

Governmental Roles and Responsibilities in Ganga Rejuvenation: Policy Framework, Implementation Challenges and the Road Ahead

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Abstract

Nearly 43% of India's economy is supported by the Ganges, the country's longest and most revered river. About 27% of India's land area is covered by its basin, which includes Bangladesh, China (Tibet), India, and Nepal. However, the river is severely degraded despite its ecological and cultural significance due to unplanned urbanisation, fast population increase, rising industry, excessive use of agrochemicals, and infrastructure that obstructs its natural flow. The Namami Gange Program is one of several conservation efforts that have attempted to stop this loss since 1985. Nevertheless, neither the restoration of the river's uninterrupted flow (aviralta) nor the achievement of long-term improvements in water quality have been achieved. This study uses a collaborative governance lens and a historical-analytical approach to track policy changes from 1985 and evaluate the Namami Gange Program's efficacy. It cites the systematic disregard of tributaries as a major cause of policy failure based on government data (CPCB, NMCG, CAG, State Pollution Control Boards), parliamentary records, IIT consortium papers, and independent reviews. About 60% of the Ganga's flow and a significant portion of its pollution burden come from its tributaries. Despite the existence of formal interagency cooperation channels, their practical performance is subpar. Weak accountability, delayed initiatives, and underutilised budgets are the results of this fragmentation. The restoration of London's River Thames, on the other hand, shows how persistent public pressure combined with methodical, long-term intervention can result in noticeable improvements in water quality. The study comes to the conclusion that a deeper lack of responsibility among the institutions and people in charge of the Ganga's conservation is more likely to be the cause of the ongoing inability to revitalise the river than technical or financial limitations.

Keywords: Ganga rejuvenation, Government's role in Ganga rejuvenation, Historical background of Ganga rejuvenation, Impact of Ganga rejuvenation policy, Ganga river water quality.

Introduction

The Ganga River Basin, which makes up around 27% of India's total land area, is regarded as the country's largest water basin. It includes 11 states on the Indian subcontinent and covers an area of about 1.01 million square kilometres. Approximately 625 million people, or 50% of the Indian subcontinent's population, reside in the Ganga Basin region, accounting for nearly 16% of the world's population, according to "Ganga Vision" (2017). The Ganga River's drainage system encompasses not just the Indian subcontinent but also three more countries (Bangladesh, Nepal, and China/Tibet) and a total area of over 1,086,000 square kilometres. Approximately 80% of this, or 862,869 square kilometres, is located in the Indian subcontinent and accounts for 40% of the region's GDP. Furthermore, the Ganga River is the 41st largest river in the world and the 20th largest in Asia. Before emptying into the Bay of Bengal, the Ganges travels 2,500 kilometres through five states in central India. The Ganges is the longest river in India in terms of length. However, the Ganges has become one of the world's most contaminated rivers as a result of numerous human activities, river-degrading factors, rapidly expanding urbanisation and population, the growth of factories and the water they use, agricultural practices involving mineral fertilisers, the building of dams, barrages, and hydroelectric projects, and more. The Ganges receives 12 billion gallons of sewage each day from its catchment areas, including 2.5 billion litres of industrial waste. The Ganges' main stem receives 2.9 million litres of domestic sewage from Class I and Class II cities per day, while 501 MLD of effluent are released into the river by industrial facilities. Unknown or non-point sources, including open defecation, agricultural pesticides, dhobi ghats (washing grounds), bathing activities, partially burnt corpses, and solid waste disposal, released thousands of tonnes of sewage and solid waste into the river every day. Furthermore, recognised sources released 14,000 tonnes of sewage and solid debris into the Ganges' main stem every day.

By 2016, 144 sewers were dumping 6,614 MLD (million litres per day) of trash from industrial and home sources into the Ganges' main stem (CPCB, 2016). A 2019 CPCB report shows that over 10,612.51 million litres of trash were dumped into the Ganges per day from over 50 cities throughout the five riparian states during the pre-monsoon period; this amount increased from 10,612.51 MLD to 10,720.14 MLD during the post-monsoon period of the same year. The river's

water quality gradually declined as a result of the corresponding BOD loads, which were 427.83 tonnes/day and 348.7 tonnes/day, respectively (CPCB, 2019). The increasing divergence from recommended norms for metrics that indicate water quality, such as BOD, DO, Total Faecal Coliform, Faecal Coliform, and pH levels, is a strong indicator of this decrease. The Ganges, which has a special place in both the material and spiritual spheres, continues to play a major role in Indian politics. Its lasting impact is seen in both regional and national politics. The topic of cleansing the Ganges is particularly delicate, as it is directly related to Indian faith and sentiment. As a result, many plans for Ganges conservation were developed between 1985 and 2015; however, the river's uninterrupted flow (aviralta) could not be restored even after over forty years. In an effort to revitalise the Ganga, Prime Minister Narendra Modi's Bharatiya Janata Party government initiated the Namami Gange Project in 2014. On May 15, 2015, it was formally approved. The government of the Bharatiya Janata Party has made revitalising the Ganga a top priority. In order to guarantee the river's restoration, the government initiated the Namami Gange Project and set aside ₹20,000 crore for five years, from 2015 to 2020. The project consists of several new projects, ongoing projects under the National River Conservation Plan (Ganga Action Plan II), and previous initiatives like those funded by the Japan International Cooperation Agency (approximately ₹496.9 crore) and the World Bank (approximately ₹4,600 crore). Infrastructure development, sewage treatment, infrastructure construction, maintenance, and repair, riverfront development, river surface cleaning, biodiversity conservation, tree plantations, public awareness, industrial waste monitoring, and "Ganga Grams" (model villages situated along river banks) are the eight main components of these initiatives. For efficient infrastructure management, a top-down strategy is being used. In this strategy, the Namami Gange Project is implemented in large part by the National Mission for Clean Ganga (NMCG). It is the highest authority in charge of carrying out the national Ganga rejuvenation policy. This organization operated under the Ministry of Environment at first, but in 2014 the Indian government transferred its administrative connection to the Ministry of Jal Shakti. When NMCG was first founded, it was a division of the Ganga River Basin Authority.

