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## Drainage

Drainage refers to the river system of an area. The area drained by a single river system is called a drainage basin. Elevated areas such as the Amazon River.

India's drainage systems are mainly controlled by the broad relief features of the subcontinent. Indian rivers are divided into two major groups.

### The Himalayan Rivers

The major Himalayan rivers include the Indus, the Ganga, and the Brahmaputra. These rivers are long and joined by many large and important tributaries.

#### The Ganga River System

The headwater of the Ganga, called the Bhagirathi, is fed by the Gangotri Glacier and joined by the Alaknanda at Devaprayag in Uttarakhand. The delta formed by the Ganga and the Brahmaputra rivers is known as the Sunderban Delta. The length of the Ganga river is over 2,500 km.

#### The Brahmaputra River System

The Brahmaputra rises in Tibet, east of Mansarovar Lake, close to the sources of the Indus and the Satluj. It is known as Tsang Po in Tibet and Every year during the rainy season, the river overflows its banks, causing widespread floods in Assam and Bangladesh.

### The Peninsular Rivers

The main water divide in Peninsular India is formed by the Western Ghats, which run from north to south close to the Western Coast. Many Peninsular rivers flow eastwards and drain into the Bay of Bengal.

Major rivers of the peninsula include the Narmada, Tapi, Mahanadi, Godavari, Krishna, and Kaveri. They mostly flow eastwards and drain into estuaries.

#### The Narmada Basin

The Narmada rises in the Amarkantak Hills in Madhya Pradesh. Its basin covers parts of Madhya Pradesh and Gujarat.

# Drainage

## 6. River Pollution

### Causes

Increased water extraction for agriculture, industry, and domestic use.

Disposal of untreated sewage and industrial waste.

### Effects

Reduces water quality and self-cleaning capacity.

### Measures

Various action plans initiated to clean polluted rivers.

## 5. Role of Rivers in the Economy

Importance: Irrigation, hydro-power, navigation, settlement growth.

Agriculture: Essential for India's agrarian economy.

Historical significance: Riverbanks led to early human settlements.

## 4. Lakes

Formed by: Glaciers, river action, wind, human activities.

Types: Permanent and seasonal.

Largest freshwater lake: Wular Lake (Jammu and Kashmir).

The Tapi rises in the Satpura ranges in the Betul district of Madhya Pradesh. Its basin covers parts of Madhya Pradesh, Gujarat, and Maharashtra.

### The Godavari Basin

The Godavari is the largest Peninsular river. It rises from the slopes of the Western Ghats in the Nasik District of Maharashtra and is about 1,500 km long. Its major tributaries are Manjra, Wainganga, and Penganga. The Godavari is also called the 'Dakshin Ganga' because of its length and the area it covers.

### The Mahanadi Basin

The Mahanadi rises in the highlands of Chhattisgarh and flows through Odisha to reach the Bay of Bengal.

### The Krishna Basin

The Krishna rises from a spring near Mahabaleshwar and flows about 1,400 km to the Bay of Bengal. Its tributaries include Tungabhadra, Koyana, and Peddapada.

### The Kaveri Basin

The Kaveri rises in the Brahmagiri range of the Western Ghats and flows to the Bay of Bengal. Its main tributaries are the Amravati, Bhavani, and Palar.

## Key Words

**Perennial:** A stream or river that flows continuously throughout the year.

**Estuaries:** The tidal mouth of a large river where the tide meets the stream.

**Tributaries:** Rivers or streams that flow into a larger river or lake.

## Lakes

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A lake is a large area of water surrounded by land. Large lakes are sometimes called seas, such as the Caspian, Dead, and Aral Seas.

India has many lakes that vary in size and characteristics. Most lakes are permanent, while some contain water only during the rainy season.

Lakes are formed by glaciers and ice sheets, wind, river action, and human activities. Most freshwater lakes in India are in the Himalayan region.

Besides natural lakes, damming rivers for hydel power has created lakes such as Guru Gobind Sagar Lake (Bhakra Nangal Project).

## Importance of Lakes

- Lakes help regulate river flow.
- They prevent flooding during heavy rainfall and maintain even water flow during dry seasons.

