

The Ganga River: A Green Sanctuaries in Bihar

Sponsored by



National Mission for Clean Ganga (NMCG),
Department of Water Resources, River
Development & Ganga Rejuvenation,
Ministry of Jal Shakti, New Delhi



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ABOUT THE EDITOR



Dr. Acharya Balkrishna, Co-founder of Patanjali Organic Research Institute, is a highly ascetic entrepreneur with a diverse personality who is a specialist in Yoga, Ayurveda, Sanskrit language, Indian sacred books, and the Vedas. Dr. Balkrishna has become a significant source of inspiration for Traditional Medicinal Practitioners and a globally recognized celebrity after dedicating his life to the resurrection of ancient healing and living practices. His maverick leadership as

Co-Founder & Managing Director of Patanjali Ayurved Limited, along with overseeing Patanjali Food and Herbal Park and Divya Pharmacy, has propelled Ayurveda into a global business phenomenon with a massive following. Additionally, he has been decorated with prestigious awards such as 'Ayurveda Expert', 'Manav Ratan', 'Bharat Gaurav', 'Indian of the Year', 'Ten Versatile and Dynamic Young Men of India', 'Bheeshma Pusaka', 'Lokmanya Tilak', and 'Transformational Business Leader' for his exceptional knowledge, passion, and service to mankind. According to a study published by Stanford University in the USA and Elsevier in Europe, Dr. Balkrishna has been recognized among the **top 2% of scientists** worldwide for his research on Ayurveda and Yoga.

With his early age passion for plants, he has become the most renowned & respected herbal specialist for health and nutrition. For the research of novel herbal medication formulations, he explored four rare plants: 'Sanjeevani', 'Somlata', 'Swarnakshiri', 'Swarnadraka', and 'Astavavarga plants'. He has taken many initiatives for Biodiversity conservation, presently working for the establishment of Patanjali Herbal Garden & herbarium, working on the compilation of a unique multivoluminous project i.e., '**World Herbal Encyclopaedia**', containing the descriptions of ~50,000 medicinal plant species with the largest collection of plant paintings and drawings. This is being done to strengthen traditional medicine systems of the world. Additionally, Dr. Balkrishna has made significant contributions to the socio-economic development of tribal communities and the upliftment of rural communities with FPOs, CLFs, and SHGs. Furthermore, his endeavors have been directed towards exploring and conserving floral diversity, phytochemical and insilico analysis, investigating soil geochemistry, understanding complex plant-microbe relationships, and monitoring water quality from Gomukh to Gangasagar.

He has published more than **400 research articles** in national and international journals received around 20 patents and authored more than **200 books** on Yoga, Ayurveda, Agriculture, Herbal Medicine, and Information Technology and edited more than **40 unpublished ancient Ayurveda manuscripts**. With the vision of ensuring universal health for the last two decades, more than **1.5 million patients** with several persistent, chronic, and non-communicable diseases have been effectively treated. He established Patanjali Ayurved College and the University of Patanjali with the humanitarian goal of assisting youngsters in achieving their goals and serving the country. Additionally, he has been involved in various government and non-government initiatives. He is also a key proponent of agricultural transformation through organic practices, working to boost agricultural productivity, increase farmer income, and ensure equitable access to a safe, affordable, and nutritious diet year-round. Apart from this, Dr. Balkrishna is actively participating in driving agricultural transformation through the 'Patanjali Farmer Samridhi Programme' by well-trained staff and around one lakh trainers. His generous personality is also reflected through his actions like helping the nation with emergency needs like post-disaster needs assessment, providing free shelter, food, and education to orphan children, and free OPD services at Patanjali Yogpeeth. With his humanitarian attitude, Dr. Balkrishna continues his phenomenal journey of making world records, uplifting mankind through medicine & lifestyle improvement, reviving sustainable agriculture, and preserving nature's gifts in the form of literature and a sustainable living approach.

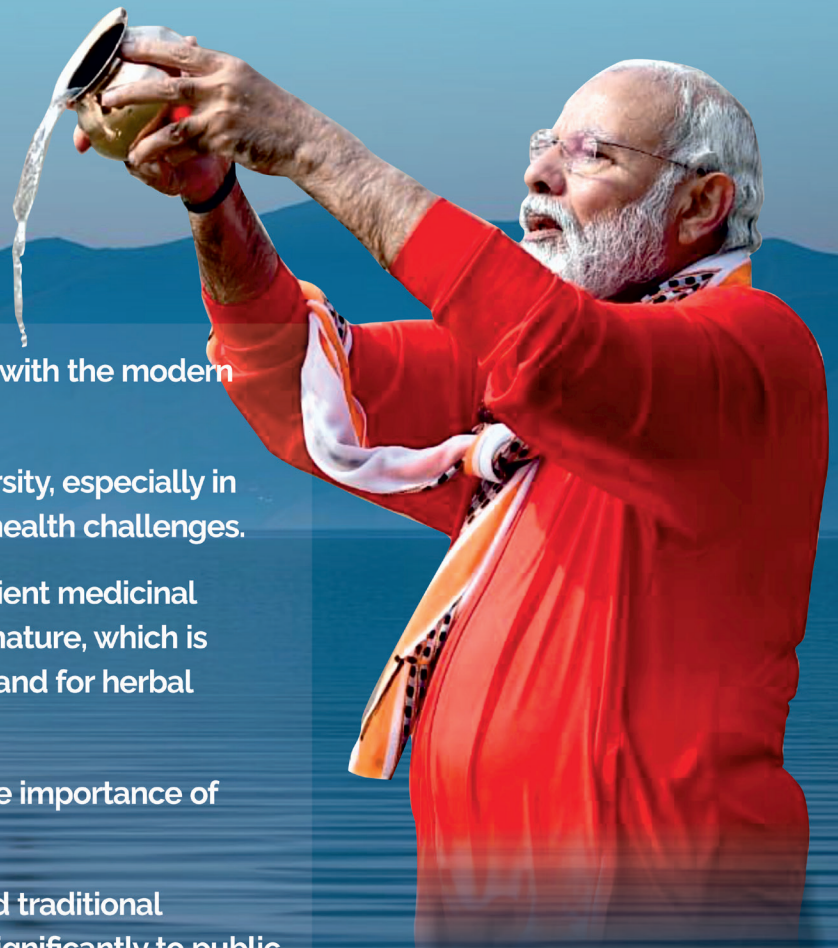
Vision of Honourable Prime Minister Shri Narendra Modi



- Medicinal plants can help in dealing with the modern day lifestyle.
- We need to harness our rich biodiversity, especially in medicinal plants, to address global health challenges.
- The world is now embracing our ancient medicinal practices. People are going back to nature, which is reflected in the growing global demand for herbal products.
- Our nation has always recognized the importance of medicinal plants.
- The potential of medicinal plants and traditional healthcare systems can contribute significantly to public health.
- Our goal is to provide affordable healthcare solutions by promoting traditional medicines including the use of medicinal plants.



Narendra Modi's address at the inauguration of the first National Arogya Fair, 2017
Narendra Modi's speech at the inauguration of the National Ayurveda Summit, 2019
Narendra Modi's address at the inauguration of the AYUSH Wellness Centre, 2016
Narendra Modi's address at the inauguration of the National Institute of Ayurveda, 2020
Narendra Modi's address at the International Conference on Integrative Medicine for Chronic Diseases, 2017
Narendra Modi's address at the Indian Science Congress, 2019





Vision of Union Minister for Jal Shakti

Shri Chandrakant Raghunath Patil

“

- We will understand the importance of water, conserve it and ensure rich water resources for future generations.
- Conservation and enhancement of water resources of our country is a sacred goal. I will work with my dedication and devotion to achieve this.
- Proper access to water is a strong step towards women's empowerment.
- Jal Shakti is Nari Shakti, as women are the most affected by water scarcity due to their household responsibilities in rural India.

”

<https://pib.gov.in/PressReleaseDetail.aspx?PRID=2024324>

<https://www.newsonair.gov.in/c-r-patil-emphasizes-water-access-as-essential-for-womens-empowerment-at-catch-the-rain-2024-workshop-in-delhi/>

<https://www.indiatvnews.com/gujarat/will-transform-jal-shakti-into-rashtra-shakti-cabinet-jal-shakti-minister-c-r-patil-after-portfolio-appointment-pm-modi-2024-06-10-936272>

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Uttar Pradesh Forest Department & Biodiversity Board

Bihar Forest Department & Biodiversity Board

Jharkhand Forest Department & Biodiversity Board

West Bengal Forest Department & Biodiversity Board

Ganga Task Force (GTF)



राजीव कुमार मित्तल, भा.प्र.से.
महानिदेशक
राष्ट्रीय स्वच्छ गंगा मिशन
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सत्यमेव जयते
75
आज़ादी का
अमृत महोत्सव

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन,
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DEPARTMENT OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION



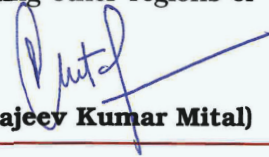
MESSAGE

The Ganga, a river deeply revered in our culture, is both a source of spiritual inspiration and home to diverse ecosystems, including riparian buffers along its banks that connect terrestrial and aquatic systems. These buffers play a crucial role in supporting amphibious life, stabilizing the riverbanks, and maintaining ecosystem services. Therefore, under the "Aviral Ganga" approach for biodiversity conservation and "Arth Ganga" for enhancing livelihoods, a project on floral diversity has been initiated through Namami Gange Mission – II, in collaboration with Patanjali Organic Research Institute (PORI), Haridwar, Uttarakhand.

The project "Scientific Exploration of Floral Diversity Near the Ganga Riverbanks for Ethnobotanical Purposes along with their Conservation and Economic Development of the Region via Skill Development Programs" aims to provide valuable scientific insights into the region's ethnobotanical wealth while promoting sustainable conservation practices. The 18-month study, conducted from Gaumukh to Gangasagar along the Ganga banks, reveals the floral profile, ethno medicinal aspects, applications, livelihood perspectives, and the role of biodiversity in ecosystem resilience, highlighting the symbiotic relationship between conservation and socio-economic development. Findings presented through publications, including project reports, monographs, exploration of ethno medicinal plants, and plant wealth along river Ganga India, will benefit stakeholders, including local communities' well-being.

It gives me immense pleasure to extend my appreciation to the entire team for successfully executing the project, which advances our understanding of the unique floral diversity along the Ganga and its role in ethnobotanical purposes, conservation, and integrating science with local knowledge. The project's focus on environmental stewardship and skill enhancement for sustainable livelihoods is commendable.

This excellent work documenting the floral diversity along the banks may pave the way for the rejuvenation of the Ganga and set a precedent for biodiversity conservation and socio-economic improvement, potentially benefiting other regions of India as well.

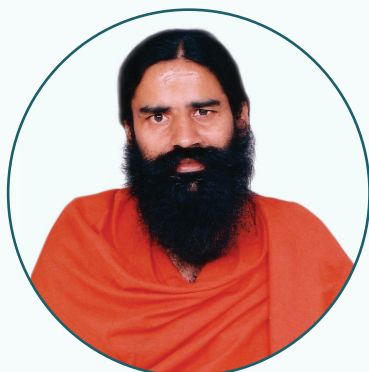

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FOREWORD



The Ganga, regarded as a goddess in Indian tradition, has enriched our country's spiritual and medical legacy in addition to its natural scenery. Many medicinal plants have been growing along the banks of this sacred river for many years. The Ganga River is vital to the existence of the local aboriginal population. The Ganga River is always important to the natives' economics, employment opportunities, religious beliefs, etc. Respected for its natural richness as well as its spiritual importance, the Ganga supports a wide variety of medicinal plants. The foundation of ancient medical systems like Ayurveda has been these plants, which are nourished by the pristine waters of the Ganga, leading us toward comprehensive health and well-being.

Bihar is separated into northern and southern regions by the Ganga River. The Ganga and its tributaries supply the basin that is extremely vital to the native population, which makes the river extremely significant to the people of Bihar. This basin improves agricultural output and creates employment opportunities, which strengthens the state's economy. The medicinal plants along the Ganga River symbolize the mutually beneficial relationship between humans and the natural environment, in addition to their evident applications. Through careful study and experience, our ancestors learned about the therapeutic properties of these plants and used them in everyday life and healthcare. This priceless legacy that has been passed down through the ages merits our respect and ongoing investigation. I write these remarks for this amazing compilation with immense gratitude and appreciation.