However, the National Mission for Clean Ganga (NMCG) is the primary organization in charge of carrying out the programs developed by the National Ganga Council following the dissolution of the Ganga River Basin Authority and the establishment of the National Ganga Council. The role of local governments in carrying out Ganga rejuvenation plans is restricted to implementation, whilst State Program Management Groups (SPMGs) operate at the regional level and District Level Committees at the district level. They make very little effort to put these policies into practice on the ground. According to the 2017 CAG report covering the period from 2014 to 31 December 2017, the NMCG, various SPMGs, and implementing agencies used only 8% to 63% of the funds allotted between 2014 and December 31, 2017, despite the Government of India establishing several accountable and responsible institutional structures. The national government, state governments, local organisations, businesses, and the general people are just a few of the many stakeholders who share responsibility for keeping the Ganga clean.

Each has its own obligations, and as will be discussed later, there have been failures in carrying them out.

Central Government & NMCG	Responsibility: Formulating national policy, allocating budgetary resources (running into thousands of crores of rupees), and monitoring project implementation at the national level. Shortcoming: Persistent laxity in the effective utilisation of funds and weak ground-level monitoring.
State Governments & SPCBs	Responsibility: Constructing and maintaining Sewage Treatment Plants (STPs), and enforcing strict action against regulation-violating factories and industries. Shortcoming: Weak enforcement of existing laws, attributable to administrative negligence and insufficient political will.
Local Bodies (Municipal Corporations and Panchayats)	Responsibility: Preventing urban sewage and waste from entering the river, and improving solid waste management systems. Shortcoming: In numerous cities, untreated sewage continues to flow directly into the Ganga through open drains.
Industrial Units	Responsibility: Refraining from discharging untreated chemical and toxic effluents into the river. Shortcoming: Cost-cutting incentives drive many industries to illegally discharge

	untreated wastewater.
Masses	Responsibility: Refraining from disposing of religious offerings, household waste, and plastics into the river. Shortcoming: Limited public awareness and inconsistent fulfilment of individual social responsibility.

This is not the first initiative launched by the Government of India to revive the Ganga; several previous plans have been developed for the same purpose including GAP 1, GAP 2, National River Conservation Plan, Yamuna Action Plan 1, Yamuna Action Plan 2, Yamuna Action Plan 3, and Gomti Action Plan.

2. Theoretical and Analytical Framework

2.1 River Governance and Policy Failure:

Research on large river basins underscores that effective governance extends well beyond engineering interventions; it requires coordinated action across jurisdictions, administrative tiers, and sectors. Since the mid-1980s, the Ganga has been the focus of persistent policy attention, yet assessments continually show that the gap between policy aim and actual results is growing. The Comptroller and Auditor General's (CAG) performance audits and independent studies reveal persistent project completion delays, substantial under utilisation of funds allotted, poor sewage treatment plant (STP) operation and maintenance, and lax monitoring and enforcement procedures. The Ganga Action Plan's (GAP) limited success is attributed to a number of structural flaws, including a top-down, bureaucratic implementation model, a lack of data on water withdrawals and wastewater generation, the marginal involvement of local bodies and communities, and a narrow focus on the main stem rather than the entire basin. The Namami Gange Program (NGP) has received similar criticism despite having a much greater budget and a wider reach. The gap between high-level political promises and field-level implementation is a recurrent finding that is frequently linked to poor lines of accountability, overlapping mandates, and fragmented institutional setups.

2.2 A Critical Perspective on Collaborative Governance

Collaborative governance refers to arrangements in which a number of public and private entities work together to tackle difficult issues that cannot be solved by a single agency. Shared goals, official or informal coordination methods, collaborative decision-making, pooled resources, and reciprocal responsibility are some of its distinguishing characteristics. This strategy is thought to be essential for maintaining public involvement over time and for coordinating policies across water supply, sanitation, industry, agriculture, and urban planning in environmental management, especially for transboundary and multi-sectoral resources. When the collaborative-governance lens is applied to the Ganga, it poses a number of analytical problems, such as how federal ministries, state governments, pollution control boards, urban and rural local bodies, and other stakeholders share duties.

What official coordination structures are in place, such as District Ganga Committees, State Program Management Groups (SPMGs), and the National Ganga Council, and how do they really operate? How much do these organisations facilitate collaborative planning, funding, execution, and oversight? Where do coordination breakdowns occur, and how do they impact important results like tributary restoration, STP performance, and sewage interception? According to existing research, the Ganga's institutional architecture may seem complete on paper, but in reality it suffers from conflicting authorities, unclear accountability, and a lack of funding and technical resources at the sub-national levels. The collaborative-governance concept focuses on the incentives, power relationships, and information flows that influence actor behaviour and policy performance rather than just formal frameworks.

2.3 Management of the Whole Basin and Tributaries

The function of tributaries is an important but often disregarded aspect of Ganga administration. In terms of hydrology, tributaries account for around 60% of the Ganga's flow, with just 40% coming from the headwaters of the main stem. Significant pollution loads are transported from metropolitan areas, industrial clusters, and agricultural runoff by major tributaries such as the Yamuna, Ramganga, Kali, Gomti, Ghaghara, Gandak, and Kosi. The major river channel has been disproportionately targeted by governmental measures notwithstanding this. The

Parliamentary Standing Committee on Public Accounts' 125th Report (2024) makes it clear that all significant tributaries must be included in Namami Gange's vision of a "Nirmal" (clean) and "Aviral Dhara" (continuous flow). The paper also identifies the ongoing lack of a thorough, basin-wide management plan years after the National Ganga River Basin Authority (NGRBA) was notified, as well as the delays in completing long-term action plans. This discrepancy between main-stem-centric implementation and basin-level rhetoric is essential to comprehending the program's limited efficacy.

