

Drainage

The term drainage describes the river system of an area. Many small streams flowing from different directions come together to form the main river. This main river ultimately drains into a large water body e.g. a lake, a sea or an ocean.

The area which is drained by a single river system¹ is known as a **drainage basin**.

The world's largest drainage basin is of the Amazon river (South America).

Whereas in India, the largest drainage basin is of the Ganga river.

An elevated area, such as a mountain or an upland, which separates two drainage basins is known as a **water divide**.

Drainage Systems in India

The drainage systems of India are mainly controlled by broad relief features of the subcontinent. Based on these features, the Indian rivers are divided into two major groups such as

- The Himalayan rivers
- The Peninsular rivers

Apart from originating from the two major physiographic regions of India, these two major groups are different from each other. Both of these major groups are discussed below

1. The Himalayan Rivers

- These rivers are mostly perennial, which means they have water throughout the year. These rivers receive water from rain as well as from melted snow from the high mountains.
- The Indus and the Brahmaputra are major Himalayan rivers. They originate from North of the mountain ranges.

¹ River System A river alongwith its tributaries is called a river system.

Chapter Syllabus

- Concept
- Drainage Systems in India
- The Himalayan Rivers
- The Peninsular Rivers
- Lakes
- Role of Rivers in the Economy
- River Pollution

- These rivers are long and flow in wide, deep and important tributaries. They have cut through the mountains, making gorges.
- These rivers have long courses from their source to the sea. These rivers perform maximum erosion activity in their upper course and carry huge loads of silt and sand.
- These rivers form meanders, oxbow lakes and other depositional features during their middle and lower courses in the floodplains. These rivers have well developed deltas.



Some Features Made by Rivers

A river along with its tributaries may be called as river system. The major river systems of the Himalayan rivers are

- The Indus river system,
- The Ganga river system,
- The Brahmaputra river system,

Note: As per the latest CBSE Syllabus, here we will discuss only Ganga and Brahmaputra river system.

The Ganga River System

- This system starts as the Bhagirathi (headwaters of the Ganga) from the Gangotri glacier². It is joined by the Alaknanda river at Devprayag in Uttarakhand to form the Ganga. Its length is over 2500 km.
- At Haridwar, the Ganga emerges from the mountains on to the plains.
- The Ganga is joined by many tributaries from the Himalayas. Few of these tributaries are major rivers such as the Yamuna, Ghaghara, Gandak and Kosi.

- The river Yamuna originates from the Yamunotri glacier in the Himalayas. It flows parallel to the Ganga as a right bank tributary. It meets the Ganga at Allahabad.
- The Ghaghara, the Gandak and the Kosi rise in the Nepal Himalayas. These are the rivers which cause flood in parts of the Northern plains each year. These cause widespread damage to life and property but also enrich the soil for agricultural use.
- The Ganga's main tributaries which come from the Peninsular uplands are the Chambal, the Betwa and the Son. These rise from semi-arid areas, have shorter courses and do not carry much water in them.
- The Ganga flows Eastwards till Farakka in West Bengal. This is the northernmost point of the Ganga. Here it divides into two branches and forms a distributary⁸ known as the Bhagirathi-Hooghly (also called Hugli), which flows Southwards through the deltaic plains into the Bay of Bengal.
- The main stream of the Ganga flows Southwards into Bangladesh, where it is joined by the Brahmaputra. Further downstream, it is known as Meghna. This river flows into the Bay of Bengal.
- The delta formed by the Ganga and the Brahmaputra rivers is known as the Sundarban Delta.
- It is the world's largest and fastest growing delta. It is also the home of Royal Bengal Tiger.
- The Sundarban Delta derived its name from the Sundari tree which grows well in marshland⁹.
- Ambala is located on the water divide between the Indus and the Ganga river system. The plains from Ambala to the Sundarban stretch over nearly 1800 km but the fall in its slope is only 300 m. In simple terms, there is a fall of just one metre for every 6 km. Therefore, the river develops large meanders.

Namami Gange Programme

The Namami Gange Programme is an Integrated Conservation Mission approved as a flagship programme by the Union Government in June 2014. The objective of this programme is effective abatement (reduction) of pollution, conservation and rejuvenation of the national river Ganga.

