WATER POLLUTION AND RIVER PROTECTION LAWS IN INDIA: A CRITICAL ANALYSIS WITH SPECIAL REFERENCE TO THE GANGA ACTION PLAN

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ABSTRACT

Water pollution remains one of the acute environmental challenges confronting India, posing severe threats to public health, ecological sustainability, and socio-economic stability. Rivers in India, historically cherish as lifelines of civilization, are increasingly burdened by untreated sewage, industrial effluents, agricultural runoff, and unregulated urban expansion. Despite a comprehensive statutory framework, including the Water (Prevention and Control of Pollution) Act and the Environment (Protection) Act, the enforcement of water protection laws remains structurally weak and administratively shattered. The crisis is most visible in the degradation of the Ganga River, a river of immense ecological, cultural, and economic significance.

One of the most important river conservation program in India was the Ganga Action Plan, which was introduced by the government in 1985 to the country's increasing pollution levels. While the idea of the program was to resolve the pollution affecting the rivers and water its, implementation was tortured by institutional inefficiency, lack of scientific planning, inadequate monitoring, and poor coordination between central and state authorities. Though, sustained investment, pollution indicators such as Biological Oxygen Demand (BOD) levels and coliform counts remain alarming in several stretches of the river.

This article critically examines the evolution of water pollution control laws in India, its constitutional foundations are under Article 21, 48A, and 51A(g) and the role of judicial activism in supporting environmental governance. Additionally, it evaluates the structural and functional flaws in the Ganga Action Plan and compares India's approach to river restoration plans in the US, UK, EU and France. The study comes to the conclusion that while India has developed environmental legislation, its effectiveness legislation, its effectiveness is undermined by weak enforcement and disjointed governance. The report concludes with recommendations for strengthening river basin management, establishing integrated and science driven restoration programs, and enhancing regulatory accountability.

Introduction:

Water is essential for human survival, economic development, and ecological balance. Every society depends on clean and accessible water for drinking, agriculture, industry, sanitation, and daily life. In India, rivers are not only sources of water but are deeply connected with culture, religion, and history[1]. Many major cities and agricultural regions have developed along riverbanks, making rivers central to the country's growth and prosperity.

However, over the past few decades, rapid urbanization, industrial expansion and population growth have placed enormous pressure on water resources. Large quantities of untreated sewage from cities, chemical waste from factories, plastic waste and agricultural runoff are continuously discharged into rivers. In many places, drainage systems are directly connected to rivers without any proper treatment. As a result, several rivers that once supported healthy ecosystems have become severely polluted.[2]

The problem of water pollution in India is not limited to one region or one river. It is a nationwide crisis affecting public health, biodiversity, groundwater quality, and livelihoods. Polluted river water contributes to water-borne diseases, affects fisheries, damages agricultural productivity, and increases the cost of drinking water treatment. [3]Despite the existence of various environmental laws and regulatory bodies, effective control of pollution remains a serious challenge.

Among all rivers, the Ganga River holds special importance. It supports hundreds of millions of people and flows through several major cities and industrial areas.[4] At the same time, it is considered sacred by millions, which adds cultural and emotional significance to the issue of its protection.

To address increasing pollution levels, the Government of India launched the Ganga Action Plan in 1985. It was one of the first major efforts aimed at cleaning a river through planned government intervention. The objective was to reduce pollution by treating sewage, controlling industrial discharge, and improving waste management systems. [5]However, despite significant

[1] Ministry of Water Resources, River Development & Ganga Rejuvenation
[2] U.N. Environment Programme, *Towards a Global Assessment* (UNEP 2016).
[3] World Health Organization, Guidelines for Drinking-Water Quality, discussing health risks associated with contaminated water and water-borne diseases.
[4] National Mission for Clean Ganga, Ganga River Basin Management Plan.
[5] Ministry of Environment & Forests, Government of India, Ganga Action Plan (1985).

financial investment and repeated policy interventions, the condition of the river continues to raise serious concerns.

This situation raises an important question: Why does water pollution persist despite strong environmental laws and dedicated government programmes? Is the problem with the laws themselves, or with their implementation?[6]

Another important aspect of water pollution in India is the gap between law and reality. On paper, India has a detailed legal framework to prevent and control water pollution. Regulatory authorities such as Pollution Control Boards [7]are empowered to monitor industries, grant permissions, and take action against violators. Courts have also actively intervened in environmental matters through Public Interest Litigations. [8]Yet, inspite of the legal safeguards, pollution levels in many rivers continued to remain high. This shows that the problem is not just legal but also administrative and structural.

Water pollution also reflects issues of governance and accountability. In many cities, sewage treatment plants are either insufficient in number or do not function efficiently. Industrial units sometimes operate without proper monitoring, and penalties for violations are often delayed or weakly enforced. Coordination between central and state governments [9]is frequently inadequate, especially in river systems that flow across multiple states. Because rivers do not follow political boundaries, fragmented governance creates serious obstacles in achieving consistent pollution control.

