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Atilano, Lesley Ann and Valerio, Aldrin and Moreno, Frede

International Technology Management Corp. (intem), Manila, Philippines

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Decentralized Environmental Governance under State Capacity Constraints: Institutional Challenges and Policy Innovations in Zamboanga City, Philippines

Lesley Ann Atilano [1], Aldrin Valerio [2], Frede Moreno[3]
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Abstract

Decentralization reforms assign extensive environmental governance responsibilities to local governments across the Global South, yet environmental outcomes remain uneven. This article examines how state capacity constraints shape decentralized environmental governance in Zamboanga City, a highly urbanized coastal city in the southern Philippines. The study situates the Philippine Local Government Code within broader debates on decentralization, multilevel governance, and local state capacity. Using qualitative process tracing supported by administrative, fiscal, and enforcement data from 2015–2023, the article analyzes three policy domains: solid waste management, coastal resource management, and urban watershed protection. Findings show that formal authority decentralizes faster than administrative capacity, fiscal autonomy, and enforcement power. Political incentives, intergovernmental fragmentation, and uneven technical capacity produce sectoral variation in governance performance. The study identifies policy innovations that emerge under constraint, including interlocal cooperation, hybrid enforcement arrangements, and civil society co-production. The article contributes to environmental governance scholarship by demonstrating how decentralized systems operate under persistent capacity gaps and by offering a framework for assessing policy performance in constrained local states.

Keywords: decentralization; environmental governance; state capacity; local government; Philippines; coastal cities

1. Introduction

Environmental governance in developing countries increasingly relies on decentralization as a core institutional strategy. Governments transfer authority for environmental planning, regulation, and enforcement to local governments to improve responsiveness and accountability. International development institutions frame decentralization as a pathway to sustainable environmental outcomes, especially in urban and coastal contexts (Agrawal and Ribot, 2012). Despite these expectations, empirical evidence shows mixed results. Local governments often hold legal authority without sufficient administrative, fiscal, or technical capacity to deliver environmental outcomes (Faguet, 2014; Andersson and Ostrom, 2008).

The Philippines offers a critical setting to examine this tension. The Local Government Code of 1991 devolves extensive environmental responsibilities to cities and municipalities, including solid waste management, coastal resource management, and watershed protection. National environmental agencies retain regulatory oversight, but local governments assume frontline implementation. More than three decades after devolution, environmental indicators remain uneven across local jurisdictions. Urban coastal cities face acute pressure from population growth, land conversion, and climate exposure.

[1]*Scintilla Juris-Philippines*
[2] *College of Public Administration and Development Studies, Zamboanga City, Philippines*
[3]*International Technology Management Corp. (intem), Manila, Philippines*

Corresponding Author: Lesley Ann Atilano, Scintilla Juris-Philippines (email: lesleyatilano.tang2023@gmail.com)

This article examines decentralized environmental governance in Zamboanga City, a highly urbanized city with a population of 977,234 based on the 2020 Census of Population and Housing (Philippine Statistics Authority, 2021). The city administers over 98,000 hectares of land area and more than 1,000 square kilometers of municipal waters along the Sulu and Celebes Seas. Zamboanga City experiences persistent challenges in waste disposal, coastal degradation, and watershed management. At the same time, the city develops policy innovations under fiscal and administrative constraint.

The study addresses the following research question: How do state capacity constraints shape environmental governance outcomes under decentralized institutional arrangements? The article advances three arguments. First, decentralization in the Philippines produces a structural gap between formal authority and effective capacity at the local level. Second, governance performance varies across environmental sectors based on enforcement complexity, political salience, and intergovernmental coordination. Third, constrained local governments generate adaptive governance arrangements that partially offset capacity deficits.

The article contributes to environmental policy and governance scholarship by offering a grounded analysis of decentralization under constraint. Rather than assessing decentralization as a binary success or failure, the study examines how institutional design interacts with capacity, incentives, and local context. Zamboanga City serves as a theoretically strategic case that reflects governance conditions common to coastal cities in the Global South.

2. Environmental Governance and Decentralization: Literature Review

Environmental governance literature frames decentralization as a strategy to align decision-making authority with local ecological knowledge and stakeholder accountability. Classical fiscal federalism argues that local governments respond more effectively to place-specific environmental conditions. Empirical research, however, shows uneven outcomes. Decentralization improves environmental performance only when local governments possess administrative capacity, fiscal autonomy, and enforcement authority. Studies on common-pool resources demonstrate that local control succeeds where monitoring and sanctioning institutions function effectively.

In developing-country contexts, decentralization often transfers responsibilities faster than resources, producing implementation gaps. State capacity scholarship highlights that weak staffing, limited technical expertise, and fragmented authority undermine local environmental management. Multilevel governance research further shows that overlapping mandates between national and local institutions diffuse accountability and increase coordination costs. Recent studies emphasize sectoral variation, noting that environmental policies with high monitoring and enforcement demands perform poorly under decentralized arrangements. The literature converges on a central insight: decentralization shapes environmental governance outcomes through its interaction with capacity, institutional design, and political incentives rather than through authority transfer alone.

2.1 Decentralization and Environmental Outcomes

Decentralization theory links local authority with improved policy responsiveness and accountability. Early normative arguments suggest that local governments possess superior information about local environmental conditions and stakeholder preferences (Oates, 1972). Subsequent empirical work complicates this claim. Decentralization improves outcomes when local institutions possess enforcement capacity, fiscal resources, and accountability mechanisms (Agrawal and Gupta, 2005).

Comparative studies show that decentralization often shifts responsibility without transferring resources. Faguet (2014) demonstrates that decentralization improves service delivery only when local governments control budgets and personnel. In environmental governance, Andersson and Ostrom (2008) find that decentralized forest management succeeds under conditions of local monitoring and sanctioning capacity. Absent these conditions, decentralization weakens enforcement.

2.2 State Capacity and Local Governance

State capacity refers to the ability of public institutions to implement policy, collect revenue, enforce rules, and coordinate actors (Fukuyama, 2013). Local state capacity varies widely within decentralized systems. Scholars distinguish between legal authority and practical capacity. Formal mandates alone do not produce outcomes.

In developing country contexts, local governments face persistent staffing shortages, limited technical expertise, and dependence on intergovernmental transfers (Grindle, 2017). Environmental governance magnifies these constraints because it requires specialized knowledge, monitoring infrastructure, and sustained enforcement. Studies of urban environmental management show that cities often rely on informal arrangements to compensate for weak capacity (Bulkeley et al., 2014).

2.3 Multilevel Environmental Governance

Environmental governance operates across multiple levels of government. Multilevel governance theory emphasizes vertical coordination, shared authority, and overlapping competencies (Hooghe and Marks, 2003). In practice, unclear role allocation creates implementation gaps. National agencies retain regulatory authority, while local governments execute policies without full control over standards or enforcement tools.

In the Philippines, environmental governance involves national agencies such as the Department of Environment and Natural Resources (DENR), local governments, and barangay-level institutions. This structure creates coordination challenges that shape local performance (Brillantes et al., 2020).