The Brahmaputra River System

- The Brahmaputra river originates in Tibet, East of Mansarovar lake. Its source is very close to the sources of the Indus and Satluj.
- It flows Eastward parallel to the Himalayas. On reaching the Nanga Parbat mountain (7757m), it takes a 'U' turn and enters India in Arunachal Pradesh through a gorge. Here, it is called Dihang.
- It is slightly longer than the Indus and most of its course lies outside India. It is joined by many tributaries like Dihang, Lohit etc to form the Brahmaputra in Assam.
- It carries very little silt and water from Tibet as it is a cold and dry area. Whereas in India, the Brahmaputra passes through a region of high rainfall (Assam) so, the river carries a large volume of water and considerable amount of silt.
- It has a braided channel¹⁰, in Assam, forming many riverine islands. Majuli island, the world's largest riverine island is formed by it. Brahmaputra overflows its banks during the monsoon every year, causing severe floods in Assam and Bangladesh.
- Unlike other North Indian rivers, the Brahmaputra is marked by huge deposits of silt on its bed causing the riverbed to rise. The river also shifts its channel frequently.
- Brahmaputra is known as Tsang Po in Tibet and Jamuna in Bangladesh.

Check Point 01

1. The river having the largest drainage basins in India is
2. Identify the major tributaries of the Ganga river system.
3. Name the world's largest and fastest growing delta that is the home of Royal Bengal Tiger.
4. Name two major tributaries of the Brahmaputra river.
5. Name the city located at water divide between the Indus and the Ganga river system.

2. The Peninsular Rivers

- These are the seasonal rivers as their flow is dependent on rainfall. During the dry season, the large rivers even reduced the flow of water in their channel.

- These rivers have shorter and shallower¹¹ courses as compared to the Himalayan rivers.
- Most Peninsular rivers originate in the Western Ghats and flow towards the Bay of Bengal e.g. Mahanadi, Godavari, Krishna and Kaveri. These rivers make deltas¹² at their mouths.
- The Western Ghats act as a water divide in the Peninsular India. These Ghats run from North to South close to the Western coast.
- The coastal plains between Western Ghats and the Arabian Sea are very narrow. Hence, the coastal rivers are short.
- Some of the Peninsular rivers originate in the central highlands and flow towards the West.
- Tapi and Narmada are the only two long rivers which flow West and make estuaries¹³. The drainage basins of the Peninsular rivers are comparatively small in size.

The important basins of the Peninsular rivers are as follows

The Narmada Basin

- The Narmada originates in the Amarkantak hills of Madhya Pradesh. It flows towards the West in a rift valley¹⁴ formed due to a geological fault.
- On its way to the sea, the Narmada creates many picturesque locations. The marble rocks near Jabalpur, where the Narmada flows through a deep gorge is one such example. The other example is the Dhudhar falls, where the river plunges (dive) over steep rocks.
- All the tributaries of Narmada are very short in length. Most of its tributaries join the main stream at right angles.
- The Narmada basin covers parts of Madhya Pradesh and Gujarat. The Narmada River Conservation Mission has been undertaken by the government of Madhya Pradesh by a scheme named Namami Devi Narmade.

The Tapi Basin

- Tapi river originates in the Satpura ranges in the Betul district of Madhya Pradesh. It flows in a rift valley parallel to the Narmada river but it is much shorter in length.
- It covers parts of Madhya Pradesh, Gujarat and Maharashtra.

10. Braided channel A drainage channel in which bars and islands have been deposited and around which the river flows. Braiding occurs when the discharge fluctuates frequently or when the river cannot carry its full load.
11. Shallower A little depth.
12. Deltas Triangular shaped alluvial deposits at the mouth of rivers where they enter the sea.
13. Estuary The tidal mouth of a large river, where the tide meets the stream.
14. Rift Valley A long narrow valley formed by land between two parallel faults subsiding, often associated with earthquake activity.

2. Gorges Deep narrow passages with steep rocky sides through which rivers may flow.
3. Course The route or direction followed by a ship, road or river.
4. Erosion activity It is the gradual destruction and removal of rock or soil in a particular area by rivers, the sea or the weather.
5. Meander A winding curve or bend of a river.
6. Oxbow Lake A crescent-shaped lake formed when a meander of a river or stream is cut off from the main channel.
7. Glacier A huge mass of ice slowly flowing over a landmass formed from compacted snow in an area where snow accumulation exceeds melting and sublimation.
8. Distributary A branch of a river that does not return to the main stream after leaving it.
9. Marshland An area of low-lying land that is usually saturated with water.