2.4 Methodology and Scope

In order to track the institutional development of Ganga rejuvenation policy from 1985 to the present and assess the Namami Gange Program in relation to its declared goals, this study uses a historical-analytical methodology. The analysis, which is situated in the fields of political science and public administration, employs a collaborative-governance framework to investigate the degree and boundaries of coordination between state and federal governments, pertinent ministries, pollution control boards, local organisations, and non-governmental stakeholders throughout the policy cycle, including design, financing, implementation, and monitoring. The study mostly uses secondary data from official documents, such as reports from the Central Pollution Control Board (CPCB), National Mission for Clean Ganga (NMCG), CAG, and State Pollution Control Boards; parliamentary records, particularly reports from the Public Accounts Committee; technical evaluations by the IIT consortium; orders from the National Green Tribunal; and certain independent investigations. These publications are the direct source of quantitative data on government spending, project schedules, and water quality regulations; citations are included throughout.

3. The Ganga Rejuvenation Policy's Historical Development

3.1 Phase I of the Ganga Action Plan (1985–2000)

Launched in 1985 under the Ministry of Environment and Forests, the Ganga Action Plan (GAP) was the government's first significant effort to clean up the Ganga. Building sewage treatment facilities and capturing and rerouting municipal sewage from a few municipalities along the main stem were its key priorities. It was a major policy commitment that acknowledged the importance

of the Ganga to the country and the necessity of focused investment. Notably, a committee established by the Central Pollution Control Board in 1979 discovered that approximately 260 MLD of industrial sewage and 1,340 MLD of domestic sewage were dumped into the Ganga every day by 25 towns spread across three Ganga-basin states during the first phase of GAP. Through sewage flow interception, redirection, and treatment, GAP's initial phase sought to enhance water quality. By 2000, ₹462 crore had been approved for this phase; the Ministry of Environment and Forests' Status Paper on River Ganga states that ₹452 crore had been spent as of March 31, 2000, but NMCG records as of March 31, 2014, place the amount at ₹433.30 crore. By 2000, 260 of the 261 approved projects had been finished. This phase encompassed a total of 25 towns in Bihar, Uttar Pradesh, and West Bengal (4, 6, and 15 towns, respectively).

State	Interception: Target	Interception: Achieved	Sewer Line (km): Target	Sewer Line (km): Achieved	STP Projects: Target	STP Projects: Achieved	STP Capacity MLD: Target/Achieved
Uttar Pradesh	40	40	136	136	13	13	375.09 / 375.09
Bihar	17	17	53.71	53.71	7	5	135.50 / 118
West Bengal	31	31	173.14	173.14	15	14	371.60 / 341.60
Total	88	88	362.85	362.85	35	32	882.19 / 834.69

Source: *SWOT Analysis, Ganga Action Plan*, pp. 31–32 (nmcg.nic.in); *CAG (2000)*; *Status Paper on River Ganga*, Ministry of Environment and Forests; *Status of Progress under National River Conservation Plan*, NMCG (31.03.2014).

By the late 1990s, it was evident that GAP had fallen short of its primary goals: pollution levels increased in tandem with urbanisation and population expansion, and water quality remained low in many areas. The experience demonstrated the limitations of dispersed, engineering-focused initiatives carried out in the absence of robust institutional frameworks and consistent political commitment.

A. 3.2 Intermediate Initiatives, the National Ganga River Basin Authority, and GAP Phase II (1993–2014):

GAP's second phase, which included 59 towns in Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, and West Bengal and extended to tributaries including the Yamuna, Gomti, Damodar, and Mahananda, was introduced in 1993 after the first phase failed to improve water quality. It was included in the National River Conservation Plan (NRCP) in 1996. The National River Conservation Directorate (NRCD) was created by the government in the same decade with the goal of expanding sewage interception and treatment to additional cities and rivers. However, these efforts were hampered by a lack of financing, a disjointed implementation, and lax enforcement. An key institutional development occurred in 2009 when the Ministry of Environment and Forests established the National Ganga River Basin Authority (NGRBA), which is headed by the prime minister and consists of chief ministers from the basin states. Its responsibilities included mobilising resources, guaranteeing cross-sectoral collaboration, and creating a thorough river-basin management plan. However, in reality, its influence was still little; detractors cited irregular meetings, sluggish basin planning work, and the ongoing division of duties among ministries and agencies. The river-basin management plan was created by a group of seven IITs, but long-term action plans languished for years and a fully operational basin-level framework was never finished on time. As of March 31, 2014, GAP-II, the Yamuna Action Plan (I–III), the Gomti Action Plan (I–II), the Damodar Action Plan, the Mahananda Action Plan, and NGRBA had a total sanction of ₹6,931.90 crore, of which ₹3,402.43 crore had been spent on various projects (some official calculations put the figure at ₹2,927.83 crore).

No.	Scheme	Sanctioned (₹ lakh)	Spent (₹ lakh)	Projects Targeted	Projects Achieved
1	Yamuna Action Plan (1, 2, 3)	160325.77	153235.34	307	298
2	Gomti Action Plan (1, 2)	31879.31	47460.88	61	59
3	Mahananda Action Plan	5488.23	5054.19	3	1

4	Damodar Action Plan	439.85	429.19	14	14
5	Ganga Main Stem (GAP)	59105.17	50530.80	314	264
6	NGRBA	435952	83533	65	16
	Total	693190.33	292782.5	764	652

Source: Report of the Lok Sabha Committee on Estimates, 2016–17, p. 91.