2.4 Conceptual Framework

Decentralized environmental governance involves complex, multi-actor interactions across institutional levels and sectors. This study situates its analysis within a **multi-level governance framework** that emphasizes relational state capacity, polycentric authority, and adaptive policy mechanisms. The framework draws on governance theory to explain how formal mandates, enforcement feasibility, and political dynamics produce heterogeneous outcomes in resource-constrained settings (Lemos & Agrawal, 2006; Ribot, 2004; Ostrom, 2007).

Authority, Capacity, and Outcome Alignment

The conceptual model posits that environmental outcomes emerge from three interacting dimensions: **authority clarity**, **operational capacity**, and **governance alignment**. Authority clarity addresses the distribution and specificity of legal mandates across government tiers, from national statutes to local ordinances. Operational capacity encompasses human resources, technical expertise, and fiscal allocations. Governance alignment reflects the degree of coordination among state agencies, non-state actors, and community organizations, including shared monitoring and enforcement mechanisms. This relational perspective treats capacity as shaped by enforcement complexity and political incentives (Ribot, 2004; Ostrom, 2007).

Fig. 2.4.1 illustrates how the three dimensions interact. Where authority clarity and operational capacity align, procedural compliance increases. Conversely, misalignment—such as shared authority without coordination—elevates transaction costs and reduces deterrence, leading to weaker outcomes. This interaction mirrors **polycentric governance theory**, where multiple overlapping decision centers influence adaptive capacity and system responsiveness (Ostrom, 2007).

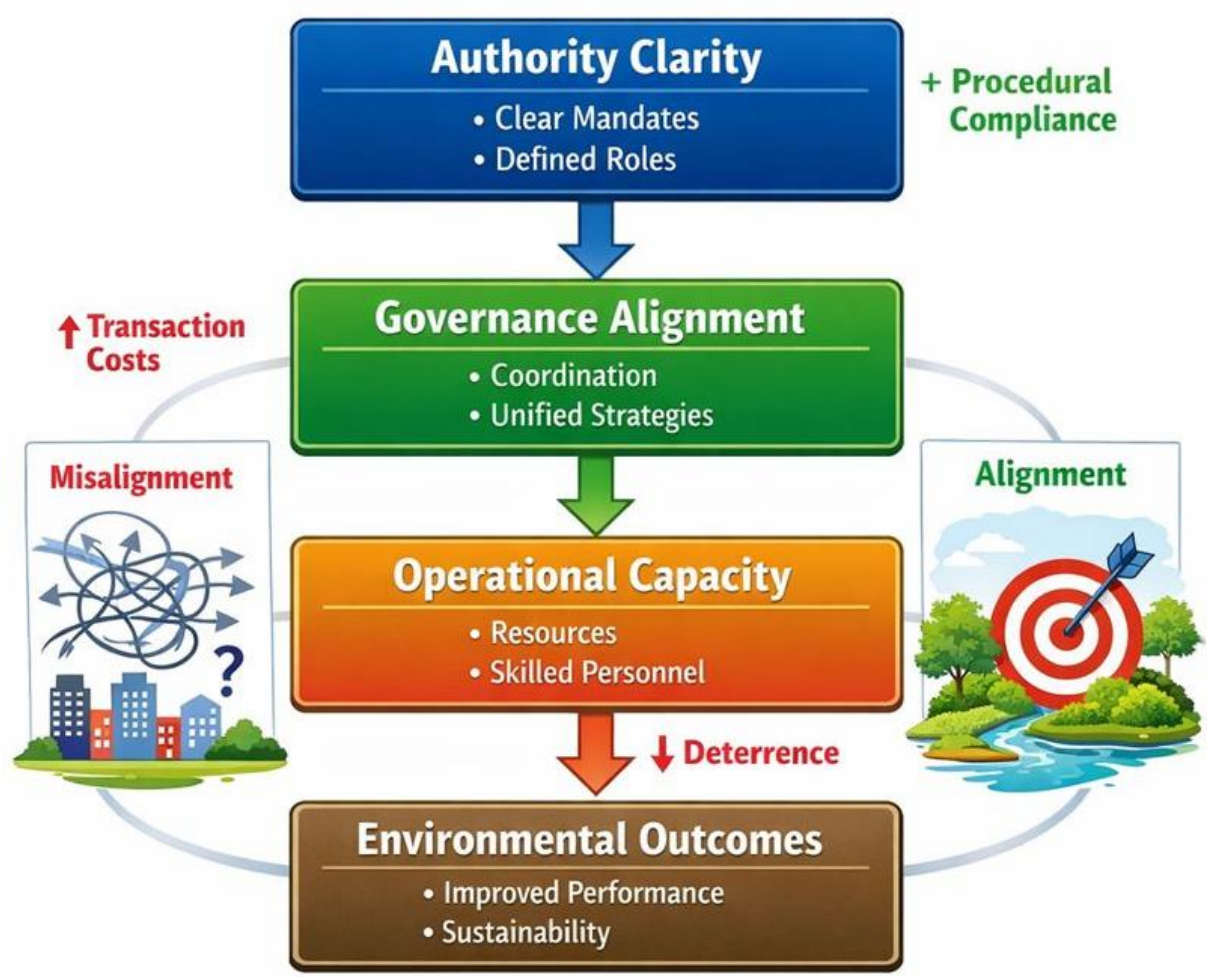


Fig. 2.4.1 *Governance Alignment and Environmental Outcomes*

Multi-Level Interactions and Adaptive Mechanisms

The framework incorporates mechanisms from **multi-level governance** and **adaptive governance** paradigms, highlighting vertical and horizontal interdependencies (Marks, 1993; Newig & Fritsch, 2009). It assumes that local actors, national agencies, and non-state stakeholders co-produce governance outcomes through iterative feedback and learning. Adaptive mechanisms include policy experimentation, public-private partnerships, and community engagement, which respond to dynamic environmental pressures while compensating for formal capacity constraints.

Table 2.4.1 synthesizes the conceptual framework by linking theoretical dimensions to observable empirical indicators. Authority clarity represents the legal and institutional distribution of mandates across national and local tiers, with indicators such as legal specificity and the distinction between shared versus exclusive authority. This variable captures the extent to which formal mandates can guide effective environmental governance. Operational capacity reflects the availability of resources necessary to implement mandates, including staffing levels, technical expertise, and fiscal allocations. Governance alignment emphasizes coordination mechanisms, measured through inter-agency councils and the degree of community participation. Effective alignment ensures that decentralized mandates translate into practical interventions. Adaptive policy mechanisms illustrate how local governments innovate under constraints, with indicators including public-private partnerships, digital monitoring systems, and co-production platforms that leverage community involvement to supplement limited state capacity. Enforcement complexity considers technical and political constraints, such as prosecution

rates, patrol frequencies, and stakeholder resistance, highlighting factors that impede or facilitate compliance. Collectively, the table operationalizes abstract governance concepts, enabling systematic analysis of how authority, capacity, coordination, innovation, and enforcement dynamics interact to produce sector-specific environmental outcomes. It provides a practical foundation for evaluating decentralized governance in resource-constrained urban settings.