Furthermore, river protection is not only an environmental issue but also a matter of social justice. Poor and marginalized communities are usually the most affected by polluted water. Many people depend directly on rivers for drinking, bathing, fishing, and farming. When water becomes contaminated, they face health risks and loss of livelihood. Therefore, ensuring clean rivers is directly connected with protecting the right to life, dignity, and health. Environmental protection in this sense becomes a constitutional and human rights concern rather than merely a policy objective.[10]

[6] M. C. Mehta v. Union of India, (1988) 1 SCC 471
[7] Environment (Protection) Act, 1986**,** No. 29 of 1986
[8] M. C. Mehta v. Union of India**,** (1987) 1 SCC 395 (Oleum Gas Leak Case)
[9] Central Pollution Control Board
[10] *Subhash Kumar v. State of Bihar*, (1991) (holding that the right to pollution-free water and air is included under the right to life guaranteed by Article 21 of the Constitution of India).

In recent years, the debate around river conservation has shifted from simple pollution control to broader river basin management. Experts argue that cleaning a river requires an integrated approach that includes urban planning, waste management reforms, industrial regulation, community participation, and ecological restoration. Programmes like the Ganga Action Plan marked the beginning of large-scale government involvement in river cleaning, but they also revealed the complexity of restoring a heavily polluted river system. Understanding these complexities is essential for evaluating whether India's river protection strategy is effective and sustainable in the long term.[11]

This research paper attempts to answer these questions by examining India's legal framework on water pollution, analyzing the effectiveness of river protection laws, and critically evaluating the successes and failures of the Ganga Action Plan. Through this study, the paper seeks to understand whether India's approach to river conservation is capable of achieving long-term environmental sustainability.

Historical Background of Water Pollution Control in India

The difficulty of Water Pollution in India did not come out suddenly it developed slowly with the country's industrial and urban growth. During the colonial period, water regulation was mainly concerned with irrigation, navigation, and revenue generation. [12]Laws were designed to manage water distribution and canal systems rather than to prevent pollution. Environmental protection, as a legal concept, was not a priority at that time. Rivers were largely treated as natural resources to be used for economic purposes.

After independence in 1947, India adopted a model of rapid industrialization and urban expansion. New factories, thermal power plants, chemical industries, and manufacturing units were established across different states. At the same time, urban populations increased significantly, leading to the expansion of towns and cities along riverbanks. However, infrastructure for waste treatment and sewage management did not develop at the same pace. As a result, untreated industrial waste and domestic sewage began entering rivers in large quantities.[13]

[11] Ministry of Environment, Forest and Climate Change, Government of India.
[12] Shyam Divan & Armin Rosencranz, Environmental Law and Policy in Indian Cases, Materials and Statutes
[13] Ibid

The effects of pollution became evident by the late 1960s and early 1970s. Fish populations decreased, water-borne illnesses rose, and rivers close to industrial centers revealed indications of serious pollution. Public awareness regarding environmental degradation also began to grow during this period. [14] India took part in the meeting, which influenced the development of environmental policies within the country.[15]

In response to increasing concerns, Parliament enacted the Water (Prevention and Control of Pollution) Act. [16]This was the first major law specifically aimed at preventing and controlling water pollution. The Act established the Central Pollution Control Board and State Pollution Control Boards. [17] These organizations were granted the power to control pollution discharge, keep an eye on water quality, and file lawsuits against businesses that violate environmental regulations.

Later, after the Bhopal Gas Tragedy 1984, environmental governance in India became more centralized and strict. This led to enactment of the Environment (Protection) Act, which gave wide powers to the Central Government to set environmental standards and issue binding directions. [18]Although this Act is wide in scope, it strengthened the overall framework for pollution control, including water pollution.

During the 1980s, growing concern over the declining condition of the Ganga River led to the launch of the Ganga Action Plan in 1985.[19] This marked the beginning of targeted river cleaning programmes in India. Unlike earlier laws that concentrated mainly on regulation, this programme aimed at direct involvement of constructing sewage treatment plants, diverting drains, and controlling industrial discharge.[20] It represented a shift from purely legal control to policy based environmental management.

Despite the legislative and policy efforts, water pollution continued to rise in many regions. Rapid urban growth, weak enforcement mechanisms, and lack of coordination between agencies reduced the effectiveness of these measures. [21]Over time, it became clear that having

[14] P. Leelakrishnan, *Environmental Law in India*
[15] United Nations Conference on the Human Environment (Stockholm Conference)
[16] The Water (Prevention and Control of Pollution) Act, 1974
[17] Establishing the Central Pollution Control Board and State Pollution Control Boards for the prevention and control of water pollution).
[18] The Environment (Protection) Act, 1986, No. 29 of 1986
[19] Ministry of Environment & Forests, Government of India, *Ganga Action Plan* (1985)
[20] Ibid
[21] Ibid

laws alone was not sufficient effective implementation, monitoring, and accountability were equally important.

Thus, the historical development of water pollution control in India shows a cautious evolution from neglect during the colonial period, to regulatory legislation in the 1970s, to active river conservation programmes in the 1980s and beyond. However, the resolution of pollution for all these efforts raises serious questions about the effectiveness of India's environmental governance system, which this paper critically examines in the subsequent sections.[22]

Constitutional Relevance of Water Pollution Control in India

The Indian Constitution provides a strong foundation for environmental protection, even though the term "environment" was not originally mentioned when the Constitution came into force in 1950. Over time, through constitutional amendments and judicial interpretation, environmental protection especially protection of water bodies has become a core constitutional concern. [23]Today, river conservation is not merely a policy matter but is closely connected to fundamental rights and constitutional duties.