Sewage-treatment capacity progress during this time varied by scheme: under GAP (1,2), this amount of capacity was installed against 1,098.31 MLD sanctioned; under Yamuna Action Plan (1,2,3), 942.25 MLD was installed against 1,012.25 MLD sanctioned; under Gomti Action Plan, 392 MLD was installed against 423.40 MLD sanctioned; under the Damodar Action Plan, both sanctioned and installed capacity stood at 13.17 MLD under the Mahananda Action Plan, 50 MLD was installed against 59 MLD sanctioned. By July 13, 2015, a total of ₹4,168.55 crore had been spent on these initiatives, leading to the building of sewage treatment facilities with a combined capacity of 2,618.73 MLD, according to the Lok Sabha Committee on Estimates (2016–17).

Metric	GAP (1,2)	Gomti (1,2)	Yamuna (1,2,3)	Damodar	Mahananda	NGRBA	NRCP-Haryana	Total
Spent (₹ crore)	961	472.22	1526.4	4.29	50.54	1032.51	121.51	4168.55
Projects	524	59	304	14	1	25	0	927
STP Capacity (MLD)	1098.31	392	942.25	13.17	50	123	0	2618.73

Source: Expenditure on Cleaning of Ganga, Press Information Bureau, July 2014; Report of the Lok Sabha Committee on Estimates, 2016–17, p. 33.

The Gangetic dolphin was designated as India's national aquatic mammal in 2010, and three hydropower projects totalling 1,461 MW Pala Maneri, Bhaironghati, and Loharinag Pala were put on hold. In 2012, the area between Gaumukh and Uttarkashi was designated as an eco-

sensitive zone. Over the previous thirty years (1985–2015), around ₹4,000 crore was spent on Ganga-cleaning programs, according to the Lok Sabha Committee on Estimates (2016–17). A World Bank-assisted National Ganga River Basin Project study, citing IIT research, said that the Ganga basin produces over 12,051 million litres of sewage every day, and that different cleaning initiatives had only produced a total of about 5,716 million litres of treatment capacity. In particular, 7,301 million litres of sewage are produced daily along the Ganga's main stem, compared to a treatment capacity of just 2,126 million litres, resulting in a daily shortage of 3,987 million litres on the main stem alone.

3.3 The Namami Gange Program (since 2014):

The Namami Gange Program, approved as a flagship project with a budget of ₹20,000 crore in 2014–15, signalled the beginning of a new era in Ganga protection. Wastewater treatment, solid waste management, riverfront development (ghats and crematoria), industrial effluent monitoring, ensuring sufficient ecological flow (e-flow), afforestation, biodiversity conservation, and public involvement were all included in this more comprehensive approach that was implemented through NMCG. According to government sources, 167 sewage treatment facilities had been put into service by June 2025, resulting in a total treatment capacity of 3,781 MLD. Work has also been done on a few tributaries in addition to the main river, which reflects the basin-wide strategy described in policy papers. Additionally, the initiative has placed a strong focus on outside financial collaborations, such as World Bank support. Significant obstacles still exist in spite of this advancement. Delays in project completion, inadequate funding utilisation, flaws in STP operation and maintenance, and inadequate internal audit systems in a number of states have all been highlighted in CAG and parliamentary committee reports. These shortcomings were also mentioned in the Public Accounts Committee's 125th Report. Namami Gange was approved for over five times the cost of ₹20,000 crore for just five years, compared to the approximately ₹4,168.55 crore spent on Ganga rejuvenation over the preceding thirty years (1985–2015). Unfortunately, despite yearly increases in program funds, more than ₹9,000 crore of this has already been spent without yielding a favourable, long-lasting change in the Ganga's water quality.

demonstrates that structural issues with implementation have continued despite the amount of money spent on cleaning the Ganga, making it impossible to assure the river's cleanliness.

4. Water Quality: The Ganga's Water Grew More Polluted: From 1985 to 2010, the Ganga's faecal coliform levels continuously above recommended limits, according to the Ganga River Basin Management Plan (2015). In a similar vein, the CPCB's Pollution Assessment: Ganga River Report (2013) discovered that between 2002 and 2011, important water purity indicators such as pH, BOD, DO, faecal coliform, and total coliform significantly exceeded recommended levels. In light of this, the Namami Gange Program, for which ₹20,000 crore was approved, was initiated by the Bharatiya Janata Party administration that took office at the national level in 2014 with the goal of restoring the river's natural flow and cleanliness. The Ganga's aviralta and natural flow have not been restored nearly six years after the program's inception. The CPCB's 2018 report states that there was no improvement in water quality between 2014 and 2018; in fact, four more places were discovered to be contaminated. According to an additional CPCB report published in 2019, assessments carried out between December 2018 and March 2019 revealed that not a single location in the Ganga and its tributaries (Pandu, Saloni, Falgu, Gomti, Ramganga, and Varuna) had clean water, demonstrating that severe pollution affects both the main stem and its tributaries equally.

5. Obstacles to Ganga Preservation

Despite numerous rejuvenation initiatives launched by the Government of India to restore the Ganga's natural flow and water quality, nearly ₹4,000 crore had been spent through various government institutions by 2015 alone, yet no tangible outcome has followed (Lok Sabha Secretariat, 2017). Unchecked development has effectively turned the Ganga into a conduit for waste. A 2019 CPCB report notes that more than fifty towns across Ganga-basin states discharge sewage into the river through 257 drains, releasing approximately 10,612.51 million litres of sewage daily; 194 of these drains are on the main stem and 63 on tributaries (Central Pollution Control Board, 2019). Industrial pollution accounts for roughly 20% of the river's total pollution

load, and an estimated 14,000 tonnes of solid waste is dumped into the Ganga each day. Although government agencies have repeatedly claimed action against non-compliant industrial units, ground realities tell a different story. In 2020, 97 towns along the river's main stem discharged around 3,250 MLD of sewage daily, against a treatment capacity of only 2,074 MLD as of 30 May 2020.