Table 2.4.1 operationalizes the study's conceptual framework by linking abstract governance dimensions to measurable indicators. Authority clarity captures the specificity and distribution of legal mandates, distinguishing between shared and exclusive authority, which determines the potential for effective decision-making. Operational capacity reflects the resources available to implement mandates, including staffing, technical expertise, and fiscal allocations, which directly influence performance. Governance alignment emphasizes coordination mechanisms, such as inter-agency councils and community participation, ensuring that decentralized mandates translate into practical interventions. Adaptive policy mechanisms represent innovation under constraint, with empirical indicators including public-private partnerships, digital monitoring systems, and co-production platforms that leverage community engagement to enhance outcomes. Enforcement complexity addresses technical and political barriers to compliance, measured through prosecution rates, patrol frequencies, and stakeholder resistance. Collectively, the table provides a structured approach for analyzing how authority, capacity, coordination, innovation, and enforcement interact, offering a practical basis for assessing sector-specific environmental governance under decentralization.

Table 2.4.1. Conceptual Variables and Indicators

Dimension	Conceptual Variable	Empirical Indicator
Authority	Clarity of Mandates	Legal specificity, shared vs exclusive authority
Capacity	Operational Resources	Staffing, technical training, fiscal expenditure
Governance Alignment	Coordination Mechanisms	Inter-agency councils, community participation
Adaptive Policy Mechanisms	Innovation Under Constraint	PPPs, digital monitoring, co-production platforms
Enforcement Complexity	Technical and Political Constraints	Prosecution rates, patrol frequencies, stakeholder resistance

The framework assumes that **decentralization does not automatically yield effective outcomes without capacity and alignment**; rather, governance systems function as **relational structures shaped by institutional design, resource flows, and actor networks**. This model extends governance theory by operationalizing abstract constructs into testable dimensions, linking decentralization theory with empirical governance performance (Ostrom, 2007; Lemos & Agrawal, 2006).

3. Philippine Context of Decentralized Environmental Governance

The Philippine context of decentralized environmental governance reflects an ambitious transfer of authority to local governments under the 1991 Local Government Code. Cities and municipalities assume primary responsibility for solid waste management, coastal resource management, and local environmental enforcement, while national agencies retain regulatory and oversight functions. This hybrid arrangement creates shared authority across governance levels. Empirical studies show that decentralization strengthens local autonomy but exposes wide variation in administrative and fiscal capacity among local governments. Heavy reliance on national fiscal transfers limits local discretion in environmental investment. Environmental mandates impose high technical and enforcement demands that exceed local staffing and resource levels. Coordination between local governments and national agencies remains inconsistent, particularly in coastal and watershed management. Accountability gaps

emerge as national agencies set standards while local governments bear implementation burdens. The Philippine experience demonstrates that decentralization institutionalizes local responsibility without fully resolving capacity constraints, shaping uneven environmental governance outcomes across jurisdictions and policy sectors.

3.1 Legal and Institutional Framework

The 1991 Local Government Code devolves environmental functions to local governments. Cities assume responsibility for solid waste management, local environmental planning, and enforcement of environmental ordinances. Republic Act No. 9003, the Ecological Solid Waste Management Act of 2000, assigns cities responsibility for waste segregation, collection, and disposal. Republic Act No. 8550, as amended by Republic Act No. 10654, mandates local governments to manage municipal waters in coordination with national agencies.

Despite devolution, national agencies retain permitting and regulatory powers. DENR controls environmental compliance certificates and protected area management. This arrangement produces shared authority with ambiguous accountability.

3.2 Fiscal Capacity and Resource Constraints

Local governments in the Philippines rely heavily on the Internal Revenue Allotment, renamed the National Tax Allotment in 2022. In 2023, Zamboanga City reports total revenues of approximately PHP 10.2 billion, with national transfers accounting for over 70 percent of total income (Commission on Audit, 2024). Environmental offices receive limited budget shares relative to infrastructure and personnel services.

The City Environment and Natural Resources Office employs fewer than 80 technical and enforcement staff for 98 barangays. Staffing levels constrain monitoring and enforcement across land and coastal areas.

4. Zamboanga City as a Strategic Case

Zamboanga City presents a strategic case for analyzing decentralized environmental governance under conditions of state capacity constraints. As a highly urbanized city in Mindanao, the city combines dense population, extensive coastal jurisdiction, and complex political dynamics, making it a compelling setting for examining sector-specific governance outcomes within a single institutional framework. With a population of approximately 977,000 in 2023, Zamboanga City manages diverse environmental challenges ranging from urban solid waste to coastal and watershed conservation, providing a microcosm for understanding the interplay between authority, capacity, and political incentives.

The city administers 11 major watersheds, including the Pasonanca watershed, which supplies over 80 percent of domestic water demand through the Zamboanga City Water District (ZCWD Annual Report, 2022). Watershed management faces pressures from urban expansion, informal settlements, and agricultural encroachment, while enforcement capacity remains limited due to insufficient personnel and technical monitoring resources. Encroachment cases rose from 37 to 64 between 2019 and 2023, illustrating the operational challenges inherent in managing complex hydrological and ecological systems under decentralized authority.

Solid waste management represents another critical sector. Zamboanga generates an estimated 350–400 metric tons of waste per day, collected and processed through barangay-level materials recovery facilities and a sanitary landfill in Salaan. Despite infrastructure expansion, capacity constraints persist, and collection efficiency varies significantly across barangays. Budget allocations for waste

management remain stable, yet they struggle to match rising service demands. Daily operational challenges, including limited vehicles, labor shortages, and inconsistent community participation, highlight the gap between formal authority and operational capacity in decentralized governance.

Coastal ecosystems in Zamboanga City face pressures from small-scale fishing, mangrove conversion for aquaculture and urban development, and pollution from urban runoff. Fisheries enforcement remains weak, with only 146 apprehensions recorded from roughly 18,000 registered small-scale fishers between 2019 and 2023, and prosecution rates remain below 25 percent. The combination of overlapping mandates among local government units, the Department of Environment and Natural Resources (DENR), and community organizations complicates monitoring and compliance, revealing how shared authority affects governance outcomes in resource-constrained settings.

These conditions make Zamboanga City a strategic case for examining variation across environmental policy sectors. By analyzing solid waste, coastal resource, and watershed management under a single governance framework, the study highlights how differences in authority clarity, operational capacity, enforcement feasibility, and political sensitivity shape sectoral outcomes. The city's experience also illuminates adaptive governance strategies, including public-private partnerships, community-based initiatives, and technology-enabled monitoring, which partially mitigate capacity gaps.

In sum, Zamboanga City offers a rich empirical setting for exploring decentralized environmental governance under constraint. Its combination of urban complexity, diverse ecosystems, and multilevel institutional arrangements allows the study to identify patterns of selective effectiveness, policy innovation, and sectoral variation, providing insights applicable to other urban centers in the Global South facing similar governance and resource challenges.

