Lesson - 23

Study of Ecosystem of Ganga River

Ecosystem is a landscape of a special biotic and abiotic identity. Ecosystems can be divided into aquatic and terrestrial systems. This system presents major conditions of life on earth. There is a deep mutual relationship between biological and abiotic components of the ecosystem. Terrestrial ecosystem includes forests, pasture lands, desert, mountain and islands while aquatic ecosystem includes the pond, lake, swamp, river, delta and the oceans. Some basic elements in each ecosystem such as nature of ecosystem, structure, uses, extinction of ecosystem, rescue activities and preservation are given importance. With aquatic conservation, man gets biological and abiotic resources. These resources are helpful in human development. Human beings are facing various problems due to mismanagement of aquatic resources. Due to excessive use of water, there is serious problem of drinking water. Chemical fertilizers, fertilizers, increasing population, pollution, mixing of solid waste in water have caused many problems. This polluted water is

Table 23.1
Facts about Ganga Basin

Length of Ganga	2,071 Km.
Total drainage region	9.51 Lakh Sq.Km.
In India	8.61 Lakh Sq. Km.
Total % of area of India	26%
Total % of Population residing	45%

Table 23.2
Statewise distribution of Drainage Region of Ganga

States	Total no. of cities situated on its bank	Drainage area (Km.)
Uttrakhand & U.P.	890	294,364
M.P. & C.G.	394	198,962
Bihar & Jharkhand	130	143,961
Rajasthan	222	112,491
West Bengal	373	71,485
Haryana	106	34,341
Himachal Pradesh	57	4,317
Delhi	01	1,484
Total	2073	861,404

Source : CWC Publication No.50/59 Major Drainage Region of India 1990

harmful for both aquatic organisms and human beings.

The aquatic ecosystem can be divided into flowing and stagnant or salty and sweet or freshwater. The ecosystem of rivers is included in freshwater or sweet and flowing ecosystem. Many kinds of flora and fauna are found in this ecosystem. All the civilizations of the world originated and flourished on the banks of river ecosystems. These are known as cradles of human civilization. Hence in all civilizations, the flowing rivers are equated with mother. Humanity is sustaining on river valleys in India for centuries. Some of the oldest human civilizations were originated on the banks of Indus and Saraswati river basin systems. The northern fertile plain of India is formed by Ganga, Yamuna, Sindhu, Saraswati, and Brahmaputra rivers. This fertile region accommodates large portion of world population.

Ecosystem of Ganga River

1. Mountainous Region:

Ganga is the national river and considered as the most sacred river of India. Since ages Aryan Indians have been residing along this river. Ganga has nurtured Ram, Krishna, Guatam, Mahavir and Nanak in its cradle. It is believed that this sacred river washes sins and thus making the way to heaven easier. The origin of Ganga river is in the form of Alaknanda and Bhagirathi. The height from the sea level of the place of its origin is about 3140 meters. The main branch of Ganga is Bhagirathi, which originates from Gomukh in Gangotri Glacier of Kumaon Himalayas. It incarnates from a small cave like structure, the water basin source of which is at 5000 meters from sea level. Many associate rivers play important role in formation of Ganga

