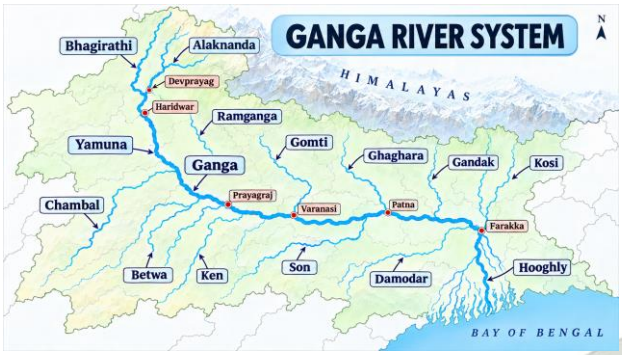
GANGA RIVER SYSTE M

Origin • Course • Tributaries • Dams • Delta • Economy



1. Ganga River System

- The Ganga River System, also known as the Ganges River System, is an extensive network of rivers, tributaries, distributaries and wetlands across northern India and parts of Bangladesh. The river originates in the Himalayas, flows through the fertile Indo-Gangetic Plain and drains into the Bay of Bengal, forming the Ganges-Brahmaputra Delta.
- It stretches over 2,500 km, making it one of Asia's longest rivers.
- It forms a complex network of Himalayan and Peninsular tributaries.
- It sustains numerous cities, farmlands and industries across its basin.
- It has immense spiritual significance in Hindu traditions, rituals and pilgrimages.

EXAM FACT: The Ganga forms the largest river basin in India.

2. Origin and Basic Facts

The Ganga originates as the Bhagirathi River from the Gangotri Glacier at Gaumukh in Uttarakhand, at an elevation of 3,892 m. After merging with the Alaknanda River at Devprayag, the stream is officially named the Ganga.

Feature	Details
Origin	Gaumukh (Gangotri Glacier), Uk
Source stream	Bhagirathi
Confluence giving the name Ganga	Bhagirathi + Alaknanda at Devprayag
Elevation at origin	3,892 m
Total length	Approximately 2,525 km
Major states	Uttarakhand → Uttar Pradesh → Bihar → Jharkhand → West Bengal
Final drainage	Bay of Bengal
Basin coverage	26.4% of India's geographical area; supports nearly 50% of India's population

3. Course of the Ganga

- The course is divided into three sections shaped by Himalayan terrain, alluvial plains and deltaic regions.

A. Upper Course — Himalayan Region

- Steep gradients, rapids and narrow gorges.
- Bhagirathi meets Alaknanda at Devprayag; the river is named Ganga.
- Enters the plains at Haridwar.
- Barrages at Haridwar, Bijnor and Narora divert water to the Upper, Madhya and Lower Ganga Canals.

B. Middle Course — Indo-Gangetic Plains

- From Haridwar to Bihar, the river becomes wider and supports dense agricultural activity.
- Joined by Ramganga, Yamuna, Gomti, Ghaghara, Gandak and Kosi.
- Fertile alluvial soil; the river meanders widely due to a low gradient.

C. Lower Course — Bengal Region

- The river slows down and splits into distributaries, forming the world's largest delta.
- Farakka Barrage regulates the flow.
- Ganga splits into Bhagirathi-Hooghly (right) and Padma (left).
- Padma enters Bangladesh and joins the Brahmaputra and Meghna.

- Tidal influence supports dense mangrove forests in the Sundarbans.

4. Tributaries of the Ganga

Tributaries are classified as right-bank and left-bank tributaries according to the side from which they join the main river.

Major tributaries listed in the source

- Yamuna River
- Tons (Tamsa) River
- Son (Sone) River
- Punpun River
- Chandan River
- Phalgu (Niranjana) River
- Kiul River
- Karamnasa River
- Ramganga River
- Gomti River
- Ghaghara (Karnali) River
- Gandak River
- Kosi River
- Mahananda River

5. Right-Bank Tributaries

The major right-bank tributaries join the Ganga mainly from the southern side of its flow.