Maintaining a river's natural flow is essential to sustaining its cleanliness, yet the Ganga has increasingly been treated by the state chiefly as a source of revenue a tendency epitomized by the persistent failure to reach agreement on ecological flow (e-flow). Between 2006 and 2018, twelve reports were submitted on restoring and sustaining the river's cleanliness, yet none achieved consensus: four recommended e-flow of up to 50%, while three recommended 20–30%. The government has since approved only 20–30% e-flow a level inadequate to keep the river ecologically alive. The principal obstacle to maintaining adequate e-flow is the network of barrages and dams along the Ganga, which withhold water needed for the river's flow in pursuit of revenue. A 2007 report by the World Wide Fund for Nature warned that rising pollution and over-exploitation could drive rivers toward extinction a warning that has led some experts to voice concern that the Ganga's present condition may itself be a sign of this trajectory. Given that the river underpins roughly 43% of India's economy, its disappearance would be economically catastrophic, with negative consequences extending well beyond the river itself. Despite repeated government claims of progress, the Ganga's condition continues to worsen, since industrial and domestic sewage entering the river has not been effectively curbed and its aviralta cannot be restored so long as its tributaries continue to be neglected.

A Committee on Estimates constituted under the Ministry of Water Resources, River Development and Ganga Rejuvenation, chaired by Murli Manohar Joshi, expressed sharp disappointment with the steps taken to clean the Ganga, noting the absence of any fixed, accountable authority (Lok Sabha Secretariat, 2017). Separately, a CAG report criticized the Ministry of Environment for spending funds outside the Ganga basin, and flagged the failure of senior officials at NMCG and state management groups to hold meetings within stipulated timeframes or to utilize Clean Ganga Fund resources (Comptroller and Auditor General of India, 2017). The National Green Tribunal, for its part, criticized the various authorized institutions for

spending approximately ₹7,034.64 crore on Ganga rejuvenation between 2014 and 2017 without producing concrete results, and directed them to assess water quality through 36 real-time monitoring stations (National Green Tribunal, 2018). The Supreme Court, too, has expressed disappointment with the government's Ganga rejuvenation policy, observing that although roughly 8.5 years had passed since the constitution of the Ganga basin authority, the government still had no clear roadmap for cleaning the river and that, at the current pace, even 200 more years would not suffice to complete the task (Kharwar, 2021).

Taken together, the persistent failure to rejuvenate the Ganga despite decades of policy intervention and substantial financial investment cannot be attributed to technical or financial difficulties alone. Instead, it reflects deep structural and governance problems: a basin-wide challenge addressed through fragmented, main-stem-centric interventions; an institutional architecture that distributes responsibility without ensuring clear accountability; and a pattern of implementation that systematically neglects tributaries, even though they account for nearly 60% of the river's flow and a large share of its pollution load.

Although it was formally introduced in 2015, the Namami Gange Programme for Ganga revitalisation has been operated by the ruling Bharatiya Janata Party administration since 2014. The largest obstacle to the initiative has been that, despite significant funding, there has not been a noticeable improvement in water quality. Significant amounts have also been spent on Ganga-related public relations, raising concerns in independent media. When considered collectively, technical or financial issues cannot be the only cause of the Ganga's ongoing failure to recover despite decades of governmental intervention and significant financial investment. Rather, it is a reflection of deep structural and governance issues: a basin-wide problem addressed through disjointed, main-stem-centric interventions; an institutional architecture that assigns responsibilities without guaranteeing clear accountability; and an implementation pattern that routinely ignores tributaries despite the fact that they contribute significantly to the river's pollution load and nearly 60% of its flow.

6. Present Gaps in Accountability

Despite decades of policy intervention and substantial financial investment, Ganga rejuvenation efforts suffer from critical accountability failures. The National Mission for Clean Ganga (NMCG) operates without clear responsibility for water quality outcomes, and expenditure tracking does not link spending to measurable environmental improvements. Regulatory bodies like the CPCB and SPCBs possess enforcement powers but face political interference, slow prosecution, and weak implementation capacity. River Rejuvenation Committees (RRCs), created by NGT order in 2018, remain advisory without statutory authority, dedicated funding, or digital monitoring tools. Recent claims of reduced polluted river stretches (from 351 to 296 in 2025) lack methodological transparency.

7. Key Reforms Proposed

7.1 National Level

- Link NMCG funding to measurable water quality improvements (BOD reduction, DO increase) rather than infrastructure creation alone
- Launch a public real-time dashboard displaying water quality data at city and ward levels
- Grant RRCs statutory status, dedicated budgets, and enforcement powers
- Introduce third-party audits of pollution monitoring data to prevent manipulation

7.2 State and Municipal Level

- Implement Extended Bulk Waste Generator Responsibility requiring large institutions to file annual waste returns
- Create escrow accounts for environmental compensation funds, ring-fenced for basin-specific cleanup

- Mandate public compliance reporting and NGT-based periodic assessments for urban local bodies

7.3 Oversight Mechanisms

- Strengthen NGT's proactive monitoring through regular action-taken reports and joint inspection committees
- Require quarterly parliamentary reports on fund utilisation, project progress, and water quality trends
- Simplify citizen access to NGT for filing pollution complaints

8. International Lessons : Successful river restorations (Danube, Elbe, Thames) demonstrate that sustained improvement requires integrated basin management, long-term political commitment, transparent monitoring, and clear institutional accountability not just financial investment or isolated projects.