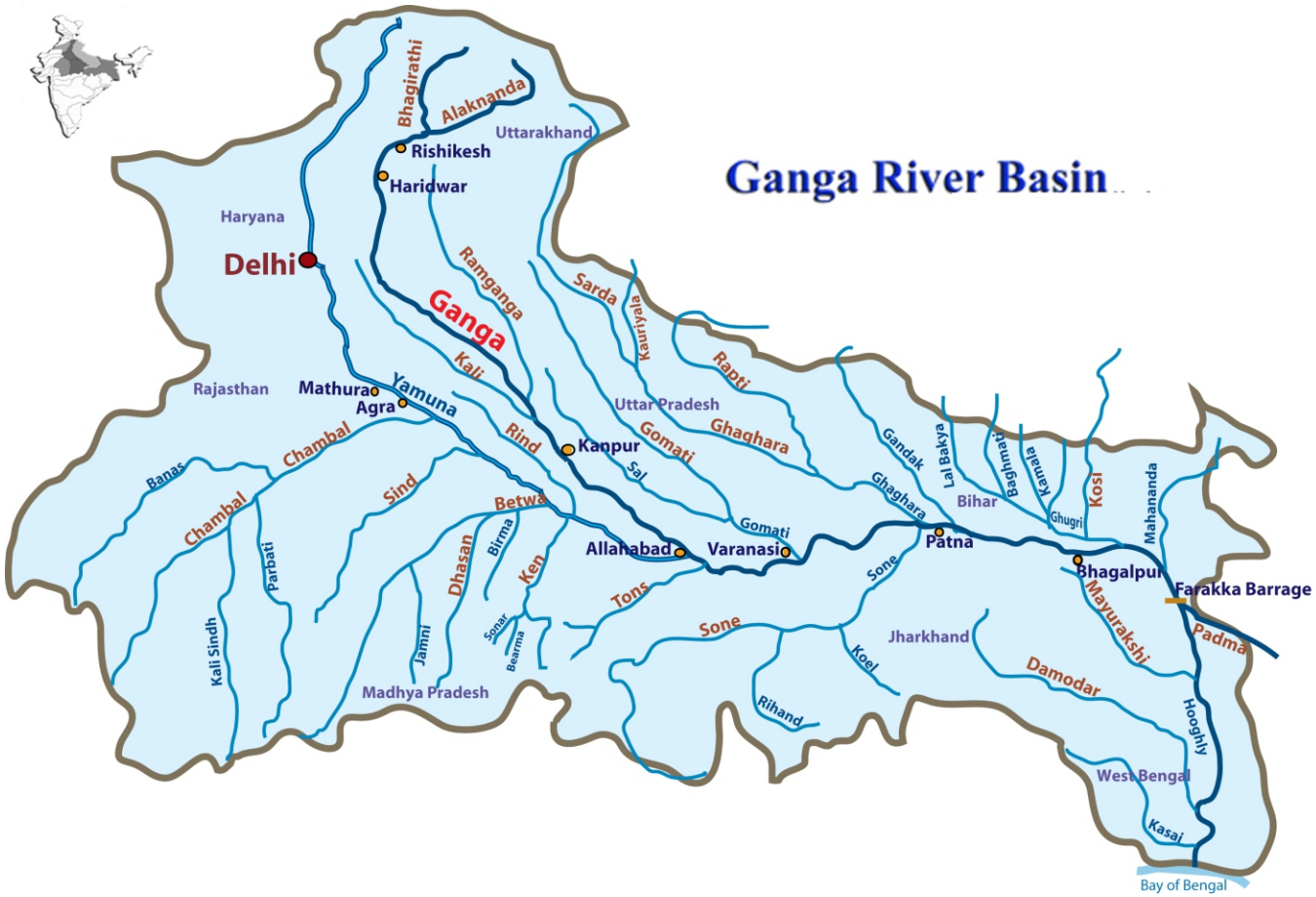

Fig.23.1 : Ganga River Basin

river. At DevPrayag, these rivers confluence to form Ganga river. It travels through narrow mountaineous route in Shivalik Himalayas for 200 kilometers enters through Hrishikesh into plain areas at Haridwar. On this travel route, it creates deep valleys passing through zigzag route. One can find valleys upto 600 meter deep at some places. Rocks, boulders pebbles, stone and sand are found on both banks of the river. The slopes on each side are very steep.

2. Upper Plain Region:

Biodiversity, cultural and spiritual aspects are of much significance in this area. The species of Torfish are found in this region and biodiversity is abundant near Shivpuri. Sand dunes, flood plains and of how lakes are formed at Gadmukhteshwar area. Dolphins, crocodiles and tortoise are found in this region. This place is called as Ramsar. The quantity of debris increases as the river approaches Farukhabad. The flood plains become broader. Agriculture, fishery, animal husbandry, human population and settlements increases in this region. The religious rituals like holy bath and funerals are performed on the banks of river. This increases pollution in the river. The number of organisms like insects, birds of different species and creeping organisms increases. The region from Bithur to Kanpur pollutes Ganga the maximum. Especially the leather industry of Kanpur has polluted Ganga river the most. The faecal sludge that flows into the river by the cities situated on the both side of river have greatly affected the sacredness of the river. The growth of plankton and amount of Nephrectileinvertebrate are found in abundance in this region. These are very sensitive which are affected by the human activities like bathing, religious rituals and boating. Various species of birds, insect-moths, fish, tortoise are found in this region. Agriculture and animal husbandry are the main occupations of the region. This place is important from the perspective of religion and archaeology. An ancient Brahma Temple in Bithur is of much significance. Meanders, flood plains, lakes are the most common landforms in this region. This is the region of special landforms of Khadar and Bhangar. Dense forests are found in Doab and lowland and swamps or muddy areas are found in the region. Gomti and Ghaghra are the main rivers of this region.