1. Yamuna River

- The largest and most important right-bank tributary of the Ganga. It originates from the Yamunotri Glacier in Uttarakhand and flows through major urban and agricultural centres.
- Originates at 6,387 m in the Himalayas.
- Passes through Haryana, Delhi and Uttar Pradesh.
- Major tributaries: Chambal, Betwa, Ken and Hindon.
- Joins the Ganga at Allahabad (Prayagraj), at the Triveni Sangam.

Importance

- Essential for irrigation in the Yamuna–Ganga Doab.
- Provides water to Delhi and surrounding regions.
- Associated with ancient Indian civilization and heritage.

2. Tons (Tamsa) River

- An important right-bank tributary flowing through central India.
- Originates in the Kaimur Range, Madhya Pradesh.
- Known for waterfalls such as Chachai Falls.
- Flows through Madhya Pradesh and Uttar Pradesh.

Importance

- Supports local irrigation and agriculture.
- Carries seasonal monsoon flows essential for the eastern UP plains.

3. Son (Sone) River

- A major right-bank tributary with a large basin area.
- Originates from the Amarkantak Plateau, Madhya Pradesh.
- Longest right-bank tributary after the Yamuna.
- Flows through Madhya Pradesh, Uttar Pradesh, Jharkhand and Bihar.
- Known for the Indrapuri Barrage in Bihar.

Importance

- Major irrigation projects for Bihar and Uttar Pradesh.
- Its alluvial plains are agriculturally fertile.

4. Punpun River

- Flows parallel to the Ganga and drains eastern Bihar.
- Originates in the Palamu Hills of Jharkhand.
- Flows through Gaya and Patna.
- Joins the Ganga near Fatuha in Bihar.

Importance

- Crucial for local farming in Bihar's plains.
- Mentioned in the Puranas as a sacred river.

5. Chandan River

- A small right-bank tributary located in Bihar and Jharkhand.
- Originates in the hills of Jharkhand.
- Flows into Bihar's plains and merges with the Ganga.

Importance

- Supports agriculture and groundwater recharge.
- Plays a role in small-scale irrigation.

6. Phalgu (Niranjana) River

- Historically significant due to its association with Bodh Gaya.
- Formed by the merging of the Niranjana and Mohana rivers.
- Flows through Gaya in Bihar.
- Eventually drains into the Punpun River.

Importance

- Considered sacred by Hindus and Buddhists.
- Important for religious rituals in Gaya, especially Pind Daan.

6. Left-Bank Tributaries

These tributaries join from the northern Himalayan side. They originate mainly in the Himalayas and are described as perennial rivers with high discharge and rich sediments.

1. Ramganga River

Originates in the Doodhatoli Range of Uttarakhand and flows through Jim Corbett National Park before entering the plains. It contributes to irrigation and water supply in western Uttar Pradesh and joins the Ganga near Kannauj.

- Origin: Doodhatoli Hills, Uttarakhand.
- Passes through Corbett National Park.
- Joins the Ganga near Kannauj.

2. Gomti River

Originates from Gomat Taal in Pilibhit and flows entirely through the plains of Uttar Pradesh. It passes through Lucknow and Sultanpur and meets the Ganga at Ghazipur.

- Origin: Gomat Taal, Pilibhit (Uttar Pradesh).
- Major cities: Lucknow, Sultanpur and Jaunpur.
- Joins the Ganga at Ghazipur.

3. Ghaghara (Karnali) River

Rises in the Tibetan Plateau near Lake Mansarovar and flows through Nepal before entering India. It carries heavy sediments and can cause floods; it joins the Ganga at Chhapra in Bihar.

- Origin: Mapchachungo Glacier, Tibet.
- Known as Karnali in Nepal.
- Joins the Ganga at Chhapra, Bihar.

4. Gandak River

Originates in the Himalayas of Nepal from the Nhubine Himal Glacier. It flows south through deep valleys, bringing nutrient-rich alluvium to Bihar, and meets the Ganga near Patna.

- Origin: Nhubine Himal Glacier, Nepal.
- Known as Kali Gandaki/Narayani in Nepal.
- Joins the Ganga near Patna.