The Godavari Basin

- Godavari river originates from the slopes of the Western Ghats in the Nask district of Maharashtra.
- It is the longest river (about 1500 km). It has the largest drainage basin and the largest delta of the Peninsular rivers. It is also known as Dakshin Ganga because of its length and the area it covers.
- It has many tributaries such as Manjira, Wainganga and Penganga, Purna, Wardha and Pranhita.
- The Godavari basin covers parts of Maharashtra (about 50% of the basin area lies in Maharashtra), Madhya Pradesh, Odisha and Andhra Pradesh. It drains into the Bay of Bengal.

The Mahanadi Basin

- Mahanadi river originates in the highlands of Chhattisgarh. It flows through Odisha to reach the Bay of Bengal.
- The length of the river is about 860 km. Its drainage basin is shared by Maharashtra, Chhattisgarh, Jharkhand and Odisha.

The Krishna Basin

- Krishna river originates from the Western Ghats near Mahabaleshwar. It flows into the Bay of Bengal.
- Its length is about 1400 km. Tungabhadra, Koyana, Ghaprabha, Musi and Bhima are some of its tributaries.
- In basin, covers parts of Maharashtra, Karnataka and Andhra Pradesh.

The Kaveri Basin

- Kaveri river originates in the Brahmagiri range of the Western Ghats. It flows into the Bay of Bengal South of Coimbatore in Tamil Nadu. The length of the river is about 360 km.
- Its main tributaries are Amravati, Bhavani, Hemavati and Kallu. Kaveri drains in the parts of Karnataka, Kerala and Tamil Nadu.
- It makes the second biggest waterfall in India, known as Bhivaneaswadram. The hydroelectric power generated from the falls is supplied to Mysore, Bengaluru and the Kolar Gold Field.

There are some other rivers which flow in the West and East direction. For e.g. the Sabarmati, Mahi, Bharathpuzha and Periyar are west flowing rivers, whereas the Damodar, Brahmani, Baitarani and Subarnarekha are east flowing rivers.

Check Point 02

- From which hills the Narmada river rises?
- Which missions has been undertaken by the government of Maharashtra under Namami Devi Narmda Scheme.
- The length of Mahanadi river is
- The largest Peninsular river is
- is the second biggest waterfall made by Kaveri river.

Lakes in India

India has many permanent as well as seasonal lakes. Seasonal lakes contain water only during the monsoon season. For example, the lakes found in the inland drainage basins¹⁵ of semi-arid regions, i.e. the Sambhar Salt lake in Rajasthan.

Lakes in India are formed by different processes such as action of glaciers and ice sheets, by wind, river actions or human activities.

A meandering river across a flood plain forms cut-offs that later develop into Ox-bow lakes.

Spits¹⁶ and bars¹⁷ form lagoons¹⁸ in coastal areas, e.g. the Chilika, Pulicat and Kolleru lakes.

Bigger lakes are called the seas, like the Caspian Sea, the Dead Sea and the Aral Sea.

Fresh Water Lakes

Fresh water lakes are formed when glaciers dig out (create) a basin, which is later filled with snowmelt. Most of the fresh water lakes are in the Himalayan region.

The Wular lake in Jammu and Kashmir is the result of tectonic activity. Wular lake is the largest fresh water lake in India. The Dal lake, Nainital, Bhimtal, Loktak and Barapani are some other important fresh water lakes.

Apart from natural lakes, the damming of the rivers for the generation of hydel power has also led to the formation of lakes such as Guru Gobind Sagar (Bhakra Nangal Project) formed by damming the Satluj. 71 per cent of the world's surface is covered with water, but 97 per cent of that is salt water. Of the 3 per cent that is available as freshwater, three quarters of it is trapped as ice.

¹⁵ Inland Drainage Basin: It refers to the point of land that absorbs water from rain or snow melt and drains downhill into a river, lake, reservoir, sea or ocean.

