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Review article

Review Article on Bridging Policy and Practice Gaps in Marine Litter Management: A Call for Integrated Solutions with Local Government Institutions

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ABSTRACT

Marine litter has emerged as a global issue and a growing problem with ecological, social, and economic threats to coastal areas. This article addresses the policy practice gap of managing marine litter in Bangladesh by focusing on the involvement of Local Government Institutions (LGIs). The task has identified the barriers and potentials for closing this gap at the local level through a content analysis of 299 and 25 policy documents, including international agreements, national policy frameworks, and regional reports that were de-segregated. The paper adopts the Institutional Analysis and Development (IAD) framework to analyze challenges resulting from different enforcement mechanisms, poor communication among stakeholders, and a lack of resources. Key findings have revealed that LGIs have launched some community-based activities, such as waste separation at source, beach cleaning, recycling and others; their efforts are constrained by a lack of funds (meaning they may never reach their potential), a shortage of technical know-how, and a low level of public awareness. The study emphasizes the importance of incorporating indigenous models into national policies and highlights the need to overcome the disconnection between policy and practice by fostering participatory policymaking, building capacities, and promoting multi-stakeholder partnerships. The study finally concentrates on the need for an adaptive policy scheme to support LGIs and enable sustainable marine litter management.

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Introduction

Marine litter has considered as one of the significant contemporary environmental concern issues, leading to important ecological, economic, and social implications (Râpă et al., 2024; Sambandam et al., 2024). Concurrently, challenges are not restricted to the national level and therefore require actions along with the international together with local levels. Internationally, instruments such as the MARPOL Convention (MARPOL may refer to both MARPOL Convention (1973/78), the Honolulu Strategy (2011), and UN Sustainable Development Goal (SDG) 14 focus on controlling marine pollution through preventive measures and better management (Bhat et al., 2025; Techera & McCann, 2024).

At the national level, a few countries (among which Bangladesh also belongs) utilize more overarching like the Environment Conservation Act (1995) and subsequent rules regarding solid waste management (2021), as proxies for regulating marine litter (Ahmed et al., 2025; Borongan & NaRanong, 2022). However, still no dedicated marine litter policy in Bangladesh, which creates ambiguities in enforcement, overlapping responsibilities, and weak accountability (Prantor et al., 2025; Saikot et al., 2025). Existing national policy framework focuses on conservation and waste management but do not address marine litter as a standalone issue (Ahmed et al., 2025; Kasar & Songachan, 2024). This fragmented policy environment demonstrates the urgency of harmonizing national objectives with local implementation strategies that can better address context-specific challenges.

However, local government institutions (LGIs) served as frontliners in waste and environmental management. Waste services are supplied, local regulations enforced, and communities mobilized by Municipalities and Union Parishads (Anokye et al., 2024; Karademir & Özbakır Acımert, 2024). Community-led waste segregation, beach clean-up drives, and small-scale recycling schemes have

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been experimented with in coastal districts like Cox's Bazar and Khulna (Ahmed et al., 2024). There are also instances where LGIs work in partnership with NGOs and the private sector to set up waste-to-resource systems such as compost or plastic recycling units (Ansar et al., 2025; E J Ferdin et al., 2025). For example, Cox's Bazar Development Authority has collaborated with international NGOs to raise awareness on solid waste management under tourism-dependent zones to reduce litter leakage into the Bay of Bengal (Bashar & Bernell, 2025; Parveen, 2024). In fishing villages, union parishads on the coast of Satkhira district have taken a more casual approach: trying out ad hoc deals with youth clubs to pick up and recycle single-use plastics (Ashrafuzzaman, 2023). This is not to say that civil society cannot lead the way in addressing public health issues, as we see from these cases, it has become clear that the power of going at the problem from all levels when local governments are given resources, technical aging capabilities, and partnerships. The absence of contextual models adjusted for disaster-prone coastal communities in which waste leaks into flooding and cyclones, along with exacerbating waste leakage into rivers and seas, further widens the gap between policy aspirations and ground realities (Dayananda et al., 2025; MacAfee & Löhr, 2024).

In addition, content analysis of national policies identifies that although marine litter is indirectly addressed under solid waste, biodiversity, and pollution control laws, no one explicitly recognizes the cross-sectoral nature. This misalignment negatively affects stakeholder mobilization and community participation and results in over-stretched, under-resourced local governance. Bringing this policy together with practice divides, it is essential to incorporate local governance models into national frameworks. Local authorities have an intimate understanding of local customs, socio-economic factors, and environmental sensitivities, and are therefore crucial in the development of adaptation strategies (Kumar et al., 2025; Micu & Roznovietchi, 2025).

Apart from, community-based waste management in coastal communities can be scaled up through integration with national aims on the circular economy, especially the approach of turning trash into cash, such as converting plastic waste to a valuable product or alternative livelihoods (Kumar et al., 2025; Suryawan & Lee, 2025). The adoption of local monitoring systems, like the participatory beach litter survey in France, into national reporting mechanisms may help enhance accuracy and accountability (Baccar Chaabane et al., 2024; Merlino et al., 2025).

Further, in accordance with Institutional Analysis and Development (IAD) framework application at local levels and the interaction of mechanism with outcomes require systematically connected with top level policy goals (Dizani et al., 2024; Jia, 2023). However, this approach reinforces that local governments are not only implementers but co-producers of adaptive governance solutions by which marine litter challenges could be addressed in a locally relevant and specific manner. Therefore, a justice-oriented adaptation lens also suggests the need to focus on vulnerable coastal groups like women or indigenous people to guarantee their equitable access to resources and involvement in decisions over resource use. The purpose of this research is therefore twofold: to critically address the policy and practice gap in marine litter management in Bangladesh and to focus on connecting with the role of LGIs as a first-point implementer when it comes to adaptation strategies. Ultimately, it is at the confluence of local models, national frameworks, and global commitments where policy and practice gaps towards an effective marine litter governance will be bridged to secure resilient coastal ecosystems and communities.

Thematic Study

In this thematic study, policy deployment and real practices of marine litter in Bangladesh show a strong disconnection. Although policies at the national and regional levels-Solid Waste Management Rules (2021), National Environment Policy (2018), Coastal Zone Policy (2005)-provide broad guidance on waste management and coastal protection, they are not specific to marine litter. Adopting IAD framework, this thematic analysis looks for common themes in the policy documentation, institutional practices and community interventions. The key issues of legislative lacunas, weak enforcement, stakeholder interaction and local level adaptive attempt stand out. The IAD lens shows that rules are not well aligned, actor responsibilities not clear, and monitoring weak. Despite theoretical alignment

Policy Framework and Coordination Gaps

There are gaps between policy formulation and implementation in Bangladesh marine litter management, a thematic analysis reveals. Important policies are Solid Waste Management Rules, National Environment Policy, and Coastal Zone Policy since 2021, 2018, and 2005 respectively. However, they do not create a marine litter framework (Islam, 2022; Murshed et al., 2022). Although there are objectives related to risk management, sustainable production, and circular economy theoretically, yet their existence across various agencies results in a huge coordination gap. Further, the IAD framework reveals that rules are not well aligned, actor responsibilities not clear, and monitoring weak.