In a time when finding long-term, comprehensive health solutions is more important than ever, this compilation serves as a source of knowledge. It inspires individuals to return to their roots, appreciate the wisdom of traditional medicine, and combine it with cutting-edge medical procedures. In addition to being theoretical, the work presented in this collection has applications in terms of enhancing native activities in general, such as promoting environmental stewardship, protecting biodiversity, and enhancing health outcomes.

I express my sincere gratitude to Acharya Balkrishna and his committed group of knowledgeable scientists for their everlasting dedication. Their work emphasizes the Ganga River's ongoing significance to the local inhabitants of Bihar, encouraging a healthy and peaceful way of life for them.

This work will draw in additional river lovers who rely on the Ganga River for their future explorations. Let's follow this path with reverence, inquiry, and dedication to protecting the environment that so kindly provides for us.

With blessings and best wishes,

-Swami Ramdev

PREFACE

One of the best rivers in the northern Indian subcontinent is the Ganga. It has always been revered as the sacred river in Hinduism. The majority of its path is traversed by a broad, leisurely stream that passes through one of the world's most fertile and densely inhabited areas. It rises in the Himalayas and empties into the Bay of Bengal, hundreds of millions of people live in its basin. In Bihar, the Ganga River enters near Chausa Village in the Buxar district, marking the beginning of its journey through the state. The river's drainage area within Bihar spans approximately 15,165 square kilometers. As it flows through Bihar, it traverses twelve districts: Buxar, Bhojpur, Patna, Saran, Vaishali, Samastipur, Begusarai, Khagaria, Munger, Bhagalpur, Katihar, and Lakhisarai. Among these, the Patna district has the longest stretch of the river, extending over 99 kilometers. The Ganga River serves as a natural divide, separating Bihar into two distinct regions: the North Bihar Plains and the South Bihar Plains. This geographical split significantly impacts the agricultural and ecological characteristics of the state. The Ghaghara, Gandak, Bagmati, Kosi, Mahananda, Son, Phaglu, etc. are its major tributaries within the state that comprise its basic drainage system. Among the various religious practices that are strongly embedded in the culture are daily prayers, festivals, and festivities held along the banks of the Ganga. In Hinduism, the river is considered a holy entity and a means of atoning for transgressions.

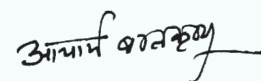
The Indian government has taken action through a number of projects, beneficiary plans, and training programs to protect the interests of the Ganga. The National Mission for Clean Ganga (NMCG) program, under the Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti, is the nodal ministry in charge of overall policy planning and program coordination for Ganga development. The Ganga River status is taken into consideration while designing the Ministry's plans and projects, which aim to close significant gaps in institutions and initiatives. The NMCG is in charge of several initiatives, which promote the social, economic, biological, and spiritual development of the Ganga River. Similarly, the Patanjali Organic Research Institute along with its sister institute i.e. Patanjali Research Foundation has been designated to serve as the Ganga River's revitalization and development.

Information on the Ganga River within Bihar has been gathered and documented in this book through field surveys, earlier literature, and online research. The Ganga River, its tributaries, employment, economy, people communities, towns, and cities nearby are all covered in detail in this book. This book also discusses the challenges the river

is now experiencing. The book also discusses vegetation and the effects it has on the environment and ecology. The information on the medicinal plants gathered during the field survey is provided in this book. This book also includes information on government initiatives that have been moving forward to conserve and revitalize the Ganga River in the state.

I express my deepest gratitude to Param Pujya Swami Ramdev Ji for his unwavering leadership and support throughout this endeavour, as well as for his invaluable guidance in every aspect of our work. I express my gratitude to the Ministry of Jal Shakti for their invaluable recommendations and guidance. My best wishes to the dedicated and highly skilled experts, who have gathered data and conducted extensive research on the diverse botanical heritage of the Ganga River basin. I would especially want to express my gratitude to the district and sub-district administrations, as well as the national and state biodiversity boards for their cooperation and support throughout our team's field visits.

I am confident that this book would be helpful to anyone interested in learning more about the Ganga in Bihar.



-Acharya Balkrishna

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THE GANGA

The Ganga River is essential to life, culture, and economy in India. It originates from the Gangotri Glacier in the Himalayas and flows through northern India to the Bay of Bengal. This river system is an essential component of Indian civilization and not only a geographical feature. The Ganga has provided water for drinking, transit, and cultivation to many populations for millennia. The year-round, steady flow of the river is essential to the survival of the businesses, cities, and agriculture surrounding its banks. Rivers like the Ganga are essential to the processes that sustain ecosystems, economies, and civilizations since water is the basis of life.

One of the longest and holiest rivers in India, the Ganga originates at the Gangotri Glacier in Uttarkashi, Uttarakhand, often referred to as the Bhagirathi. The Bhagirath-

Kharak and Satopanth glaciers are the source of the Alaknanda, another significant tributary. The official beginning of the Ganga River is Devprayag, where these two major tributaries converge. The Ganga runs southward from Devprayag through the foothills of the Himalayas, passing through the sacred city of Haridwar, a significant Hindu pilgrimage site. Following its departure from the hills at Haridwar, the Ganga flows onto the plains of Uttar Pradesh before entering Bihar close to Chausa in the Buxar district. The Ganga then flows through the districts of Bhojpur, Patna, Saran, Vaishali, Samastipur, Begusarai, Khagaria, Munger, Bhagalpur, Katihar, and Lakhisarai as it continues eastward. With the Ganga extending a total of 99 kilometers, the Patna district is the longest. Bihar is split between the North Bihar Plains and the South



Bihar Plains by the Ganga River. From the Katihar district, it enters Jharkhand. After that, it continues south and enters the West Bengal. The Ganga separates into two streams around 40 kilometers before Farakka. The right branch, known as the Hooghly River, travels southward through West Bengal, while the left branch flows eastward into Bangladesh.

In its lower reaches, near Kolkata, the river is referred to as the Bhagirathi before it finally merges with the Bay of Bengal. The Ganga River spans a total length of about 2600 kilometers from its source at Gomukh to its mouth at the Bay of Bengal, nourishing millions of lives along its path and holding immense cultural and spiritual significance throughout its journey.

In terms of sheer volume, the Ganga alone accounts for about 25% of India's total water

resources. This abundance has historically supported dense populations and thriving agricultural practices in the Gangetic plains, which are among the most fertile regions in the world. Beyond India, the Ganga River basin extends into Nepal and Bangladesh, encompassing a vast area that supports more than 300 million people. Communities in these countries rely heavily on the Ganga for their water needs, further emphasizing its regional importance. However, despite its significance, the Ganga faces numerous challenges today, including pollution, unsustainable use of water resources, and environmental degradation. Efforts are ongoing to preserve and rejuvenate the river's health through initiatives like the Ganga Action Plan and Namami Gange, aimed at cleaning the river and ensuring its sustainability for future generations.



SALIENT FEATURES

Length

Total - 2600 kms

Uttarakhand - 450 kms

Uttar Pradesh - 1000 kms

Sharing length between UP & Bihar - 110 kms

Bihar - 405 kms

Jharkhand - 40 kms

West Bengal - 520 kms

Catchment Area Ganga Basin- 8,61,404 km² (26.4%) of India

Average Annual discharge- 4,93,400 million m³

Main Tributaries- Yamuna, Ramganga, Gomti, Ghaghara, Gandak, Damodar, Kosi & Kali-East

Main sub tributaries- Chambal, Sindh, Betwa, Ken, Tons, Sone & Kasia-Haldi

Major Cities located on the bank- Srinagar, Rishikesh, Haridwar, Bijnor, Narora, Kanauj, Kanpur, Prayagraj, Varanasi, Mirzapur, Patna, Bhagalpur, Bahrapur, Serampore, Hawarah, Kolkata

Festivals- Kumbh Mela, Kartik Purnima, Makar Sakranti, Ganga Navami, Ganga Dussehra, Chath Puja, Somwati Amavasya or Mauni Amavasya

SPIRITUAL VALUES

For India, the Ganga River holds great spiritual and cultural significance, making it more than simply a mere river. It is seen to be kind and life-sustaining, and it is occasionally likened to the nation. In the end, the Ganga River represents purity, divinity, and cultural inheritance because of its complex character, which is reflected in its profound influence on Indian mythology, religion, and daily life.

In Hinduism, the Ganga River—embodied as the Goddess Ganga—has great cultural and spiritual significance. Within its basin, the 'Mother Ganga' provides life for about 300 million people. Originating from Gomukh and merging with the Alaknanda River at Devprayag, it is known as the Bhagirathi River along this stretch, named after King Bhagiratha who brought Ganga from heaven through severe penance.

Ganga is revered as the river of knowledge, believed to be the sister of Goddess Saraswati, the embodiment of knowledge. According to mythology, Ganga flows from the *Kamandal* of Lord Brahma, thus considered his daughter. She is also regarded as the sister of Goddess Parvati, hence called the daughter of the Himalayas. The Narada Purana narrates that the weight of Ganga was too immense for the earth to bear, and Lord Shiva eased its descent by capturing it in his matted hair, earning her the title 'daughter of Shiva'.

Ganga is perceived as the amalgamation of various deities—Shiva, Shakti, Brahma, and Vishnu—symbolizing purity and divinity. For Hindus, the Ganga is not just a river but a way of life, offering sustenance and spiritual purification through its purifying waters believed to possess self-cleaning properties. In essence, Ganga embodies both earthly and





heavenly realms, representing a sacred link between the divine and mortal worlds in Hindu culture.

In Hindu culture, the Ganga River holds an unparalleled significance that spans across the entirety of life's milestones. It is revered as more than just a physical entity; it embodies spiritual purity and divine grace. Hindus view the water of the Ganga as sacred and liken it to *amrit*, the nectar of immortality. Many keep Ganga water in their homes for its auspicious qualities, using it in various ceremonies and rituals throughout their lives.

From birth to death, the presence of the Ganga is integral in Hindu rituals and customs. It is used during childbirth, naming ceremonies (*namakaran*), the introduction of solid food (*annagrahan*), sacred thread ceremonies (*yagyopaweeet*), marriages, and funerals. During funerals, Gangajal (water from the Ganga) is

often poured into the mouth of the deceased, symbolizing purification and the journey towards spiritual liberation.

For many Hindus, the Ganga is the center of their daily existence. They take a bath in its waters to start their days, saying prayers and hymns to the river in adoration. There are several rich cultures, festivals, fairs, and ceremonies throughout the whole Ganga River. The stairs that lead down to the river, known as Ghats, are especially sacred and are used as meeting spots for meditation, ceremonies, and spiritual activities. These Ghats are said to aid in spiritual enlightenment and cleansing and are regarded as emblems of purity.

The Ganga River ultimately both sustains life and bestows upon it a profound spiritual dimension. It gives Hindus a connection to their culture, spirituality, and the divine; it is an enduring aspect of their lives.

VARIOUS NAMES

The Ganga River, known by various names and revered across different dimensions, holds a unique place in Hindu mythology and culture. Its names reflect its diverse origins and roles:

- **Haripadodbhava Ganga:** Originating from the feet of Lord Vishnu.
- **Swargaloka's Ganga:** The Ganga of heaven.
- **Akash Ganga:** Milky Way.
- **Shiva Jattas Ganga:** Ganga flowing from the matted hair of Shiva.
- **Bhulok's Ganga:** The Ganga of the earth.
- **Van, Parvat, and Sarovar's Ganga:** The Ganga is associated with forests, mountains, and lakes.
- **Gautamanugamini Ganga:** The Ganga associated with Rishi Gautam.