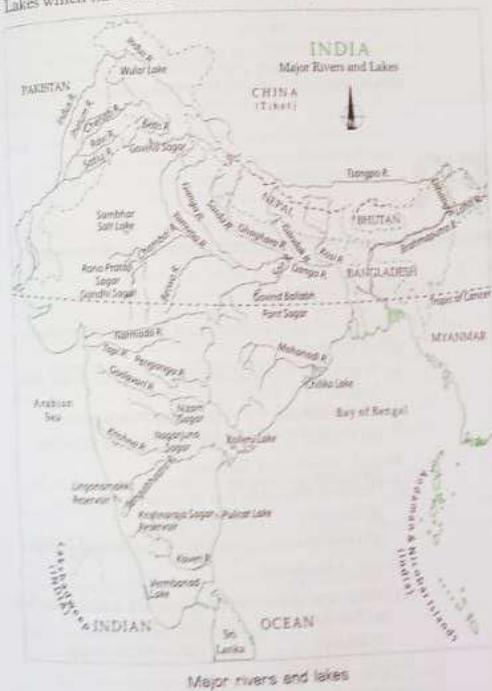
¹⁶ Spit: It is a deposition bar or beach landform off coasts or lake shores.

¹⁷ Bar: It is an elevated region of sediment in a river that has been deposited by the flow.

¹⁸ Lagoon: It is a stretch of salt water separated from the sea by a low sandbank or coral reef.

Importance of Lakes

- Lakes are useful to human beings in many ways. They are tourist destination and also used for sporting activities like boating, swimming, water sports, etc.
- Lakes help to regulate the flow of a river. During heavy rainfall, it prevents flooding and during the dry season, it helps to maintain an even flow of water.
- It can also be used for developing hydel power. It moderates the climate of the surroundings, maintain the aquatic ecosystem, enhance natural beauty, helps develop tourism and provide recreation.
- Lakes which have saline water are used to produce salt.



Major rivers and lakes

Role of Rivers in the Economy

- Water from the rivers is a basic natural resource essential for various human activities.

- Rivers provide water for irrigation, facility for navigation, to generate hydroelectric power, etc.
- River water is used in agriculture to grow crops, which is a major source of livelihood of the majority of Indian population.

Pollution of Rivers

The quality of river water is affected by the growing demands of humans for domestic, municipal, industrial and agricultural use. So, to meet those growing demands, more river water is used and thus, reducing their volume of water.

When untreated sewage and industrial waste flow into river bodies, these greatly affect the quality of water and self-cleansing (self-purifying) capacity of rivers.

For e.g. the Ganga river has self cleansing capacity to assimilate (taken in) pollution loads with in 20 km. But it is not possible due to increasing urbanisation and industrialisation.

National River Conservation Plan (NRCP)

The river cleaning programme in the country was initiated with the launching of the Ganga Action Plan (GAP) in 1985. The Ganga Action Plan was expanded to cover other rivers under the National River Conservation Plan (NRCP), in the year 1995.

The objective of the NRCP is to improve the water quality of the rivers, which are major water sources in the country, through the implementation of pollution abatement work.

Check Point 03

- Seasonal lakes contain water only during _____ season.
- Which is the largest fresh water lake in India?
- _____ per cent of the world's surface is covered with water.
- When was National River Conservation Plan initiated?
- _____ plan was expanded to cover other rivers under the NRCP.

SUMMARY

- The term drainage describes the river system of an area.
- The area which is drained by a single river system is known as a **drainage basin**.
- Based on relief features the Indian rivers are divided into two major groups such as the Himalayan rivers and the Peninsular rivers.
- The Himalayan rivers are mostly **perennial** which means they have water throughout the year. On the other hand, the Peninsular rivers are **seasonal** rivers. Their flow is dependent on rainfall.
- The Ganga and the Brahmaputra are major Himalayan rivers.
- The delta formed by the Ganga and the Brahmaputra rivers is known as the Sundarban Delta.
- The Peninsular rivers are the seasonal rivers as their flow is dependent on rainfall.
- Important Peninsular rivers are the Narmada, the Tapi, the Godavari, the Mahanadi, the Krishna and the Kaveri.
- Godavari is the longest Peninsular river.
- It is also known as Dakshin Ganga because of its length and the areas it covers.
- India has many permanent as well as seasonal lakes. Lakes in India are formed by different processes such as action of glaciers and ice sheets, by wind, river actions or human activities.
- Wular Lake is the largest freshwater lake.
- Water from the rivers is a basic natural resource essential for various human activities. They provide water for irrigation, facility for navigation, to generate hydro-electric power and so on.
- The quality of river water is affected by the growing demands of humans for domestic, municipal, industrial and agricultural use.
- The river cleaning programme in the country was initiated with the launching of the Ganga Action Plan under the National River Conservation Plan (NRCP).
- The objective of NRCP is to improve the water quality of the rivers, which are major water sources in the country, through the implementation of pollution abatement (reduction) work.