Local Government Initiatives and Community-Driven Actions

Municipalities and Union Parishads are important institutions at the local government level that encourage community upkeep activities. Efforts like having separate waste bins, cleaning up beaches, and making recycling and composting facilities available locally are some initiatives that show grassroots involvement (Kumar et al., 2025; Suryawan & Lee, 2025). Shah (2024) mentions NGOs and community groups are supporting the creation of waste materials into a product with value like recycling single-use plastics into building blocks and items related to livelihood activities. Communities on the coast of Cox's Bazar, Khulna and Satkhira are testing out a participative process to remove litter from the coast, showing locally adaptive action (Ashrafuzzaman, 2023; Bashar & Bernell, 2025). Still, limited financial and technical resources, as well as legal constraints, give rise to structural constraints.

Cross-Cutting Implementation Challenges

Marine litter management is impaired by cross-cutting issues, including lack of stakeholder involvement, capacity gaps and coordination gaps. There is a lack of coordination between the government departments, industry players, NGOs and local communities (Ahmad & Du, 2025; Galleli & Amaral, 2025). Availability of skilled staff, infrastructure and funding is a capacity constraint. There is an overlap of responsibilities among the ministries, departments, and local governments which hampers the administrative coordination in monitoring and enforcement. Initiatives that are adaptive locally in scope are frequently specific, stand-alone programs that are not recognized in a planning or policy framework on the national level.

Policy-Practice Disconnect

Prominent researchers like Kaiser (2024), Yigitcanlar et al. (2024) and Gong (2024) emphasizes a persistent gap between theoretical policy documents and actualized local-level implementation. Laws and policies set standards on waste disposal and emission treatments, and on Circular Economy-related actions. E.g., the laws and policies set broader goals for the protection of biodiversity, pollution abatement, and coastal sustainability (Alam et al., 2025, Hasan et al., 2025). According to the Solid Waste Management Rules (2021), there are recycling standards, composting standards, and emission standards. The National Environment Policy (2018) focuses about environmentally sustainable production and consumption patterns.

Implementation Barriers at Local Level

In the empirical level, local governments are however constrained by inadequate infrastructure support for waste separation, recycling and disposal that results into open dumping of refuse in rivers and coastal waters. However, a good deal of disparity in the enforcement of regulations and monitoring as well as reporting systems are very limited (Hossain et al., 2025; Kumar et al., 2024), together with public information drives but they are disjointed and most times do not capture the attention of the marginalized populations (Hossain et al., 2026). Despite elaborate policy frameworks, debris gets gathered on shorelines perpetually (Weststrate et al., 2024). Factors leading to this include unclear mandates, lack of funds, poor collaboration between agencies, traditions in waste management which cause litter to end up in water bodies, and technical constraints. For example waste segregation units at community level has been initiated by local government authorities in Cox's Bazar including pilot recycling initiatives; however they are yet to expand their services beyond the tourism-driven areas to cater for slum dwellers (Bashar & Bernell, 2025; Shapna et al., 2025).

Institutional Analysis and Governance Challenges

Using the IAD framework, misaligned rules, unclear actor responsibilities, and inadequate monitoring are identified as key impediments. Local authorities, however, are typically capitalized with knowledge of community behavior and environmental risk and socio-economic conditions but their decision-making power is limited by a top-down approach which can leave the coastal communities prone to loss ecologically and economically (Galleli & Amaral, 2025; Jia, 2023). Cross-municipality patterns show repeated resource deficit, capacity restriction and stakeholder coordination challenges (E J Ferdin et al., 2025; Hossain et al., 2025). Apart from, stakeholders of local government often fill these gaps, but strategies remain isolated and disconnected from existing policy frameworks (Parveen, 2024; Shapna et al., 2025).

Pathways Forward: Integration and Capacity Building

Closing these gaps involves incorporating community-run waste management initiatives into national country plans, aligning with multi-stakeholder partnerships have to engage public sector, non-governmental organizations (NGOs), and local communities in sharing of technical know-how, financial resources, and monitoring mechanisms (Kaiser, 2024; Kumar et al., 2025). Policy reform should create clear marine litter frameworks detailing roles, enforcement mechanisms, and incentives for local government and community stakeholders. Capacity building programs should strengthen local government human and technical capacity along with training in case of waste segregation, recycling technologies, and adaptive mechanism practices (Sambandam et al., 2024). Therefore, if Bangladesh is capable of harmonizing the top-down approach of policy directives with the bottom-up approach of adaptive practices, then it can move towards a more holistic, preventive and circular economy model when managing marine debris.

Methodology

The present study follows a qualitative research methodology based on policy content analysis through PRISMA guideline to address the implementation mechanism in the case of the policy-practice gap for the marine litter issue in Bangladesh. Discrepancies, incoherencies, and possibilities for integration of these local adaptive models into national frameworks are exposed by comparing them with national policies, international conventions, and regional reports.

Content Analysis of Secondary Literature, International Conventions, and Regional Policy Reports

The study was guided by a primary method of content analysis, which is systematic and replicable in that it allows the categorization and interpretation of large quantities of textual information into patterns or themes based on explicit coding guidelines. This approach was followed to explore a wide range of source materials from international (convention and framework), national policy instrument. Regional project-specific reports and plans, secondary academic literature as well as practice-based evidence. Collectively, these sources give an impression of the long-standing policy and practice gap in marine litter management and literature analysis through Biblioshiny and Vos viewer software.

Table 1: Policy and Practice Sources for Marine Litter Management in Bangladesh

Category	Examples	Relevance
International Conventions & Frameworks	MARPOL Convention (1973/78), Honolulu Strategy (2011), SDG 14 (Life Below Water)	Provide global commitments and standards for marine litter prevention and reduction
National Policy Instruments	Marine Pollution Ordinance (1977), Environmental Conservation Act (1995), Coastal Zone Policy (2005), Ecologically Critical Area Management Rules (2016), Bangladesh Biological Diversity Act (2017), National Environment Policy (2018), Solid Waste Management Rules (2021), National Adaptation Plan (2023)	Establish legal and institutional frameworks for waste management, coastal protection, and adaptation strategies
Regional & Multilateral Agency Reports	Basel Convention's Plastic Waste Partnership, World Bank's Sustainable Coastal and Marine Fisheries Project, NGO project reports	Highlight donor-driven initiatives, technical assistance, and capacity-building measures
Secondary Literature	Peer-reviewed journal articles, empirical case studies on coastal governance, waste management, and community adaptation	Provide contextual analysis, evidence of gaps, and documentation of innovative practices
Local Government & Practice-Based Policies	LGI-led waste segregation programs, community recycling schemes, participatory beach clean-ups	Demonstrate grassroots adaptive initiatives and LGI roles, but often lack integration into broader national frameworks

(Author Produces, 2025)

Key words, Database, Documents Identification and Sampling

Documents were selected and sampled purposively, taking into consideration the most relevant to marine litter management. According to these criteria, a total of 25 key texts were detected: international formal treaties, first and second-order national policies, and regional project reports, including 299 relevant secondary literature documents from Scopus, PubMed, Dimensions, and Google Scholar databases. However, this inclusion criterion provides a comprehensive overview of both policy frameworks and practical initiatives across multiple governance scales. The search keywords employed comprised of terms like marine litter, waste management, marine pollution, solid waste, coast ecosystems, and Bangladesh. The main target was the secondary sources, the policy documents, international frameworks (e.g., MARPOL Convention), the national policies (e.g., Solid Waste Management Rules, National Environment Policy), and the regional reports concerning the topic of marine litter management.