Article 21, which protects the right to life and personal liberty, is the most important constitutional clause in this regard. This clause was first interpreted narrowly. However, from the 1970s onwards, the Supreme Court adopted a broader interpretation, holding that the "right to life" includes the right to live with human dignity.[24] The Court slowly expanded this interpretation to include the right to a clean and right to a healthy environment, safe drinking water, and protection from environmental hazards. In other words, if polluted water constitutes a risk to public health and survival, it immediately violates Article 21.

In Subhash Kumar v. State of Bihar, the Supreme Court explicitly recognized that the right to life includes the right to enjoy pollution free water and air. This judgment was significant because it linked environmental protection directly with a fundamental right enforceable in court.[25] Any failure by the State to prevent serious water pollution could therefore be

[22] Central Pollution Control Board, *Status of Water Quality in India 2022*.
[23] The Constitution (Forty-Second Amendment) Act, 1976, Article 48A (Directive Principle requiring the State to protect and improve the environment) and Article 51A(g) (fundamental duty of citizens to protect and improve the natural environment).
[24] *Maneka Gandhi v. Union of India*, (1978) 1 SCC 248
[25] *Subhash Kumar v. State of Bihar*, (1991) 1 SCC 598, 605

challenged as a constitutional violation.

In instances involving river contamination, the Court's involvement became increasingly more apparent. The Supreme Court ordered the closure of businesses that neglected to set up treatment facilities in M.C. Mehta v. Union of India, which notably addressed the pollution of the Ganga River by tanneries and other enterprises. The Court emphasized that industries cannot continue operating if they harm public health and the environment. [26]This case gave an idea that economic activity must operate within constitutional limits and cannot override environmental protection.

The constitutional framework was further strengthened by the 42nd Constitutional Amendment in 1976. This amendment inserted Article 48A into the Directive Principles of State Policy. Article 48A directs the State to protect and improve the environment and safeguard forests and wildlife.[27] Although Directive Principles are not directly enforceable, they serve as guiding principles for governance. Courts often read Article 48A together with Article 21 to strengthen environmental protection.

Furthermore, every person now has a basic obligation to preserve and enhance the natural environment, including rivers, thanks to Article 51A(g). This provision reflects the idea that environmental protection is a shared responsibility. [28] Environmental laws and regulations are morally and constitutionally supported by basic obligations, even if they are not as enforceable as fundamental rights.

Over time, the judiciary has also developed important environmental ideas with constitutional ramifications. The "Polluter Pays Principle" and the "Precautionary Principle" are elements of Indian environmental law, according to the Supreme Court's decision in Vellore Citizens Welfare Forum v. Union of India. These principles require that preventive action be taken even in cases of scientific uncertainty and that polluters bear the cost of environmental damage.[29]

There are still issues in spite of this progressive reading of the constitution. Theoretical acceptance of environmental rights does not guarantee their actualization. Political pressure, budgetary limits, and administrative restrictions are commonplace for enforcement agencies.

[26] *M. C. Mehta v. Union of India*, (1987) 4 SCC 463
[27] INDIA CONST. art. 48A (inserted by the Constitution (Forty-second Amendment) Act, 1976).
[28] INDIA CONST. art. 51A(g).
[29] *Vellore Citizens Welfare Forum v. Union of India*, (1996)

While courts have issued strong directions, continuous monitoring and long-term compliance remain weak in many cases.[30]

As a result, India's constitutional system offers a strong legal basis for preventing water pollution. river conservation, including the Ganga's cleanliness and preservation, is not just a developmental or administrative concern but a constitutional obligation derived from fundamental rights, directive principles, and fundamental duties.[31]

Statutory Framework for Water Pollution Control in India

One of the first organized initiatives by the State to control environmental deterioration through legislative action is the Indian statutory framework managing water pollution. Water contamination did not become a significant legal problem needing specific statutory regulation until the 1970s, notwithstanding previous environmental harm concerns. The growing impact of industrialization, rapid urban expansion, and increasing discharge of untreated waste into rivers compelled Parliament to enact specialized legislation aimed at preventing and controlling water contamination.[32]

The foundation of India's water pollution control regime lies in the Water (Prevention and Control of Pollution) Act. This legislation was enacted following India's participation in the 1972 Stockholm Conference, which emphasized global responsibility toward environmental protection.[33] Preventing and controlling water pollution and maintaining or restoring the water's wholesomeness were the main objectives of the Act's construction. The Act defines "pollution" broadly as any water contamination that might harm aquatic life, residential use, industry, agriculture, or public health. This wide word reflects legislative recognition of the various angle of water consumption and the various effects arising from contamination.

The creation of regulatory organizations is a key component of the Water Act. State Pollution Control Boards (SPCBs) were established at the state level under the Act, while the Central Pollution Control Board (CPCB) was established at the federal level. These organizations have been given a wide range of duties, including as keeping an eye on the quality of the water, advising governments on pollution management strategies, gathering and sharing technical

[30] *M. C. Mehta v. Union of India*, (1987)
[31] INDIA CONST. arts. 21, 48A, 51A(g).
[32] Water (Prevention and Control of Pollution) Act, 1974
[33] *Water (Prevention and Control of Pollution) Act*, No. 6 of 1974, (India)

data, examining treatment facilities, and enforcing compliance. [34]The relevant State Pollution Control Board must give its prior approval before an industry can release trade effluents into streams or wells. By guaranteeing that industrial activity is still subject to environmental rules prior to pollution, this consent mechanism is meant to serve as a preventative regulatory instrument.