5. Kosi River

Originates in Tibet and enters India after flowing through eastern Nepal. Known as the "Sorrow of Bihar", it frequently shifts its course due to heavy sediment load.

- Origin: Tibet (Saptakoshi system).
- Causes widespread floods in Bihar.
- Joins the Ganga at Kursela, Bihar.

6. Mahananda River

Rises in the Darjeeling Hills and flows through Bihar and West Bengal before entering Bangladesh. It is the easternmost major tributary of the Ganga.

- Origin: Darjeeling Hills, West Bengal.
- Flows through Bihar and North Bengal.
- Joins the Ganga near Godagari, Bangladesh.

7. Important Cities on the Ganga

City / State	Key association
Srinagar (Uttarakhand)	Ancient temples and scenic Himalayan surroundings.
Rishikesh (Uttarakhand)	Global hub of yoga and spirituality; gateway to the Himalayas.
Haridwar (Uttarakhand)	Holy city; Kumbh Mela and ritual bathing ghats.
Roorkee (Uttarakhand)	IIT Roorkee and colonial-era canal systems.
Bijnor (Uttar Pradesh)	Agricultural and sugarcane belt along the Ganga.
Narora (Uttar Pradesh)	Narora Atomic Power Station and Ganga barrage.
Kannauj (Uttar Pradesh)	Famous for attar (perfume); ancient trade centre.
Kanpur (Uttar Pradesh)	Industrial city known for leather, textiles and IIT Kanpur.
Prayagraj (Uttar Pradesh)	Triveni Sangam and Kumbh Mela.
Varanasi (Uttar Pradesh)	Ancient city; cultural, spiritual and educational hub.
Mirzapur (Uttar Pradesh)	Carpets, handicrafts and scenic ghats.
Patna (Bihar)	One of India's oldest continuously inhabited cities; political and cultural hub.
Bhagalpur (Bihar)	Silk production and Vikramshila ruins.
Behrampore (West Bengal)	Town in Murshidabad district along the river.
Serampore (West Bengal)	Colonial heritage and educational institutions.
Howrah (West Bengal)	Industrial hub; linked to Kolkata by Howrah Bridge.
Kolkata (West Bengal)	Major port and metropolitan city on the Hooghly, a Ganga distributary.

8. Dams and Barrages on the Ganga River System

These structures support hydropower generation, irrigation, flood control and water management.

Dam / Project	River	Location	State	Purpose / key features
Tehri Dam	Bhagirathi (Ganga headstream)	Tehri	Uttarakhand	2,400 MW hydropower; irrigation and drinking water; one of the world's tallest dams.
Koteshwar Dam	Bhagirathi	Koteshwar	Uttarakhand	Balancing reservoir for Tehri Dam; hydropower.
Maneri Bhali I & II	Bhagirathi	Uttarkashi	Uttarakhand	Hydroelectric generation: 90 MW (Stage I) + 304 MW (Stage II).
Ramganga Dam (Kalagarh Dam)	Ramganga	Kalagarh	Uttarakhand	Irrigation, hydropower and flood control; near Corbett National Park.
Narora Barrage	Ganga	Bulandshahr	Uttar Pradesh	Irrigation supply and flow regulation near Narora Atomic Power Station.
Kanpur Barrage	Ganga	Kanpur	Uttar Pradesh	Urban water supply and irrigation regulation.
Farakka Barrage	Ganga	Murshidabad	West Bengal	2,304 m long; diverts water into Hooghly to maintain Kolkata Port.
Gandak Barrage / Project	Gandak	Valmikinagar	Bihar	Indo–Nepal project for irrigation, flood control and hydropower.