5. Theoretical Framework

This study's theoretical framework integrates **decentralization theory**, **state capacity analysis**, and **multilevel governance** to explain how environmental governance outcomes emerge from the interaction of institutional authority, organizational resources, and coordination among actors. Decentralization theory examines the shift of legal and administrative authority from central governments to subnational or local entities, theorizing that devolved authority can enhance responsiveness and contextual fit of policy implementation (Cheema & Rondinelli, 2007). Jean-Paul Faguet (2004) emphasizes that decentralization involves shifts in decision-making and accountability that can significantly affect governance outcomes at the local level.

State capacity analysis contributes by foregrounding a government's ability to implement policy effectively, emphasizing dimensions such as staffing, fiscal resources, technical expertise, and administrative systems. In public administration research, capacity has been conceptualized as the multidimensional set of resources and processes that enable organizations to fulfill their missions and achieve performance goals (Christensen & Gazley, 2008). Strong operational capacity allows local governments to enforce environmental regulations, mobilize resources, and sustain interventions, while weak capacity can produce implementation gaps even where authority exists.

Multilevel governance theory, developed by political scientists such as Liesbet Hooghe and Gary Marks, frames governance as dispersed across multiple levels of authority rather than strictly hierarchical. It highlights how decision-making and implementation occur through overlapping jurisdictions involving local, regional, national, and non-state actors, particularly in complex policy domains like environmental governance (Hooghe & Marks, 2003). This perspective captures how authority is shared and coordinated across levels, enabling more adaptive and collaborative responses to environmental problems.

The framework treats environmental governance outcomes as a function of three interacting variables. **Formal Authority** refers to the legal mandates and jurisdiction assigned to local government units,

setting the boundaries of what they are empowered to do under decentralization reforms. Without clear and enforceable authority, local actions may be constrained or undermined by higher-level legal frameworks. **Operational Capacity** encompasses the material and human resources—such as trained staff, adequate budgets, technical expertise, and enforcement tools—necessary for effective policy execution. Capacity shapes whether local governments can translate formal authority into concrete actions on the ground. **Governance Alignment** reflects the degree of coordination and cooperation among national agencies, local governments, civil society, and other non-state actors. Alignment is critical for harmonizing objectives, avoiding duplication, and leveraging complementary strengths in pursuit of environmental goals.

By integrating these elements, the framework emphasizes that effective environmental governance is not solely a function of legal authority or available resources in isolation, but rather emerges through the dynamic interplay among authority, capacity, and alignment. This multidimensional approach aligns with broader governance scholarship suggesting that complex policy outcomes depend on both institutional design and cross-level collaboration among diverse actors in polycentric systems.

Figure 1 presents an analytical framework depicting decentralized environmental governance under capacity constraints. The framework highlights a triangular relationship among three core variables: **formal authority**, **operational capacity**, and **governance alignment**, with environmental outcomes positioned at the center. **Formal authority** provides the legal mandates and jurisdictional powers that enable local governments to act, but authority alone does not guarantee effective implementation. **Operational capacity**—including staffing, financial resources, technical expertise, and enforcement tools—mediates the ability of local governments to translate authority into concrete actions. **Governance alignment** reflects coordination and cooperation among national agencies, local governments, and non-state actors, influencing the legitimacy, visibility, and effectiveness of enforcement efforts. The figure illustrates the **reciprocal influence** among these variables: strong alignment can compensate for limited capacity, while high capacity may be insufficient without clear authority or coordination. Overall, the framework emphasizes that environmental outcomes emerge from the **dynamic interplay** of legal, organizational, and relational factors.

Figure 1 illustrates a **triangular framework** representing the interdependent relationship among **formal authority**, **operational capacity**, and **governance alignment**, with **environmental outcomes** situated at the center. This framework emphasizes that effective environmental governance does not rely solely on any single factor but emerges from the **dynamic interplay** of institutional, organizational, and collaborative dimensions.

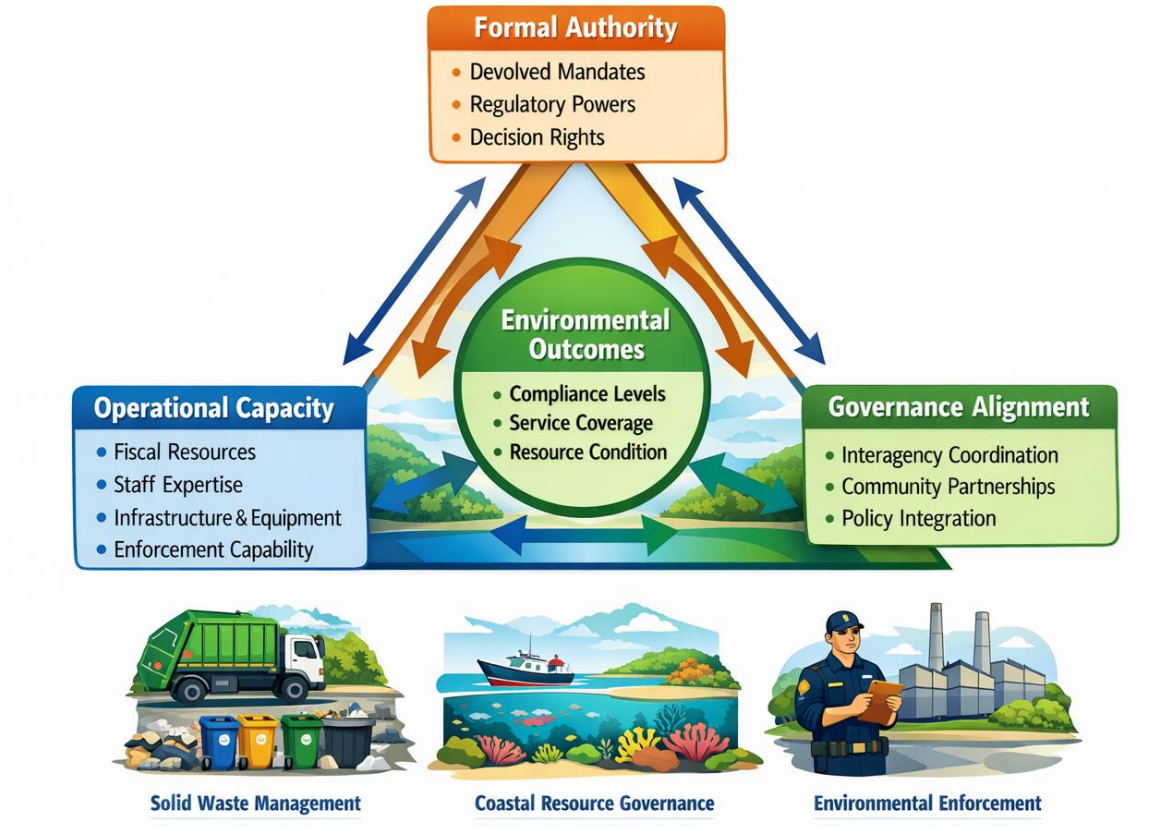
Formal authority reflects the legal mandates and jurisdiction assigned to local government units, providing the foundation for policy implementation and regulatory enforcement. However, authority alone is insufficient; without adequate staffing, technical expertise, and resources, policies cannot be fully operationalized. This is where **operational capacity** becomes critical. It encompasses personnel, fiscal resources, technical tools, and enforcement mechanisms that enable local governments to execute mandates effectively.