Table 2: Sampled Documents for Analysis

Category	Number of Documents	Examples
International Conventions & Frameworks	3	MARPOL (1973/78), Honolulu Strategy (2011), SDG 14
National Policies & Acts	8	Marine Fisheries Ordinance (1983), Environmental Conservation Act (1995), Coastal Zone Policy (2005), Plastic Bag Regulation (2010), Bangladesh Environment Policy (2018), Solid Waste Management Rules (2021), National Biodiversity Strategy (2022), National Adaptation Plan (2023).
Regional/Project-Based Reports	14	Basel Convention's Plastic Waste Partnership, World Bank's Sustainable Coastal and Marine Fisheries Project, UNEP regional reports, NGO reports (e.g., Coastal Cleanup initiatives), FAO project reports, and local government assessments
Secondary Literature	299	Human Plastics, Ecosystem, Environmental Pollution, Environmental Monitoring and Policy, Waste Product, Waste Management, Marine Pollution, Local government integration marine litter management, Climate Change, Solid Waste, Marine Debris, Fisheries and Plastic Pollution.

(Author Produces, 2025)

Development of Analytical Framework (Coding Scheme)

The coding framework like (IAD), was organized along five thematic domains: Policy Coverage; Institutional Mandates and Enforcement; Resource and Capacity Provisions; Stakeholder Engagement; Adaptive Practices and Circular Economy Linkages. Each encompassing domain was refined via sub-codes to reduce the potential for researcher bias and interpretation coherence. For instance, Policy Coverage categorized policies that made an explicit reference to marine litter, indirect implications under related sectors (e.g., solid waste or biodiversity), and no references at all. This methodical coding framework enabled a transparent and replicable analysis of governance gaps for marine litter.

Table 3: Coding Framework (Based on IAD Framework)

Thematic Category	Code Definition	Sub-Codes / Indicators
Policy Coverage	The extent to which marine litter is addressed in policy texts.	Explicit mention of marine litter, Indirect coverage (solid waste, biodiversity, coastal policy) , Absence of coverage
Institutional Mandates & Enforcement	Clarity of institutional responsibilities, legal authority, and enforcement mechanisms.	Clear division of mandates ,Overlapping/unclear responsibilities, Presence/absence of enforcement tools
Resource & Capacity Provisions	Accessibility of technical, financial and human resources for effective implementation.	Dedicated budget, Technical/technological support, Human resource allocation
Stakeholder Engagement	Extent of involvement of LGIs, NGOs, industries, and communities in governance and implementation processes.	Multi-level inclusion, Partnerships and collaboration, Absence of engagement
Adaptive Practices & Circular Economy Linkages	Integration of adaptive local models, recycling, or waste-to-value practices into policy frameworks.	Community-driven practices. Recycling initiatives ,Waste-to-value/circular economy linkages

(Author produces, 2025)

In this study, the Institutional Analysis and Development (IAD) model in this study was operationalized by a systematic content analysis that included five thematic domains e.g. policy coverage, institutional mandates, resource and capacity provisions, stakeholder engagement, and adaptive practices associated with the circular economy. The following domains were used to code the framework in order to classify policy texts and institutional practices. The explicit mentioning of marine litter in the policies, clarity of the enforcement mechanisms, and the role of the local government institutions (LGIs) in waste management were also identified as the sub-codes. Through this coding process, following issues about the policy-practice connection were identified: the lack of resources at the local level and overlapping responsibilities.

Coding Process and Extracted Themes

The process of coding was recursive, and there were 3 phases. In the course of "Initial Coding", every document was read through, and highlighted passages were classified (marine litter: clearly addressed / obscurely mentioned / missing). In Axial Coding, we made connections between codes and practice – such as contrasting clauses in the Solid Waste Management Rules (2021) on segregation and recycling with reports of LGI-led segregation efforts in Cox's Bazar and Satkhira. Selective Coding refined central themes that explain why high-level policy aspirations are frequently not realized at the local level (Resource constraints, jurisdictional overlap and low coordination). Further, to enhance credibility, coding was conducted manually by the first author and checked against secondary literature, as well as with regional reports and empirical work. The extractive code process revealed a number of important themes: (1) limited explicit policy framing: inclusion of marine litter in existing policies, (2) institutional fragmentation and unclear enforcement laws, (3) resource and capacity constraints at the LGI level, (4) unevenness in stakeholder engagement, and (5), presence of local adaptive with circular initiatives that are poorly integrated into national framework.

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Table 4: Extracting Codes from Text

Code Category	Extracted Codes / Key Themes	Relevant Text Extract
Policy Coverage	Explicit mention of marine litter is uncommon; most documents treat it indirectly under solid waste, coastal or biodiversity policy; some documents omit it entirely.	*Solid Waste Management Rules (2021)* emphasizes segregation and recycling (indirectly relevant to marine litter); several national coastal/biodiversity policies discuss pollution but do not use "marine litter" as an explicit policy target.
Institutional Mandates & Enforcement	Overlapping or unclear responsibilities across ministries/LGIs; absence of a clearly designated lead agency and weak/enforcement mechanisms.	Policy texts assign roles to multiple agencies but lack a single lead or concrete enforcement timelines and penalties, producing jurisdictional ambiguity in implementation.

Resource & Capacity Provisions	Dedicated budgets and technical support are limited; LGIs rely on ad-hoc or project funding; capacity gaps in monitoring and waste management operations.	Budget lines frequently generic or absent; capacity building mentioned as an objective but operational plans, staffing allocations, and sustained financing are often missing.
Stakeholder Engagement	Calls for multi-stakeholder participation are present, but mechanisms are patchy; NGOs and communities drive many local initiatives, while private sector engagement is uneven.	Documents reference stakeholder consultation and partnerships in principle, while field evidence shows active LGI/NGO-led segregation projects in Cox's Bazar and Satkhira, but few formalized national partnership mechanisms.
Adaptive Practices & Circular Economy Linkages	Local adaptive models, recycling pilots, and waste-to-value initiatives exist but are small-scale and not systematically integrated into policy.	Regional/project reports describe community waste-to-value pilots and recycling schemes linked to livelihoods; national policy frameworks lack explicit circular economy targets and scaling pathways.