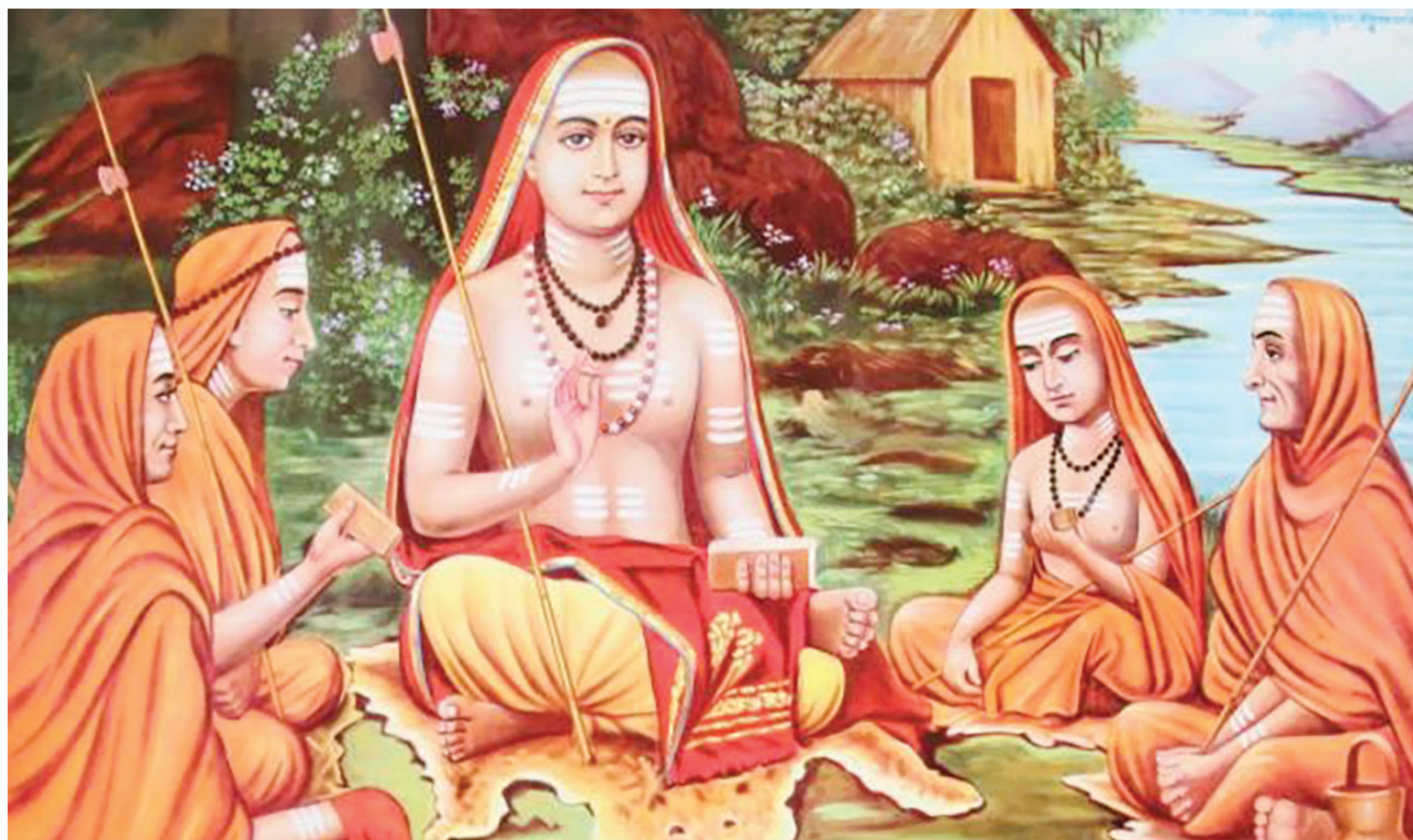
- **Bhagirathanugamini Ganga:** The Ganga associated with King Bhagiratha.
- **Gautami:** The sage Gautam gave the river the name Gautami.
- **Tripathga:** Signifying its course through heaven, earth, and the netherworld.
- **Shrotsamasmi Jahanvi:** In Bhagavad Gita, Lord Krishna declares it "Shrotsamasmi Jahanvi", emphasizing Ganga's significance among all rivers.

HISTORICAL SIGNIFICANCE

The Ganga River holds a profound historical and cultural significance in the Indian subcontinent, having witnessed the evolution of various civilizations and spiritual traditions over millennia.

Cultural Evolution: The banks of the Ganga have been a cradle for the evolution of Hindu





culture, Buddhist culture, Jainism culture, and the cultures of various dynasties like the Shakas and Huns. The key figures of Buddhism and Jainism i.e. Gautama Buddha and Mahavira preached their teachings along the Ganga, contributing to the rich tapestry of spiritual traditions in the region. It has been a focal point for trade, philosophy, and spiritual practices, nurturing diverse communities and civilizations.

Gangashtak: Adi Guru Shankaracharya's treatise, Gangashtak, underscores the spiritual importance of the Ganga. It highlights how the river is revered not only for its physical presence but also for its profound spiritual symbolism in Hinduism. This work reflects the deep reverence held for the Ganga, illustrating its role as both a purifier of sins and a spiritual guide for devotees. Through his verses, Shankaracharya emphasizes the Ganga's status as a divine entity, embodying purity, liberation, and the eternal connection

between the physical and the metaphysical in Hindu thought.

Synonymous with Himalayas: The Ganga River is closely associated with the majestic Himalayan Mountains, often described as their necklace. This association evokes a sense of spiritual sanctity and purity, as Hindu culture considers both the Himalayas and the Ganga sacred. The river's origin in the Himalayas, a region revered as the abode of gods, enhances its spiritual significance. The Ganga is seen as a divine bridge connecting the lofty heights of the sacred mountains with the earthly realm, embodying the essence of purity, devotion, and the eternal cycle of life.

Spiritual Symbolism: According to Hindu scriptures and hymns, the Ganga is revered as a divine river flowing through both heaven and earth. It is believed to possess purifying

and benedictory qualities, capable of washing away sins and bestowing spiritual upliftment. The river is personified as the goddess Ganga, who descended from the heavens to cleanse humanity of its impurities, symbolizing the river's role as a conduit for spiritual renewal and liberation. Devotees consider bathing in the Ganga as an act of purification, with the river's waters offering solace, redemption, and a path to spiritual enlightenment.

Description by Rishi Valmiki: Rishi Valmiki's depiction of the Ganga captures its majestic journey—from descending from heaven, gracing Lord Shiva's matted locks, flowing through the earth, and ultimately merging into the ocean. This portrayal emphasizes Ganga's role in purifying the soul and cleansing sins. Valmiki's narrative not only highlights the river's physical path but also underscores its spiritual significance, depicting the Ganga as a divine

entity that bridges the celestial and terrestrial realms. By chronicling its sacred descent and journey, Valmiki reinforces the belief in the Ganga's power to absolve sins and uplift the soul, making it a cornerstone of Hindu spiritual and cultural traditions.

In essence, the Ganga River transcends its physical existence to embody a spiritual and cultural icon in India. It has not only shaped the geographical landscape but also influenced the spiritual and philosophical fabric of the region, making it a source of inspiration and reverence for millions over millennia. The Ganga's enduring presence in religious rituals, literature, and daily life reflects its profound impact on the cultural identity of the Indian subcontinent. Its sacred waters continue to be a symbol of purity, devotion, and spiritual renewal, underscoring the deep reverence and connection that countless individuals hold for this majestic river.





CULTURAL SIGNIFICANCE

The Ganga River holds immense religious significance for Hindus and Sikhs, serving as the focal point for numerous festivals and rituals throughout the year. For Hindus, it is considered the holiest of rivers, with millions of devotees performing rituals such as Ganga Aarti, bathing in its waters for purification, and scattering the ashes of the deceased to attain moksha (liberation from the cycle of rebirth). Major Hindu festivals like Kumbh Mela and Ganga Dussehra revolve around the Ganga, attracting vast numbers of pilgrims. For Sikhs, the Ganga is also revered, particularly in the context of certain historical events and the presence of Sikh Gurus in regions along its banks. The river's sanctity is reflected in the communal gatherings and religious ceremonies held by Sikhs near its waters. Throughout the year, the Ganga's banks are

vibrant with the continuous flow of rituals, prayers, and festivals, underscoring its integral role in the spiritual lives of millions.

Kumbh Mela: Held every twelve years in four major locations—Haridwar, Prayagraj, Ujjain, and Nashik—the Kumbh Mela is the largest religious gathering on Earth. Devotees gather to take a holy dip in the Ganga, seeking spiritual purification and blessings. This massive event is deeply rooted in Hindu mythology and is believed to be a time when the river's waters are imbued with special spiritual potency. The Kumbh Mela attracts millions of pilgrims, sadhus (holy men), and tourists from around the world, all united in their quest for spiritual cleansing and divine favor. The festival is not only a testament to the enduring religious significance of the Ganga but also a celebration of India's rich cultural and spiritual heritage.





Ardh Kumbh: A smaller version of the Kumbh Mela, known as the Ardh Kumbh, is held every six years in Haridwar and Prayagraj. This festival, which translates to "Half Kumbh," serves as a significant religious event, attracting large numbers of devotees who come to take a holy dip in the Ganga. Although less grand in scale compared to the Kumbh Mela, the Ardh Kumbh still holds immense spiritual significance and is marked by various rituals, prayers, and gatherings that reflect the ongoing reverence for the river and its sacred role in Hindu worship.

Ganga Dussehra: Celebrated on the Dashami Tithi (tenth day) of the Jyeshtha month in the Hindu calendar, Ganga Dussehra marks the descent of the Ganga from heaven to earth. This festival commemorates the sacred event when the river, as per Hindu

mythology, descended to purify the world. Devotees observe Ganga Dussehra by performing various rituals, including bathing in the river's waters to cleanse themselves of sins and seek spiritual merit. The festival is marked by ceremonies, prayers, and offerings, reflecting the deep reverence for the Ganga and its significance in the spiritual lives of Hindus.

Magh Mela: Held annually on the banks of the Ganga, particularly in Prayagraj, the Magh Mela lasts for 45 days, starting from Makar Sankranti. Pilgrims from across India gather to take holy dips in the river and participate in a variety of religious activities, including prayers, rituals, and ceremonies. This significant event, celebrated during the winter months, is an important occasion for spiritual reflection and community gathering.



highlighting the enduring significance of the Ganga in Hindu religious practices.

Ganga Mahotsav: This five-day festival begins on Kartik Purnima and concludes on Diwali. It is celebrated with a vibrant array of cultural events, including devotional music, dance performances, and traditional rituals along the banks of the Ganga. The festival showcases the river's spiritual significance and cultural heritage, drawing large crowds of devotees and tourists who come to partake in the festivities and pay homage to the sacred river.

Sawan Month and Kanwar Yatra: The month of Sawan (July-August) is regarded as highly auspicious for devotees of Lord Shiva. During this period, millions of Kanwariyas (devotees) undertake the Kanwar Yatra, a pilgrimage where they carry holy water from the Ganga.

They travel long distances on foot to pour this sacred water over Shivalingas in their hometown temples. This ritual is performed to seek Shiva's blessings and is marked by intense devotion, religious fervor, and communal gatherings along the pilgrimage routes.

Sikh Festivals: Sikh communities also celebrate festivals along the Ganga, such as Dev Parva or Prakash Parva, which marks the birth anniversary of Guru Nanak Dev, the founder of Sikhism.

Hindu Funeral Rituals: It is believed that immersing the ashes of the deceased in the river ensures their soul attains moksha (liberation). Dedicated funeral pyres are located on riverbanks called Ghats, where cremations take place amidst sacred chants and rituals.

Among all these, the other common ritual in the Ganga River is "Aarti," or prayer, is the major event that takes place at every Ghat along the river every morning and evening. It is a notable occasion that is mostly known in the Ghats of Rishikesh, Haridwar, and Varanasi. All kinds of 'Havans' or 'Yogas', including the *Ganga Puja*, *Laghurudra*, *Maharudra*, *Atirudra*, *Durgapuja*, *Laxchandi*, *Navchandi*, *Gayatri*, *Bhoomi*, *Shilanyas*, *Murti Partishtha*, *Vastu*, *Grah Shanti*, *Nakshtra*, *Lalsrap*, *Shradh Karma*, *Narayanbali*, and *Shivlingam Abishek*, as well as the *Namkaran*, *Vivah*, and *Antimsamsakra* perform along the river. In addition to this, Ganga Ghats are used for various rituals such as *Pitra Dosha*, *Kalsarp Yoga*, *Shani Dosha*, *Manglik Dosha*,

Alpayu Yoga, *Mrityu Yoga*, and other rituals.

Millions of people have a profound spiritual connection to the Ganga River, as highlighted by these festivals and customs. These occasions are not merely religious observances but also opportunities for intercultural dialogue and communal harmony among diverse cultures. For countless Hindus, the Ganga serves as a vital source of spiritual energy, offering purification, spiritual rejuvenation, and the promise of moksha (liberation from the cycle of rebirth). In Hindu tradition, the river's waters are regarded as sanctifying and cleansing, elevating the Ganga to the status of a symbol of divine grace and eternal spirituality.