Governance alignment captures the coordination and cooperation among multiple actors, including national agencies, local offices, and civil society organizations. Alignment shapes enforcement effectiveness, compliance rates, and the legitimacy of governance interventions. The arrows in the figure indicate **reciprocal influence**, showing that deficiencies in one dimension—such as limited operational capacity—can constrain the impact of authority and alignment, while strong coordination can partially compensate for resource limitations.

In practical terms, the framework explains sectoral variation in environmental outcomes. For instance, Zamboanga City's solid waste management benefits from clear authority and moderate capacity, whereas coastal resource management suffers from shared authority, high technical demand, and coordination gaps. Overall, Figure 1 highlights that **robust environmental outcomes require**

simultaneous attention to legal mandates, organizational capacity, and collaborative governance mechanisms, underscoring the importance of integrated approaches in local environmental management.

Figure 1. Analytical Framework of Decentralized Environmental Governance under Capacity Constraints



This framework guides the empirical analysis in subsequent sections. The study uses within-case comparison across environmental sectors to trace how capacity constraints and governance arrangements shape outcomes.

6. Decentralized Environmental Governance in the Philippines

Decentralized environmental governance in the Philippines emerges from the 1991 Local Government Code, which devolves significant authority to cities and municipalities. Local governments assume responsibility for solid waste management, environmental planning, and enforcement of local environmental ordinances, while national agencies, such as the Department of Environment and Natural Resources (DENR) and the Bureau of Fisheries and Aquatic Resources (BFAR), retain regulatory oversight and technical guidance. This creates a hybrid governance structure characterized by overlapping mandates and shared accountability. Fiscal and administrative capacity varies widely across local jurisdictions, with many relying heavily on national transfers and possessing limited technical expertise. Coordination gaps between local and national agencies hinder enforcement consistency, particularly in sectors requiring specialized knowledge, such as coastal resource management and watershed protection. Despite formal authority, capacity constraints and political considerations limit effective policy implementation. The Philippine experience illustrates that decentralization provides legal empowerment but requires alignment of resources, capacity, and multilevel coordination to achieve sustainable environmental governance outcomes.

6.1 Evolution of Environmental Decentralization

The Philippine decentralization framework emerges from the 1991 Local Government Code, which transfers substantial service delivery and regulatory responsibilities to local governments. Environmental governance becomes a core devolved function. Cities and municipalities assume responsibility for solid waste management, environmental planning, enforcement of local ordinances, and management of municipal waters extending 15 kilometers from the coastline.

National government agencies retain policy-setting and regulatory roles. The Department of Environment and Natural Resources controls environmental impact assessment, protected area designation, and national standards enforcement. This hybrid structure produces a multilevel governance system characterized by overlapping authority and shared accountability.

Empirical studies show that decentralization in the Philippines strengthens local autonomy but exposes uneven local capacity (Brillantes et al., 2020). Environmental functions present higher implementation demands than social services because they require continuous monitoring, scientific expertise, and enforcement legitimacy.

6.2 Intergovernmental Coordination and Fragmentation

Environmental governance in the Philippines relies on coordination among national agencies, local governments, and barangays. In practice, coordination gaps persist. DENR regional offices oversee compliance monitoring, but city governments implement day-to-day enforcement. Jurisdictional ambiguity complicates sanctioning authority, especially in coastal and watershed areas.

Local governments depend on national agencies for technical assessments, laboratory services, and enforcement support. This dependency delays response times and weakens deterrence. Studies of coastal governance show that fragmented authority reduces compliance and weakens fisheries management (Pomeroy et al., 2021).

7. Fiscal and Administrative Capacity of Zamboanga City

Zamboanga City's fiscal and administrative capacity shapes its ability to implement decentralized environmental governance. As a highly urbanized city, it possesses legal authority to manage local environmental functions but relies heavily on national transfers, with the National Tax Allotment accounting for approximately 72 percent of total revenues in 2023. Total city income reached PHP 10.2 billion, yet environmental offices receive only about 3.7 percent of the budget, limiting investment in staffing, equipment, and enforcement activities. The City Environment and Natural Resources Office employs 78 personnel to serve 98 barangays, yielding a ratio of one environmental staff member per 12,530 residents. Enforcement capacity is constrained by limited patrol assets, particularly for coastal and watershed monitoring. Budget stability contrasts with growing environmental pressures, creating persistent gaps between legal mandates and operational capacity. These fiscal and administrative constraints directly influence the city's ability to enforce ordinances, maintain infrastructure, and support policy innovation across solid waste, coastal, and watershed sectors.

7.1 Fiscal Structure and Budget Allocation

Zamboanga City qualifies as a highly urbanized city with independent fiscal authority. Despite this status, the city relies heavily on national transfers. In fiscal year 2023, the city reports total income of PHP 10.2 billion. National Tax Allotment accounts for approximately 72 percent of total revenue, while locally sourced income contributes 28 percent (Commission on Audit, 2024).

Environmental governance receives a modest share of the city budget. Table 1 presents selected budget allocations for environmental functions between 2020 and 2023.

Table 1 presents Zamboanga City's budget allocation for environmental functions from 2020 to 2023. Over this four-year period, the total city budget increased steadily from PHP 8,450 million in 2020 to PHP 10,200 million in 2023, reflecting overall fiscal growth. Environmental offices received incremental increases in nominal terms, from PHP 312 million in 2020 to PHP 382 million in 2023. Despite these nominal increases, the proportion of the budget allocated to environmental functions remained constant at **3.7 percent** throughout the period. This suggests that while the city is expanding its overall fiscal capacity, the relative prioritization of environmental programs has not changed. The consistent percentage allocation highlights potential limitations in scaling environmental initiatives relative to other sectors, emphasizing the importance of strategic resource use and efficiency. These patterns underscore the need for local governments to not only increase funding but also enhance operational capacity and governance alignment to improve environmental outcomes.

Table 1. Zamboanga City Budget Allocation for Environmental Functions, 2020–2023 (PHP million)

Year	Total City Budget	Environmental Offices	Percentage
2020	8,450	312	3.7
2021	8,920	328	3.7
2022	9,740	356	3.7
2023	10,200	382	3.7

Source: Commission on Audit Annual Audit Reports; Zamboanga City Budget Office.

The stable percentage allocation indicates limited prioritization growth despite rising environmental pressures.

7.2 Administrative Capacity and Staffing

The City Environment and Natural Resources Office (CENRO) serves as Zamboanga City's lead agency for environmental management, overseeing policy implementation, regulatory enforcement, and community-based initiatives. As of 2023, CENRO employs a total of 78 personnel, including administrative staff, environmental officers, and enforcement aides. This staffing level translates to approximately **one environmental staff member for every 12,530 residents**, indicating a relatively high workload per officer given the city's population size. Such ratios highlight potential constraints in the office's capacity to deliver comprehensive environmental services, conduct frequent monitoring, and respond promptly to emerging issues.

Field enforcement teams face additional challenges due to limited operational resources. Coastal patrols, for instance, operate with fewer than ten patrol boats to cover more than **1,000 square kilometers of municipal waters**, constraining the frequency and geographic scope of monitoring activities. This scarcity of equipment, coupled with a lean workforce, affects the city's ability to detect and respond to illegal activities such as unauthorized fishing, pollution, or habitat degradation.