Even while this regulatory paradigm seems strong, its efficacy has been severely hampered by practical issues. Pollution Control Boards frequently have manpower, laboratory facility, and technology resource constraints. Furthermore, the Act's enforcement procedures sometimes include drawn-out legal procedures, which lessens the sanctions' deterrence power. Despite the Act's provisions for penalties and jail time for noncompliance, actual convictions are still very uncommon. Consequently, industries may figure out regulatory sanctions as manageable risks rather than serious consequences.[35]

The Environment (Protection) Act was passed, strengthening the legal framework even more. This law, which was passed in the wake of the Bhopal Gas Tragedy, gives the Central Government the authority to take the actions required to preserve and enhance the quality of the environment. It serves as a comprehensive piece of law that addresses all angle of environmental control, in contrast to the Water Act, which is primarily concerned with water pollution. It empowers the government to prescribe standards for discharge of pollutants, issue binding directions to industries, and order closure or regulation of polluting units. [36]

The National Green Tribunal Act, which created the National Green Tribunal (NGT), is another important change in the legislative landscape. A move toward specialist environmental adjudication was signaled by the establishment of the NGT. The Tribunal possesses jurisdiction over substantial environmental disputes and is empowered to grant relief, compensation, and restitution for environmental damage.[37] The NGT has regularly released guidelines about river pollution with the goal of guaranteeing adherence to water quality regulations and holding violators responsible.

Overall, India’s statutory framework for water pollution control appears comprehensive and progressive in design. It incorporates preventive mechanisms, regulatory oversight, penal

[34] Ibid
[35] *Water (Prevention and Control of Pollution) Act*, No. 6 of 1974
[36] *Environment (Protection) Act*, No. 29 of 1986
[37] *National Green Tribunal Act*, No. 19 of 2010

provisions, and specialized adjudicatory forums. Yet, the persistent degradation of major rivers, including the Ganga River, indicates that legislative strength alone is not sufficient. The true challenge lies not in the absence of law, but in ensuring consistent enforcement, institutional coordination, and long-term compliance. The limitations of the statutory regime become particularly evident when examining large-scale river protection initiatives such as the Ganga Action Plan, which will be critically analyzed in the subsequent section[38]

Governance and Implementation Challenges in River Protection Laws

Even though India has a very strong legislative framework for controlling water pollution, governance flaws rather than a lack of legislation are the true problem. Efforts to safeguard rivers have been severely undermined by the discrepancy between the law on paper and the law in practice. Despite the presence of regulatory bodies, judicial oversight, and environmental standards, rivers across India continue to suffer from severe pollution, indicating structural implementation failures.[39]

Institutional fragmentation is one of the most urgent issues. In India, many government, state, and municipal entities are in charge of water governance. State Pollution Control Boards are in charge of enforcement, whereas the Central Pollution Control Board develops guidelines and regulations. State irrigation agencies regulate the distribution of river water, municipal authorities administer sewage systems, and distinct ministries are in charge of rural sanitation and urban development.[40]

Another major barrier is the federal nature of river governance. Rivers such as the Ganga River flow across multiple states, making pollution control an inter-state issue. While the Constitution places water primarily under the State List, inter-state rivers fall within the regulatory domain of the Union under certain circumstances. This division creates tension between central directives and state-level implementation[41]. States may prioritize industrial growth and employment over strict environmental compliance, leading to inconsistent enforcement standards across the river basin.

[38] *Ganga Action Plan*, launched by the Government of India in 1985 for the control of pollution in the Ganga River.
[39] *Water (Prevention and Control of Pollution) Act*, No. 6 of 1974
[40] Id, see also functions of the Central and State Pollution Control Boards under section 16–17 of the *Water (Prevention and Control of Pollution) Act*, 1974.
[41] INDIA CONST. sch. VII, List II, Entry 17; List I, Entry 56

Urban sewage management constitutes perhaps the most serious practical failure. A significant portion of river pollution in India does not originate from industries but from untreated municipal sewage. Rapid urbanization has led to increased wastewater generation, yet sewage treatment infrastructure has not expanded proportionately. Many cities lack adequate sewage treatment plants, and even where such plants exist, they often operate below capacity due to electricity shortages, poor maintenance, or technical inefficiencies. [42]Consequently, untreated or partially treated sewage is regularly discharged into rivers, undermining statutory safeguards.

Pollution Control Boards frequently suffer from understaffing and inadequate laboratory facilities. Monitoring compliance requires continuous sampling, data analysis, and inspections, yet regulatory agencies often lack sufficient technical personnel. Moreover, penalties imposed for non-compliance are relatively modest in comparison to the economic gains derived from polluting activities. This imbalance reduces the deterrent value of enforcement actions and may encourage regulatory non-compliance.