9. Priority Activities for Effective and Accountable Ganga Rejuvenation :

Ganga rejuvenation can achieve greater success and accountability by integrating four priority activities with specific institutional and technological enhancements. These measures would shift the programme from an infrastructure-driven approach to one that is results-oriented, data-driven, and accountable.

9.1 Four Core Priority Activities

1. Outcome-Based Performance Framework for NMCG The National Mission for Clean Ganga (NMCG) should establish a comprehensive outcome-based performance framework that explicitly links project approvals and budget releases to quantifiable improvements in water-quality indicators. Key metrics should include reductions in faecal coliform counts at critical monitoring stations, increases in dissolved oxygen (DO) levels, and decreases in biochemical

oxygen demand (BOD). This framework must incorporate explicit annual targets, baseline-adjusted standards, and clear consequences for underperformance. By tying financial disbursements to verifiable environmental outcomes rather than mere asset creation, this approach would realign incentives toward measurable ecological improvements. 2. **Statutory Empowerment of River Rejuvenation Committees (RRCs)** River Rejuvenation Committees (RRCs) should be granted statutory status along with specific legal authority, dedicated financing, and enforcement capabilities. Legally empowered RRCs would be able to coordinate across departments (water resources, urban development, industry, agriculture), bridge jurisdictions (central, state, and district levels), resolve interagency conflicts effectively, and ensure tributary-specific action plans are developed, funded, and implemented in alignment with basin-wide objectives. This transformation would convert RRCs from advisory bodies into operational catalysts for integrated basin management. 3. **Enhanced Real-Time Water Quality Monitoring** The scope and operational significance of real-time water quality monitoring must be substantially expanded. Every polluted river stretch identified by the CPCB should have live BOD/DO dashboards with data that is publicly accessible, standardised, machine-readable, and routinely validated for accuracy. Technological systems require investment in sensor calibration, advanced data analytics capabilities, and integration with decision-support tools. This would enable near-instantaneous detection and response to pollution hotspots, emerging trends, and anomalies. 4. **Strengthened NGT Compliance Mechanisms** The National Green Tribunal's compliance capacity should be enhanced through mandatory quarterly action-taken reports on all directives, systematic follow-up mechanisms for monitoring implementation, transparent processes for assigning accountability in cases of chronic non-compliance, and simplified procedures enabling individuals and civil society organisations to file pollution complaints easily. These measures would strengthen participatory oversight and ensure judicial directives translate into ground-level action.

9.2 Two Cross-Cutting Enhancements

Technical Capacity Building Beyond installing digital monitoring equipment, substantial investment is needed in training personnel in data interpretation and analysis, developing early-warning models for pollution spikes, and using monitoring data to guide adaptive management

decisions. This analytical capacity would transform raw data into actionable intelligence for policymakers and implementers. **Institutional Coordination and Capacity Development** Ensuring consistent translation of policy intent into successful implementation requires more structured federal-state interaction through frequent joint review meetings, shared performance dashboards accessible to all governance levels, and comprehensive capacity-building programmes for state and local officials. These mechanisms would bridge the gap between national policy design and local execution.

Overall Impact:

Collectively, these priority activities and cross-cutting enhancements would fundamentally reorient the Ganga rejuvenation effort from infrastructure-centric spending toward a results-driven, data-informed, and accountable governance framework. This approach aligns with international best practices in river restoration while addressing India-specific institutional challenges.

10. Research Findings: Key Recommendations for Ganga Rejuvenation Policy Success

Based on comprehensive research findings, the following priority actions are essential to ensure the success of Ganga rejuvenation policies:

10.1 Infrastructure and Waste Management

Sewage Infrastructure Development For Ganga rejuvenation policy to succeed, it is imperative that various implementing agencies authorised for Ganga rejuvenation properly dispose of industrial and domestic sewage waste entering the Ganga River. This requires:

- Mapping and blocking all sewage discharge routes into the Ganga River
- Repairing deteriorated existing sewage lines
- Constructing new sewage lines where necessary

Notably, 70-80% of Uttar Pradesh lacks adequate sewage line coverage, making new infrastructure construction critical. Additionally, the polluter-pays principle must be strictly enforced under environmental pollution regulations, with penalties increased and strictly applied to deter environmental degradation. The Zero Discharge Policy should be implemented in the Ganga pollution elimination zone, though it has not been effectively enforced since August 2017 despite prolonged efforts. **Hydropower and Flow Management** A significant obstacle to achieving natural flow and aviralta (continuous flow) of the Ganga is the extensive network of dams, barrages, and canal systems. Approximately 10,715 megawatts of electricity is generated through the Ganga basin, and tributaries are not spared from hydropower projects. An estimated 70 additional hydropower projects are planned or proposed on Ganga's tributaries, which will severely impact the Upper Ganga region. These projects will affect 80% of Bhagirathi River water, 65% of Alaknanda River water, and 90% of smaller stream water. Despite these impacts, the government has not halted hydropower project construction on the Ganga. Restoring adequate water flow is essential for reviving the river.

10.2 Human Resources and Institutional Capacity

Critical Staff Shortages A major implementation gap is severe human resource shortages in agencies responsible for executing Ganga rejuvenation policy. The National Clean Ganga Mission has not issued any recommendations to address this. Key institutions affected include the Central Pollution Control Board, State Pollution Control Boards, NMCG, and State Management Groups. The CAG Report 2017 revealed significant staffing gaps during 2014-15 to 2016-17:

- **National State Management Groups** : 44-65% shortage (scientists, technical staff, administrative, and support staff)
- **State Management Groups** : 20-89% shortage with no recommendations from national bodies
- **CPCB** : 15% shortage of scientists and 35% shortage of technical staff

- **State-level PCBs** : Severe shortages across Bihar, Jharkhand, Uttarakhand, and Uttar Pradesh (76%, 73%, 56-71%, and 25% respectively)

This has become a major obstacle, preventing effective monitoring of the Ganga River.