- Lakes are used for hydel power development.
- They moderate the climate of surrounding areas, maintain aquatic ecosystems, enhance natural beauty, support tourism, and provide

## Key Word

**Glacial lake:** A lake formed by melting glaciers.

## Role of Rivers in the Economy and River Pollution

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### Role of Rivers in the Economy

Rivers have been fundamental to human history. Water from rivers is essential for various human activities. River banks have attracted settle

Rivers are especially important for irrigation, navigation, and hydro-power generation, which are vital for a country like India where agricultu

### River Pollution

Growing domestic, municipal, industrial, and agricultural demands affect river water quality. Excessive water extraction reduces river volume

Pollution affects the self-cleaning capacity of rivers. Urbanisation and industrialisation have increased pollution levels in many rivers.

To address this, various action plans have been launched to clean rivers.

## Key Words

**Irrigation:** The supply of water for agriculture from canals, wells, and tanks, either artificially or manually.

**Hydro-power:** Power derived from running or falling water.

## Example

Describe the major steps taken by the Government of India to control the pollution level in the River Ganga.

**Answer:**

1. Treating waste before dumping it into the river.
2. Implementing projects like the Ganga Action Plan (GAP) initiated in 1985, which was closed in 2000 after its first phase.
3. The National River Conservation Authority reviewed GAP and merged its second phase with the National River Conservation Plan (NRCP).
4. The NRCP covers 152 towns along 27 interstate rivers in 16 states, with pollution abatement works in 57 towns.
5. 215 pollution abatement schemes have been sanctioned, with 69 completed, targeting treatment of a million litres of sewage.

## Solved Examples

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## Example 1

**Question:** What are the main differences between Himalayan and Peninsular rivers?

**Answer:** Himalayan rivers are long, perennial, and have many tributaries. They originate from glaciers and snowfields. Peninsular rivers are st

## Example 2

**Question:** Why are the Narmada and Tapi rivers unique among Peninsular rivers?

**Answer:** Unlike most Peninsular rivers that flow eastwards, the Narmada and Tapi flow westwards and form estuaries instead of deltas.

## Practice Set

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### Easy

1. Define drainage basin.
2. Name the three major Himalayan rivers.
3. What is a perennial river?

### Moderate

1. Explain the importance of lakes in regulating river flow.
2. List the major tributaries of the Godavari river.
3. Describe the main causes of river pollution.

### Challenging

1. Compare the drainage patterns of Himalayan and Peninsular rivers.
2. Discuss the steps taken under the Ganga Action Plan to reduce pollution.
3. Explain the significance of the Western Ghats as a water divide in Peninsular India.

## Answer Key

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1. A drainage basin is the area drained by a single river system.
2. The Indus, the Ganga, and the Brahmaputra.
3. A perennial river flows throughout the year.
4. Lakes help prevent flooding during heavy rains and maintain water flow during dry seasons.
5. Purna, Wardha, Pranhita, Manjra, Wainganga, and Penganga.
6. Causes include excessive water extraction, untreated sewage, industrial effluents, urbanisation, and industrialisation.
7. Himalayan rivers are perennial and glacier-fed; Peninsular rivers are mostly seasonal and rain-fed.
8. Steps include waste treatment, pollution abatement schemes, and merging GAP with NRCP for wider coverage.
9. The Western Ghats form the main water divide, separating rivers flowing westwards from those flowing eastwards.

## Quick Reference

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- **Drainage Basin:** Area drained by a river system.
- **Water Divide:** Elevated land separating drainage basins.
- **Himalayan Rivers:** Indus, Ganga, Brahmaputra; perennial and glacier-fed.
- **Peninsular Rivers:** Narmada, Tapi, Godavari, Krishna, Kaveri; mostly seasonal.
- **Lakes:** Natural or artificial water bodies; regulate river flow and support ecosystems.
- **River Pollution:** Caused by untreated waste and excessive water use; addressed by government plans.

## Glossary

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### Drainage

The river system of an area.

### Drainage Basin

The area drained by a single river system.

### Water Divide

Elevated land separating two drainage basins.

### Perennial River

A river that flows throughout the year.

### Tributary

A smaller river or stream that joins a larger river.

### Estuary

The tidal mouth of a river where it meets the sea.

### Glacial Lake

A lake formed by melting glaciers.

### Irrigation

Supplying water to land for agriculture.

### Hydro-power

Electricity generated from flowing water.

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