(Author Produces, 2025)

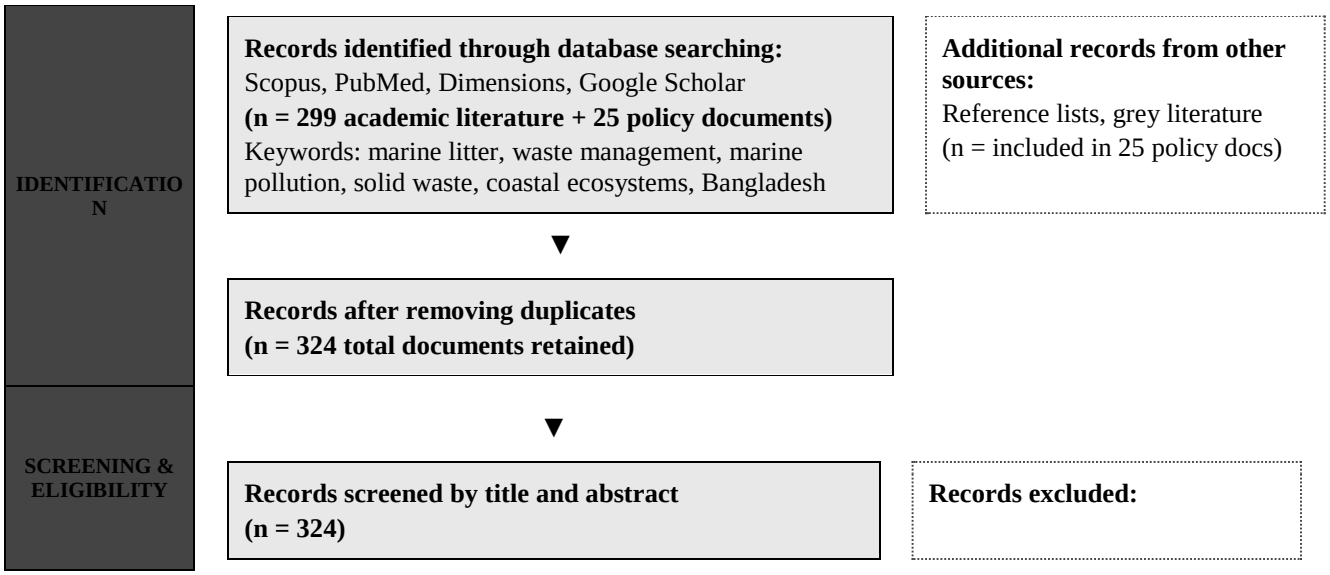
Exclusion and Inclusion criteria of 299 secondary literature

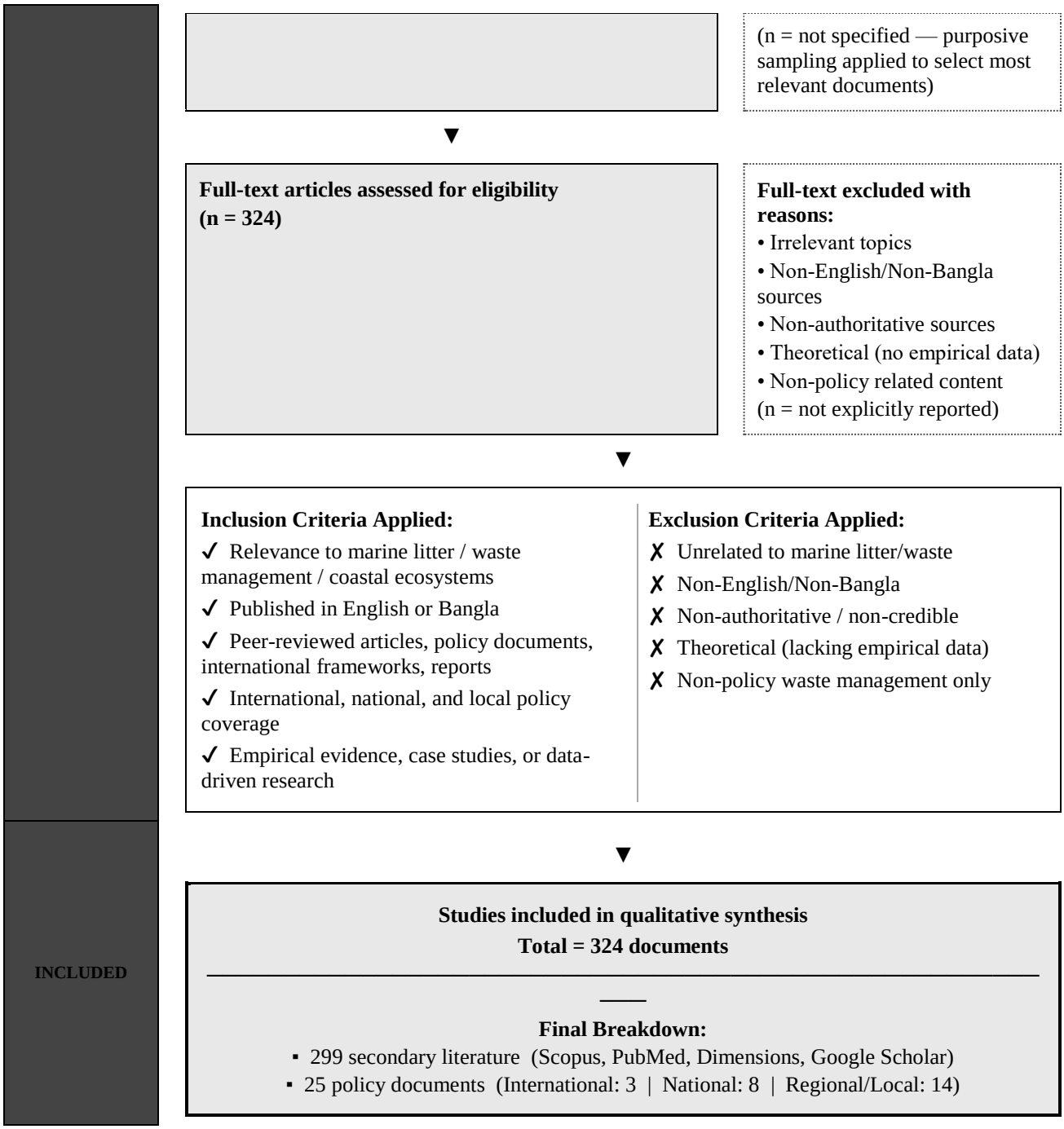
Inclusion Criteria	Exclusion Criteria
Relevance: Documents directly related to marine litter, waste management, or coastal ecosystems.	**Irrelevant Topics**: Documents unrelated to marine litter or waste management.
Publication Language: Documents published in English or Bangla.	**Non-English or Non-Bangla Sources**: Sources not available in English or Bangla.
Document Type: Peer-reviewed journal articles, international frameworks, national and regional policy documents, and reports.	**Non-Authoritative Sources**: Documents not from credible sources (e.g., non-peer-reviewed articles or unreliable sources).
Coverage: Includes international, national, and local-level policy frameworks and governance strategies.	**Limited Scope**: Documents focusing solely on non-policy related waste management practices.
Empirical Evidence: Documents providing data, case studies, or empirical research on marine litter management.	**Theoretical Papers**: Documents lacking empirical data or case study analysis.