10.3 Ganga Vision and Holistic Approach

Neglect of Ganga Vision The biggest problem in ensuring Ganga rejuvenation success has been the neglect of Ganga Vision. Research identifies four critical dimensions for river conservation and vitality:

- **Aviral Dhara (Continuous Flow)** : Prioritising uninterrupted water flow a river is alive only while it flows; stagnant rivers accumulate waste
- **Nirmalta (Purity)** : Ensuring cleanliness and water quality
- **Bau-Garbha Astitva (Groundwater Existence)** : Recharging groundwater reserves
- **Paristhitiki (Ecology)** : Preserving the river's ecological existence and biodiversity

While Namami Gange Programme includes these four components, their implementation remains inadequate and continues to be neglected.

10.4 Tributary Integration

Mainstreaming Tributaries To successfully clean the Ganga, tributaries must be given primary importance in Ganga rejuvenation policy. Although theoretically included under Namami Gange, ground reality differs significantly. Approximately 60% of water entering the Ganga comes through tributaries, meaning only 40% is the Ganga's original water. Critically, tributaries carry not only their water but also their accumulated sewage and pollution. Therefore, tributaries cannot be neglected in Ganga cleaning efforts.

10.5 Immediate Pollution Control

Real-Time Sewage Treatment There is an urgent need to immediately treat sewage from domestic and industrial sources before discharge into the Ganga. This requires upgrading the existing effluent treatment system to ensure all sewage is treated before entering the river.

10.6 Bureaucracy-Government Coordination

Improving Administrative Relations The relationship between bureaucracy and government requires significant improvement. In the Ganga cleaning programme, both play crucial complementary roles: government makes policy decisions, bureaucracy implements policies on the ground, and bureaucracy serves as advisor in policy roadmap formulation. Studying bureaucracy's role alongside government is essential for understanding policy success or failure. Current issues include severe coordination gaps in the administrative system, bureaucracy remaining largely passive in implementation, discouraging government-bureaucracy relations, and political pressure on bureaucrats at various times.

10.7 Comprehensive Project Roadmap

Detailed Project Reports (DPRs) The biggest problem in Ganga protection policy has been the absence of a comprehensive project roadmap. A clear, planned roadmap must be created for Ganga rejuvenation policy. Without it, even well-intentioned policies cannot succeed a problem evident since the policy's inception. For instance, the Ministry of Environment's NRCD stated in its affidavit that state governments created Detailed Project Reports (DPRs) within stipulated timeframes for Ganga rejuvenation and restoration. However, these DPRs were incomplete, preventing project approvals under Ganga rejuvenation. Similar issues persist in the current Namami Gange Programme. In 2014, the Supreme Court, while hearing the DPR case, noted that the government had created DPRs for Ganga rejuvenation and restoration, but they remained incomplete. The Court warned that even in the next 200 years, Ganga rejuvenation could not be ensured with such incomplete DPRs. The Court directed the central government to present DPRs clearly and systematically through PowerPoint before the Court. Similarly, the 2017 CAG Report

on Ganga rejuvenation (Namami Gange) performance audit revealed that in 2009, seven IIT institutions were contracted to create DPRs for Ganga rejuvenation and restoration following NGRCB's formation. However, concerning, even after approximately 8.5 years, no long-term plan has been created for ensuring Ganga rejuvenation and restoration.

10.8 Coordination and Data Consistency

Establishing Coordination and Uniformity Coordination and uniformity must be established among authorised institutions implementing Ganga rejuvenation policy. This would enable expectation of consistent data rather than conflicting figures a major deficiency currently observed in Ganga rejuvenation policy.

10.9 Political Will and Competition

Strengthening Political Commitment Political will in the Ganga rejuvenation domain must be strengthened. Various political parties' roles have remained questionable in this area. Different political parties should genuinely perform their actual roles in Ganga rejuvenation beyond personal interests or convenience. Additionally, political competition in the Ganga rejuvenation domain must be encouraged, as its absence has been a significant deficiency.

10.10 Corporate Social Responsibility

Enhancing CSR Participation Corporate Social Responsibility must be promoted to ensure Ganga rejuvenation and restoration programme success. Corporate houses should voluntarily allocate portions of their profits toward Ganga's aviralta (continuous flow), which would prove a milestone in programme success.

10.11 Expert Teams

Forming Specialised Expert Teams Expert teams should be constituted in the Ganga rejuvenation domain so that their knowledge and experience can be effectively utilised for Ganga rejuvenation efforts.

10.12 Federal Coordination

Centre-State Coordination in Federal Structure India's federal governance structure inherently shows overlapping roles between state and central governments. Typically, the central government blames state governments to deflect from its own failures, while state governments shift responsibility to the centre to hide their inefficiencies. Local governments are not immune either, manifesting as basic resource shortages, delays, and fund deficiencies. Therefore, coordination between central and state governments in the Ganga rejuvenation domain is essential for easier policy implementation. Simultaneously, rural and urban local institutions' capacity must be developed so they can independently ensure Ganga cleaning without depending on central government favour or state government patronage, leading to policy implementation success.

10.13 Addressing Social Apathy and Religious Activities

Managing Religious Contributions to Pollution One of the biggest problems in increasing Ganga pollution is social apathy and religious activities. Religious activities contribute approximately 5% to total Ganga pollution, manifesting social apathy toward the river. This includes idol immersion, Shiv offerings, flower and garbage disposal, and cremation materials. Paradoxically, while Hindu devotees worship the Ganga as a goddess (Mother), they simultaneously pollute it without hesitation. In other words, while Hindu devotees have immense reverence for the Ganga, this very sentiment becomes a cause of pollution. While India's common citizen kills the Ganga with domestic and industrial waste, the Ganga simultaneously kills Indian citizens every moment in return. Therefore, partial restrictions on religious offerings are necessary. Simultaneously, public awareness efforts must be accelerated, as ensuring Ganga cleaning without public cooperation is impossible. Notably, the Ganga rejuvenation programme has been a victim of public cooperation absence since its inception.

