# An overview on river pollution in India, its Causes, Impact and Government Initiatives for Sustaining River Water-Bodies

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**Abstract**

River pollution in India has become a critical issue related to the environment and public health due to rapid urbanization, industrialization, and population growth. Untreated sewage, industrial effluents, agricultural runoff, and solid waste continue to be discharged into major river systems, including the Ganga, Yamuna, and Brahmaputra, causing serious degradation in water quality. This results in the loss of aquatic biodiversity and disruption of the riverine ecosystem, apart from increasing the risk of waterborne diseases in communities located along its banks. Despite policy interventions through initiatives such as the Namami Gange Mission, as well as more stringent pollution control norms, enforcement and infrastructure gaps persist, and a lack of awareness among the public is evident. Reviving the health of Indian rivers requires an integrated approach that merges efficient wastewater treatment with industrial regulation, sustainable agricultural practices, and the involvement of the community.

**Keywords: India, Pollution, River, Sustainability, Water-Body.**

## Introduction:

Large river systems have long formed part of the cultural, economic, and ecological fabric of India-from the Himalaya-fed Ganga and Brahmaputra to the peninsular rivers such as the Godavari, Krishna, and Narmada waterways, which sustain drinking-water supplies, agriculture, industry, fisheries, and religious practices for hundreds of millions of people. Over the past few decades, however, rapid urbanization, population growth, and industrial expansion have placed unprecedented pressure on these rivers. Untreated or partially treated municipal sewage, industrial effluents, agricultural runoff laden with fertilizers and pesticides, solid waste dumping, and sand mining have combined to severely compromise water quality in many stretches. Monitoring reports from government agencies consistently identify a large number of river stretches as “polluted” or “priority” segments based on biochemical oxygen demand and other indicators, reflecting the widening mismatch between pollution loads and treatment capacity. The ecological implications of such degradation are widespread. Increased organic loads and nutrient enrichment stimulate eutrophication, lower dissolved oxygen levels, and cause fish kills, whereas toxic metals and persistent organic pollutants bio accumulate through food webs and affect aquatic invertebrates, fish, birds, and mammals. Habitat fragmentation, altered flow regimes, and sediment contamination further reduce riverine biodiversity, putting both endemic and migratory species into danger. These impacts do not stay confined to water only; the communities dependent on river fisheries, floodplain agriculture, drinking water intakes, and riparian grazing face direct risks to health and livelihood, whereas changes in river ecology spill over to adjacent wetlands and terrestrial ecosystems. In response, the Government of India and state governments have launched several initiatives over time, including river-specific programmes like the Ganga Action Plan and later the National Mission for Clean Ganga; broader frameworks like the National River Conservation Plan; and more recent interventions that incorporate wastewater infrastructure expansion, industrial compliance, solid waste management, and community participation. Yet despite significant investments and some localized improvements in sewage treatment capacity and riverfront management, many rivers remain under stress, and new challenges like climate-driven flow variability, emerging contaminants, and continuing urban growth complicates restoration efforts.

This article examines river pollution in India from four interrelated dimensions: the main sources and causes of pollution, and their spatial patterns; the share of river stretches that are currently described as polluted, and the ensuing impact on ecological health; impact on the aquatic and terrestrial biodiversity and on human populations dependent on riverine ecosystems; and the formulation, execution, and results of significant government programs with consideration for the contemporary state of river cleaning efforts. Through synthesizing recent data from monitoring, policy documents, and scientific studies, this paper aims to present a nuanced, evidence-based picture of the current scenario and to highlight the gaps and opportunities that remain for achieving ecologically healthy and socially just river systems in India.

## 1. Objectives:

1.1 To understand the reasons behind the cause of pollution in river water bodies.

1.2. To grow concern about the alarming deteriorated conditions of the rivers of India.

1.3. To develop an understanding of the impact of river pollution on both terrestrial and aquatic biological systems.

1.4. To know about different government schemes and policies for the betterment of the rivers of India.

## 2. Major causes of pollution in the river waterbodies of India:

**2.1. Municipal wastewater or domestic waste:** Municipal wastewater, or domestic sewage, is currently the main cause of river pollution in India. This reflects a structural mismatch between rapid urbanization and incomplete infrastructure to treat sewage from urban areas. According to information made available by the Central Pollution Control Board, an estimated 72,368 million liters per day of sewage are generated by urban areas, with installed treatment capacity at around 31,841 MLD, accounting for about 44% of the total load. For this reason, over half of the country's domestic wastewater flows into rivers and streams without or with partial treatment. When considered in terms of the treatment performance, the magnitude of this capacity gap becomes more striking. One such assessment carried out by NITI Aayog in collaboration with the CPCB estimates that an overall deficit of about 78.7% exists in domestic sewage treatment, which indicates that a significant share of the domestic effluent is escaping proper treatment and, eventually, reaches the receiving water bodies. National river water quality assessments further reflect the consequences of chronic under-treatment. The

CPCB's 2022 analysis, which employs biochemical oxygen demand (BOD) as an indicator of organic pollution, identified 311 polluted stretches across 279 rivers in 30 States and Union Territories, with domestic sewage recognized as the dominant source of organic loading in most urban and peri-urban segments. Contemporary syntheses of monitoring data suggest that, approximately, over half of India's 605 monitored rivers are currently polluted due to high levels of BOD and faecal coliform. These conditions can be principally traced to the municipal wastewater inflows from rapidly growing towns and cities lacking functional sewerage networks and sewage treatment facilities. Indeed, illustrative of these dynamics is the Yamuna, which, for a relatively brief 22-km segment-about 2% of the river's length-traversing Delhi, contributes nearly 80% of the total pollution load. This concentration of municipal discharges underlines how localized effluent sources can have disproportionate impacts on entire river systems. Collectively, these empirical observations and official datasets establish that municipal wastewater is not just one of the many causes contributing to river degradation in India but is, in fact, a structurally embedded core problem. Its resolution demands an integrated policy response that links expansion of sewage treatment capacity with improvements in sewer connectivity, operation and maintenance, as well as the implementation of decentralized wastewater management strategies in both metropolitan centers and smaller urban settlements.