(Author Produces, 2025)

Accordingly, the inclusion and exclusion criteria have been well designed in a manner that pertinent, authoritative, and empirical sources only play part in the study. Inclusion criteria include documents on direct effort in marine litter and waste management with a specific preference to peer-reviewed journal articles, international frameworks, and credible policy documents published in English or Bangali. Empirical research or case study is chosen to buttress the data-driven research methodology. On the contrary, non-relevant, non-authoritative, and theoretical articles that lack empirical research are avoided to guarantee integrity of the research and to use reliable and actionable information to analyze marine litter management practices.

PRISMA Flow Diagram: Literature Screening and Selection





(Author Produces, 2025)

Accordingly, The PRISMA flow chart demonstrates the methodical nature of the analysis of the policy of marine litter management in Bangladesh. During Phase 1, 324 records were found, including 25 policy documents and 299 sources of secondary literature. Phase 2 involved screening, which was done based on relevance to marine litter management, local governance, and national/international policies and it led to the exclusion of irrelevant, non-authoritative, and theoretical materials. Phase 3 was a full-text review and was used to evaluate eligibility where the inclusion criteria were direct relevance to marine litter, empirical evidence, and an interest in governance. All the 324 documents that passed the inclusion criteria were included in the final analysis to lead to the complete picture of policy gaps.

Criteria for this study bibliometric vs. qualitative content analysis

The bibliometric and qualitative content analysis comparison in the framework of the marine litter management research shows two different, but complementary approaches. Bibliometric analysis provides a methodological means of mapping the research terrain, following trends, major themes and impactful studies. It can determine the connecting clusters, the change in the research focus, and the quantitative picture of the field development using such tools as Biblioshiny and VOSviewer. Conversely, qualitative content analysis articulates the depth and context of certain policy documents together with secondary literature. It explores the correspondence between theory and practice, reveals the gaps, obstacles, and possibilities of introducing

national models of adapting to local conditions. Bibliometric analysis focuses on the coverage and relations of the research area whereas qualitative content analysis goes more in-depth and explores the content of existing policies and practices to provide information about the efficiency and drawbacks of the existing patterns of governance.

Bibliographic methods and parameters

To examine the policy and practice gap in marine litter management in Bangladesh, the bibliographic methods were used in this study. In the systematically reviewed literature, the 299 documents of academic articles, policy frameworks, and regional reports were analyzed with the help of content analysis. Through coding have identified key themes, including policy coverage, institutional mandates, resource provisions, stakeholder engagement, and local adaptive practices. The study used such tools as Biblioshiny and VOS Viewer software to map visually the trends of research and bibliographic networks. This holistic view enabled the determination of loopholes between theory and practice of local implementation and the necessity to ensure a more effective coordination and integration of governance levels.

Ethical Considerations

This research respected ethical considerations by using secondary data and publicly available documentation sources that did not require direct participation from human participants. This removed the risk (and implication for consent, privacy, and confidentiality) of anyone being identifiable. Ethical adherence was ensured through correct referencing of all sources (acknowledging the institutional authorship) and contextual interpretations to avoid distortion. Documents were reviewed transparently and objectively, such that results were accurately extracted from source texts.

Findings and Analysis:

Policy Landscape vs. Gaps

The study focuses policy practice gap in marine litter management in Bangladesh through the analysis of the existing structures and local interventions through the National Adaptation Plan (NAP) 2023- 2050, which aims at improving climate resilience by protecting the ecosystem, minimizing risks, and improving sustainable livelihoods. To determine the indirect and direct relevance of the marine litter management to the mentioned policies, the key policies that are mentioned in the study include the Solid Waste Management Rules (2021), the National Environment Policy (2018), and the Bangladesh Biological Diversity Act (2017) as well as the Ecologically Critical Area Management Rules (2016). Also, the study focuses on the community needs and vulnerability alleviation using the Coastal Zone Policy (2005) and Marine Pollution Ordinance (1977), which underscores the significance of the local governance and cooperation of multi-stakeholders in dealing with marine litter. The core findings of this research will eventually assist in the enhancement of the operationalization of the national policy framework by paying attention to the role of the Local Government Institutions (LGIs) and the necessity of the more unified approach towards the management of marine litter.

Further, NAP 2023-2050 focuses on the provisions climate adaptation strategy with the vulnerability of coastal communities to environmental hazards like marine litter, together with multi-stakeholder collaboration, sustainable waste management, and ecosystem-based approaches (Rida, 2025). Despite the integrated vision of the NAP 2023-2050 still has to cope with the essential problems of the comparative novelty of this approach when compared to the approaches developed earlier (Rida, 2025). Previously, those measures used to deal with issues related to the environment did not mention specifically maritime waste; for example, there is no explicit reference to marine litter in either the Solid Waste Management Rules (2021) or the Coastal Zone Policy (2005) (Hasan et al., 2025; Rupasinghe et al., 2025). Under sections of the Biodiversity Act (2017) and ECA Rules (2016), priority is given to species protection and habitat conservation, but legal instruments for their enforcement on ground level or for engaging communities are absent (Rupasinghe et al., 2025). Ministry's jurisdiction overlaps with other ministries, mandates are unclear, and technical capacity at the local government level is low affecting proper implementation (Prantor et al., 2025).

Nonetheless, under NAP 2023-2050 guidance (Article 3.1: Coastal Resilience and Community Engagement), resource constraints, absence of efficient monitoring systems, and ignorance among the community impede aspirations to implementable policies (Rida, 2025).Multistakeholder collaboration, participatory monitoring as well as waste-to-value initiatives can realize NAP 2023-2050 goals in this way, making sure that marginalized coastal communities are equally included in such a process (Palma et al., 2025; Rida, 2025). Accordingly, integration of local adaptive models with national directives not only ensures better enforcement but also promotes circular economy and ecosystem-based adaptation strategies development, thus furthering the implementation of the proposed plan (Micu & Roznovietchi, 2025).