10.14 Accountable Institutions

Creating Responsible and Accountable Institutions For ensuring Ganga rejuvenation success, accountable and responsible institutions must be established. The Lok Sabha's 16th Estimates Committee in 2016 severely criticised Ganga rejuvenation efforts. Although third-party institutions were created following the 2016 Committee's recommendations, no information is available on NMCG's portal regarding them. Additionally, the government's complex interdependence policy has been the biggest problem in the Ganga rejuvenation path. Ten ministries are involved in implementing Ganga rejuvenation policy, with central government systems playing crucial roles. State government working groups also play important roles, including local government agencies all contributing to increased complex interdependence in policy implementation. Therefore, responsible and accountable institutions must be created in the Ganga rejuvenation domain.

10.15 Learning from International Examples

Adopting Global Best Practices For Ganga rejuvenation policy success, lessons must be learned from other countries. Notably, the Ganga is not the world's only polluted river. Examples like the Thames and Rhine rivers demonstrate that improving their effluent systems and administrative structures, combined with public cooperation, successfully cleaned these rivers. Applying these lessons to the Ganga domain can help make the river clean.

10.16 Non-Governmental Collaboration

Engaging Non-Governmental Organisations For Ganga rejuvenation policy success, non-governmental support must be sought alongside government efforts. Many non-governmental organisations work in the Ganga domain. Information provided by NGOs related to the Ganga rejuvenation and restoration programme can play a milestone role in programme success.

10.17 Online Mapping and Geo-Records

Creating Accurate Spatial Data Clear and planned online mapping and geo-records must be created. A major Ganga cleaning problem has been the inability to accurately estimate the Ganga River's geographical length. Administrative records show varying figures for instance, some testimonies cite 2,525 km while other administrative records show 2,500 km. This problem extends beyond the main Ganga to its tributaries. Ganga rejuvenation policy will only become realistic when all Ganga-related information is reliable and clear. This requires accurate knowledge of villages, cities, drains, hospitals, industrial units, and sewage loads located in the Ganga's riparian zones. However, precise and planned information related to the Ganga is currently lacking.

10.18 Decision-Making and Management

Addressing Governance Failures The government must work on decision-making and management problems hindering Ganga rejuvenation policy success. Decision-making and management issues have proven the biggest obstacles to policy failure, requiring immediate attention and reform.

11. Conclusion

The ongoing inability to revitalise the Ganga cannot be solely attributable to technical or financial challenges, even after over forty years of policy involvement and significant financial expenditure. Rather, it is a reflection of deep structural and governance issues: a basin-wide problem that is addressed through fragmented, main-stem-centric interventions; an institutional architecture that assigns responsibilities without guaranteeing clear accountability; and an implementation pattern that routinely ignores tributaries, despite the fact that they contribute significantly to the river's pollution load and nearly 60% of its flow. This study, which employs a collaborative-governance lens and a historical-analytical approach, demonstrates that the Ganga Action Plan and the Namami Gange Programme share a common shortcoming: they have primarily treated the Ganga as a collection of discrete projects (sewage treatment plants, ghats, riverfront development) rather than as an integrated socio-ecological system that requires coordinated, basin-wide management. Pollution carried by the Yamuna, Kali, Ramganga, Gomti,

and other tributaries continues to undermine downstream investment despite the prevalence of "river-basin management" and "holistic rejuvenation" in policy documents. However, planning, financing, and monitoring in practice continue to be biased toward the main river and a few major urban centers. The National Ganga Council, NMCG, State Program Management Groups, and District Ganga Committees collectively form a multi-level governance system that, on paper, seems to be a complete institutional architecture for Ganga protection. A distinct reality, however, is revealed by audit reports and parliamentary committee findings: overlapping mandates, ambiguous lines of authority, delayed decision-making, underutilised funding, and badly maintained and run infrastructure. Years after NGRBA was established, a thorough river-basin management plan is still lacking, as stated clearly in the Public Accounts Committee's 125th Report (2024). The policy's poor effectiveness is largely due to this discrepancy between formal institutional design and real functional coordination, which reflects a failure in the incentives, information flows, and accountability mechanisms that support collaboration in addition to a lack of institutions. Because no single authority is held entirely accountable, the broad dispersion of responsibility within this system frequently serves as a shield: when results fall short, each player may refer to the shortcomings of others. The River Thames in London, on the other hand, demonstrates a different approach: persistent public pressure, a strong regulatory framework, and long-term institutional change resulted in a long-lasting improvement in water quality. This proposes a number of strategic changes for the Ganga, including shifting policy away from a project-centric approach and toward a basin-wide approach; integrating time-bound, clear plans for each major tributary into a single, publicly accessible and regularly updated Ganga River Basin Management Plan; strengthening institutional arrangements to remove duplication and clarify accountability; increasing the accessibility and comparability of data on water quality, project progress, and fund utilisation across states; stepping up enforcement against industrial polluters and noncompliant municipalities; and transforming community monitoring and grievance-redress mechanisms. In the end, the question is not whether India can afford to clean the Ganga, but rather whether it can afford the danger of failing to do so. In addition to maintaining vital ecosystems and supporting the livelihoods of hundreds of millions of people, the river is a potent emblem of culture and civilisation. The evidence in this paper demonstrates that the main challenge is not a lack of information or resources, but rather a

persistent failure of governance and accountability. This issue can only be resolved by high-level political will, institutional reforms that link incentives to results, and sustained dedication that transcends election cycles. The idea of a "Nirmal and Aviral Ganga" can only become a reality after that.

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