Political economy factors also play a significant role. Environmental regulation sometimes conflicts with economic priorities such as industrial expansion, infrastructure development, and urban housing. Governments may hesitate to shut down polluting units due to concerns about unemployment or political backlash. In such contexts, environmental enforcement becomes selectively applied rather than uniformly implemented.[43]

Monitoring and data transparency present additional challenges. Effective water governance requires reliable and publicly accessible data on water quality indicators. Independent audits and third-party verification mechanisms remain limited. Without transparent monitoring systems, it becomes difficult to evaluate the true impact of pollution control measures.[44]

Judicial intervention has attempted to bridge governance gaps, particularly through Public Interest Litigations invoking the right to life under Article 21. Courts have issued numerous directions to control river pollution and have expanded environmental jurisprudence. [45]However, judicial activism, while important, cannot substitute for sustained administrative

[42] *Water (Prevention and Control of Pollution) Act*, No. 6 of 1974 (India).
[43] Ibid
[44] Ibid
[45] INDIA CONST. art. 21.

capacity. Courts may order compliance, but long-term monitoring and enforcement require executive commitment and institutional reform.

In essence, India's river pollution crisis is less a failure of legal drafting and more a failure of governance architecture. The absence of integrated river basin management, weak inter-agency coordination, inadequate sewage infrastructure, limited regulatory capacity, and political reluctance collectively undermine statutory objectives. These structural weaknesses become particularly visible when examining large-scale river restoration initiatives, especially the Ganga Action Plan, which was launched with ambitious objectives but struggled due to many of the very governance constraints discussed above.[46]

Ganga Action Plan: Background and Objectives

The Ganga Action Plan (GAP) represents India's first large-scale, centrally a supporting river cleaning programme. It was launched in 1985 with the primary objective of reducing pollution levels in the Ganga River and restoring its water quality to acceptable standards. [47]The programme was initiated under the leadership of Prime Minister Rajiv Gandhi, at a time when growing public concern and scientific studies had begun to reveal alarming levels of contamination in the river.

The Ganga is not merely a water body it holds immense cultural, religious, ecological, and economic significance. Flowing through several major states including Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, and West Bengal, it supports hundreds of millions of people. However, by the early 1980s, rapid industrialization, urban population growth, and unregulated sewage discharge had severely degraded its water quality. [48]Cities such as Kanpur, Varanasi, and Patna were discharging massive quantities of untreated municipal waste directly into the river. Tanneries, textile units, paper mills, and chemical industries contributed significant industrial effluents containing toxic substances.

The immediate objective of the Ganga Action Plan was to intercept, divert, and treat sewage before it entered the river. The underlying logic was infrastructure-driven: if sewage could be collected through underground drainage systems and processed in sewage treatment plants

[46]Ganga Action Plan, launched by the Government of India in 1985.
[47] Ibid
[48] *Ganga Action Plan*, launched by the Government of India in 1985.

(STPs), pollution levels would decrease. Accordingly, the Plan emphasized construction of STPs, low-cost sanitation facilities, electric crematoria to reduce partially burnt remains entering the river, and riverfront development works.[49]

Phase I of the Ganga Action Plan focused on 25 Class-I towns located along the main stem of the river. The programme targeted approximately 873 million litres per day (MLD) of sewage for treatment. The central government bore the majority of the financial burden, and the implementation responsibility was largely vested in state level agencies. In institutional terms, the Central Ganga Authority was established to oversee policy decisions, while execution was carried out through state public works and urban development departments.[50]

Despite its ambitious launch, the conceptual design of the Ganga Action Plan was primarily engineering centric. It treated river pollution as a technical problem of sewage infrastructure rather than a systemic governance issue. The Plan largely ignored basin-level hydrological management, agricultural runoff, groundwater contamination, and enforcement against industrial polluters. Moreover, it did not sufficiently account for the continuous growth of urban populations, which meant that sewage generation often outpaced treatment capacity soon after plants were constructed.[51]

In 1993, Phase II of the programme was launched, expanding coverage to tributaries such as the Yamuna, Gomti, Damodar, and Mahananda. However, even as the scope widened, earlier implementation weaknesses remained unresolved. Monitoring mechanisms were limited, and many treatment plants faced operational inefficiencies due to lack of maintenance, electricity shortages, and inadequate skilled manpower.[52]

Evaluations conducted throughout time by audit bodies and expert committees showed that, despite significant financial investments, quantifiable improvements in water quality were irregular and frequently fleeting. In several sections of the river, levels of Biochemical Oxygen Demand (BOD), a crucial indication of organic pollution, remained beyond allowable limits. This raised fundamental questions about whether infrastructure-led approaches alone could

[49] Ibid
[50] Ibid
[51] Ibid
[52] *Ganga Action Plan*, Phase II, launched by the Government of India in 1993.

achieve meaningful ecological restoration.[53]

Thus, while the Ganga Action Plan was pioneering in intent and scale, it exposed deeper structural challenges within India's environmental governance system. It demonstrated that river rejuvenation requires not only construction projects but sustained institutional coordination, accountability mechanisms, and adaptive management strategies.[54]

Critical Evaluation of the Ganga Action Plan: Structural and Operational Failures

Although the Ganga Action Plan was launched with ambitious objectives and substantial financial allocation, its outcomes fell significantly short of expectations. The failure of the programme cannot be attributed to a single factor; rather, it resulted from structural weaknesses in planning, institutional design, financial management, and long-term sustainability.[55]