3. Mid Ganga Plains:

Eastern Uttar Pradesh and Bihar constitutes the mid Ganga Plains. These are densely populated areas. Major occupations of the residents in this region are agriculture, animal husbandry, fishery and small industries associated with these occupations. The main tributaries of Ganga in this region are Ghagra, Gandak, Kosi and Son. The pace of flow of Ganga becomes slower in this region and mixing of sand, soil, waste, excreta, and chemicals etc. increases the pollution of river. The land forms like meander, alluvial, soil planes, lakes etc. are formed in this region. The water is not suitable for drinking and bathing due to excessive pollution. The floods in Kosi river causes damages to human property. Shark, crocodiles, tortoise, alligators and fishes are main living organisms of the river. The Vikramshila Dolphin sanctuary is spread over 50 kms of region in Bhagalpur district. In this series Dolphin has been declared as national aquatic organism on May 05, 2010. The Dolphins are also called as fresh water tiger. This region is also full of dense forests and wild animals.

4. Lower Ganges Plains:

The region from Kishanganj (Purnima-Bihar) to whole of West Bengal (excluding northern mountainous region) and Bangladesh come under the lower Ganges plain. In this region, Ganga and its tributaries are divided into many small stream.

Fig. 23.2 : Sunderban Delta Region

Low slope and presence of alluvial soil presents a magnificent view of deltaic region. The total area of this delta region is 60,000 square kilometres. The forests found in the swampy areas se facing side are called as sunderbans. This area is preserved area in both countries India and Bangladesh. It is one of the foremost areas in terms of biodiversity in the world. Mangrove and tidal type plants are found in this region. Sundari plants are found in large numbers in the region and hence the name of the region is Sundarvan. The characteristic of this ecosystem is the plants and living organisms can survive in the mixture of both fresh water and brackish water. This largest delta region of the world is spreading towards sea. The world famous Royal Bengal Tigers are found in theseforests. Apart from this all type of herbivores and carnivores organisms, birds etc. are found in sunderbans. This region is known for rice production and jute production in the world. This region is affected by tropical cyclones that cause huge losses to human property. The region has hot and humid monsoon type climate. Hence tropical wet Mangrove forests are found here. Since the production of rice and fishes is in abundance, the rice and fishes form the staple food.

Dams and Barrage on Ganga River:

The number of dams and barrages built on Ganga river are important parts of Indian economy and public life. The most important among these is Farakka Barrage (2,240 meters length, started on April 21, 1975) located at India Bangladesh border. This serves the purpose of irrigation, fishing, water in Hoogly (in summer), and to prevent the Kolkata port from silting. Tihri Dam was also made for execution of multi-purpose projects on Bhagirathi river. The height of this dam is 261 meters. It produces 2400 MW electricity, irrigates 2,70,000 hectare area and supplies 102.20 crore litres of drinking water to Delhi, Uttar Pradesh and Uttarakhand. The third biggest dam was built at Haridwar known as Bhimghoda. It was built by British rulers in 1940. The water from this dam is used for irrigation, drinking and fishing purposes. Apart from these, barrages were built on Sharda, Kosi and Gandak rivers near Nepal border. These are useful for production of electricity, irrigation and drinking water. These dams have benefitted the region a lot but it has problem of deposition of silt. Farakka barrage is most affected by it.

Pollution in Ganga River:

The total length of Ganga river is 2071 kms. It has many small and big tributaries. Some join it from northern Himalayan region while some join from southern peninsular region. About 2500-3000 cities are found on the both banks of river Ganga, which are densely inhabited. Agriculture and Animal husbandry is practised on both sides of river. Various type of industries are set up in cities. The solid waste from chemical, leather, fertilizer, and other industries and human excreta, waste etc are mixed in Ganga that is causing severe pollution in Ganga river. The water is not suitable for use for drinking and bathing purposes. This pollution is spoiling the ecosystem of river. The dissolved oxygen found in the river is at 6.8-7.2 mg per litre which is very high. The normal range for dissolved oxygen is 4.0 mg per litre. This is found highest in Haridwar, Allahabad, Patna and Varanasi. Bio-chemical oxygen (BOD) is found maximum from Kanouj to Varanasi. Near Kanpur it is recorded at 16.39 mg per litre. In the mountainous region, it is recorded at 15.58 mg per litre. The quantity of DO and BOD is found at different levels before and after monsoon season. The quantity of coliform is recorded maximum at Kanouj, Kanpur, Allahabad, and Varanasi. Increased levels of DO, BOD and coliform has caused maximum pollution in the water.