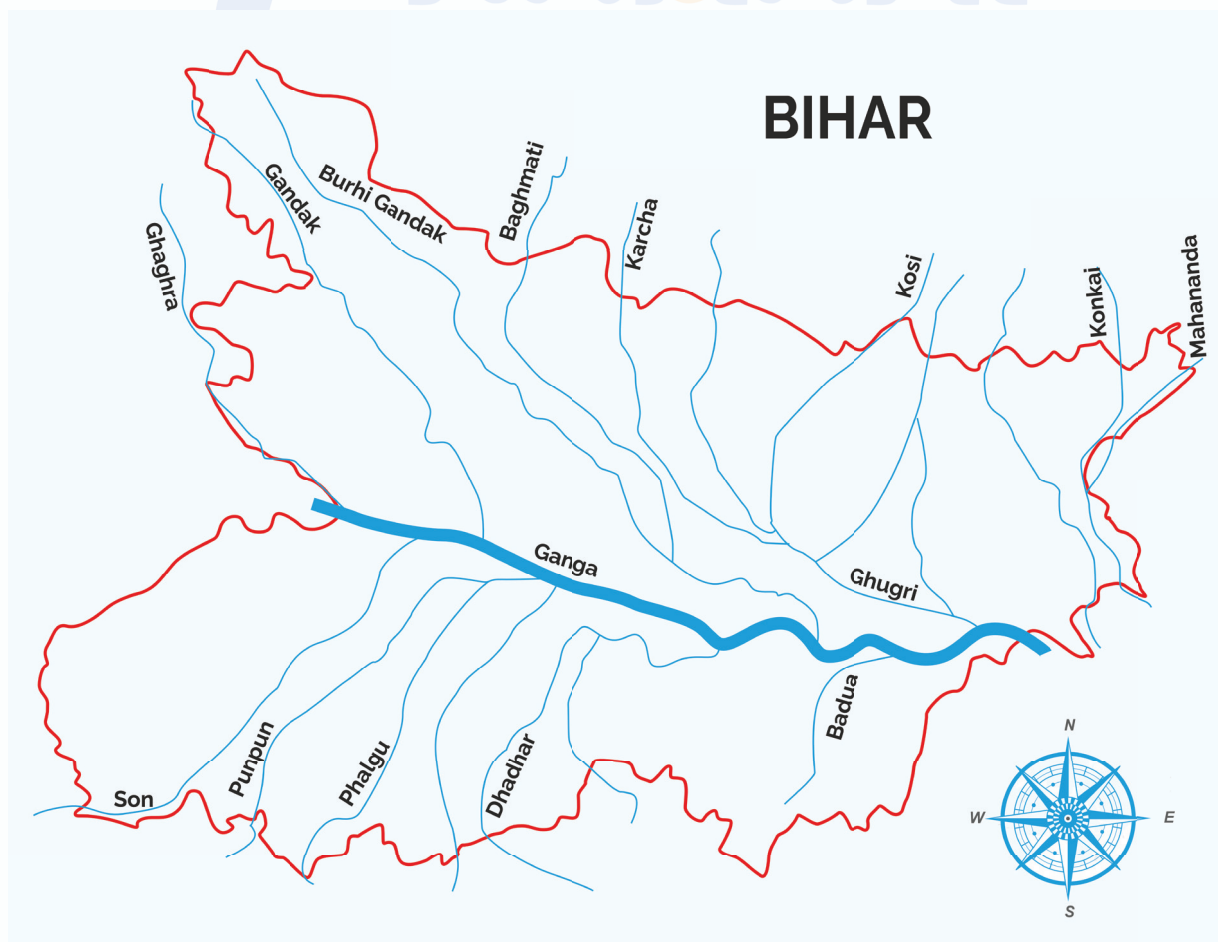


THE GANGA RIVER IN BIHAR

The Ganga River enters Bihar near Chausa Village in the Buxar district, marking the beginning of its journey through the state. The river's drainage area within Bihar spans approximately 15,165 square kilometers. As it flows through Bihar, it traverses twelve districts: Buxar, Bhojpur, Patna, Saran, Vaishali, Samastipur, Begusarai, Khagaria, Munger, Bhagalpur, Katihar, and Lakhisarai. Among these, the Patna district has the longest stretch of the river, extending over 99 kilometers.

The Ganga River serves as a natural divide, separating Bihar into two distinct regions: the North Bihar Plains and the South Bihar Plains. This geographical split significantly impacts the agricultural and ecological characteristics of the state.

However, the river faces considerable environmental challenges. Twenty-five drains across Bihar, particularly in Buxar, Patna, Munger, Bhagalpur, and Kahalgaon, discharge a substantial volume of domestic and industrial wastewater into the Ganga. These drains collectively contribute approximately 579 million liters per day (MLD) of wastewater. In Patna city alone, nine drains have been recorded discharging up to 224 MLD of wastewater. Similarly, five drains in Buxar city contribute around 34 MLD of wastewater. The high levels of pollution from these drains highlight the urgent need for effective wastewater management and pollution control measures to protect the river's health and maintain its vital role in the region.



TRIBUTARIES

The state of Bihar is divided into its north and south by the Ganga River, and each region has a system of rivers that flow into the Ganga. The Ghaghra River is the first river in the north to reach the Ganga at Chapra. Another significant Himalayan tributary that joins the Ganga before the Patna is the Gandak, which originates in the vicinity of Kathmandu. The Burhi Gandak is a tributary that flows into the Ganga at Gogri and Bairarpur in Munger district, having its source in the Chautarwa Chaur terai area near Bhishambharpur in West Champaran district. Kosi, another significant tributary, rises in the Nepal Himalayas and joins the Ganga near Kursela in the Katihar district. Two additional tributaries, the Bagmati and Kamla rivers, enter the Ganga at Badlaghat in the Khagaria district. The Son River rises in south Bihar near Amarkantak Hill and empties into the Ganga at Maner, Patna. The Punpun River rises in Jharkhand's Palamu district, where it eventually joins the Falgu or Niranjana River before emptying into the Ganga near Fatuha in Patna. The Kiul River rises in the Jharkhand district of Giridih and joins the Ganga near Surajgarha in the Lakhisarai district of Bihar. The details of the major tributaries are as follows:

Ghaghara River

- **Origin:** The Ghaghara River is the first river in north Bihar that originates from the Tibetan Plateau flows through the northern regions and reaches the Ganga at Chapra, Bihar.
- **Significance:** It is one of the major tributaries of the Ganga, contributing significantly to its water volume. The Ghaghara joins the Ganga near the town of Chhapra in the Saran district.
- **Impact:** The River supports extensive agriculture in its basin and is crucial for irrigation and drinking water.

Gandak River

- **Origin:** The Gandak River rises in the Tibet Autonomous Region and flows southeast into Nepal before entering Bihar.
- **Significance:** It merges with the Ganga at the border of Bihar and Nepal, near the town of Triveni. The Gandak is a key river for irrigation in the region, particularly in the districts of West Champaran, East Champaran, and Muzaffarpur.
- **Impact:** The River is vital for flood management and supports large-scale agriculture in its basin.

Kosi River

- **Origin:** The Kosi River originates in the Tibetan Plateau and flows through Nepal before entering Bihar.
- **Significance:** Known as the "Sorrow of Bihar" due to its tendency to cause flooding, the Kosi joins the Ganga near the town of Kursela in Katihar district. The river is crucial for replenishing the groundwater and supporting agriculture.
- **Impact:** Despite its challenges, the Kosi is vital for irrigation and maintaining the ecological balance in its basin.

Son River

- **Origin:** The Son River originates from the Amarkantak Plateau in Madhya Pradesh and flows eastwards through Jharkhand before entering Bihar.
- **Significance:** It joins the Ganga near the town of Patna. The Son is an important river for irrigation and has several dams and reservoirs along its course.
- **Impact:** The River aids in flood control and water supply for agriculture in the regions it flows through.



Mahananda River

- **Origin:** The Mahananda River originates in the Darjeeling hills of West Bengal and flows into Bihar.
- **Significance:** It merges with the Ganga near the town of Kahalgaon in Bhagalpur district. The Mahananda supports agriculture and provides water for domestic use in its basin.
- **Impact:** The River is crucial for maintaining the water balance and supporting local ecosystems.

Punpun River

- **Origin:** The Punpun River originates in the Kaimur Hills and flows southeast through Bihar.
- **Significance:** It joins the Ganga near Patna. The Punpun is important for local agriculture and provides water for irrigation and domestic use.
- **Impact:** The River supports the agricultural activities in its basin and contributes to the local water supply.

Minor Tributaries

- **Other Minor Tributaries:** Several smaller rivers and streams, including the Baghmata, Kamla, and Burhi Gandak, also feed into the Ganga, contributing to its flow and affecting the hydrology of the region.
- **Significance:** These minor tributaries play a role in the local water cycle, supporting agriculture, and providing water resources for rural communities.

The tributaries of the Ganga River in Bihar are integral to the river's flow, ecosystem, and the livelihoods of millions of people. They contribute significantly to irrigation, agriculture, and water supply, while also presenting challenges related to flood management and pollution. Effective management of these tributaries is essential for maintaining the health and sustainability of the Ganga River system and supporting the needs of the region.



VARIOUS COMMUNITIES AROUND THE GANGA RIVER

The Ganga River in Bihar is not only a major geographical and spiritual entity but also a central aspect of the lives of various communities living along its banks. These communities are deeply intertwined with the river's cultural, economic, and social fabric. The communities around the Ganga River in Bihar are diverse, each with unique cultural practices and economic activities linked to the river. Understanding these communities' connections to the river highlights the complex interplay between natural resources and human societies in this region. Here's an overview of the diverse communities around the Ganga River in Bihar:

Maithili Community

- **Location:** Predominantly in the Mithila region of northern Bihar, including districts such as Darbhanga, Madhubani, and Sitamarhi.

- **Culture:** The Maithil community has a rich cultural heritage, known for its distinctive art forms like Madhubani painting and traditional festivals. The Ganga is revered in their religious practices, and rituals often involve the river.
- **Festivals:** The Chhath Puja is celebrated with great devotion, where Maithili performs rituals to honor the Sun God and the Ganga.
- **Economy:** Agriculture is the primary occupation, with the fertile lands along the Ganga's tributaries supporting diverse crops.

Bhumihar Brahmins

- **Location:** They are located mainly in the districts of Patna, Bhojpur, and Saran.
- **Culture:** Bhumihar Brahmins are known for their historical role in the administration and





education of Bihar. They hold the Ganga in high spiritual regard, performing various rituals and ceremonies along its banks.

- **Festivals:** Rituals and festivals, such as Ganga Dussehra, are celebrated to honor the river's divine significance.
- **Economy:** Many are involved in agriculture, education, and administration. The river plays a role in their religious and cultural events.

Yadav Community

- **Location:** Predominantly they are located in districts like Patna, Vaishali, and Muzaffarpur.
- **Culture:** The Yadav community, traditionally associated with dairy farming, celebrates various festivals and rituals related to the Ganga. They hold the river as sacred and perform purification rituals.

- **Festivals:** The river plays a role in their major festivals, where they perform traditional rituals and offer prayers to the river.

- **Economy:** Dairy farming and agriculture are key economic activities, supported by the fertile lands along the Ganga and its tributaries.

Muslim Community

- **Location:** They are located throughout Bihar, with significant populations in districts like Patna, Bhagalpur, and Muzaffarpur.
- **Culture:** The Muslim community engages in various cultural practices and religious observances that intersect with the Ganga's significance. The river's role in providing water and resources is crucial for their daily lives.
- **Festivals:** Islamic festivals and practices may align with the Ganga's significance,



especially in regions where the river's water is used for purification and religious observances.

- **Economy:** Their economic activities include agriculture, trade, and crafts, often facilitated by the river's resources.

Scheduled Castes (SC) and Scheduled Tribes (ST)

- **Location:** They are located in various districts, including Buxar, Bhojpur, and Khagaria.
- **Culture:** These communities often rely on the Ganga for their daily needs and participate in river-based rituals. They have a deep connection with the river, which impacts their traditional practices and cultural identity.
- **Festivals:** They participate in river-based festivals and ceremonies, reflecting the river's importance in their cultural and daily life.

- **Economy:** Their livelihoods include agriculture, fishing, and local crafts. The river is a vital resource for their sustenance.

Fishing Communities

- **Location:** They are located along the riverbanks in districts such as Patna, Bhagalpur, and Katihar.
- **Culture:** Fishing communities have a direct dependence on the Ganga for their livelihood. The river supports their primary occupation, and their cultural practices are closely linked with fishing and water-based rituals.
- **Festivals:** They celebrate festivals related to the river and its bounty, integrating their occupational practices with cultural celebrations.
- **Economy:** Fishing and related activities are central to their economy, with the Ganga





providing a rich source of fish and other aquatic resources.

Riverine Communities

- **Location:** They spread across various districts, particularly in areas prone to flooding.
- **Culture:** These communities adapt their lifestyles to the seasonal changes and floods of the Ganga. Their cultural practices are shaped by the river's rhythms and their interactions with its changing waters.
- **Festivals:** Their festivals and cultural practices often revolve around the river's seasonal changes, reflecting their deep connection with the Ganga.
- **Economy:** Their livelihoods are often focused on agriculture, floodplain farming, and seasonal fishing, directly influenced by the river's flood cycles.