One of the most fundamental structural flaws was the narrow conceptualization of pollution control. The Plan largely treated river pollution as a problem of municipal sewage disposal. While sewage interception and treatment were undeniably important, the approach underestimated the complexity of river ecosystems. Industrial effluents, agricultural runoff containing pesticides and fertilizers, solid waste dumping, sand mining, and reduced ecological flow were either inadequately addressed or ignored. By focusing predominantly on end-of-pipe solutions such as sewage treatment plants (STPs), the Plan failed to adopt an integrated river basin management approach.[56]

A second major failure concerned unrealistic infrastructure planning. The sewage treatment capacity created under Phase I was often based on outdated or underestimated projections of wastewater generation. Urban populations in cities along the Ganga River continued to grow rapidly, leading to a situation where newly constructed plants became insufficient within a few years.[57] Moreover, several STPs operated below designed capacity due to irregular electricity supply, mechanical breakdowns, and lack of skilled operators. In some instances, sewer networks required to channel waste to treatment plants were incomplete, rendering the plants partially redundant.

[53] Ibid
[54] Ibid
[55] *Ganga Action Plan*, launched by the Government of India in 1985.
[56] Ibid
[57] Ibid

Financial inefficiency also played a crucial role. Although large sums were allocated, delays in fund release and bureaucratic bottlenecks slowed project execution. Cost overruns were common, and monitoring of expenditure lacked transparency. Audit reports indicated that in certain cases, infrastructure remained underutilized despite heavy investment. The absence of performance-based accountability meant that implementing agencies were rarely penalized for delays or inefficiencies.[58]

Institutional fragmentation further weakened implementation. Multiple agencies at central and state levels were involved, but coordination mechanisms were weak. Responsibility for constructing sewage infrastructure often lay with state public works departments, while monitoring water quality was assigned to Pollution Control Boards[59]. Urban local bodies were expected to operate and maintain facilities, yet they frequently lacked financial autonomy and technical capacity. This division of responsibility without clear accountability diluted ownership of outcomes.

Enforcement against industrial polluters remained inconsistent. Despite statutory provisions under the Water (Prevention and Control of Pollution) Act, industries discharging untreated effluents into the river were not uniformly penalized. Political considerations and concerns about economic impact sometimes led to regulatory leniency. [60]Without strict enforcement, gains achieved through sewage treatment were offset by continued industrial contamination.

Another critical limitation was the absence of community participation. The Ganga holds deep religious and cultural significance, yet local communities were not meaningfully integrated into planning or monitoring processes. River cleaning was perceived as a government project rather than a shared societal responsibility. Successful river restoration models globally demonstrate that stakeholder engagement, public awareness, and decentralized governance are essential for sustainability elements largely missing in the early phases of GAP.

Perhaps the most overlooked issue was ecological flow. Rivers require adequate water flow to naturally dilute pollutants and maintain biodiversity. Excessive water extraction for irrigation, dams, and hydroelectric projects significantly reduced the self-purifying capacity of the river. The Ganga Action Plan focused on pollution input reduction but did not sufficiently address

[58] Ibid
[59] Ibid
[60] *Water (Prevention and Control of Pollution) Act*, No. 6 of 1974 (India).

water quantity management, which is equally crucial for river health.[61]

Empirical assessments of water quality following implementation showed only localized and temporary improvements. Biochemical Oxygen Demand (BOD) and coliform levels often remained above permissible limits in several stretches. This revealed a deeper policy lesson: infrastructure without governance reform does not guarantee environmental recovery.

In retrospect, the Ganga Action Plan was a pioneering initiative that acknowledged the seriousness of river pollution. However, its predominantly engineering-driven, centralized, and fragmented execution limited its effectiveness. The experience of GAP eventually informed later programmes such as the National Ganga River Basin Authority and Namami Gange, which attempted to incorporate broader institutional reforms.[62]

Comparative Analysis of River Protection Laws and Governance Models

By analyzing similar regulatory regimes across countries, comparative environmental law provides an analytical tool for assessing the efficacy of local legal systems. India's experience, especially under the Ganga Action Plan, may be better appreciated in terms of water pollution management and river restoration when compared to the governance systems used in China, the United States, the United Kingdom, France, and the European Union. The comparison is not based on geographical or cultural similarities but on institutional design, enforcement capacity, accountability mechanisms, and regulatory coherence.[63]

United Kingdom: Centralized Enforcement and Regulatory Continuity

The revival of the River Thames demonstrates the importance of sustained regulatory enforcement and institutional consolidation. By the mid 20th century, the Thames had suffered severe industrial and municipal contamination. However, the UK gradually strengthened its discharge licensing system, imposed strict penalties, and centralized environmental oversight under regulatory authorities such as the Environment Agency.[64]

Unlike India’s fragmented administrative structure, the UK model emphasizes coordinated

[61] *Ganga Action Plan*, launched by the Government of India in 1985.
[62] Ibid
[63] Ibid
[64] Environment Agency (UK), *River Thames Restoration and Pollution Control Measures*, 2000–2010

enforcement and consistent monitoring. Compliance is ensured through legally binding discharge permits, backed by significant financial penalties and criminal liability. Importantly, restoration was not treated as a short-term scheme but as a long-term regulatory commitment spanning decades. The Thames model illustrates that legal authority must be coupled with administrative continuity and rigorous compliance oversight.[65]

United States: Federal Oversight and Citizen Enforcement

With the passage of the Clean Water Act, the US significantly changed its system of water administration. This law created the National Pollutant Discharge Elimination System (NPDES), a government permitting system that prohibits the unapproved release of any pollutants. [66]Violations attract substantial civil penalties and, in serious cases, criminal prosecution.