Literature analysis vs. Marine Litter Management

Thematic Map analysis

The literature including 299 secondary texts and 25 international, national, and regional reports of the thematic Map analysis of Biblioshiny's focuses on tracking changes in research topics, which indicate changes in focus and terminology across the research field. Thus, Motor Themes such as human health, single-use plastics, and climate change, which are highly influential, internally developed, and highly influencing Motor Themes (High Centrality, High Density), reflect a maturation in global impact and social effects. This main research is supported by Basic Themes such as marine litter, waste management, and marine environment, High Centrality, Low Density: these underlying concepts are necessary but fragmented and serve as the broad, often incoherent setting for the research that can be found here. In addition, Niche Themes such as management strategies and litter items (High Density, Low Centrality) represent specialized, internally coherent work that is presently lacking wider access to the wider discourse. Finally, global terms such as plastic pollution

have been placed in the Emerging quadrant (Low Centrality, Low Density) and thus it is clear the field will be moving away from broad terms into more specific, highly impactful research space in a direction that signals the sector's strategic shift toward solutions and global consequences.

Figure 1: Literature Thematic Map of Marine Litter Management

Accordingly, the thematic map shows that there are considerable policy-implementation gaps in marine litter management in Bangladesh. According to the analysis, some of the key challenges identified are lack of coordination among the stakeholders, inadequate enforcement, and unclear responsibilities of actors. The main areas of study, including policy and management, ecological effects, and new challenges, including the effect of the COVID-19 pandemic on garbage, highlight the dynamism of marine litter regulation. The key to bridging these gaps should be a more holistic strategy, in which the community-based practices are formally established in the national policies. An enhanced development of local government structures and encouragement of multi-stakeholder cooperation will be effective essential in the proper use of marine litter management measures.

Bibliographic Network Analysis vs. Marine Litter Management

The mentioned VOS viewer co-occurrence network map of bibliographic, including 299 relevant secondary literature with 25 international, national, and regional project reports, reveals three dominant, interconnected clusters representing the core themes of the research field. Visualization reveals the conceptual landscape of marine plastic pollution research. The network illustrates three different research clusters, such as the Red Cluster (Policy & Management) which cover phrases dominated by governance-related terms including "management", "policy context", "challenge" and "stakeholder". These are studies focusing on marine plastic pollution governance and institution. Thereafter, Green Cluster (Ecological Impact) focused on "beach," "debris," "distribution" and "abundance". This cluster represents environmental impacts, monitoring plastic accumulation together with accelerates on coastal and marine habitats. Subsequently, then Blue Cluster (Emerging Topics): containing "covid," "pandemic" and "shoreline", which indicates early-stage research about the plastic waste spike due to pandemic and its impact at coasts. The connecting lines would suggest that commonalities in concepts are associated, especially between policy implementation and environmental assessment.

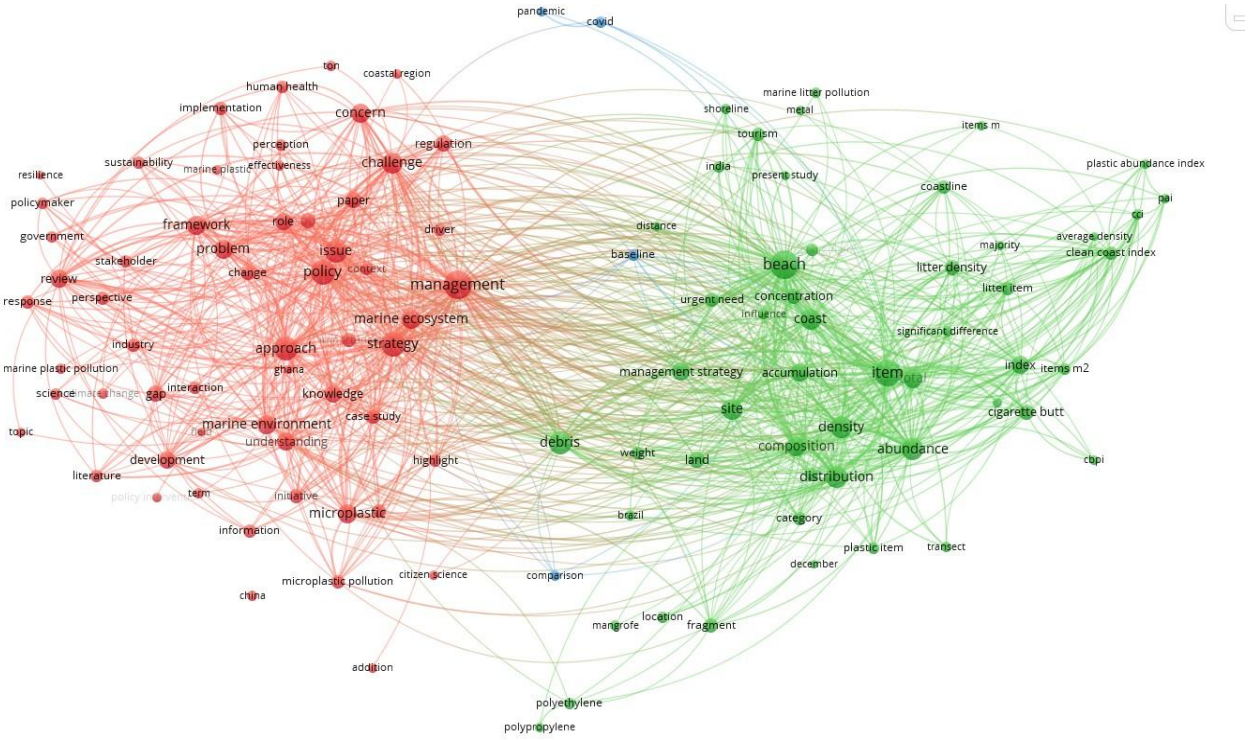


Figure 2: Vos viewer co-occurrence network map of Bibliographic Analysis

Consequently, some of the interconnected clusters in the VOS viewer analysis of the marine litter management encompass important elements to governance and policy. The Red Cluster (Policy and Management) includes terms related to governance such as "management" and "policy context, and stakeholders" which demonstrate the interest in the problem of institutional and regulatory issues in controlling marine plastic pollution. The Green Cluster (Ecological Impact) focuses on the ecological implications of marine waste and emphasizes the necessity to carry out effective environmental monitoring and plastic accumulation research. The Blue Cluster (Emerging Topics) is concerned with the impact of the COVID-19 pandemic on marine litter, which underlines the topicality of the integrations of the policies to unpredicted global upheavals. These clusters demonstrate the interactive nature of the policy, ecological science, and the new global problems of marine litter management, emphasizing the necessity of the integrated responsive governance frameworks to deal with marine pollution holistically with local government.