SIGNIFICANCE OF THE GANGA RIVER FOR LOCAL COMMUNITIES

The Ganga River, flowing through Bihar, is deeply intertwined with the lives of local communities. Its significance extends beyond its spiritual and cultural importance to influence daily life, local economies, and social practices. Here's an exploration of how the Ganga impacts local aspects of communities in Bihar:

Economic Activities

- **Agriculture:** The fertile plains of Bihar, irrigated by the Ganga and its tributaries, support diverse agricultural activities. Local farmers rely on the river for irrigation, which is crucial for growing crops such as rice, wheat, and sugarcane. The seasonal flooding of the river deposits nutrient-rich silt, enhancing soil fertility and agricultural productivity.



- **Fishing:** Fishing communities along the Ganga depend on the river for their livelihoods. The river provides a significant source of fish, which is a staple food and an important economic activity for these communities. Traditional fishing techniques and practices are passed down through generations.
- **Transportation:** Historically, the Ganga has served as a vital transportation route for goods and people. While modern transportation has reduced its role, local communities still use the river for transporting agricultural produce and other goods. Small boats and ferries are often employed for local transit.

Cultural and Religious Practices

- **Rituals and Ceremonies:** The Ganga plays a central role in local religious and cultural practices. Communities conduct daily

rituals and ceremonies along the riverbanks. Festivals like Chhath Puja, Ganga Dussehra, and the Magh Mela involve extensive participation from residents, who perform rites and offer prayers to the river.

- **Pilgrimage and Festivals:** The Ganga attracts pilgrims from across Bihar and beyond, especially during major festivals. Local communities actively engage in organizing and facilitating these events, including the management of Ghats (steps leading to the river) and providing amenities for pilgrims.
- **Sacred Sites:** Several Ghats along the Ganga, such as those in Patna and Bhagalpur, hold religious significance for local communities. These sites are used for ritual bathing, making offerings, and conducting ceremonies related to life events such as births, marriages, and deaths.





Social Practices

- **Community Gatherings:** The riverbanks serve as important social spaces for local communities. Events such as fairs, markets, and community gatherings are often held along the Ganga, fostering social interaction and cultural exchange.
- **Education and Awareness:** Local organizations and community groups often conduct awareness programs and educational activities related to the Ganga's importance. These include initiatives to promote river conservation, hygiene, and sustainable practices among residents.
- **Cultural Heritage:** The Ganga influences local cultural heritage, including folk traditions, music, and art. Various communities celebrate their connection to the river through traditional dance, music performances, and local festivals.

Environmental Challenges

- **Pollution:** Local communities face challenges related to river pollution, including the discharge of domestic and industrial wastewater into the Ganga. Efforts to address pollution involve local initiatives to clean and protect the river, often supported by governmental and non-governmental organizations.
- **Flooding:** The seasonal flooding of the Ganga impacts local communities, particularly in flood-prone areas. While flooding enriches the soil, it also poses risks to homes, infrastructure, and agricultural lands. Community-based flood management practices and relief measures are crucial for mitigating these impacts.
- **Water Scarcity:** In times of drought or reduced water flow, local communities experience water scarcity issues. Managing

water resources and ensuring equitable access to clean water from the Ganga are ongoing concerns for residents.

Local Governance and Participation

- **Community Involvement:** Local governance structures and community-based organizations play a significant role in managing and preserving the Ganga. Residents often participate in local committees and initiatives focused on river conservation, waste management, and environmental sustainability.
- **Collaborative Efforts:** Collaboration between local communities, government agencies, and environmental organizations is essential for addressing the challenges faced by the Ganga. Community-driven projects and partnerships aim to improve the river's health and enhance the quality of life for residents.

EMPLOYMENTS ALONG THE GANGA RIVER

The Ganga River significantly influences the employment landscape for communities living along its banks in Bihar. The river provides a variety of livelihood opportunities, fostering economic activities that are vital for the local population. Here are the key employment sectors related to the Ganga River in Bihar:

Agriculture

- **Primary Employment Source:** Agriculture is the predominant occupation for many communities along the Ganga River. The river's fertile plains support the cultivation of diverse crops such as rice, wheat, sugarcane, and maize.
- **Irrigation:** The Ganga provides essential irrigation, enabling multiple cropping cycles and enhancing agricultural productivity.





This, in turn, supports not just farmers but also those involved in related activities like seed supply, equipment maintenance, and transportation of produce.

Fishing

- **Traditional Livelihood:** Fishing is a traditional and vital livelihood for many families residing along the Ganga. The river is home to a rich diversity of fish species, providing sustenance and income.
- **Fish Markets:** The fishing industry supports local fish markets and contributes to the supply chain, with employment opportunities in fish processing, distribution, and sales.

Transportation and Trade

- **Riverine Transport:** The Ganga has historically been a crucial transportation

route. Small-scale ferry services and boat transport facilitate the movement of people and goods, employing boatmen and those involved in the maintenance and operation of these services.

- **Trade Hubs:** Towns and cities along the Ganga, such as Patna, serve as important trade hubs. The river facilitates the movement of agricultural produce, raw materials, and finished goods, supporting a variety of trading activities and associated jobs.

Tourism and Pilgrimage

- **Pilgrimage Tourism:** The Ganga River is a major pilgrimage site, attracting millions of devotees annually for rituals and festivals such as Chhath Puja, Ganga Dussehra, and Kumbh Mela. This influx of pilgrims creates numerous employment opportunities in

hospitality, guiding services, transport, and retail.

- **Cultural Tourism:** The rich cultural heritage along the Ganga, including historical sites and religious landmarks, attracts tourists, further boosting employment in the tourism sector.

Handicrafts and Cottage Industries

- **Local Crafts:** The regions along the Ganga are known for their unique handicrafts and cottage industries, which employ artisans and craftsmen. Products such as textiles, pottery, and handwoven baskets are often sold in local markets and to tourists.
- **Cultural Artifacts:** The production of religious artifacts and items used in rituals and ceremonies associated with the Ganga creates additional job opportunities.

Environmental and Conservation Efforts

- **Clean-Up Initiatives:** Governmental and non-governmental organizations engaged in Ganga river conservation efforts employ clean-up drives, pollution control measures, and ecological restoration projects.
- **Awareness Programs:** Employment opportunities also arise from educational and awareness programs aimed at promoting sustainable practices and environmental stewardship among local communities.

Industrial Employment

- **Small-Scale Industries:** Various small-scale industries located along the riverbanks contribute to local employment. These include food processing units, textile mills, and brick kilns that utilize local resources.
- **Challenges:** However, industrial activities can also pose challenges, such as pollution





and environmental degradation, which require balanced regulatory measures to protect the river while sustaining livelihoods.

SOCIO-ECONOMIC ISSUES ALONG THE GANGA RIVER

The Ganga River, while being a source of livelihood and cultural heritage, also presents several socio-economic challenges for the communities living along its banks in Bihar. These issues encompass a wide range of problems, from environmental degradation to health concerns and economic instability. Here are some of the key socio-economic issues faced by these communities:

Pollution and Health Risks

- **Water Pollution:** Industrial effluents, domestic sewage, and agricultural runoff significantly pollute the Ganga River. The contamination of water affects the health of local populations, leading to waterborne diseases such as cholera, dysentery, and typhoid.
- **Air Quality:** Burning of waste along the riverbanks contributes to air pollution, which, combined with poor water quality, poses serious health risks to residents.
- **Inadequate Sanitation:** Many communities lack access to proper sanitation facilities, exacerbating the problem of open defecation and further contaminating the river.

Economic Instability

- **Agricultural Vulnerability:** While agriculture is a primary livelihood, it is highly vulnerable to natural disasters such as floods and droughts. These events can devastate crops, leading to economic instability for farming communities.

- **Unemployment:** Seasonal fluctuations in agricultural productivity and the decline of traditional industries have led to high unemployment rates. Many locals are forced to migrate to urban areas in search of better employment opportunities.
- **Fisheries Decline:** Overfishing and pollution have reduced fish populations, threatening the livelihoods of fishing communities. This decline affects income and food security for these families.

Environmental Degradation

- **Deforestation:** The need for agricultural land and fuelwood has led to significant deforestation along the Ganga River. This environmental degradation reduces biodiversity, impacts soil fertility, and exacerbates flood risks.
- **Soil Erosion:** Intensive farming practices and deforestation contribute to soil erosion, which in turn affects agricultural productivity and increases the vulnerability of communities to natural disasters.

Infrastructure Deficiencies

- **Lack of Basic Services:** Many villages along the Ganga lack basic infrastructure, including clean drinking water, sanitation, healthcare, and education facilities. This deficiency hampers the overall development and well-being of these communities.
- **Poor Transportation:** Inadequate transportation infrastructure limits access to markets, healthcare, and educational institutions, further isolating these communities and restricting economic growth.

Cultural Erosion

- **Loss of Traditional Knowledge:** Modernization and migration are leading

to the erosion of traditional knowledge and practices related to agriculture, fishing, and craftsmanship. This loss diminishes cultural heritage and the sustainability of local livelihoods.

- **Changing Lifestyles:** Younger generations are increasingly moving away from traditional occupations and lifestyles, seeking employment in urban areas. This shift creates a cultural disconnect and impacts the social fabric of these communities.

Governmental and Policy Challenges

- **Inadequate Implementation:** While there are numerous government initiatives aimed at cleaning the Ganga and improving socio-economic conditions, the implementation of these programs is often inadequate and plagued by corruption and inefficiency.
- **Resource Allocation:** Inequitable allocation of resources and lack of targeted policies to address the specific needs of riverine communities exacerbate socio-economic disparities.

MAJOR TOWNS AND CITIES ALONG THE GANGA RIVER

The Ganga River flows through several major towns and cities in Bihar, playing a crucial role in the socio-economic and cultural life of the state. These urban centers are hubs of commercial, educational, and religious activities. Here are some of the prominent towns and cities along the Ganga River in Bihar:

Buxar: It is situated near the point where the Ganga River enters Bihar. It is known for its historical and mythological importance, Buxar is associated with the Battle of Buxar in 1764, a pivotal event in Indian history. The town also has religious significance, with many ancient temples and Ghats along the Ganga.

Bhojpur (Arrah): Arrah, the district headquarters of Bhojpur, lies along the banks of the Ganga. It is known for its historical sites and educational institutions. The town has a rich cultural heritage and is a significant agricultural and trade center.

Patna: It is the capital city of Bihar, and stretches along the southern banks of the Ganga. Patna is one of the oldest continuously inhabited places in the world, with a history dating back to ancient times. It is a major educational, commercial, and political center. Landmarks include the Golghar, Patna Sahib Gurudwara, and the Mahavir Mandir.

Saran (Chapra): Chapra, the administrative headquarters of the Saran district, is situated near the Ganga River. It is an important industrial and agricultural hub. The town is known for its educational institutions and vibrant culture.

Vaishali (Hajipur): Hajipur, the district headquarters of Vaishali, lies across the river from Patna. It is a significant industrial and transport hub, with the Mahatma Gandhi Setu Bridge connecting it to Patna. It has historical importance due to its proximity to ancient Vaishali, a center of early Buddhism and Jainism.

Samastipur: It is located close to the banks of the Ganga River. It is known for its agricultural activities, particularly the cultivation of litchis and mangoes. The town is also an important railway junction.

Begusarai: It is situated along the banks of the Ganga, Begusarai is a significant urban center in Bihar. It is known for its industrial activities, particularly in the oil and gas sector, with the presence of the Barauni Refinery. It is also a major agricultural and educational hub.

Khagaria: It is located near the Ganga River and is an important transit point. It is known for its agricultural activities, Khagaria is a key center for trade and commerce, with connectivity to various parts of the state.

Munger: It lies along the southern bank of the



Ganga. Munger is known for its rich history and culture, with landmarks such as the Munger Fort and Bihar School of Yoga. It is also famous for its traditional gunsmithing industry.

Bhagalpur: It is situated on the southern banks of the Ganga. It is known as the Silk City, Bhagalpur is famous for its silk industry. The city also has historical and educational significance, with institutions like Tilka Manjhi Bhagalpur University.

Katihar: It is situated near the Ganga River in northeastern Bihar. Katihar is an important railway hub and commercial center. The town is known for its agricultural activities, especially the cultivation of jute and paddy.