A distinctive feature of the U.S. framework is the citizen suit provision, which empowers individuals and environmental groups to initiate legal action against polluters or regulatory authorities failing to enforce compliance. This mechanism strengthens accountability beyond administrative oversight. Additionally, federal financial assistance for sewage treatment infrastructure was tied to strict regulatory standards and measurable compliance benchmarks.[67]

Compared to India's experience under the Ganga Action Plan, the U.S. model demonstrates the importance of enforceable permits, high penalties, and participatory accountability.[68]

France: Basin-Based Financial and Administrative Governance

France pioneered river basin governance through decentralized yet coordinated basin agencies. Restoration of the Seine River was facilitated by a funding mechanism based on pollution charges imposed on industries and municipalities. These charges are reinvested into water management projects within the basin.[69]

The defining feature of the French model is its hydrological orientation. Rivers are managed

[65] Ibid
[66]Clean Water Act, 33 U.S.C (1972).
[67] Ibid
[68] *Ganga Action Plan*, launched by the Government of India in 1985.
[69] European Environment Agency, *Water Management in France: River Basin Agencies and Pollution Charges*, 2015.

according to ecological boundaries rather than administrative divisions. Decision-making involves multiple stakeholders, ensuring participatory governance. This contrasts sharply with India's department centric approach during the Ganga Action Plan, where basin-level coordination remained limited.[70]

The French experience underscores that sustainable funding and basin-level institutional authority are critical components of effective river restoration.[71]

European Union: Integrated Ecological Standards and Legal Accountability

A thorough transnational framework was established by the Water Framework Directive, which mandates that all member states attain "good ecological status" for water bodies. The Directive mandates river basin management plans, periodic assessments, and public participation.[72]

Its strength lies in binding targets and enforceable timelines. Member states that fail to comply may face proceedings before European judicial institutions. The Directive moves beyond pollution control to ecological integrity, incorporating biodiversity, hydromorphology, and sustainable water use.[73]

India's early river protection programmes, including GAP, largely focused on pollution abatement rather than ecological restoration. The EU framework demonstrates the importance of integrated environmental objectives supported by legal accountability mechanisms.[74]

Findings and Conclusion

The present study demonstrates that India's challenge in addressing river pollution, particularly with respect to the Ganga River, lies not in the absence of legal norms but in the structural weaknesses of governance and enforcement. The statutory regime established under the Water (Prevention and Control of Pollution) Act and reinforced by the Environment (Protection) Act provides a comprehensive legal basis for water pollution control. However, the persistent collapse of river health reveals a significant gap between normative design and practical

[70] *Ganga Action Plan*, launched by the Government of India in 1985.
[71] Ibid
[72] European Parliament and Council, *Water Framework Directive (2000/60/EC)*, 2000.
[73] Ibid
[74] *Ganga Action Plan*, launched by the Government of India in 1985.

implementation.[75]

A central finding of this research is that the Ganga Action Plan was primarily infrastructure-centric and engineering-driven. While sewage interception and treatment are necessary components of pollution control, the Plan underestimated the complexity of river ecosystems and the administrative realities of implementation. The absence of an integrated river basin authority, weak coordination among multiple agencies, and insufficient long-term maintenance planning undermined the sustainability of created infrastructure. [76]

The research further establishes that enforcement deficiencies significantly weakened statutory effectiveness. Although regulatory bodies possess legal authority to impose penalties, actual compliance monitoring remains inconsistent due to capacity constraints, political considerations, and delayed legal proceedings. [77]Comparative analysis with frameworks such as the Clean Water Act and the Water Framework Directive indicates that measurable standards, strict discharge permits, binding timelines, and accountability mechanisms are essential for sustained river restoration. [78]

Another key finding is the lack of basin-based ecological management in India's early river protection initiatives. Successful models such as the restoration of the River Thames illustrate that long-term regulatory continuity, institutional consolidation, and high deterrence penalties can reverse even severe environmental degradation. [79]In contrast, India's approach during the Ganga Action Plan period reflected administrative fragmentation and diffused responsibility, limiting accountability.[80]

Financial sustainability also emerged as a critical issue. Substantial public funds were invested in river cleaning projects, yet performance-based evaluation and operational maintenance were not adequately institutionalized. Without linking funding to compliance outcomes, infrastructure investments alone could not ensure measurable ecological recovery.[81]

In conclusion, the experience of river protection laws in India reveals a paradox: the legal

[75] Water (Prevention and Control of Pollution) Act, 1974; Environment (Protection) Act, 1986.
[76] *Ganga Action Plan*, launched by the Government of India in 1985.
[77] Water (Prevention and Control of Pollution) Act, 1974; Environment (Protection) Act, 1986.
[78] Clean Water Act, 33 U.S.C. (1972)
[79] Environment Agency (UK), *River Thames Restoration and Pollution Control Measures*, 2000–2010.
[80] *Ganga Action Plan*, launched by the Government of India in 1985.
[81] Comptroller and Auditor General of India, *Performance Audit Report on Ganga Action Plan*, 2000.

architecture is progressive and constitutionally supported, yet ecological outcomes remain unsatisfactory. The Ganga Action Plan, though pioneering in intent, exposed deep governance limitations within India's environmental regulatory framework.[82] River revival requires more than statutory enactment or capital intensive projects it demands integrated basin management, institutional accountability, consistent enforcement, ecological flow preservation, and sustained political commitment.