Beyond coastal enforcement, administrative tasks—including report generation, permit processing, and community engagement—place additional demands on staff time, potentially diverting resources from field operations. Consequently, the effectiveness of environmental governance is influenced not only by legal authority and coordination mechanisms but also by the city's operational and administrative capacity. Strengthening staffing levels, enhancing technical expertise, and expanding equipment resources are critical steps toward improving enforcement coverage, ensuring consistent monitoring, and ultimately achieving more robust environmental outcomes.

8. Sectoral Governance Context and Baseline Conditions

Zamboanga City's environmental governance varies across sectors due to differences in authority, technical demand, and enforcement challenges. Solid waste management handles 350–400 metric tons daily, with 55% from households; only 42 of 98 barangays have functional materials recovery facilities. Coastal resource management oversees mangroves, coral reefs, and seagrass beds, supporting 18,000 small-scale fishers, yet illegal fishing persists, with prosecutions under 25% of recorded apprehensions. Urban watershed protection focuses on Pasonanca, supplying 80% of domestic water, but encroachment cases rose from 37 to 64 (2018–2022), constrained by political and livelihood concerns. Legal authority, capacity, and politics drive uneven outcomes.

The study examines three environmental sectors that reflect distinct governance challenges: solid waste management, coastal resource management, and urban watershed protection.

8.1 Solid Waste Management

Zamboanga City generates an estimated **350–400 metric tons of solid waste per day**, reflecting a combination of residential, commercial, and institutional sources. Residential waste accounts for roughly **55 percent** of the total volume, followed by commercial waste at 30 percent and institutional waste at 15 percent (City Solid Waste Management Board Records, 2022). This composition underscores the importance of targeting households in solid waste reduction strategies while also engaging commercial and institutional sectors in proper waste management practices.

The city operates a **sanitary landfill in Salaan**, inaugurated in 2017, which meets minimum national standards for waste disposal and environmental protection. Despite compliance with regulatory requirements, the landfill faces **capacity constraints**, raising concerns about long-term sustainability as population growth and urbanization increase waste generation. Complementary strategies such as waste reduction, recycling, and composting are critical to extend the landfill's lifespan and mitigate environmental impacts.

Waste segregation compliance remains **uneven across barangays**, highlighting challenges in public awareness, monitoring, and enforcement. In 2023, only **42 of 98 barangays** report functional materials recovery facilities, limiting the city's ability to divert recyclable materials from the landfill effectively. Enforcement primarily relies on **barangay-level implementation**, which varies significantly depending on local leadership, staffing, and resources. Some barangays demonstrate high levels of compliance through active monitoring and community engagement, while others struggle due to limited personnel or low public participation.

Overall, solid waste management in Zamboanga City reflects the interplay of infrastructure, local governance, and citizen behavior. Strengthening materials recovery facilities, improving barangay-level enforcement, and promoting widespread compliance with segregation policies are essential to enhance environmental outcomes and ensure the sustainability of the city's waste management system.

8.2 Coastal Resource Management

Zamboanga City administers one of the largest **municipal water jurisdictions in the Philippines**, encompassing extensive coastal ecosystems that include **mangroves, coral reefs, and seagrass beds**. These ecosystems provide critical ecological services such as shoreline protection, habitat for marine biodiversity, and support for small-scale fisheries, which are vital to local livelihoods. In 2022, the city recorded approximately **18,000 small-scale fishers** registered under the Fisherfolk Registration System, reflecting the substantial socio-economic reliance on coastal resources.

Despite the existence of regulatory frameworks designed to protect marine ecosystems, **illegal fishing remains a persistent challenge**. Between 2019 and 2023, city enforcement data indicate **146 apprehensions for fisheries violations**. Prosecution rates, however, remain low due to multiple factors, including **evidentiary challenges**, limited staffing, and **overlapping jurisdiction with national agencies**. These constraints limit the deterrent effect of enforcement and allow some illegal activities to continue, undermining long-term sustainability of fisheries resources.

Mangrove cover, particularly in peri-urban areas, has declined due to coastal development, pollution, and encroachment. However, the city has promoted **community-based rehabilitation projects**, which have demonstrated localized success. Such initiatives rely on collaboration among barangay officials, local NGOs, and fisherfolk organizations, illustrating the potential for **co-production approaches** to complement formal enforcement. These projects not only restore critical habitats but also engage communities in stewardship, enhancing awareness and fostering voluntary compliance with resource management regulations.

Overall, coastal resource management in Zamboanga City reflects the complex interplay of ecological, social, and institutional factors. Addressing illegal fishing, enhancing enforcement capacity, and scaling up community-based rehabilitation are key priorities to protect marine ecosystems, support sustainable livelihoods, and improve the resilience of coastal communities to environmental pressures.

8.3 Urban Watershed Protection

The **Pasonanca watershed** is a critical resource for Zamboanga City, supplying more than **80 percent of the city's domestic water demand**. Its ecological integrity is essential not only for potable water provision but also for maintaining flood control, soil stability, and biodiversity within surrounding areas. However, increasing population growth, urban expansion, and the proliferation of informal settlements place significant pressure on the watershed's health. Encroachment and unsanctioned land use threaten forest cover, reduce natural filtration capacity, and compromise the watershed's ability to provide clean water consistently.

To address these challenges, the city enforces a **watershed code** that regulates land use within protected zones, limiting activities such as residential development, logging, and agricultural expansion. Effective monitoring and enforcement rely on coordination among multiple actors, including the city government, the **Zamboanga City Water District (ZCWD)**, and the **Department of Environment and Natural Resources (DENR)**. This collaborative approach seeks to combine regulatory authority, technical expertise, and local knowledge to detect violations and implement remediation measures.

City records indicate that **encroachment cases increased from 37 in 2018 to 64 in 2022**, signaling rising pressure on the watershed. Enforcement actions often face political resistance, particularly when they affect livelihoods of residents living within or near protected areas. This tension underscores the need for **hybrid enforcement strategies**, which combine regulatory measures with negotiated compliance, community engagement, and potential livelihood support to reduce opposition while ensuring environmental protection.

Overall, the management of the **Pasonanca watershed** highlights the multifaceted challenges of urban environmental governance in rapidly growing cities. Ensuring **water security** while maintaining **ecological integrity** requires careful monitoring, protection of forest cover, and prevention of encroachment. At the same time, addressing **socio-economic concerns**, including the livelihoods of informal settlers and local communities, adds complexity to enforcement and regulatory measures. Effective governance therefore depends on **robust operational capacity**, clear legal authority, and strong **interagency coordination**, supported by **adaptive strategies** that integrate community engagement, negotiated compliance, and technical interventions to sustainably safeguard this critical urban watershed.