Lakhisarai: It is located close to the Ganga River. It is known for its historical and archaeological sites, Lakhisarai is an important center for trade and agriculture in the region.

MAJOR TOWNS AND CITIES ALONG THE GANGA'S TRIBUTARIES

The Ganga River has several significant tributaries flowing through Bihar, each of which supports major towns and cities along its banks. The major towns and cities along the Ganga's tributaries in Bihar are integral to the state's economy and culture. These urban centers are not only hubs of agricultural and industrial activities but also preserve the rich cultural heritage and historical significance associated with the rivers. Here are some of the prominent towns and cities along the Ganga's tributaries in Bihar:

Along The Gandak River

- **Hajipur (Vaishali):** It is situated at the confluence of the Gandak and Ganga rivers. It is an important industrial and transport hub, known for the Mahatma Gandhi Setu Bridge connecting it to Patna. Hajipur has historical importance and is close to ancient Vaishali.

- **Muzaffarpur:** It is located along the banks of the Burhi Gandak, a tributary of the Gandak River. It is known for its litchi and mango production, Muzaffarpur is a major commercial center with significant agricultural and educational activities.

Along The Ghaghara River

- **Siwan:** It is located near the Ghaghara River. It is known for its agricultural productivity, particularly paddy and wheat. Siwan is an important trade and transport hub in the region.
- **Chapra (Saran):** It is situated at the confluence of the Ghaghara and Ganga rivers. It is an industrial and agricultural hub, Chapra is known for its educational institutions and vibrant culture.

Along The Kosi River

- **Supaul:** It is situated along the banks of the Kosi River. Supaul is known for its agricultural activities and is a major center for trade and commerce in the region.
- **Saharsa:** It is located near the Kosi River. It is known for its fertile agricultural land, and it is a key center for paddy and wheat production. It is also an important railway junction.
- **Madhepura:** It is situated near the Kosi River. It is an agricultural hub known for its rice and wheat cultivation. Madhepura also has educational institutions and is a developing urban center.

Along The Son River

- **Dehri-on-Sone:** It is situated on the banks of the Son River. It is known for the Indrapuri Barrage and its significance in irrigation. Dehri-on-Sone is an industrial town with a rich history.

- **Arrah:** It is the district headquarters of Bhojpur, and is located near the confluence of the Son and Ganga rivers. Arrah is a historical city known for its role in the Indian independence movement and its educational institutions.

Along The Punpun River

- **Patna:** It is the capital city of Bihar, and is situated at the confluence of the Punpun and Ganga rivers. Patna is one of the oldest continuously inhabited places in the world, with significant historical, cultural, and economic importance.

Along The Bagmati River

- **Sitamarhi:** It is located along the Bagmati River. It is known for its historical significance in the Ramayana and its role as an agricultural center, particularly for paddy and maize.
- **Muzaffarpur:** It is also influenced by the Bagmati River. It is a major commercial center known for its agricultural produce and educational institutions.

CHALLENGES FACING THE GANGA RIVER

The Ganga River in Bihar faces several challenges that threaten its ecological health, cultural significance, and the livelihoods of communities dependent on it. Here are some of the key challenges:

Pollution

- **Industrial Pollution:** Several industries, including tanneries, textile mills, and chemical factories, discharge untreated or inadequately treated effluents into the Ganga. These pollutants include heavy metals, toxic chemicals, and organic waste, which deteriorate water quality and harm aquatic life.

- **Domestic Waste:** In densely populated areas, untreated or partially treated sewage is often released into the river. This includes human waste and household chemicals, contributing to high levels of biological and chemical oxygen demand (BOD and COD).
- **Religious and Cultural Practices:** Practices such as the immersion of idols made from non-biodegradable materials, and the disposal of ritualistic waste, contribute to pollution. The ash and remains from cremations, though organic, add to the river's load of particulate matter.

Water Scarcity and Management

- **Overexploitation:** In many regions of Bihar, excessive extraction of water for irrigation and other purposes has led to reduced flow in the river. This depletion is exacerbated during the dry season when the river's natural replenishment is minimal.
- **Dams and Barrages:** The construction of dams and barrages upstream can affect the flow of the river downstream in Bihar. Altered flow regimes impact the river's ecological balance and the livelihoods dependent on it.

Erosion and Sedimentation

- **Riverbank Erosion:** The Ganga's dynamic nature results in significant erosion of riverbanks in Bihar. This erosion can lead to loss of land and property, displacing communities and affecting agriculture.
- **Sedimentation:** High sediment loads from upstream areas can lead to siltation in the riverbed, reducing the river's capacity to carry water and increasing the risk of floods.

Flooding

- **Seasonal Flooding:** Bihar is prone to annual floods due to the Ganga and its



tributaries. Flooding is exacerbated by sedimentation, reduced river flow, and inadequate drainage systems. These floods can cause widespread damage to homes, infrastructure, and agriculture.

- **Climate Change:** Changes in climate patterns can lead to increased frequency and intensity of floods, putting additional strain on communities and infrastructure in Bihar.

Ecological Degradation

- **Loss of Biodiversity:** Pollution, habitat destruction, and altered flow patterns have led to a decline in the river's biodiversity. Species such as the Gangetic dolphin and various fish species are under threat.
- **Invasive Species:** Non-native species introduced into the river can disrupt the local ecosystem, outcompeting native species and altering the river's ecological balance.

Management and Infrastructure Challenges

- **Ineffective Sewage Treatment:** The infrastructure for wastewater treatment in Bihar is often inadequate or outdated, leading to ineffective treatment of sewage before it enters the river.
- **Poor Solid Waste Management:** Inefficient management of solid waste results in litter and debris ending up in the river, exacerbating pollution issues.
- **Enforcement Issues:** Implementing and enforcing environmental regulations can be challenging due to limited resources, bureaucratic inefficiencies, and lack of public awareness.

Socioeconomic Issues

- **Poverty and Development:** Many communities along the Ganga rely on the river for their livelihoods, including fishing and agriculture. Pollution and environmental degradation threaten these livelihoods, exacerbating poverty.
- **Urbanization:** Rapid urbanization in cities like Patna has led to increased waste generation and pressure on existing infrastructure, impacting the river's health.

Policy and Governance

- **Coordination Challenges:** Effective management of the Ganga requires coordination between various state and central agencies. Fragmented governance and a lack of cohesive strategies can hinder progress.
- **Implementation Gaps:** While there are numerous plans and policies aimed at revitalizing the Ganga, such as the Namami Gange program, the implementation of these plans can face delays and obstacles.

Public Awareness and Participation

- **Lack of Awareness:** Many local communities may not be fully aware of the environmental impacts of their activities on the river, leading to practices that exacerbate pollution.
- **Community Involvement:** Engaging communities in conservation efforts is crucial. Ensuring active participation and awareness among local populations can be challenging but is necessary for sustainable management.









VEGETATION ALONG THE GANGA RIVER IN BIHAR

The vegetation along the Ganga River in Bihar is diverse and reflects the region's rich ecological tapestry. This vegetation is shaped by the river's dynamic nature, the region's climate, and human activity. Bihar's part of the Ganga River basin is characterized by a range of habitats from riverbanks and floodplains to more upland areas. This diverse vegetation supports a wide range of wildlife and contributes to the livelihoods of local communities. Here's a look at the key types of vegetation you might encounter in this region:

Riparian Vegetation: Riparian vegetation along the Ganga River in Bihar plays a crucial role in sustaining the region's ecological balance and enhancing its biodiversity. This lush vegetation, thriving in the fertile, moisture-rich environment of the riverbanks, includes a mix of grasses,

sedges, and shrubs that stabilize the soil and prevent erosion. Notable plants such as *Lantana* and *Bacopa* are common, adapting well to the continually changing water levels. The area is also home to significant tree species like Sal (*Shorea robusta*), which provide shade and habitat for various wildlife, and Pipal (*Ficus religiosa*), revered for its cultural and ecological significance. The dense growth of reeds and aquatic plants further supports a complex web of life, including birds and insects, making riparian zones along the Ganga River in Bihar vital for both ecological health and human livelihoods.

In the Ganga River range of Bihar, the canopy is mainly composed of *Shorea robusta*, *Diospyros melanoxylon*, *Boswellia serrata*, *Terminalia elliptica*, *Terminalia bellirica*, *Terminalia arjuna*, *Pterocarpus marsupium*, *Madhuca indica*, etc.





Other than canopies, the important species are *Abelmoschus moschatus*, *Acalypha indica*, *Achyranthes aspera*, *Bolboschoenus maritimus*, *Chrozophora rottleri*, *Cleome viscosa*, *Croton bonplandianus*, *Cynodon dactylon*, *Cyperus rotundus*, *Desmodium gangeticum*, *Dichanthium annulatum*, *Digitaria sanguinalis*, *Eclipta prostrata*, *Euphorbia hirta*, *Euphorbia Parviflora*, *Fimbristylis dichotoma*, *Hygroryza aristata*, *Ipomoea aquatica*, *Justicia peploides*, *Kyllinga brevifolia*, *Lathyrus sativus*, *Leucas aspera*, *Lippia javanica*, *Melilotus indicus*, *Panicum repens*, *Phyllanthus virgatus*, *Rungia pectinata*, *Saccharum spontaneum*, *Scoparia dulcis*, *Sida cordata*, *Sida rhombifolia* subsp. *alnifolia*, *Tamarix dioica*, *Vicia sativa*, etc.

Floodplain Vegetation: Floodplain vegetation in Bihar, shaped by the annual inundation of the Ganga River, exhibits a unique and dynamic range of plant life adapted to the region's

seasonal flooding. These fertile floodplains, enriched by nutrient-laden sediments deposited by the river, support a diverse array of vegetation. In the shallow waters and moist soil of the floodplains, aquatic plants like Water Hyacinth (*Eichhornia crassipes*) and Water Lily (*Nymphaea* spp.) flourish, creating vibrant, floating mats and enhancing the aquatic habitat. Wetland grasses such as *Eleocharis* and *Juncus* thrive in the periodically submerged areas, their adaptability allowing them to survive and reproduce in these fluctuating conditions. The floodplain vegetation not only stabilizes the soil and reduces erosion but also provides critical habitat for wildlife, including migratory birds and amphibians. This rich tapestry of plant life is integral to the floodplain's ecological health, supporting both biodiversity and the livelihoods of local communities dependent on agriculture and fishing.



Agricultural Vegetation: Agricultural vegetation in Bihar reflects the region's reliance on its fertile alluvial soils and the productive capabilities of the Ganga River basin. The rich, silt-laden soils, replenished by seasonal flooding, support a variety of staple and cash crops that are central to Bihar's economy and food security. The predominant crops include rice, which is a staple food and thrives in the region's abundant water resources, particularly in the low-lying areas that retain moisture. Wheat and maize are also widely cultivated, benefiting from the favorable growing conditions provided by the river's sediment-rich soil. Sugarcane is another significant crop, particularly in areas with adequate irrigation. Beyond these staples, the region supports diverse vegetable and fruit cultivation, including potatoes, tomatoes, and mangoes, which are vital for local consumption and markets. Agricultural practices are deeply intertwined with the rhythms of the Ganga River, with irrigation systems and

seasonal planting schedules adapted to the river's flood patterns. This agricultural vegetation not only sustains local populations but also supports a network of associated industries and services, contributing significantly to Bihar's rural economy.

Wetland and Marsh Vegetation: Wetland and marsh vegetation in Bihar thrives in the waterlogged and periodically inundated environments created by the Ganga River and its tributaries, showcasing a rich diversity of plant life adapted to varying water levels. In shallow waters, Water Hyacinth (*Eichhornia crassipes*) and Water Lily (*Nymphaea* spp.) create floating mats that support aquatic life and assist in nutrient absorption and water filtration. Marshier areas are dominated by Sarcostemma, Bulrushes (*Schoenoplectus* spp.), Cattails (*Typha* spp.), and sedges (*Carex* spp.), which stabilize soil and provide essential habitat for wildlife. Shrubs like Willows (*Salix* spp.) and other wetland-adapted trees contribute to bank stabilization and shade.





These wetlands and marshes play crucial ecological roles by supporting biodiversity, improving water quality, and mitigating flooding, while also offering resources for local communities. However, they face threats from drainage for agriculture, pollution, and climate change, making conservation efforts essential to preserving their ecological and socio-economic benefits.