Local Government Capability vs. Challenges

Local government institutions (LGIs) such as municipalities and Union Parishads are key players in the fight against marine pollution, relying on community mobilization. They have undertaken waste segregation at household levels as well as local recycling initiatives so that there will be less solid waste stream into rivers and coastal areas. These programs require households to be taught how to segregate biodegradable and non-biodegradable waste and then be provided with sorting bins. Through providing such measures, LGIs aim at making the general environment protection policies realizable initiatives at the grassroots level; this indicates a proactive stand even when there is no specific marine litter policy in place. Other than these forms of interventions, the LGIs organized beach cleaning day, and other successful measures that drew people, youth clubs, and volunteers' attention were established by them (Hossain et al., 2025; Sultana, 2025). These processes, in turn, not only make degradable environment more degradable but also make community get involved more environmentally conscious. For instance, under Cox's Bazar municipality, many touristy areas are kept clean through organized programs, while the adjacent informal settlements remain dirty due to a lack of resources for maintenance inside those areas (Shapna et al., 2025). Also, under the Satkhira district administration, various youth clubs conduct an awareness campaign called "Say No to single-use plastic (Parveen, 2024). As a matter of fact, this campaign cannot bring an effective outcome due to a lack of funds, inadequate application of the legal framework, and awareness.

Local Government Institutions vs. Stakeholders Engagement

LGIs engage in partnerships with NGOs and private stakeholders to sponsor waste-to-value firms, for example, composting units and plastic recycling projects, which produce sources of livelihood. These joint efforts contribute to bringing in technical expertise and financial support, otherwise lacking at the lower level (Parveen, 2024). The policy and practice gap continues to broaden the issues of coordination among stakeholders (Shapna et al., 2025). The mandates are overlapping amidst ministries, departments, and municipalities, hence leadership is fragmented, while collaboration with NGOs, private industries, and community actors is still sporadic (Parveen, 2024). For instance, in Khulna and Cox's Bazar majority of NGOs involved in waste-to-value projects operate independently from municipal planning (Islam et al., 2022). This results in fragmented efforts and duplication of resources. Absence of integrated coordination mechanisms hinders the efficiency and scope of marine litter interventions, thus making critical coastal areas underserved regions as well as weakening the connection between national policies referring to the National Environment Policy (2018), Solid Waste Management Rules (2021) with the local level implementation mechanism (Alam et al., 2025; Murshed et al., 2022).

Community Participation vs. Local government

Community participation in the waste management sphere is far below par, and there are no public campaigns that target slums or marginal populations. Thus, the plastic debris continues accumulating in rivers, beaches, and coastal ecosystems, which endanger fisheries, people's mean of subsistence, tourism as well and biodiversity. In disaster-prone regions, the rate of litter flow into the ocean tends to rise during floods and cyclones; it creates environmental and social havoc (E J Ferdin et al., 2025). Based on the analysis made by using the IAD approach have detected main problems such as misaligned rules-in-use, unclear responsibilities, and weak monitoring. Even though local governments possess critical situational knowledge about community practices as well as environmental hazards, they are restrained by top-down governance structures from adjusting strategies to circumstances, which results in their disconnect between policy intentions and practical outcomes.

By integrating community-driven practices into national circular economy goals, local government initiatives can gain formal recognition, resources, and technical support. At the local level, municipalities and Union Parishads have shown how community-driven approaches can effectively address certain issues (Ashrafuzzaman, 2023; E J Ferdin et al., 2025). For example, through waste segregation, recycling schemes, and participatory clean-up campaigns, it is possible to stop litter leakage and increase public engagement (Alam et al., 2025). Nevertheless, these initiatives are under-resourced and disconnected because of capacity constraints and a lack of formal recognition in national policy frameworks. Bridging strategies should thus concentrate on mainstreaming local models into national circular economy goals that are underpinned by capacity-building programs, dedicated funding as well as participatory monitoring systems.

Integration of Local Models vs. Multi-Stakeholder Collaboration

The current study on local Bangladesh adaptive models has revealed that can be very effective in reducing marine garbage while also improving community livelihoods.

Therefore, the paradigm shifts from centrally administered to community-based waste management approaches has redefined the concept of waste management by considering the peculiarities of socio-economic and environmental conditions at the local level. For example waste-to-value approaches through conversion of single-use plastic into construction materials with organic waste composting not only contribute towards good environmental stewardship but also income-generating activities, thus demonstrating the fact that locally developed adaptive measures are two-fold helpful system both socially and ecologically (Ansar et al., 2025; Bashar & Bernell, 2025).

Multi-stakeholder partnerships between LGIs, NGOs, industries, and development partners create a platform in which the expertise, funding, and infrastructure are put to effective use (Palma et al., 2025). The Plastic Waste Partnership under the Basel Convention, as an example, and the Sustainable Coastal and Marine Fisheries Project supported by the World Bank in Bangladesh show that joint interventions lead to significant marine litter decrease through policy reforms combined with grassroots initiatives as well as improve local resilience. Also, these partnerships support knowledge exchange and innovative practices that can be adopted in other coastal districts (Ahmad & Du, 2025; Guggisberg, 2024).

Therefore, crucial to put in place policy and practice capacity measures to build on the gains made; This is through developing a stand-alone marine litter policy with clear enforcement mechanisms as well as incentives, which will provide the LGIs with the mandate required to replicate successful local practices. Building the capacities of institutions, including training on segregation of waste, recycling technologies, climate change governance, among others on how they can be good implementers of these local initiatives. Incorporation of the equity and justice lens helps in ensuring all groups, especially women, indigenous people, and residents of informal settlements, actively participate in planning and enjoying the fruits of marine debris control projects. Thus, implementation of those activities makes it possible to bring into line national policy goals and local implementation by means of forming a sustainable network where self-driven community actions, formal governance, and multi-stakeholder collaboration meet together towards the achievement of both environmental protection and socio-economic improvement objectives.

Further, in the policy tract, multiple international treaties such as MARPOL, the Honolulu Strategy, and SDG14 are the main commitments at a broader level, while at a national level, Solid Waste Management Rules, Environment Policy, and Coastal Zone Policies form instruments that provide strategic goals on waste management, biodiversity, and sustainable development (Saikot et al., 2025; Suryawan & Lee, 2025). However, implementation is delegated primarily to the local practices led by LGIs, bottom-up community actors, and NGOs with private sector partnerships. These initiatives, which represent the frontline of waste segregation, beach clean-ups, recycling, and waste-to-value projects, transform policy intention into practical measures, but they persist in being fragmented and under-resourced without systemic integration into national frameworks.