Fig. 23.3 : Dolphin in Ganga

Conservation Measures:

In Ganga Action Plan I & II, has arrangements were made for treatment of pollution of the river and plants were established for its cleaning and purification of water. Billions of rupees have been

Maha Khumbh Mela

At Prayagraj (Allahabad) the confluence of River Ganga, Yamuna and Saraswati, a megha fair known as Maha Khumbh is organised at the interval of every 12 years, in which lakhs of tourist come from own country and abroad. It is largest halt of faith and reverence of human beings on the earth. According to Indian Mythology, few drops of nectar achieved from 'Sagar Manthan' were fallen here. It is organised during a special astrological position. 'Purna Khubh' is held once in 144 years. It is believed that bathing in this Maha Khubh Mela will lead to Salvation. Harvard University of USA have included the celebration of 'Maha Khubh Parv' in its study. The arrangements of this fair has been highly praised and the research team felt that the arrangements are better than FIFA World

Sagar Manthan and Maha Khumbh - Prayagraj

spent since 1985. These efforts have not yielded good results. Administrative and political will and foresight are greatly lacking in efforts. In addition, corruption has been a big problem for the country. Preservation of Ganga river will help in smooth functioning not only river but also for human beings flora, fauna, environment, and highest ecosystem. There is dire need to preserve dolphins, Mahasheer fish, alligator, Bengal Tiger, Mangrove and tidal type forests. Number of dams and barrages have been built in the name of development on Ganga river. Settlements have been established in flood plains. Deforestation has increased occurrences of soil erosion, landslide, and flooding. Saving and preserving Ganga is essential for survival of human beings. Rise in temperatures are melting the glaciers. This can be a great trouble for survival of Ganga and other rivers. The responsibility of cleaning Ganga rests with Government as well as people residing nearby it. Unless we truly respect the Ganga river as mother, the government machinery will not be able to maintain its purity.

Important Points

1. Biotic and abiotic components of environment are studied in Ecosystem.
2. Ganga is a national river of India. Increasing pollution is causing imbalance in its ecosystem. There is dire need to save and preserve dolphin and Mahashir fish species.
3. Vikramshila dolphin sanctuary is established at Bhagapur for preservation of dolphins. There are only 2000-2500 river dolphins remaining in country.
4. Ganga river originates at Kumaun Himalaya and travels to Rishikesh and Haridwar plain region and further moves to Uttar Pradesh, Bihar, Western Bihar, and Bangladesh and then creates Sundarban delta region.
5. Sundarban are one of the foremost region for biodiversity. Royal Bengal tigers are found in this region. This is the protected region.
6. At Devprayag, ther is confluence of Alaknanda and Bhagirathi rivers.

Exercise
Objective questions

1. Which species of animal is preserved at VikramshilaSantuary?
   A. Dolphin B. Shark
   C. Alligator D. Mahshir fish

2. The source of origin of Ganga is
   a. Shivpuri b. Prayag
   c. DevPrayag d. Gangotri

3. What are found in Sundarbans?
   a. Sher b. Royal Bengal Tigers

c. Camel d. Hippopotamus

4. Bhagirathi and Alaknanda are
   a. Rivers flowing in Uttar Pradesh
   b. Tributaries of Ganga in Bihar
   c. Watercourses from glaciers in Uttarakhand
   d. Tributaries of Brahmaputra in Assam.

5. Tihari dam is constructed on which river
   a. Yamuna b. Alaknanda
   c. Mandakini d. Bhagirathi

Very short Answer Questions

6. What is the total length of Ganga river?
7. Where does Ganga river enter into plain region?
8. Name the most polluted region of the Ganga river?
9. Name the components of ecosystem?
10. Where is Farakka Barrage located?

Short Answer Questions:

11. Explain the importance of ecosystem.
12. Name the fresh water ecosystems.
13. The purest water in Ganga river is found in which region.
14. What is sunderban?
15. What is the meaning of extended delta ?

Essay type questions

16. Make clear the river ecosystem and explain mid Ganga Valley area ecosystem?
17. Explain the pollution of Ganga river and analyse the reasons and various measures for tackling pollution.
18. Explain biodiversity and explain in detail the biodiversity of Sundarban.

Answer key:

1. A 2. D 3. B 4. C 5. D