**2.2 .Industrial wastewater:** Industrial waste remains a critical and persistent driver of river pollution in India, operating in tandem with municipal sewage and often acting synergistically to push numerous river stretches beyond acceptable ecological and public-health thresholds. The rapid pace of urbanization has manifested itself as a surge in wastewater release, with inadequately developed wastewater treatment. The CPCB estimates that sewage generation from urban centers is about 72,368 million liters per day (MLD), and installed treatment capacity is about 31,841 MLD, or approximately 44% of the total load. Thus, more than half of the domestic wastewater is discharged into rivers and streams without being properly treated or often with minimal treatment. The CPCB's 2022 analysis, using biochemical oxygen demand, an indicator of organic pollution, identified 311 polluted stretches across 279 rivers in 30 States and Union Territories, with domestic sewage identified as the dominant source of organic loading in most urban and peri-urban segments. More recent syntheses of monitoring data indicate that approximately half of India's 605 monitored rivers are currently classified as polluted due to elevated BOD and faecal coliform levels, primarily attributable to municipal wastewater inflows from rapidly expanding towns and cities lacking functional sewerage networks and sewage treatment plants. Successive assessments by the CPCB identify hundreds of river stretches failing to meet basic "bathing quality" standards, largely due to elevated BOD, heavy metals, and toxic organic compounds originating from industrial clusters along river corridors. The 2023 CPCB assessment (data reported in 2025) identifies 296 polluted river stretches on 271 rivers across 32 States and Union Territories with effluents from industries and inadequately treated sewage noted as key degradation sources showing only marginal improvement from 2022 when 311 stretches were recorded. Industrially, estates associated with textiles, tanneries, pulp and paper, pharmaceuticals, petrochemicals, and electroplating units typically discharge complex effluents containing high BOD and chemical oxygen demand (COD), suspended solids, dyes, phenols, detergents, nutrients, and a suite of heavy metals (including chromium, lead, cadmium, and zinc). These contaminants deplete dissolved oxygen, threaten sensitive aquatic biota, and accumulate in sediments and biota, causing long-term ecological impairment and biomagnification within food webs. The situation is particularly acute in large river systems with dense industrial belts. For example, CPCB assessments of the Ganga basin identify pollutant clusters at Kashipur and Moradabad along the Ramganga, and at Meerut and Modinagar along the Kali, where paper mills, sugar factories, and distilleries discharge effluents that significantly raise BOD and color, rendering receiving stretches unsuitable for bathing or aquatic life. Similarly, the Sabarmati River in Gujarat, traversing industrial zones of Gandhinagar and Ahmedabad, is characterized as "mostly polluted" due to direct and often untreated industrial wastewater, with studies reporting elevated metal concentrations (Cu, Mn, Fe, Cr, Zn, Pb, Cd) at multiple sites, particularly downstream of industrial outfalls. The Yamuna, especially in the Delhi–Haryana reach, receives combined loads from industrial drains and common effluent treatment plants serving mixed industrial areas; recent inspections indicate continued non-compliance by over a hundred units in the Barhi industrial area of Sonipat and high BOD in drains discharging into the Yamuna, highlighting gaps in effluent treatment infrastructure and enforcement. Estimates for the Ganga main stem suggest more than 500 million liters per day of industrial wastewater are released into the river, often partially treated or untreated, compounding the already high urban organic load. Although there has been a gradual national decline in the total number of polluted river stretches, CPCB continues to report hundreds of Priority-1 and Priority-2 sites where BOD levels exceed 30 mg/L and 20 mg/L respectively well above the 3 mg/L threshold deemed safe for bathing , reflecting severe organic and toxic pollution in rivers such as the Ganga, Yamuna, Sabarmati, and Sutlej near heavily industrialized zones. Overall, industrial waste causes chemical and biological riverine impairment and undercuts socioeconomic systems through the degradation of drinking-water sources, fisheries, and agriculture, while imposing health burdens on riparian communities. This problem persists despite a sound regulatory framework under the Water Prevention and Control of Pollution Act, 1974, and requirements for zero-liquid-discharge or effective CETP-based treatments across many sectors. Persistent non-compliance evidenced through CPCB and National Green Tribunal–linked reports, underlines that enforcement, monitoring, and technological upgrading of effluent treatment remain key challenges in the restoration of river health across India's industrial corridors.