Kosi Project (Kosi Barrage)	Kosi	Birpur	Bihar	Major flood-control and irrigation system; Indo–Nepal collaboration.
Rihand Dam	Rihand (Son tributary)	Pipri, Sonebhadra	Uttar Pradesh	Govind Ballabh Pant Sagar; described in source as India's largest reservoir; hydropower and irrigation.
Bansagar Dam	Son	Shahdol	Madhya Pradesh	Joint MP–UP–Bihar irrigation project; hydropower generation.
Matatila Dam	Betwa (Yamuna)	Lalitpur	Uttar Pradesh	Hydropower, irrigation and regional water supply.
Chambal Project (Gandhi Sagar, Rana Pratap Sagar & Jawahar Sagar)	Chambal (Yamuna tributary)	MP–Rajasthan	—	Multipurpose hydropower and irrigation system across three major dams.
Damodar Valley Project	Damodar	Jharkhand & West Bengal	—	Flood control, hydropower and irrigation; India's first multipurpose river valley project.
Durgawati Dam	Durgawati (Karmanasa)	Kaimur	Bihar	Under construction; drinking water and irrigation supply.

9. Ganga–Brahmaputra Delta

Before draining into the Bay of Bengal, the Ganga and Brahmaputra together form the world's largest delta, situated between the Bhagirathi-Hooghly and Padma-Meghna rivers. It has an indented and complex coastline, distributaries and islands, and dense mangrove forests. Low-lying swamps are frequently affected by seawater flooding during high tides.

KEY TERM: Sundarbans — dense mangrove forests shaped by tidal influence.

10. Government Initiatives

Industrial, domestic and agricultural pollution has affected water quality. Government initiatives aim to clean, conserve and rejuvenate the Ganga and its tributaries.

1. Namami Gange Programme (2014)

- Launched in 2014 by the Ministry of Jal Shakti.
- Objectives: sewage treatment, riverfront development, industrial effluent control and afforestation along riverbanks.
- Integrated mission with a budget of over ₹20,000 crore for cleaning the Ganga and its tributaries.

2. Ganga Action Plan (GAP I & II)

- GAP-I (1986–2000): first major effort to control pollution in major cities along the Ganga.
- GAP-II (1993–2000): focused on additional towns and river stretches.
- Measures included sewage treatment plants (STPs), public awareness campaigns and industrial waste control.

3. National Ganga River Basin Authority (NGRBA)

- Established in 2009 under the Ministry of Environment & Forests.
- Objective: coordinated management and pollution control of the Ganga basin.
- Responsible for implementing policies and monitoring water quality across multiple states.

4. River Surface Cleaning Initiatives

- Floating trash skimmers and manual cleaning drives.
- Focus on plastic, industrial debris and solid-waste removal from riverbanks and ghats.

5. Afforestation and Biodiversity Programmes

- Plantation of trees along riverbanks to reduce soil erosion.
- Protection of aquatic species such as the Ganges river dolphin and gharial.

11. Economic Importance

The Ganga supports agriculture, industry, fisheries, tourism and inland navigation. Its fertile plains, abundant water supply and navigable stretches support regional livelihoods and the national economy.

- Irrigation across Uttar Pradesh, Bihar, Jharkhand and West Bengal supports rice, wheat, sugarcane and other crops.
- Fertile alluvial plains contribute to agricultural productivity and food security in northern India.
- Freshwater fish habitat supports the livelihoods of fishermen.
- Water is supplied to industries in Kanpur, Varanasi and Kolkata, including textiles, leather, paper and chemical sectors.
- Navigable stretches form part of National Waterway-1, transporting coal, cement and food grains.
- Pilgrimage and tourism at Haridwar, Varanasi and Prayagraj support local and regional economies.
- Tehri Dam and Maneri Bhali projects generate electricity, support irrigation and help control floods.
- Sand, silt and gravel extracted from the river are used in construction.

Length	About 2,525 km
Entry into plains	Haridwar
Major right-bank tributary	Yamuna
Sorrow of Bihar	Kosi
Gomti origin	Gomat Taal, Pilibhit
Ramganga confluence	Near Kannauj
Ghaghara confluence	Chhapra
Gandak confluence	Near Patna
Kosi confluence	Kursela
Farakka Barrage	Diverts water into Hooghly
Delta	Ganga–Brahmaputra Delta; Sundarbans mangroves
Major river-cleaning programme	Namami Gange (2014)

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12. Quick Revision — Must Remember

Topic	Fact to revise
Origin	Gaumukh, Gangotri Glacier; source stream Bhagirathi
Naming point	Devprayag — Bhagirathi meets Alaknanda