2 million Kw. It supplies electricity to Punjab, Haryana and Delhi.
- ii) The Damodare valley project with its three hydel power stations at Tilaiya, Kolar , Maithon and Panchef, has an installed capacity of 104 MW. The great demand for power in this rapidly industrializing area is met only partially by this hydel power.
- iii) The Hirakund dam project in Orissa has an installed capacity 270.2 MW. It supplies power to the Rourkel Steel Plant.
- iv) The Rihand project is essentially a hydroelectric project. It has an installed capacity of 800 MW. The power house is supplied by water from the largest manmade lake in India which lies on borders of Madhya Pradesh and Uttar Pradesh.
- v) The Chambal ?Valley project has two power houses one at Gandhi Sagar Dam in Madhya Pradesh and the other at Kota in Rajasthan .the total installed capacity of the two stations is 180 MW.

- vi) The Konya hydroelectric project of Maharashtra has a total installed capacity of 540 MW. The waters of the east flowing Konaya a tributary of the Krishna is stored in a dam and then directed through a tunnel to ensure a drop of about 480 metres along the western edge of the ghats. The power is supplied to the Bombay – Poona industrial region.
- vii) The Sharavathy hydroelectric project is gigantic hydel scheme of Karnataka state. The total capacity of the project is 712.8 MW. Besides supplying power to the project Bangalore industrial region, the project exports power to Tamil Nadu and Goa.
- viii) The Kundah project in Tamil Nadu has an installed capacity of 425 MW, it will be further expanded.
- ix) Sabarigiri in Karela has an installed capacity of 300 MW.

WATERSHED DEVELOPMENT

The watershed is the basin of tributary. It may have a small stream to it may not have any such stream, but whenever it rains, the water flows through it finally to join some stream. The watershed, thus, is a physiographic unit and can be used conveniently for integrated development of small natural unit areas. The watershed development is a holistic approach. It includes programmes for soil and moisture conservation, water harvesting, afforestation, and horticulture, pasture development and up gradation of community land resources.

RAINWATER HARVESTING

It is a technique of increasing the recharge of ground water by capturing and storing rainwater by constructing structures, such as dug wells. Percolation pits, check dams. Rainwater reservoirs by adopting artificial recharge techniques to meet the household needs through storage in tanks. The objectives of rainwater harvesting are:-

- i) To meet the increasing demand for water,
- ii) To reduce run off,
- iii) To avoid flooding of roads,
- iv) To augment the groundwater storage and raise the water table,
- v) To reduce groundwater pollution,
- vi) To improve the quality of groundwater and,
- vii) To supplement domestic water requirement during summer and long dry spells.

MANAGEMENT OF WATER

- Creating awareness among the community and involving people in all activities concerned with water conservation and its better management.
- Stopping use of treated water for gardening, washing vehicles, toilets and washbasins.
- Registering all water extraction points like tube wells and bore wells.

- Checking water extraction points to prevent drying up of underground aquifers.
- Preventing pollution of water bodies. Once it is ruined it takes years for replenishment.
- Repairing immediately the water supply pipelines to prevent wastage and pollution of water.

Q. Mention briefly the factors which compel India to provide irrigation facilities for agriculture?

The main factors responsible for this area:-

- Uncertain and Unequal rainfall:** India gets rain from monsoon winds. These winds give rain mostly in mid June to mid September. The rest part of the year remains mainly dry. At the secondly, distribution of rain is not uniform. At the same time, some parts of the country get heavy rainfall and other parts remain rain thirsty. In these circumstances, irrigation is necessary for cultivation.
- Vagaries of the Monsoon:** The monsoon winds give heavy rainfall in a short period. It looks like bursing of a balloon. The water of the heavy rainfall flows to the rivers as it cannot seep through the earth so soon. Such type of rainfall is not useful for agriculture. Thus, irrigation becomes very necessary fro better production.

USES OF WATER RESOURCES

- Water is used for domestic purposes like drinking, washing, bathing and cleaning.
- Water is requires for irrigating agricultural crops.
- Water is used for the generation of electricity.
- Fisheries are developed in water bodies.