**2.3. Solid waste and Plastic pollution:** Solid waste mismanagement, notably the leakage of plastics into drainage networks, has emerged as a major, discrete pathway through which Indian rivers are degraded, operating in concert with liquid effluents and sewage to modify hydrology, water quality, and riverine ecology. Contemporary modelling efforts and national assessments indicate that India is among the largest global sources of riverine plastic pollution: a 2024 analysis integrating international datasets estimates that India generates approximately 9–10 million tonnes of plastic waste annually and accounts for roughly one-fifth of global plastic pollution, reflecting high rates of mismanaged and dispersed municipal waste (Plastics For Change). A substantial portion of this mismanaged fraction reaches rivers through open dumping on floodplains, unlined landfills, and informal dumps along storm drains and tributary channels, particularly within rapidly urbanizing corridors. Global assessments of river plastic emissions consistently place the Ganga basin among the top ten river systems worldwide in terms of plastic export to the oceans, with recent estimates indicating that the Ganga alone may discharge in the order of 0.1–0.12 million tonnes of plastic annually, contingent on hydrological conditions and waste management scenarios (PubMed). Empirical surveys along the main stem and tributaries of the Ganga corroborate these modelling results, documenting dense accumulations of macro-plastics (packaging, multilayered sachets, carry bags, food containers, and fishing gear) entrapped on sandbars, vegetation, and near-bank eddies, as well as high loads of microplastics in surface waters and sediments, signaling fragmentation and long-term persistence (IWA Publishing). Comparable patterns have been reported elsewhere in India: national authorities such as the National Green Tribunal and the Central Pollution Control Board (CPCB) have repeatedly identified heaps of solid waste and plastics obstructing conduits, drains, and outfalls along the Yamuna in Delhi and downstream stretches, thereby impairing flow, precipitating localized flooding, and delivering pulses of organic and inorganic contaminants during rainfall events (CPCB). More broadly, a 2020–2021 assessment by international researchers on mismanaged plastic waste indicates that India ranks among the top countries for riverine microplastic pollution, with tributaries of the upper Ganga and other Himalayan rivers already recording significant microplastic concentrations in freshwater environments (ScienceDirect). Ecologically, this burden of solid waste and plastics yields multiple cascading impacts: physical smothering of benthic habitats and spawning grounds; entanglement and ingestion risks for fish, turtles, birds, and aquatic mammals; and the formation of artificial "rafts" that transport invasive species and persistent organic pollutants along the river continuum. Microplastics and their associated additives- e.g., phthalates, bisphenols, and flame retardants-can adsorb heavy metals and hydrophobic organic contaminants, thereby acting as vectors for toxic substances that bioaccumulate in aquatic food webs and potentially enter human diets via fish and shellfish harvested from polluted stretches. Socio-culturally, the accumulation of mixed solid waste-including plastics, religious offerings wrapped in non-biodegradable materials, and discarded consumer items, visually degrades the aesthetic and ritual value of rivers like the Ganga and Yamuna, undermining long-standing cultural relationships while imposing direct public-health burdens on riparian communities reliant on these waters for bathing, washing, and in many peri-urban and rural settings-drinking water. In this context, recent policy interventions-such as the Plastic Waste Management Rules (amended from 2016 onward) and phased bans on specific categories of single-use plastic-represent important but incomplete steps; CPCB status reports on plastic waste implementation highlight significant gaps in segregation, collection efficiency, and enforcement, suggesting that in the absence of rapid improvements in municipal solid waste governance and upstream reduction of plastic use, solid waste and plastic pollution will continue to be structurally embedded drivers of river degradation in India for the foreseeable future (CPCB).

**2.4. Concerning issue of sand mining and modification of the riverbeds:** Large-scale riverbed modification and unregulated sand mining are among the major but generally unrecognized causes of river degradation and related pollution in India. Such stressors undermine the geomorphic and ecological integrity of river systems well beyond impacts on water quality. River sand and gravel play crucial roles in fluvial sediment budgets, channel stability, groundwater–surface water interactions, and habitat structure; heavy extraction disrupts these processes through deepening of the channels, steepening bed gradients, and acceleration of bank erosion. Consequently, such alterations enhance suspended sediment loads and turbidity, mobilize legacy contaminants stored in floodplain deposits, and destabilize aquatic habitats. A recent global synthesis of riverine sand mining indicates that instream extraction induces bed degradation, channel incision, lowering of water tables, and disconnection from floodplains, culminating in losses of fish spawning grounds, macroinvertebrate habitats, and riparian vegetation; Indian case studies feature prominently within this evidence base. In the Indian context, sand mining expanded rapidly in response to urban construction demand. Documents compiled by the India Rivers Forum and SandRP report chronic illegal and excessive extraction from rivers such as the Ganga, Yamuna, Narmada, Cauvery, and numerous smaller basins, frequently exceeding replenishment rates and contravening environmental clearance conditions. These practices not only degrade channel morphology but also contribute to a broader conception of "pollution": the release of fine sediments and associated nutrients or adsorbed pollutants into the water column by destabilized banks and freshly excavated beds increases turbidity and degrades physicochemical water quality. In addition, heavy machinery operating within channels leaks oils and lubricants and generates noise and vibration, which stresses aquatic biota. Incident-based evidence from the Yamuna illustrates the scale of physical alteration: inspections by the Haryana Irrigation and Water Resources Department in 2025 found that illegal sand mining at Asadpur in Sonipat district had markedly diverted the river's natural course and created unauthorized embankments and access roads, prompting formal action and highlighting risks of increased flood vulnerability and local scouring around infrastructure. A related 2025 order of the National Green Tribunal established an inter-state task force to monitor illegal sand mining along the Yamuna floodplain between Delhi and Ghaziabad, with directions to ensure compliance with national guidelines. Beyond individual rivers, policy documents such as the Sustainable Sand Mining Management Guidelines, 2016, and the Enforcement and Monitoring Guidelines for Sand Mining, 2020, issued by the Ministry of Environment, Forest and Climate Change, categorically state that indiscriminate extraction can have the effect of lowering riverbeds, inducing saline intrusion in coastal reaches, degrading the quality of groundwater, and causing damage to hydraulic structures, thereby transforming localized mining activities into basin-scale environmental hazards. These morphodynamic changes feed back into the dynamics of river-pollution: diminished base-flows and groundwater tables reduce the capacity of the rivers to dilute organic and chemical loads, while eroded banks and destabilized floodplains increase inputs from agricultural runoff and solid wastes. In conjunction with other drivers such as sewage and industrial effluents, changes induced by sand mining contribute to the decline of aquatic biodiversity and to the emergence of "polluted river stretches" documented in national assessments by the Central Pollution Control Board. Overall, sand mining and alteration of the riverbed in India need to be looked upon not only as issues of extraction of resources but also as structural pressures that magnify both the physical and chemical dimensions of river pollution. This calls for stricter enforcement, science-based extraction limits, and basin-scale planning to safeguard fluvial health.