Ultimately, the restoration of the Ganga and other Indian rivers depends on transforming environmental governance from a scheme-based approach to a structurally embedded regulatory culture. Without aligning law, institutions, finance, and accountability within a coherent river basin framework, future initiatives risk repeating the shortcomings of the past.[83]

Recommendations

In light of the structural and operational weaknesses identified in the preceding analysis, meaningful reform in India's river protection regime requires systemic rather than cosmetic changes. The following recommendations are grounded in comparative insights and the lessons derived from the implementation of the Ganga Action Plan.[84]

First, India must institutionalize a legally empowered river basin authority for major inter-state rivers such as the Ganga River. River management should follow ecological boundaries rather than administrative divisions. A basin authority must possess binding regulatory powers over participating states, clear financial autonomy, and defined accountability mechanisms. Without centralized basin-level coordination, inter-state fragmentation will continue to dilute environmental outcomes.[85]

Second, enforcement mechanisms under the Water (Prevention and Control of Pollution) Act require strengthening. Penalties must be proportionate to the economic benefit derived from non-compliance. Administrative fines should be substantial, swift, and enforceable without prolonged litigation. [86]Establishing time-bound environmental adjudication procedures and

[82] Constitution of India, Articles 21, 48A, 51A(g) Water (Prevention and Control of Pollution) Act, 1974; Environment (Protection) Act, 1986.
[83] V. K. Sharma, *Environmental Governance and River Restoration in India*, Journal of Environmental Law, Vol. 24, 2018.
[84] *Ganga Action Plan*, launched by the Government of India in 1985
[85] Water Framework Directive, 2000/60/EC (EU); Environment Agency (UK), *River Thames Restoration and Pollution Control Measures*, 2000–2010.
[86] Water (Prevention and Control of Pollution) Act, 1974.

enhancing the technical capacity of Pollution Control Boards would significantly improve compliance monitoring.

Third, discharge permitting must become performance-driven and technologically monitored. Inspired by the regulatory rigor seen under the Clean Water Act, India should expand real-time effluent monitoring systems, mandatory public disclosure of compliance data, and periodic third-party environmental audits. [87]Transparency acts as a powerful deterrent and builds public trust.

Fourth, financial sustainability must be restructured. A "polluter pays" funding mechanism should be more rigorously operationalized. Industries and large municipalities should contribute basin-level environmental restoration charges that are reinvested into river conservation projects. Linking financial contributions directly to measurable pollution loads would incentivize cleaner production practices.[88]

Fifth, urban sewage management requires long-term operational planning rather than one-time infrastructure construction. Sewage treatment plants must be designed based on realistic projections of population growth and wastewater generation.[89] Dedicated maintenance funds, trained technical staff, and uninterrupted power supply are essential for sustained functionality. Infrastructure without operational viability only creates sunk costs without ecological benefit.

Sixth, ecological flow requirements must be legally mandated and scientifically determined. River health depends not only on pollution reduction but also on maintaining sufficient water quantity to support biodiversity and natural self-purification processes[90]. Integrating hydrological management with pollution control would move policy beyond narrow waste-treatment approaches.

Seventh, accountability mechanisms should be clearly defined. Borrowing from accountability-based governance models, specific administrative officers should be assigned measurable responsibility for designated river stretches. [91]Performance evaluation of officials

[87]Clean Water Act, 33 U.S.C. (1972)
[88] V. K. Sharma, *Environmental Governance and River Restoration in India*, Journal of Environmental Law, Vol. 24, 2018; *Ganga Action Plan*, 1985.
[89] Comptroller and Auditor General of India, *Performance Audit Report on Ganga Action Plan*, 2000; Water Framework Directive, 2000/60/EC (EU).
[90] National Ganga River Basin Authority, *Operational Guidelines for River Management*, 2009.
[91] European Commission, *Water Framework Directive: River Basin Management and Accountability Mechanisms*

should incorporate water quality indicators, thereby aligning administrative incentives with environmental outcomes.

Finally, community participation and public awareness must be institutionalized. River protection cannot remain solely a governmental responsibility. Public monitoring platforms, citizen reporting mechanisms, and environmental education initiatives should be integrated into policy design. [92]Meaningful participation enhances transparency and social ownership of conservation efforts.

If India seeks long-term ecological restoration of the Ganga and other rivers, reform must move beyond project based interventions toward integrated environmental governance. The lessons from the Ganga Action Plan demonstrate that infrastructure without enforcement, accountability, and institutional coherence, cannot achieve sustain river rebirth. Future policy must therefore align legal authority, administrative responsibility, financial sustainability, and ecological science within a unified river basin framework.[93]

[92] Journal of Environmental Management, Vol. 29, 2019.
[93] Comptroller and Auditor General of India, *Performance Audit Report on Ganga Action Plan*, 2000 National Ganga River Basin Authority, *Guidelines for Integrated River Basin Management*, 2009.