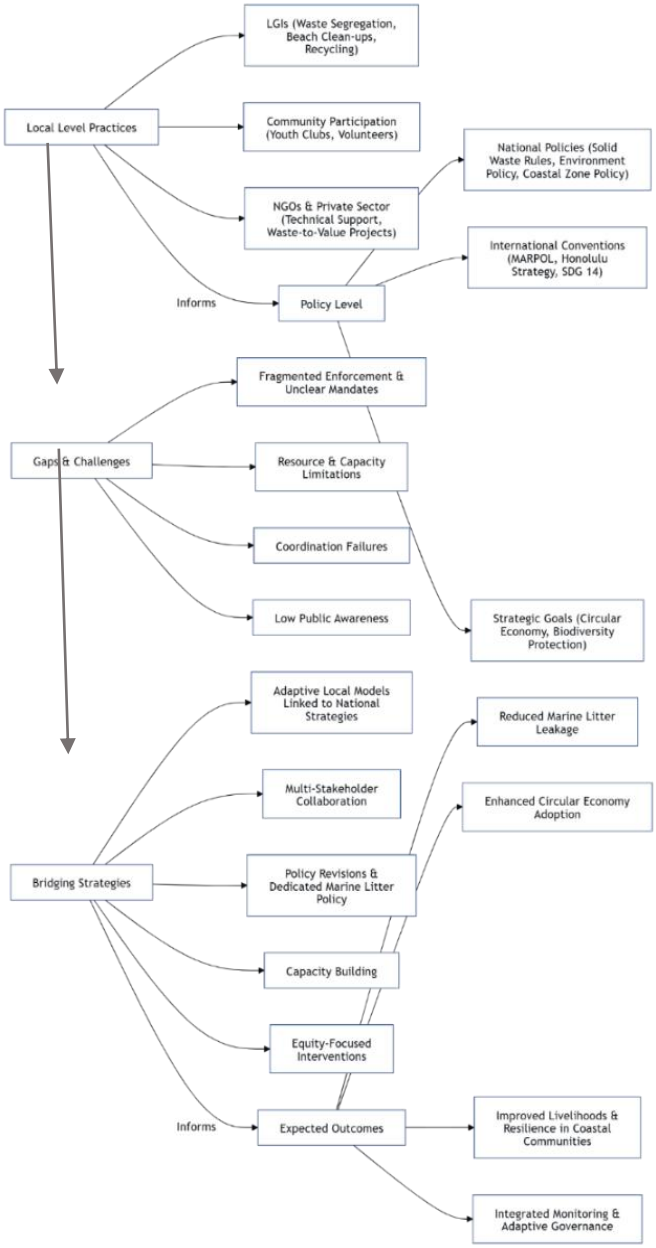


Figure 3: Proposed Framework for Marine Litter Management

(Authors own elaboration, 2025)

Therefore, the diagram highlights that local practice is not only an implementer but also an informer of policy reform, creating a feedback loop for enhancing the adaptive governance mechanism. To establish a governance and policy framework that is effective to control marine litter, it is paramount to consider some of the most crucial connections between policy and practice on different levels. Local Government Institutions (LGIs) are very important in filling these gaps by introducing community-based activities like waste segregation, recycling and beach cleanup. These endeavors are, however, usually limited by resources and inadequate technical capacity. The national and international policies such as Solid Waste Management Rules (2021) and MARPOL are broad but do not present a holistic approach to the management of marine litter. This is why integration of local adaptive strategies with national policy objectives is necessary to come out of dissipated efforts and enhance resource

allocation. The integration of marginalized populations into the decision-making processes, as well as the collaboration of various stakeholders, is important in developing a sustainable, circular economy system that can help in combating the problem of marine litter and help to create long-term resilience to coastal ecosystems.

Limitation of the Study

The qualitative content analysis of this study is made through the secondary literature, policy documents, and regional reports in order to point out the gap between policy and practice regarding marine litter management in Bangladesh. It is based on international conventions, national policies, and local activities, although the analysis is mainly based on the documented intentions, requirements and reported activities, not on the real-time implementation issues. The depth of the study is also dependent on the temporal factors, use of language and coverage of the policy since the documents analyzed were only in English and Bangali which might have missed critical non-English and non-published information. Moreover, the change in the national policies, such as the National Adaptation Plan (2023), can also modify the level of efficiency of the current frameworks, which can further affect the accuracy of the study.

Knowledge Gaps and Future Research Direction

A significant information gap is at the policy level, with inadequate national strategy on marine litter and scattered approaches like the Coastal Zone Policy (2005) along with Solid Waste Management Rules (2021) being used to address this issue indirectly. In practice, the local adaptive actions like community waste segregation and recycling programs of LGIs that are constrained by lack of funding, technical know-how and trained personnel are also hindered at a very serious limit level.

Apart from, existing studies like Prantor et al. (2025); Islam (2022); Bhat et al. (2025); Hasan (2024); Rida (2025); Suryawan and Lee (2025);Kumar et al. (2024); Ahmad and Du (2025); Ansar et al. (2025); Borongan and NaRanong (2022) primarily focus on either macro-level policy analysis with micro-level community interventions, but fewer empirical investigations bridge this divide by examining how institutional misalignment, resource constraints, and unclear mandates at intermediate governance levels prevent effective marine litter reduction. Additionally, the literature lacks comprehensive documentation of the informal, context-specific adaptive practices developed by local government institutions and NGO partnerships in disaster-prone coastal communities, where waste leakage is exacerbated by cyclones and flooding. Most research emphasizes like Alam et al. (2025); Kasar and Songachan (2024); Omokaro et al. (2025); Dayananda et al. (2025); Garg and Arora (2025) and Guggisberg (2024) have identified that technological solutions and circular economy frameworks without adequately addressing the socio-political barriers, jurisdictional overlaps, and capacity limitations of marine litter management.

Accordingly, the gap between policy and practice should be addressed in future research on marine litter management, especially with the use of the framework of Institutional Analysis and Development (IAD). It is important to develop a transparent national policy on marine litter that defines roles, responsibilities, and enforcement procedures, as well as financial incentives of local governments and other stakeholders in the community. Studies have required discovering an effective way to scale the local examples, e.g. participatory monitoring, beach clean-ups, and waste-to-value programs, and connect them to the national climate adaptation plans (e.g. NAP 2023-2050). Moreover, the focus on the multi-stakeholder cooperation, sharing technical competence and comparative governance can be a priority in the Southern Asia area to find transferable innovations and adaptive patterns of governance.

Conclusion

This research, based on the IAD framework reveals clear evidence of policy-practice gap in marine litter governance in Bangladesh. The problem stems from a disparate national policy framework where marine litter is only addressed in general terms within wider environmental, coastal, and solid waste laws. This systematic vagueness leads to undefined roles and responsibilities, as well as lack of enforcement. As the LGIs are active with responsive practices such as community-based waste segregation and beach through efforts are structurally constrained by insufficient financial resources, technical capacity, and a lack of inadequate integration among multi stakeholders into overarching national strategies and policy framework. This policy and practice gap between high-level legislative intent and community level initiatives compromises the efficacy of anti-litter initiatives as well as the accumulation of marine debris and accelerating risking coastal ecosystem health.

To fill this crucial gap, a change of paradigm is needed: from fragmented, reactive waste management to integrated, preventive and circular economy-oriented development. The way forward is to invigorate the function of local government as indispensable co-producers of adaptive solutions. Solutions should focus on ensuring that community-led approaches are formally integrated into national policy frameworks such as the NAP (2023-2050). This necessitates development of exclusive, marine litter policy which has to be developed through inclusive multi-stakeholder partnership, capacity building based on need and long-term financing. Finally, a combination of locally pertinent action together with consistent national support is crucial in sustaining resilient coastal ecosystems and promoting sustainable development in Bangladesh.

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Conflict of Interest

The authors have declared no conflict of interest

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