### 3. Impact of river pollution on the environment and human life:

River pollution in India is restructuring riverine ecosystems and generating cascading impacts on water quality, aquatic life, riparian wildlife, and overall biodiversity integrity. CPCB surveillance in 2023 identified 296 polluted river stretches across 271 rivers in 32 states and union territories, largely based on biochemical oxygen demand (BOD > 3 mg/L), indicative of substantial organic loading and chronic hypoxic stress for aquatic organisms (nwda.gov.in). In stretches of the Ganga, Yamuna, Sabarmati, Mithi, Musi, and other rivers, the steady inputs of untreated municipal sewage and industrial effluents decrease dissolved oxygen, provoke algal blooms, and favor a limited set of pollution-tolerant species, while sensitive taxa, like many hill-stream fishes, aquatic insects, and mollusc-decline or disappear. Longitudinal observations in the Ganga basin document changes in ichthyofaunal communities, with several native species becoming rare and a greater proportion of assemblages comprising generalists or invasive species. Nationally, India hosts more than 3,500 fish species (marine and freshwater), representing over 10% of global fish diversity and a high proportion of endemic freshwater finfish, thus making river pollution a major threat to this globally important biodiversity hotspot . Toxic contaminants add to the effects of organic pollution: heavy metals, including iron, manganese, zinc, copper, nickel, chromium, cadmium, and lead, have been reported at concentrations above permissible limits in stretches of the Yamuna near Agra and elsewhere, and bioaccumulate in fish tissues such as muscle, liver, and kidney at levels which alter blood biochemistry, reduce growth, and impair reproduction with a possible trophic transfer of carcinogenic elements like Pb, Cd, and Cr to piscivorous birds, mammals, and humans (Nature). These stressors are driving broad ecological simplification: diversity of benthic invertebrates declines; plankton communities become dominated by a few tolerant algae and cyanobacteria; and the loss of diverse prey base impacts higher trophic levels, including otters, fish-eating birds, and the Ganges River dolphin. India's first-ever comprehensive river-dolphin survey (2021-2023) estimated around 6,327 Ganges River dolphins across the Ganga, Brahmaputra, and Beas systems, while underscoring that this aquatic apex predator faces severe survival threats from pollution, boat traffic, entanglement, and flow regulation. Local reports of dolphin mortalities in the Brahmaputra and Ganga substantiate how degraded water quality and habitat fragmentation are eroding dolphin populations and the broader riverine ecosystem health . Contamination of irrigation waters and waters used for rearing livestock in riverbanks and floodplains results in the accumulation of metals and chemical residues in soils and crops, thereby altering soil microbial communities and affecting insects, amphibians, and terrestrial predators dependent on healthy riparian zones indirectly. In view of hydrological connectivity from headwaters to estuaries, inland pollution exerts ecological effects on deltaic and coastal ecosystems. Also, nutrient- and contaminant-rich discharges into the Ganga-Brahmaputra-Meghna and other deltas degrade nursery habitats for fish and crustaceans, threatening biodiversity associated with mangroves. Against the background of global evidence that the populations of migratory freshwater fish have declined by over 80% since 1970, with pollution identified as a key driver, India's polluted river network is not only a local environmental crisis but a meaningful contribution to the global erosion of freshwater biodiversity, hence undermining ecosystem services such as fisheries, natural water purification, and climate regulation that sustain the livelihoods of millions of people and numerous species.

Also, river pollution poses serious risks to human health, livelihoods, and economic growth. Millions of people rely on rivers like the Ganga and Yamuna for drinking, bathing, irrigation, fishing, and religious practices. The Ganga supports about 400 million people in its basin but is overwhelmed by untreated sewage and industrial waste. In cities like Varanasi, around 200 million liters of untreated sewage flow into the river every day. This causes exceptionally high levels of faecal coliform, making the water unsafe for direct contact. Studies of Indian rivers reveal that many monitoring sites show biochemical oxygen demand (BOD) and coliform counts that exceed safe limits. This indicates widespread water contamination affecting domestic use and agriculture. Consequently, polluted river water significantly contributes to India's heavy burden of waterborne disease. National estimates show that approximately 37.7 million people suffer from water-related illnesses each year, with over 10,000 deaths occurring between 2017 and 2022 due to diseases like cholera, diarrhoea, typhoid, and viral hepatitis. Many of these are linked to contaminated surface and river water. Historical and recent outbreaks, such as the hepatitis E-driven jaundice epidemics in Delhi (1955–56) and Shimla (2015–16), have been directly linked to sewage-tainted river water entering municipal supplies. This highlights how failures in river and wastewater management lead to public health crises. In addition to acute diseases, long-term exposure to heavy metals and toxic pollutants in rivers used for irrigation and fishing seen in sections of the Yamuna and other rivers creates ongoing health risks, including kidney damage, neurological issues, and cancer. It also undermines food safety as contaminated water affects crops, milk, and fish consumed by local communities. The economic impact is significant. The World Bank estimates that health issues from water pollution in India account for roughly 3% of the country's GDP. This loss reflects decreased productivity, healthcare costs, and reduced earning capacity, making river pollution both an environmental crisis and a serious human development challenge.

5. Government initiatives:

**5.1. Namami Gange :**The Namami Gange Programme is one of the most ambitious river rejuvenation programmes ever undertaken in India. The programme has been conceptualized as an integrated conservation mission to restore the ecological integrity of the Ganga River basin. The government-approved Flagship Programme in June 2014 allocated ₹ 20,000 crore for this purpose, reflecting the national priority for the revival of this iconic river. Two major objectives have been set before the programme abates pollution in the river at every juncture, and to rejuvenate the Ganga on a long-term basis in its natural course asset worth crores in cultural, ecological, and economic terms. The Namami Gange programme integrates policy reforms, infrastructure development, scientific research, community participation, and inter-state cooperation on a single platform, thereby adopting a multi-layered approach for sustainable and quantifiable restoration of the health of the National River Ganga.

**Achievements:**

- **Creating Sewage Treatment Capacity :**One of the major components of the programme has been the expansion of sewage treatment capacity along the Ganga basin. So far, sanctions have been made for 200 sewerage infrastructure projects, including one decentralized modular system, with an overall investment of ₹ 31,810 crore. Of these, 116 projects are already complete and operational, while the remaining ones are progressing through different stages of construction and implementation.

- **River Surface Cleaning :** Targeted efforts have been made to remove floating solid waste from the river surface and adjoining ghats. In all, dedicated river-surface cleaning mechanisms have been deployed across 11 key locations, with adequate measures for routine collection and safe disposal of debris in order not to further degrade the water quality.