9. Comparative Sectoral Governance Matrix

Zamboanga City's environmental governance exhibits clear sectoral variation shaped by legal authority, technical complexity, and enforcement capacity. Solid Waste Management handles 350–400 metric tons daily, with 55% from residential sources. While the city maintains a sanitary landfill meeting national standards, uneven barangay compliance and limited functional materials recovery facilities—42 of 98 barangays—highlight capacity gaps. Coastal Resource Management oversees extensive mangroves, coral reefs, and seagrass beds, supporting roughly 18,000 small-scale fishers. Despite 146 apprehensions between 2019 and 2023, prosecutions remain below 25% due to fragmented jurisdiction and limited enforcement. Urban Watershed Protection centers on the Pasonanca watershed, supplying over 80% of domestic water. Encroachment cases rose from 37 to 64 (2018–2022), with enforcement constrained by political sensitivity and livelihood concerns. These differences illustrate that governance outcomes are uneven, reflecting sector-specific challenges in authority, technical demands, compliance, and socio-political pressures, offering a comparative perspective for targeted interventions.

Table 2 presents a governance baseline across three environmental sectors in Zamboanga City, enabling within-case comparison of institutional arrangements, enforcement challenges, and observed performance. The table illustrates variation in **legal authority**, **enforcement complexity**, **political salience**, **technical demand**, and **observed outcomes** for solid waste management, coastal resources, and watershed protection.

Solid waste management demonstrates **high local authority**, medium enforcement complexity, and high political salience. Despite resource constraints, observed performance is relatively better compared to the other sectors, suggesting that clear legal mandates empower local actors to coordinate implementation, mobilize barangay-level enforcement, and engage communities effectively. Conversely, both coastal resource management and watershed protection are characterized by **shared legal authority** and high enforcement complexity, which contribute to weaker observed outcomes. Overlapping jurisdiction with national agencies, coupled with ecological and technical challenges, complicates enforcement, delays responses, and reduces the visibility and deterrence effect of regulatory actions.

Political salience and technical demand further differentiate sectoral performance. Solid waste management benefits from high public attention and moderate technical requirements, enabling more consistent compliance and monitoring. Coastal and watershed management involve higher technical demands and, in the case of watersheds, lower political salience, limiting both enforcement rigor and community engagement.

Table 2. Sectoral Governance Baseline in Zamboanga City

Dimension	Solid Waste	Coastal Resources	Watershed Protection
Legal Authority	High	Shared	Shared
Enforcement Complexity	Medium	High	High
Political Salience	High	Medium	Low
Technical Demand	Medium	High	High
Observed Performance	Uneven	Weak	Moderate

The matrix underscores the relationship between **enforcement complexity**, **authority distribution**, and observed environmental performance across sectors. Sectors characterized by **shared authority**—such as coastal resource management and watershed protection—tend to exhibit weaker performance due to overlapping mandates, coordination challenges, and procedural delays. These factors complicate monitoring, limit enforcement continuity, and reduce the deterrent effect of regulatory interventions. In contrast, sectors where **local government authority is clear and well-defined**, such as solid waste

management, achieve relatively better outcomes even when resources, staffing, and technical capacity are limited. Clear authority enables local actors to implement policies consistently, coordinate effectively with community stakeholders, and leverage political incentives to support compliance. This pattern suggests that while operational capacity and fiscal resources are important, **the clarity of legal and institutional authority** plays a critical role in shaping environmental outcomes. The matrix therefore highlights the need for governance designs that align authority, capacity, and coordination mechanisms to mitigate sector-specific performance disparities.

Overall, the matrix underscores the **relationship between authority clarity, enforcement complexity, and performance**. Sectors with stronger, clearly defined local authority achieve better outcomes despite capacity constraints, while shared governance and technical complexity present barriers that require enhanced coordination, capacity building, and adaptive governance strategies to improve environmental management across the city.

10. Case Implications for Environmental Governance Theory

Zamboanga City provides a compelling case for examining how decentralized environmental governance systems function under conditions of persistent capacity constraints. Across sectors such as solid waste management, coastal resource management, and urban watershed protection, the city demonstrates that formal legal authority, while necessary, is insufficient on its own to ensure compliance, effective resource stewardship, or sustainable outcomes. In practice, the translation of laws and policies into tangible environmental improvements is heavily mediated by sector-specific technical demands, enforcement feasibility, political incentives, and the coordination requirements among multiple actors.

For instance, in solid waste management, the city possesses formal regulatory control and operates a sanitary landfill that meets minimum national standards. However, uneven compliance among barangays—illustrated by the fact that only 42 of 98 maintain functional materials recovery facilities—underscores that authority alone cannot guarantee consistent implementation. Implementation capacity, local knowledge, resource availability, and community engagement all shape sectoral performance, highlighting the limits of a purely top-down regulatory approach.

Coastal resource management similarly demonstrates the challenges of decentralized governance. The city oversees extensive municipal waters with mangroves, coral reefs, and seagrass beds, providing livelihoods for roughly 18,000 small-scale fishers. Despite formal rules and enforcement mechanisms, illegal fishing persists, with 146 apprehensions recorded between 2019 and 2023 but prosecutions completing in less than 25% of cases. Fragmented jurisdictional authority, limited enforcement resources, and the high political cost of targeting constituents who rely on fishing livelihoods constrain governance outcomes. This case illustrates how political incentives and institutional fragmentation interact to shape environmental compliance and resource sustainability.

Urban watershed protection, focused on the Pasonanca watershed, highlights additional dimensions of political and social complexity. The watershed supplies over 80% of the city's domestic water, yet encroachment cases rose from 37 in 2018 to 64 in 2022. Enforcement is constrained by political sensitivity and the livelihoods of encroaching communities, demonstrating how governance outcomes are influenced by the social and economic context in which regulatory authority operates.

Collectively, these examples show that sectoral variation in governance outcomes is not random but emerges from the interplay of authority, capacity, technical complexity, and socio-political dynamics. The Zamboanga City case underscores the importance of analyzing decentralized systems with attention to both formal institutional structures and the practical realities of implementation. It also highlights the need for adaptive governance strategies that can align enforcement with local incentives, enhance coordination among agencies, and build capacity at the subnational level.

This context sets the stage for the empirical analysis that follows. The next section outlines the research design, data sources, and analytical strategy employed to trace causal mechanisms within and across sectors. By examining these dynamics empirically, the study aims to contribute to broader theoretical debates in environmental governance about how decentralized authorities can achieve effective, equitable, and sustainable outcomes despite persistent capacity and coordination challenges.

11. Research Design and Methodology

This study employs a mixed-methods research design to examine environmental governance in Zamboanga City across solid waste management, coastal resource management, and urban watershed protection. Primary data include official city records, barangay reports, and enforcement statistics, supplemented by semi-structured interviews with local government officials, community leaders, and key stakeholders. Secondary sources comprise policy documents, legal frameworks, and prior research on decentralized governance and environmental management. The analytical strategy combines sectoral case analysis with cross-sectoral comparison, identifying patterns in authority, capacity, compliance, and political incentives. Quantitative data on waste generation, apprehensions, and encroachment cases are used to measure governance performance, while qualitative data provide insight into enforcement challenges, coordination gaps, and socio-political constraints. Triangulating these sources allows for tracing causal mechanisms, assessing implementation variability, and generating evidence-based implications for theory and policy. This methodology ensures both rigor and contextual depth in evaluating sectoral environmental governance outcomes.