ECOLOGICAL PERSPECTIVE OF PLANT WEALTH ALONG THE GANGA RIVER

The abundance of flora along Bihar's Ganga River is essential to preserving ecological balance and the well-being of the riverine and adjacent ecosystems. This varied vegetation, including aquatic species, trees, shrubs, and medicinal plants, has a major impact on several biological processes and interactions across the Ganga River basin. Some ecological perspectives are as:

Biodiversity Support: The Ganga's riparian zones are distinguished by various plant species that add to the area's overall biodiversity. Numerous animal species, including birds, insects, mammals, and aquatic creatures, are supported by the diversity of plants. For example, shrubs and trees give wildlife vital homes and food supplies. Birds and insects can find food from *Mangifera indica* (mango) trees, while various species can find shelter and food from *Ficus religiosa* (peepal tree). A variety of aquatic life forms, including fish and amphibians, are supported by aquatic plants including *Typha angustifolia* (cattail) and *Nelumbo nucifera* (Indian Lotus).

Soil Stabilization and Erosion Control: A key component of soil stability and erosion prevention is the riparian vegetation along the Ganga River. Trees, shrubs, and grasses have deep root systems that bind the soil together, lowering the chance of erosion and keeping



silt out of rivers. This is especially crucial for preserving the structural soundness of riverbanks and stopping the depletion of rich topsoil. For instance, *Typha angustifolia* and other bamboo species' roots maintain the soil near riverbanks, reducing erosion brought on by water flow and human activity.

Water Quality Maintenance: A large portion of the Ganga River's water quality is maintained by aquatic and semi-aquatic plants. As a natural filter, plants such as *Hydrilla verticillata* and other submerged and floating vegetation species draw impurities, excess nutrients, and other contaminants out of the water. Phytoremediation is the procedure that lowers toxic material levels and enhances the general health of the aquatic ecosystem. Furthermore, the organic material produced by the breakdown of plant materials sustains microbial populations that are vital to the cycling of nutrients.

Climate Regulation: Numerous strategies exist for the riparian vegetation along the Ganga to regulate climate. As carbon sinks, riparian zones' trees and other plants absorb carbon

dioxide from the atmosphere and lessen the consequences of climate change. Local microclimates are also influenced by thick vegetation because it reduce temperature swings, increases humidity, and provides shade. This is especially helpful in controlling the riverine environment's temperature and preserving the ideal habitat for both plant and animal life.

Cultural and Spiritual Significance: The plants along the Ganga River have important cultural and spiritual significance in addition to their ecological roles. Numerous plant species have strong roots in regional customs, religious beliefs, and cultural ceremonies. For instance, the Indian Lotus (*Nelumbo nucifera*), which represents enlightenment and purity, is highly esteemed in Buddhist and Hindu faiths. In Hinduism, the Peepal Tree (*Ficus religiosa*) is revered and connected to many gods. This cultural link emphasizes the value of protecting the diversity of plants along the river and encourages care and conservation among the surrounding people.





MEDICINAL PLANTS ALONG THE GANGA RIVER IN BIHAR

Along the Ganga River in Bihar, the rich tapestry of medicinal plants reflects a deep connection between traditional knowledge and the diverse ecological landscape of the region. Tulsi (*Ocimum sanctum*), commonly known as holy basil, is a prominent medicinal plant found in the vicinity of temples and traditional homes. Revered for its wide range of therapeutic properties, Tulsi contains compounds like eugenol and rosmarinic acid, which are known for their antioxidant, anti-inflammatory, and antimicrobial effects. This plant plays a vital role in traditional medicine, where it is used to treat respiratory issues, digestive disorders, and stress-related conditions.

In close association with Tulsi, Neem (*Azadirachta indica*) thrives along the riverbanks and in surrounding areas. Known as the "village pharmacy," Neem is integral to local health practices due to its potent antimicrobial and anti-inflammatory properties. Active compounds such as azadirachtin and nimbolide are utilized in treating skin conditions, dental health issues, and

as a general detoxifying agent. Neem's presence in sacred groves and around homes highlights its significance in both cultural and medicinal contexts.

In the warmer Ganga basin parts of Bihar, the important medicinal plant *Aloe vera* is grown. It contributes significantly to traditional medicine with its soothing gel, which is widely used to treat burns, wounds, and skin irritations. The gel contains aloin and various polysaccharides, which provide its healing properties. Aloe Vera's adaptability to the local climate and its broad range of applications underscore its importance in regional herbal remedies.

Further enhancing the medicinal diversity of the region is Ashwagandha (*Withania somnifera*), commonly found in the drier, elevated areas along the river. This adaptogenic herb is valued for its ability to enhance stamina, reduce stress, and improve overall vitality. Withanolides, the primary active compounds in Ashwagandha, are known for their anti-inflammatory and neuroprotective



effects. Traditional Ayurvedic medicine uses Ashwagandha to combat stress and support mental clarity, highlighting its role in holistic health practices.

In the wetlands and marshes of the Ganga River basin, Brahmi (*Bacopa monnieri*) thrives, renowned for its cognitive and mental health benefits. The plant contains bacosides, which enhance memory and reduce anxiety. Brahmi's role in traditional medicine as a cognitive enhancer and stress reliever reflects its value in supporting brain health. Its presence in these wetland areas demonstrates its adaptation to specific ecological niches and its contribution to local herbal medicine.

These medicinal plants along the Ganga River in Bihar not only provide significant health benefits but also represent a harmonious blend of traditional knowledge and ecological diversity. Preserving these plants and their habitats is crucial for maintaining both cultural heritage and biodiversity, ensuring that future generations can continue to benefit from their medicinal properties.

CULTIVATION OF MEDICINAL PLANTS ALONG THE GANGA RIVER

The cultivation of medicinal plants along the Ganga River in Bihar is deeply embedded in the region's agricultural practices and traditional healing systems. This practice leverages the fertile alluvial soils and the diverse climatic conditions of the Ganga basin to grow a variety of plants that are integral to local herbal medicine.

The cultivation of medicinal plants along the Ganga River in Bihar not only supports traditional health systems but also contributes to the local economy and sustainability. By integrating these plants into agricultural and community practices, farmers and communities help preserve valuable herbal knowledge and promote environmental stewardship. Efforts to enhance cultivation techniques, protect natural habitats, and foster sustainable practices are

essential for ensuring the continued availability and effectiveness of these medicinal plants.

COMMERCIAL AND ECONOMIC VALUE OF MEDICINAL PLANTS

The commercial and economic value of medicinal plants in Bihar is multifaceted, reflecting their diverse applications across various industries. The state's rich biodiversity and traditional knowledge support a robust sector that spans market demand, pharmaceutical integration, cosmetic and personal care products, nutraceuticals, and export potential. This sector also contributes significantly to socio-economic development in the region.

Market Demand and Economic Impact: The market demand for medicinal plants is driven by increasing consumer interest in natural and holistic health solutions. In Bihar, plants such as Tulsi, Neem, Aloe Vera, Ashwagandha, and Brahmi are in high demand both domestically and internationally. The economic impact is substantial as these plants are integral to various industries, including pharmaceuticals, cosmetics, and nutraceuticals. Local farmers and producers benefit from selling raw materials and value-added products, leading to increased income and economic stability in rural areas.

Pharmaceutical Industry Integration: The integration of medicinal plants into the pharmaceutical industry enhances their commercial value. Plants like Neem and Ashwagandha are used in the production of medicines due to their proven therapeutic properties. Neem is utilized in treatments for skin conditions and infections, while Ashwagandha is valued for its adaptogenic properties, aiding in stress relief and overall wellness. The pharmaceutical industry's reliance on these plants creates a significant market for them, supporting local cultivation and processing activities. This integration also fosters research and development,



leading to innovations in drug formulations and health products.

Cosmetic and Personal Care Industry: Medicinal plants play a vital role in the cosmetic and personal care industry. Aloe Vera is extensively used in skin care products for its soothing and hydrating properties, while Tulsi and Neem are popular in personal care items for their antibacterial and anti-inflammatory effects. The demand for natural and organic cosmetic products is rising, driven by consumer preferences for chemical-free alternatives. In Bihar, the cultivation of these plants supports local cosmetic manufacturers and contributes to the growth of the personal care industry, providing economic opportunities and enhancing the region's reputation as a source of high-quality natural ingredients.

Nutraceuticals and Dietary Supplements: The nutraceutical and dietary supplement sectors are major consumers of medicinal plants. Ashwagandha, Brahmi, and Tulsi are incorporated into dietary supplements due to their health benefits, such as stress reduction, cognitive enhancement, and immune support. The increasing global demand for natural health products and supplements offers significant commercial opportunities for Bihar. The production of these supplements supports local agriculture and processing industries, creating jobs and contributing to economic growth. The state's ability to supply high-quality plant materials meets the needs of the growing nutraceutical market, both domestically and internationally.

Export Potential: Bihar's medicinal plants have substantial export potential, driven by global interest in natural and organic health products. Aloe Vera, Neem, and Ashwagandha are among the plants with high export value. Exporting these plants and their derivatives generates foreign exchange earnings and expands market access for local producers. The state's strategic location and established trade networks facilitate the

export of medicinal plant products to international markets, enhancing its economic profile and fostering global trade relationships.

Socio-Economic Development: The cultivation and commercialization of medicinal plants contribute to socio-economic development in Bihar. The sector supports rural livelihoods by providing income opportunities for farmers and entrepreneurs. It also promotes sustainable agricultural practices, such as organic farming and agroforestry, which benefit the environment and local communities. Additionally, the growth of related industries, such as processing and marketing, creates jobs and stimulates local economies. Investments in infrastructure, research, and education related to medicinal plants further enhance socio-economic development and improve living standards in rural areas.

Overall, the commercial and economic value of medicinal plants in Bihar is extensive, with significant impacts across various industries. The state's rich biodiversity and traditional knowledge support a thriving sector that contributes to market demand, pharmaceutical integration, cosmetic and personal care products, nutraceuticals, and export potential. By leveraging these opportunities, Bihar can enhance its economic development, support rural livelihoods, and promote sustainable practices, positioning itself as a key player in the global medicinal plant market.

IMPORTANT MEDICINAL PLANTS AROUND THE GANGA RIVER

The Ganga River in Bihar nurtures a diverse array of medicinal plants, many of which have been used in traditional medicine for centuries and are now recognized for their significant therapeutic properties. These plants thrive in the nutrient-rich soils and varied climatic conditions along the riverbanks, making the region a valuable source of medicinal flora. The important medicinal plants around the Ganga River in Bihar are:

Acemella oleracea (L.) R.K.Jansen



- ☞ **Vernacular name:** Ninai
- ☞ **Medicinal Uses:** The flowers are chewed in mouth ulcer

Aegle marmelos (L.) Corrêa



- ☞ **Vernacular name:** Bel
- ☞ **Medicinal Uses:** The fruits are directly eaten in diarrhoea & dysentery

Azadirachta indica A.Juss.



- ☞ **Vernacular name:** Neem
- ☞ **Medicinal Uses:** The juice of leaves is taken for diabetes

Barleria prionitis L.



- ☞ **Vernacular name:** Kala-bansa, Piyabansa
- ☞ **Medicinal Uses:** The leaves decoction is used in cough and asthma



Boerhavia diffusa L.



- ☞ **Vernacular name:** Gadapunna
- ☞ **Medicinal Uses:** The root decoction is useful in fever

Cajanus cajan (L.) Huth



- ☞ **Vernacular name:** Arhar
- ☞ **Medicinal Uses:** The leaves juice taken with water in jaundice

Calotropis procera (Aiton) W.T.Aiton



- ☞ **Vernacular name:** Madar
- ☞ **Medicinal Uses:** Warm sesame oil dipped leaves wrapped in eczema and pain-affected parts. The latex is applied to boils. The leaves along with banana fruits useful in jaundice

Camellia sinensis (L.) Kuntze



- ☞ **Vernacular name:** Chai Patti
- ☞ **Medicinal Uses:** The decoction of leaves is useful in diarrhoea & dysentery

Carica papaya L.



- ☞ **Vernacular name:** Papita
- ☞ **Medicinal Uses:** The fruit juice is taken orally in jaundice

Catharanthus roseus (L.) G.Don



- ☞ **Vernacular name:** Sadabahar
- ☞ **Medicinal Uses:** The leaves decoction is useful in diabetes

Cinnamomum verum J.Presl



- ☞ **Vernacular name:** Daalchini
- ☞ **Medicinal Uses:** The leaves decoction is useful in cough

Cissus quadrangularis L.



- ☞ **Vernacular name:** Hadjod
- ☞ **Medicinal Uses:** The stem decoction is useful in joint pain and arthritis



Citrus × limon (L.) Osbeck



- ☞ **Vernacular name:** Lemon
- ☞ **Medicinal Uses:** The fruits juice with water is helpful in stomachaches and its decoction along with *Aloe vera* and black salt is useful in blood pressure

Cucumis sativus L.