- **Biodiversity :**One of the long-term goals of the Namami Gange programme aims at bringing back the native life of the river: species that once thrived along the Ganga, which are now restricted or endangered. The mission focuses on restoring such species for them to again play their natural role in maintaining a balanced ecosystem of the river. In this direction, science-based conservation plans are being jointly developed and implemented by the WII, CIFRI, and Uttar Pradesh Forest Department. Surveys conducted by WII have identified stretches of the river where biodiversity is still relatively strong, and these areas are now being prioritized for protection. They have also set up rescue and rehabilitation centers for injured or displaced aquatic animals and trained a network of local volunteers known as Ganga Pahari's who help monitor and protect these stretches of the river. Public awareness has also been made part of the mission. Interpretation centers like Ganga Tarini and Ganga Darpan have been developed to make people understand the ecological importance of the river and species dependent on it. Work at CIFRI has focused on fish populations. They have mapped fish diversity across the Ganga using GIS tools and initiated tagging programmes to track the migration of species such as Hilsa. They also have fish ranching and awareness activities in support of the revival of species like Indian Major Carps and Mahseer, which are of ecological and livelihood value. Meanwhile, the Uttar Pradesh Forest Department is expanding conservation-breeding programmes for freshwater turtles and Gharials at the Kukrail centre in Lucknow. The aim of this is to gradually rebuild stable populations of these iconic species within the Ganga basin.

- **Afforestation :** Afforestation has been treated as a central pillar of the Ganga rejuvenation programme because a river's health is inextricably linked with the health of the forests that feed it. To reinforce this linkage, Dehradun-based Forest Research Institute prepared a detailed project plan covering more than 1.34 lakh hectares across the Ganga basin states: Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal. The ₹ 2,293 crore project details where and how new green cover should be created to support the river system. The plan approaches the riverscape through four lenses: natural landscapes, agricultural landscapes, urban landscapes, and conservation-focused interventions. This structure allows the project to work not only in the forested upper catchments but also along the farmlands, towns, and degraded patches that influence the river's flow and quality. The afforestation initiative fundamentally strives to enhance the ecological resilience of the river in terms of its natural flow, or aviralta. The program seeks to reduce soil erosion, improve groundwater recharge, and reconstruct the general ecological processes that give life to the Ganga through the restoration of natural vegetation and riverbank stabilization. These interventions have been implemented by the State Forest Departments in all five basin states since 2016–17, with financial support from the National Mission for Clean Ganga. Their work ranges from planting native species and protecting riparian zones to maintaining green corridors that help reconnect fragmented habitats along the river.

- **Public engagement :** Public engagement was an important pillar of the program, which had its own set of outreach activities at large in order to build awareness and strengthen community participation. Events such as seminars, workshops, rallies, cleanliness drives, plantation campaigns, exhibitions, and school-level competitions were carried out across multiple states. These efforts were supported by a coordinated IEC strategy that deployed mass media—television, radio, newspapers, and digital platforms—to broaden the reach of the programme. A theme song on Ganga was also shared widely on digital media to enhance visibility, while NMCG kept its social media presence active on platforms like Facebook, Twitter, and YouTube for uninterrupted public engagement.

**5.1.1 Ganga Gram :**

A major component of the program relates to the development of rural sanitation in villages falling directly on the banks of the Ganga. The Ministry of Drinking Water and Sanitation selected 1,674 Gram Panchayats in Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, and West Bengal as priority areas. For promoting basic sanitation infrastructure, ₹ 578 crore was provided for toilet construction in these riverbank villages. Out of the targeted 15.27 lakh household units, 8.53 lakh toilets have already been completed, marking substantial—though not yet comprehensive—progress in reducing open defecation and limiting faecal contamination of the river system. A consortium of seven IITs has prepared the Ganga River Basin Plan and further adopted 65 villages distributed among 13 IITs to develop them as model settlements. These model villages provide a testing ground for integrated interventions in sanitation, waste management, and ecological restoration. Further, the United Nations Development Programme (UNDP) has been engaged as the implementation partner for the rural sanitation component in Jharkhand, with a project outlay of ₹ 127 crore aimed at developing the state as a demonstration model for community-driven sanitation reforms.

**5.2. International and Inter-Ministerial Collaborations :**

NMCG has increasingly framed river rejuvenation as a knowledge-driven, globally informed endeavour. Countries with established experience in river restoration, like Australia, the United Kingdom, Germany, Finland, and Israel, have shown interest in partnering with India, which underlines how the Ganga's revival has taken on an internationally relevant ecological dimension. Within the country, too, NMCG has tried to reinforce cross-sectoral coordination by signing Memorandums of Understanding with various central ministries, such as Human Resource Development, Rural Development, Railways, Shipping, Tourism, AYUSH, Petroleum, Youth Affairs and Sports, Drinking Water and Sanitation, and Agriculture. The idea behind the collaborations is to ensure a smooth flow of expertise, integration of different institutional capacities, and coherence across various interventions from infrastructure to cultural outreach activities.

**5.3. National River Conservation Plan** :

The National River Conservation Plan is a central government scheme begun in 1995 to clean up rivers throughout India with national coverage. Based on the earlier Ganga Action Plan, it expanded the scope from a single river to multiple major river systems. The programme aims to reduce the pollution load entering the rivers and bring their water quality to a level that supports ecological health and safe human use. Under the scheme, the Union Government partners with the states and Union Territories by providing not only financial support but also technical guidance for implementing sewage treatment, sanitation, and other pollution-control measures.

The National River Conservation Plan has extended the reach of river conservation from the Ganga basin to include other major river systems in the country, and it is expected to play an increasingly important role in India's environmental and socio-economic future. Its main accomplishments have included the building up of a sewage treatment infrastructure with a combined capacity to handle 2,522.03 MLD, thereby removing a substantial amount of pollution load in urban rivers. This intervention not only improves water quality but also contributes to the restoration of aquatic ecosystems and supports the conservation of riverine biodiversity. Economically, cleaner rivers translate into reduced incidence of waterborne diseases, which implies a lesser load on the healthcare system. They have also ensured better-quality irrigation water, boosting agriculture-related productivity. Improved riverfronts and cleaner water bodies boost the tourism potential of urban river cities, adding a cultural and economic dimension to the programme. The NRCP, therefore, further strengthens social and cultural outcomes by preserving rivers of religious and historical significance, promoting community development through associated infrastructure projects, and enhancing water security for millions of residents dependent on these waterways. On the policy and governance front, the plan has reinforced the institutional mechanism for water management, improved coordination between central and state authorities, and provided a replicable model for other river conservation initiatives in India.