NCERT FOLDER

Find out on page 17

- 1 Which river has the largest basin in India?

Ans. The Ganga river has the largest basin in India.

Find out on page 22

- 2 Find out the name of the biggest waterfall in India.

Ans. The biggest waterfall in India is on the Varahi river in Shimoga district of Karnataka. The name of the waterfall is Kunchikal fall and its height is 455 metres (1493 ft).

Activity on page 23

- 3 Make a list of natural and artificial lakes with the help of the atlas.

Ans. Natural lakes are Wular lake, Dal lake, Nainital lake, Bhimtal lake, Loktak lake, Barapani lake, Chilika lake, Sambhar lake, Pulicat lake, Kolleru lake, Vembanad lake.

Artificial lakes are Gobind Sagar, Rana Pratap Sagar, Nizam Sagar, Nagarjuna Sagar, Hirakud.

Exercises on page 23

- 1 Choose the right answer from the four given below:

- (i) In which of the following is Wular Lake located?

- (a) Rajasthan
(b) Punjab

Ans. (a) Jammu and Kashmir

- (ii) The river Narmada has its source in

- (a) Satpura
(b) Vindhya
(c) Amarkantak

Ans. (c) Amarkantak

- (iii) Which one of the following is a seasonal river?

- (a) Sambhar
(b) Wular

Ans. (a) Sambhar

- (iv) Which one of the following is a Peninsular river?

- (a) Narmada
(b) Godavari

Ans. (a) Godavari

Drainage

- (v) Which one of the following is a Peninsular river?
(a) Mahanadi
(b) Krishna
(c) Tapi

Ans. (a) Tapi

- 2 Answer the following questions:

- (i) What is a drainage basin?

Ans. The area which is drained by a single river system is known as a drainage basin.

- (ii) Which one of the following is a Himalayan river?
(a) Ganga
(b) Brahmaputra
(c) Godavari

Ans. The Ganga and the Brahmaputra are major Himalayan rivers.

- (iii) Where is Wular Lake located?

Ans. Wular Lake is located in Jammu and Kashmir.

- (iv) Name the longest river in India.

Ans. The longest river in India is the Ganga.

- (v) Why is Godavari called 'Dakshin Ganga'?

Ans. Godavari is called 'Dakshin Ganga' because of its length and the areas it covers.

- (vi) Which one of the following is a Peninsular river?
(a) Mahanadi
(b) Krishna
(c) Tapi

Ans. (a) Tapi

- (vii) Which one of the following is a Himalayan river?
(a) Ganga
(b) Brahmaputra
(c) Godavari

Ans. The Ganga and the Brahmaputra are major Himalayan rivers.

- (viii) Which one of the following is a Peninsular river?
(a) Mahanadi
(b) Krishna
(c) Tapi

Ans. (a) Tapi

- (ix) Which one of the following is a Himalayan river?
(a) Ganga
(b) Brahmaputra
(c) Godavari

Ans. The Ganga and the Brahmaputra are major Himalayan rivers.

- (x) Which one of the following is a Peninsular river?
(a) Mahanadi
(b) Krishna
(c) Tapi

Ans. (a) Tapi

- (xi) Which one of the following is a Himalayan river?
(a) Ganga
(b) Brahmaputra
(c) Godavari

Ans. The Ganga and the Brahmaputra are major Himalayan rivers.

- (xii) Which one of the following is a Peninsular river?
(a) Mahanadi
(b) Krishna
(c) Tapi

Ans. (a) Tapi

- (xiii) Which one of the following is a Himalayan river?
(a) Ganga
(b) Brahmaputra
(c) Godavari

Ans. The Ganga and the Brahmaputra are major Himalayan rivers.

- (xiv) Which one of the following is a Peninsular river?
(a) Mahanadi
(b) Krishna
(c) Tapi

Ans. (a) Tapi

- (xv) Which one of the following is a Himalayan river?
(a) Ganga
(b) Brahmaputra
(c) Godavari

Ans. The Ganga and the Brahmaputra are major Himalayan rivers.

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(a) Mahanadi
(b) Krishna
(c) Tapi

Ans. (a) Tapi

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(a) Ganga
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Ans. (a) Tapi