- ☞ **Vernacular name:** Cucumber
- ☞ **Medicinal Uses:** Direct use of fruits helpful in jaundice

Curcuma longa L.



- ☞ **Vernacular name:** Haldi
- ☞ **Medicinal Uses:** A decoction of rhizome alone or along with *Zingiber officinale*, *Piper nigrum*, and jaggery useful in cough, cold, joint pain, and arthritis

Euphorbia tithymaloides L.



- ☞ **Vernacular name:** Naagdon
- ☞ **Medicinal Uses:** Direct chewing of the leaves is helpful in piles

Glycyrrhiza glabra L.



- ☞ **Vernacular name:** Mulethi
- ☞ **Medicinal Uses:** The leaf decoction along with *Piper longum*, *Ocimum tenuiflorum*, and *Zingiber officinale* is useful in cough. The root decoction is useful in diabetes

Mentha spicata L.



- ☞ **Vernacular name:** Pudina
- ☞ **Medicinal Uses:** Soak leaves in water and consume; this relieves cough, mouth ulcers, and stomachaches

Morus alba L.



- ☞ **Vernacular name:** Shahtoot
- ☞ **Medicinal Uses:** The leaves paste is effective in boils and piles

Musa × paradisiaca L.



- ☞ **Vernacular name:** Banana
- ☞ **Medicinal Uses:** Direct use of fruits useful in jaundice



Nyctanthes arbor-tristis L.



- ☞ **Vernacular name:** Harsingar, Parijat
- ☞ **Medicinal Uses:** The leaves and flower decoction are useful in fever

Ocimum tenuiflorum L.



- ☞ **Vernacular name:** Tulsi
- ☞ **Medicinal Uses:** A decoction along with Haldi, Milk, and Kali Mirch is useful in cough. 1-2 drops of leaf juice applied to the eyes and ears

Phyllanthus emblica L.



- ☞ **Vernacular Name:** Amla
- ☞ **Medicinal Uses:** The fermented fruit juice along with Syzygium cumini used in diabetes

Piper betle L.



- ☞ **Vernacular name:** Paan
- ☞ **Medicinal Uses:** The leaves paste applied on the mouth for mouth problems

Piper longum L.



- ☞ **Vernacular name:** Laung
- ☞ **Medicinal Uses:** A fruit decoction along with the Cinnamon is useful in cough

Piper nigrum L.



- ☞ **Vernacular name:** Kali Mirch
- ☞ **Medicinal Uses:** A mix decoction of its seeds along with rhizome of Adrak and Haldi is taken at night for cough

Ricinus communis L.



- ☞ **Vernacular Name:** Arandi
- ☞ **Medicinal Uses:** The seed oil applied externally in piles

Saccharum officinarum L.



- ☞ **Vernacular name:** Ganna
- ☞ **Medicinal Uses:** The juice of the stem useful in jaundice



Syzygium cumini (L.) Skeels



- ☞ **Vernacular name:** Jamun
- ☞ **Medicinal Uses:** Regular usage of fruits or fermented juice, either on its own or in conjunction with Amla is useful in diabetes and gastric problems

Tinospora cordifolia (Willd.) Hook.f. & Thomson



- ☞ **Vernacular name:** Giloy
- ☞ **Medicinal Uses:** Stem decoction either alone or in combination with *Tinospora crispa*, Parijat, and Kali Mirch taken at night for fever, cold, cough, asthma, malaria, dengue, diabetes, and blood pressure

Trigonella foenum-graecum L.



- ☞ **Vernacular name:** Mathi
- ☞ **Medicinal Uses:** The extract from overnight-soaked seeds given in the morning to treat joint pain, headache, and stomachaches

Vitex negundo L.



- ☞ **Vernacular name:** Mevdi
- ☞ **Medicinal Uses:** The leaves paste applied externally for joint pain

Wrightia tinctoria (Roxb.) R.Br.



- ☞ **Vernacular name:** Indrajao
- ☞ **Medicinal Uses:** A paste of cooked fruits relieves joint pain. Fruit decoction aids liver issues, bark decoction helps with piles, and leaf juice is applied to the scalp for hair problems.

Zingiber officinale Roscoe



- ☞ **Vernacular name:** Adrak
- ☞ **Medicinal Uses:** A decoction of rhizome either alone or in combination with Kali Mirch and Haldi or taken with honey is useful for the cough

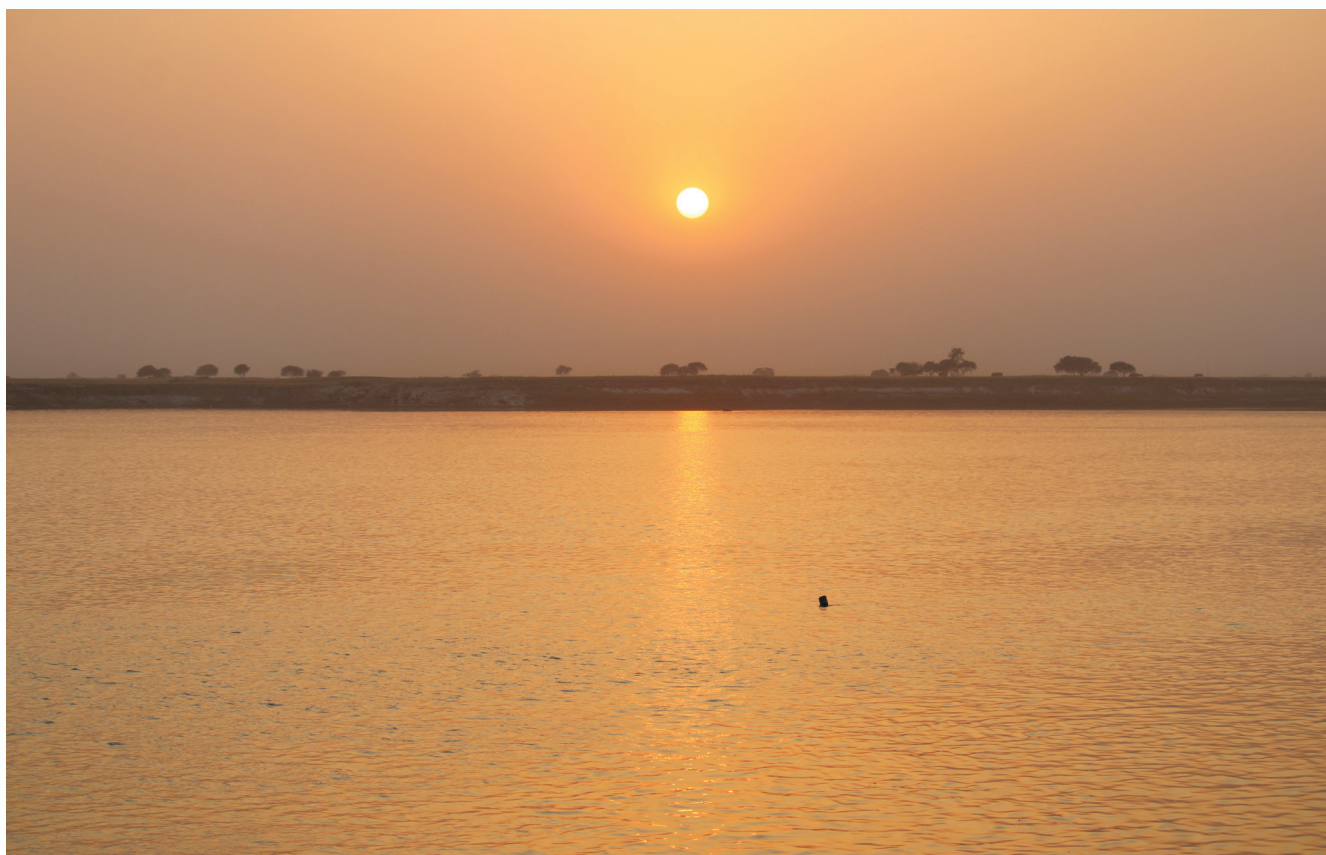
GOVERNMENT INITIATIVES FOR GANGA RIVER CONSERVATION

The Ganga River, one of the most significant water bodies in India, is critical for the ecological balance, cultural heritage, and economic livelihood of Bihar. Recognizing its importance, the government has launched several initiatives aimed at conserving and rejuvenating the Ganga River in Bihar. These initiatives focus on pollution control, ecological restoration, sustainable management, and community engagement.

Namami Gange Programme: To clean up the Ganga and other small rivers in the Ganga basin, the Government of India launched the Namami Gange Program in 2014-15. This program combines a basin approach with a variety of interventions, including capacity building, research and monitoring, and public awareness campaigns. This flagship program integrates various efforts to tackle pollution, conserve and

rejuvenate the river, and promote sustainable development. Additionally, the program aims to improve ecological flows, conserve biodiversity, and afforestation, and improve riverbank amenities and sanitation. Some key actions of this program as:

- **Sewage Treatment Plants (STPs):** Establishing and upgrading STPs to treat urban sewage before it enters the river has been a priority. The construction of STPs in cities like Patna aims to significantly reduce the load of pollutants entering the Ganga.
- **Riverfront Development:** The development of riverfronts in cities along the Ganga, including Patna, involves creating green spaces, improving public amenities, and ensuring better waste management practices.



- **Clean-up Drives:** Regular clean-up drives and waste management initiatives focus on removing solid waste and pollutants from the river, thereby improving water quality.
- **Sustainable Agriculture Practices:** Promoting sustainable agricultural practices to reduce runoff and pollution entering the river from agricultural activities. This includes encouraging organic farming and better land management practices.

Ganga Vikas Mission: The Ganga Vikas Mission is a comprehensive initiative aimed at the holistic development and conservation of the Ganga River and its basin. Launched by the Government of India in June 2014, the mission focuses on various aspects including ecological restoration, pollution control, sustainable management, and socio-economic development. Its objective is to rejuvenate the Ganga River while ensuring the well-being of communities living in its basin. This mission includes:

- **Ecological Restoration:** Efforts to restore the natural flow and ecological balance of the river, including reforestation of catchment areas and habitat restoration.
- **Waste Management:** Implementation of solid waste management systems to prevent littering and dumping in the river.
- **Public Awareness Campaigns:** Educating local communities about the importance of river conservation and promoting practices to reduce pollution.

Ganga Action Plan (GAP): The Ganga Action Plan, initiated in the 1985 and later revised and expanded under the Namami Gange Programme, has played a foundational role in addressing river pollution. Key aspects of the plan in Bihar include:

Integrated Ganga Conservation Project: The Integrated Ganga Conservation Project is a multi-faceted initiative aimed at addressing the complex challenges facing the Ganga River and its basin. The project focuses on a comprehensive approach to river conservation, incorporating various aspects of environmental management, pollution control, socio-economic development, and community engagement. Its goal is to rejuvenate the Ganga while ensuring sustainable development and improving the quality of life for the communities living along its banks. This project involves an integrated approach to river conservation, focusing on:

- **Water Quality Monitoring:** Regular monitoring of water quality to track pollution levels and effectiveness of conservation measures.
- **Community Participation:** Engaging local communities in conservation activities, including river cleaning drives and awareness programs.
- **Research and Innovation:** Supporting research on innovative technologies and practices for river conservation and pollution control.

State-Specific Initiatives: Bihar has also implemented several state-specific initiatives to complement national efforts:

- **River Basin Management:** Developing and implementing management plans specific to the Ganga River basin in Bihar to address local environmental challenges and promote sustainable development.
- **Institutional Strengthening:** Strengthening institutions and agencies responsible for river management and pollution control to ensure effective implementation of conservation measures.

- **Local Governance and Engagement:** Involving local governance bodies and community organizations in the planning and execution of river conservation projects to ensure community-driven solutions and accountability.

Legal and Regulatory Measures: The government has also enacted various legal and regulatory measures to support river conservation:

- **Pollution Control Regulations:** Enforcing regulations related to industrial discharge, waste management, and environmental protection to reduce pollution levels in the Ganga.
- **Forest Conservation Laws:** Implementing laws to protect and restore forests in the Ganga basin, which play a crucial role in maintaining the river's ecological health.

Overall, the government initiatives for Ganga River conservation in Bihar are multifaceted, addressing pollution control, ecological restoration, sustainable management, and community engagement. Through programs like Namami Gange, the Ganga Vikas Mission, and the Ganga Action Plan, alongside state-specific measures and legal frameworks, significant progress is being made to rejuvenate and protect the Ganga. Continued commitment to these initiatives, coupled with active community involvement and innovation, is essential to ensuring the long-term health and sustainability of this vital river.