### 5.4. One District-One River Initiative in Uttar Pradesh

The Uttar Pradesh government has launched a complete environmental campaign, "One District – One River," to restore the health of rivers across all 75 districts of the state. It addresses river pollution, drying water bodies, and the restoration of ecological balance, improving the recharge of groundwater, revival of biodiversity, and thus improvement in the quality of life for communities reliant on these rivers. By integrating scientific planning, technological tools, and community participation, this program aspires to create sustainable water management practices that can be replicated across the state.

Under this scheme scientific and community-based approach is applied in a unique in many aspects, as scientific planning is combined with grassroots involvement. For guiding the districts in drawing up river-specific revival plans, prestigious technical institutions like IIT Kanpur, IIT BHU, IIT Roorkee, and BBAU Lucknow were tapped. Hydrological studies, channel mapping, ecological assessments, and riverbank evaluations provide the basis for these plans so that restoration happens in a way that is effective and sustainable

Also, several other rivers in Uttar Pradesh have similarly benefited from this initiative or related schemes:

**I.** **Malin River**: It was once a clean river in the Bijnor District. This river had shrunk due to the encroachment, pollution, and deforestation taking place over the years. Its restoration involved comprehensive desilting, cleaning, and afforestation on the embankments. Additional measures, such as check dams and rainwater harvesting, helped recharge groundwater and reinvigorate local ecosystems, providing both agricultural and ecological benefits to surrounding communities.

**II.** **Chhoti Gandak**: It is a tributary to the Ghaghara River and has degraded due to siltation, waste dumping, and unabated farming along the banks. A multi-phase rejuvenation plan was implemented for this river that involved removing illegal encroachments, check dam construction, and community-led monitoring systems. Pollution control efforts managed to bring back the river’s flow and overall ecological health, thereby allowing it to perform its various environmental and social functions once again.

**III.** **Matuka River, Varanasi District**: At one time, the Matuka River played an important role in both ecosystem services and in cultural practices. However, it lost its vitality through urbanization. Restoration in this regard covers cleaning and realignment, source wastewater treatment, and planting trees on riverbanks for erosion control and habitat reconstruction. These activities have successfully brought back both the ecological and cultural significance of the river in Varanasi.

**6. Discussion :**

The present study has shown that river pollution in India is the consequence not of a single cause but of the cumulative effect of many interrelated anthropogenic activities. The identified causal factors reveal that untreated municipal wastewater, industrial effluent, agricultural runoff, solid waste, and sand mining practices together press upon the river systems. This multidimensional character of pollution suggests that fragmented interventions cannot ensure sustained improvements. For instance, even if industrial discharges are regulated along discrete segments, the ongoing influx of untreated sewage and plastic waste can continue to degrade water quality and aquatic habitats. The documented impacts on human health, livelihoods, and ecosystems further stress the urgent need for an integrated river-basin approach. Pollution of rivers is compromising drinking-water security, raising the incidence of water-borne diseases, and adversely impacting agriculture and fisheries reliant on steady, clean flows. Ecologically, processes such as declining dissolved oxygen, eutrophication, and contamination by heavy metals and organic pollutants lead to biodiversity loss and disruption of food webs. More critically, these effects disproportionately affect vulnerable communities living along riverbanks, with limited alternatives and a reliance upon river water for domestic and occupational needs.

The discussion of various large-scale river rejuvenation programs, enhanced effluent standards, sewage-treatment infrastructures, and so on reveals both progress and persistent gaps. On the one hand, these schemes underscore a policy-level recognition that river health is central to sustainable development, public health, and cultural heritage. On the other hand, these are beset with implementation challenges, including inter-agency coordination, operations and maintenance of treatment facilities, and inadequacies in monitoring and local community involvement, which limit effectiveness. In many instances, institutional and financial mechanisms have not kept pace with the scale and complexity of the problem. Put together, the findings show that technical measures alone are not enough. Controlling river pollution in India has to be done with strong regulation, trustworthy infrastructure, and community-level engagement. Indeed, public awareness, change in waste disposal habits, strict enforcement of already existing environmental laws, and local stakeholders' participation at the levels of both planning and monitoring should go hand in hand with different government schemes. Research areas may include detailed case studies regarding specific rivers, datasets of long-term water quality, as well as socio-economic analyses regarding river-impacted communities to better identify which interventions are most effective and how these can be scaled. Thus, this study reinforces the view that restoring and protection of India's rivers are not only ecological imperatives but also a social-economic necessity needing sustained, coordinated, and science-based action.

**7. Conclusion**

River pollution in India is not only an environmental problem but also a social, economic, and public health one. The causes, from untreated municipal sewage and industrial effluents to agricultural runoff and solid waste, to sand mining, have cumulatively overwhelmed the intrinsic self-purifying capabilities of most rivers. The manifestations of this degradation are evident in the form of deteriorating water quality, increased disease burden among river-dependent populations, loss of biodiversity, and disruption of productive activities like fishing and agriculture. Government initiatives like the Namami Gange Programme, National River Conservation Plan, and related initiatives at the state level demonstrate a significant rise in both policy attention and finances spent, with some visible local successes under specific conditions. However, the success of the above programs depends essentially on effective enforcement of pollution standards, adoption of science-based river basin management, and participation of local communities and other stakeholders.

Reconceptualizing rivers as ecosystems of dynamic character, rather than water conduits, underlies any meaningful attempt at the restoration of India's rivers. The combination of a framework for stricter regulatory mechanisms, improved infrastructure in the form of wastewater treatment, sustainable land-use practices, and behavioral change at both the individual and institutional levels is necessary. These measures, if pursued with urgency and accountability, hold the potential to progressively restore river health, secure water resources for future generations, and preserve the cultural and ecological heritage that India's rivers have sustained for centuries.

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# Cross-Cultural Comparative Reading of Asian Animated Movies*Ponyo* and *Dashavatar*

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**Abstract:**

Environmental awareness in Europe gained significant momentum in the twentieth century, particularly after the publication of Rachel Carson's influential works. In contrast, many non-European cultures have long embedded ecological consciousness within their worldviews and everyday practices. Yet these traditions were often sidelined by dominant European "theologico-ideological" frameworks that prioritised industrial progress and rationalist thought over indigenous ecological wisdom, considering them as superstition.This study adopts a comparative approach, examining animated films from two Asian cultures to highlight how indigenous narratives contribute to global environmental education. The analysis focuses on *Ponyo*, which reflects Japanese cultural attitudes towards the natural world through a magical lens, and *Dashavatar*, which draws on Indian spiritual traditions to portray the environment as sacred. Though the modes of representation differ—*Ponyo*emphasises a material and emotional connection with natural beings, while *Dashavatar* situates the environment within a divine and spiritual framework—both converge on the same principle: the need to honour ecological cycles and recognise humanity's reliance on the natural world.The study argues that such indigenous perspectives, too often overshadowed by European industrial and ideological dominance, offer vital alternatives for rethinking environmental responsibility. By foregrounding these cultural narratives, the research challenges Eurocentric hegemony and demonstrates how Asian traditions, through storytelling and myth, nurture a holistic respect for the environment.

**Keywords: European Hegemony, Environmental Consciousness, Japanese Magical World, Indian Spiritual Wisdom, Comparative Study.**

**Introduction:**

The beginnings of Indian cinema can be traced back to the silent film era of the 1910s, marked by the release of Dadasaheb Phalke's *Raja Harishchandra* (1913). From the outset, Indian films were deeply influenced by the country's cultural heritage, particularly its folk traditions, epics, and classical literature. Many cinematic narratives drew directly from mythology and folklore; for instance, the first full-length Indian film, *Raja Harishchandra*, was based on the *Mahabharata*. The period between the 1940s and 1960s is often regarded as the golden era of Indian cinema, during which filmmakers such as Satyajit Ray revolutionised the art of storytelling and cinematography. Ray's *Apu Trilogy* (1955–1959), adapted from Bibhutibhushan Bandyopadhyay's novels *Pather Panchali* (1929) and *Aparajito* (1932), became central to this cultural moment. Similarly, Shyam Benegal's *Charandas Chor* (1975) was influenced by the folk tales of Vijaydan Detha.As Singh notes, just like mainstream cinema, Indian animation has also drawn extensively from mythological traditions.(Singh 10)Popular animated series such as *Little Krishna*, *Bal Ganesh*, *Hanuman*, and *Dashavatar* are all re-creations of mythological narratives. These examples show how Indian films and cartoons act as reservoirs of cultural memory, continually revisiting ancient myths and classical texts. Such adaptations, however, do not necessarily strip these works of their "aura". (Benjamin 2)For mere commercial use. Instead, by bringing them onto digital platforms, these stories are revitalised, becoming accessible and meaningful to younger audiences.Walter Benjamin's concept of "mechanical reproduction"(Benjamin 2)suggests that repeated reproductions risk diminishing the unique historical essence, or 'aura,' of cultural works. This idea resonates with Jean Baudrillard's notion of the simulacrum, in which copies or representations no longer reflect reality but instead replace it, creating a hyperreal world where the distinction between the real and its representation collapses. (Baudrillard 370-378) Yet, Benjamin also points out that reproduction increases accessibility, especially for audiences distanced from the original context. This positive potential is evident in certain animated adaptations that reinterpret myths to highlight contemporary issues, including environmental concerns. In such cases, simulation becomes a bridge connecting ancient values with modern social needs, fostering ecological awareness alongside cultural preservation.

These adaptations not only preserve but also reimagine the 'grand narratives' of ancient India to respond to present-day challenges. This reworking aligns with Lyotard's critique of the authority and linearity of grand narratives, showing how they can be fragmented and recontextualised within modern contexts. Moreover, drawing from Lyotard's idea of the commodification of knowledge, these animated texts function as cultural products designed to market both traditional values and ecological consciousness to specific audiences—primarily children and young people. Importantly, the narratives also appeal to parents in nuclear families, who often seek content that combines education with cultural enrichment. By embedding ecological lessons within mythological frameworks, these cartoons serve both cultural continuity and consumer demand.

**Discussion:**

This is an age of environmental devastation and carbon supremacy. From 2019 to 2025, the world has experienced fluctuations in the graph of human beings' unnatural death rates. There were several reasons behind this fluctuation in the graph, whether it was Covid-19, a tsunami, an earthquake, or an Amazon forest fire. All these diseases and natural calamities are the result of the human attitude towards the environment throughout history, starting from the Industrial Revolution to the present. Ignoring a biased view, whether it is India, European nations, or Japan, the pedagogy of every indigenous culture of the world has ecological consciousness, which the urge for economic progress has undermined. Considering the alarming call by the environment, it is high time to deterritorializethe indigenous environmental pedagogies of particular nations, and reterritorializethe contemporary environmental pedagogies by incorporating indigenous environmental pedagogies of the nations around the world. In the present society, animation has become a significant pedagogical tool for environmental consciousness because, unlike the real world, the hyper-real world of animation provides liberty to the creators to incorporate animistic and new materialist illustrations of the environment. The animated movie of a nation resembles the cultural aspects of that nation because, along with adults, animated movies are apedagogical tool for the cultural educationof children.

The magical world of Studio Ghibli's*Ponyo*[1]Explored the desires and destiny of a gold fish Ponyo, who wanted to become like her human friend Sosuke. Her striving to accomplish her desire unites the animism and the new materialistic approach to the environment in the narrative.Indigenous Indian animism is rooted in the belief in reciprocal relationships between humans and non-human life forms, a perspective that aligns closely with contemporary ideas of eco-spirituality and deep ecology, both of which emphasise ethical and sustainable engagement with the natural environment. (Naess 188-190) Within the postcolonial Indian context, however, these animistic principles have long been marginalised by dominant 'theologico-ideological' frameworks established through both colonial and postcolonial hegemonies. During colonial rule, British missionaries and administrators frequently dismissed animistic practices as superstition or paganism. (Bordoloi 194-197) This dismissive classification played a significant role in undermining indigenous knowledge systems, privileging Eurocentric models that drew on monotheistic theology and scientific rationalism, each of which treated nature as inert matter or exploitable resource rather than as a living, interconnected system.Nevertheless, in the present, these once-suppressed animistic traditions are re-emerging as vital resources for ecological thought. By emphasising interdependence and respect for all life forms, indigenous worldviews offer alternatives to anthropocentric paradigms and resonate with global ecological discourses seeking to restore balance between human societies and the environment (Naess 188–190; Bordoloi 194–197). In this way, what was once dismissed as superstition is now being recognised as a valuable philosophical and ethical framework for addressing contemporary ecological crises.

The narrative raises one important question: whether human invasion into nature's territory is just for the environment? The narrative explores deep ecology's concept of species interconnectedness through animism. Animism is the indigenous cultural belief that views nature as alive and imbued with spirits and magical forces. The narrative deterritorializes and reterritorializes animism to incorporate the indigenous ecological pedagogies with contemporary ecological principles. In several aspects, the cultural environmental pedagogy of *Ponyo* aligns with Indian indigenous environmental pedagogies evident in the Indian mythological animated movie, *Dashavatar*. In setting of *Ponyo* is on the ocean, which is occupied by ships resembling a human invasion of the water body for transportation and resource extraction. In the narrative, Sosuke rescues Ponyo from a bottle in the ocean and decides to domesticate her. The army of water waves follows the order of the sea guardian, Fujimoto - who is also the wizard father of Ponyo, and follows Sosuke to bring Ponyo back to her original home – the ocean – from the artificial home of Ponyo- the bucket - created by Sosuke. As a guardian of the sea,Fujimoto has to preserve the lives of the aquatic creatures, and he was trying to do the same with Ponyo. As an anthropocentric practice, human beings tend to domesticate wild flora and fauna to accept them in human society.Human creates an artificial space for the domesticated creature, forcing them to accept this alien space as their home. In the magical world of *Dashavatar*, when Rama tried to dry out the ocean, the ocean spirit 'Jal Devta' restricted him from doing this and informed Rama about Jal Devta's duty to preserve the life of aquatic creatures. Fujimoto and Rama'sbehaviour towards humans when humans try to invade the ecosystem of the ocean becomes a pedagogical tool to raise the concerns of blue humanities among the audience. Cultural animism is reterritorialized by these magical figures to incorporate it into the ethical concerns of the blue humanities. Similar to *Ponyo*, the narrative of *Dashavatar* can be interpreted as a critique of domestication. As Sosuke struggles to domesticate Ponyo in the bucket, *Dashavatar*Satyavat rescues a magical small fish and decides to domesticate it in a pot, but after multiple tries, he finally fails to domesticate the fish in an artificially created space. This failure of Susoke and Satyavat symbolically resembles human beings' failure in constructing an artificial natural space for the domesticated creatures. Domestication alienated the creatures from their natural space, impacting the ecological balance of the Earth.

Disruption in the ecological balance of the ocean leads to natural calamities, as illustrated in the narrative of *Ponyo* and *Dashavatar*, giving light to the deep ecology's concept of interconnectedness. In *Ponyo*, Ponyo's transformation into a human being synchronises with the imbalance in the ocean ecosystem and natural calamities like a tsunami, destroying ships and towns, the fall of the human satellites, and the moon getting closer to the Earth. Fijimoto was afraid that if Ponyo completely transformed into a human, she would disturb the natural order and the water body would destroy and take over the human territory. This is visible in the latter part, where ocean water has invaded human territory, and an ancient extinct aquatic creature was revived because of the purification of the water body. These incidents lead to Ponyo's complete transformation into a human being. Ponyo's complete transformation into a human being symbolically represents human beings' complete invasion – or can be interpreted as human beings' destruction – of the ocean body. This concept of destruction leading to revival purity is also evident in the Indian indigenous cultural belief system. In *Dashavatar*, when the Earth turned impure due to human cruelty, Lord Vishnu orderedthe destruction of human life through the flood, leading to the birth of a new generation and the revival of purity on Earth. A small gold fish, Ponyo's desire to become human in *Ponyo*, and human beings' torture of other minor beings in *Dashavatar*, lead to natural calamities and mass destruction. This sheds light on the interconnected trait is the environment.

**Conclusion:**

Deterritorialization and reterritorialization of the territory of culture, manner and narrative style, the ecological message of both *Ponyo* – a Japanese animated movie - and *Dashavatar* – an Indian animated movie- can be brought into one pedagogical frame. The storyline of these narratives illustrates an individual species' rhizomatic relationship with the other creatures and with the environment. They teach human beings to accept the environmental creatures and nature in their purer form. *Ponyo*, incorporating its Japanese culture, teaches this by constructing a friendship relationship with nature and other creatures; whereas *Dashavatar,* by incorporating Indian culture, teaches this by constructing a spiritual relationship with nature and other creatures. After reterritorialization of these two cultures from their spatial territory, we can adhere to one ecological principle: human intervention into nature's territory and changing nature for human needs will lead to disturbance in the ecosystem. This disturbance can destroy in the form of natural calamities and diseases. Because the moment Ponyo becomes a hybrid creature due to human intervention, natural calamities start. But as soon as the water goddess,who is Ponyo's mother, transforms Ponyo into a pure human being, ecological balance is restored.

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Regards,

Editors: *EcoVisions*

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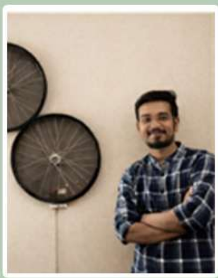

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