11.1 Research Design

The study adopts a qualitative case study design with within-case comparison across environmental sectors to examine decentralized governance under capacity constraints. This design enables detailed causal explanation in settings where randomized or experimental approaches remain infeasible, particularly in complex urban governance contexts. Zamboanga City represents a theoretically strategic case because it combines extensive decentralized authority with persistent administrative, technical, and fiscal limitations, allowing the study to explore how these constraints shape environmental governance outcomes across sectors. The city's combination of urban density, diverse ecosystems, and multilevel institutional arrangements provides rich empirical leverage for understanding variation in policy effectiveness under a single political and fiscal environment.

The study applies **process tracing** to examine the mechanisms linking institutional arrangements, operational capacity, and governance alignment to observed sectoral outcomes. This approach enables systematic reconstruction of causal pathways, identifying how formal mandates interact with local resources, enforcement feasibility, and political incentives to produce differential outcomes. By analyzing sequential policy processes—including planning, enforcement, monitoring, and stakeholder engagement—the study identifies both structural constraints and adaptive strategies that mediate performance.

The within-case sectoral comparison focuses on solid waste management, coastal resource management, and watershed governance, allowing the identification of mechanisms that explain variation in outcomes despite a shared governance context. Comparing these sectors illuminates how authority clarity, enforcement complexity, and policy innovation influence sector-specific performance. This design also permits exploration of cross-sectoral patterns, highlighting where adaptive governance strategies, public-private partnerships, and community engagement compensate for structural limitations.

Overall, the research design integrates qualitative rigor with theoretical precision, producing insights into the conditional effectiveness of decentralization, the relational nature of state capacity, and the role of adaptive mechanisms in shaping urban environmental governance outcomes.

11.2 Analytical Logic

The analysis treats environmental governance outcomes as dependent variables produced by interacting institutional, technical, and political factors. It examines how authority clarity, operational capacity, governance alignment, and enforcement complexity combine to generate sector-specific performance in Zamboanga City. Unlike quantitative approaches that rely on statistical hypothesis testing, the study evaluates causal pathways using qualitative evidence, including administrative records, interviews, and document analysis. This approach allows for detailed reconstruction of mechanisms linking institutional arrangements to observed outcomes, highlighting both enabling and constraining conditions in decentralized governance.

The study applies **process tracing** as its core analytical method, systematically identifying sequences of action and decision-making that explain variation in environmental performance across solid waste, coastal resources, and watershed sectors. By examining how mandates, resources, coordination, and adaptive strategies interact, the analysis identifies structural and relational conditions that facilitate or hinder effective governance. For example, authority clarity combined with moderate operational capacity produces partial compliance in solid waste management, while shared authority with high enforcement complexity generates weak outcomes in coastal fisheries.

This analytical logic aligns with interpretive and institutional traditions in public administration and environmental governance research (George & Bennett, 2005; Ostrom, 2010). It emphasizes context-dependent causality, recognizing that governance outcomes emerge from dynamic interactions among formal rules, resource constraints, and local actors' adaptive strategies. The approach enables the study to move beyond descriptive accounts, providing explanatory insights into the mechanisms underlying selective effectiveness, policy innovation, and sectoral variation.

By focusing on causal mechanisms rather than correlational patterns, the study contributes to theory-building in decentralized environmental governance, illustrating how institutional design, capacity limitations, and coordination dynamics jointly shape outcomes under real-world constraints.

12. Data Sources

The study relies on multiple data sources to enhance validity through methodological triangulation, ensuring a comprehensive and nuanced understanding of environmental governance in Zamboanga City. By integrating quantitative and qualitative information, the research captures both measurable outcomes and contextual factors that influence sectoral performance. The dataset spans the period from 2015 to 2023, allowing the study to analyze post-devolution dynamics, the effects of recent governance reforms, and evolving patterns in sectoral compliance, enforcement, and resource management.

Quantitative data are drawn from official city records, barangay reports, and municipal agency statistics. These include solid waste generation figures, functional status of materials recovery facilities, coastal resource monitoring data such as the number of registered fishers and apprehensions for illegal fishing, and urban watershed encroachment reports. Such data provide objective indicators of governance outcomes and allow cross-sectoral comparisons of performance over time.

Qualitative data are sourced from semi-structured interviews with key stakeholders, including city and barangay officials, community leaders, resource users, and representatives of local civil society organizations. These interviews shed light on challenges in enforcement, coordination gaps, political and social constraints, and the practical realities of implementing environmental regulations.

Secondary sources supplement these datasets, including relevant legislation, municipal ordinances, policy guidelines, environmental management plans, and prior research on decentralized governance. This contextual information helps interpret quantitative trends and supports triangulation between observed outcomes and underlying causal mechanisms.

By combining these diverse data sources, the study strengthens both internal and external validity. The integration of numerical indicators with stakeholder perspectives provides a robust empirical foundation to trace causal mechanisms, assess sector-specific governance dynamics, and generate evidence-based insights for theory and policy on decentralized environmental governance.

12.1 Administrative and Fiscal Records

Primary administrative and fiscal records form a central component of the study's data collection, providing objective, quantifiable indicators of institutional capacity, enforcement activity, and budgetary priorities. These records allow for a detailed assessment of the resources allocated to environmental governance and how these resources translate into sectoral outcomes over time.

Annual budget reports from the Zamboanga City Budget Office offer insights into the allocation of financial resources across sectors, including solid waste management, coastal resource management, and urban watershed protection. These reports reveal funding trends, identify priority areas, and provide a measure of fiscal commitment to environmental programs. Commission on Audit (COA) Annual Audit Reports complement budget data by verifying expenditures, highlighting discrepancies, and evaluating compliance with national accounting and governance standards, thereby ensuring the reliability of fiscal information.

Staffing records from the City Environment and Natural Resources Office provide data on personnel capacity, including the number of field officers, technical specialists, and administrative staff available to implement environmental programs. These records help link human resource availability to sectoral performance, enforcement coverage, and operational efficiency.

Sector-specific reports from the City Solid Waste Management Board and fisheries enforcement records from the City Agriculture Office further quantify operational outputs. These include the volume of waste processed, functionality of materials recovery facilities, number of inspections conducted, and recorded apprehensions for illegal fishing. Together, these records provide a detailed picture of enforcement effort, technical capacity, and operational effectiveness.

By combining fiscal allocations, staffing levels, and enforcement outputs, administrative and fiscal records allow the study to assess the relationship between resource inputs and governance outcomes. This approach enables the identification of capacity gaps, sectoral strengths and weaknesses, and the degree to which fiscal prioritization aligns with observed environmental management performance, forming a critical foundation for subsequent analysis.

12.2 Policy and Legal Documents

Policy and legal documents form a critical data source for understanding the institutional framework, legal authority, and regulatory mechanisms that shape environmental governance in Zamboanga City. These documents provide both the formal mandates and strategic guidance that inform decision-making, enforcement practices, and resource management across sectors.

Local environmental ordinances are analyzed to determine the scope of authority delegated to city and barangay-level institutions. They specify responsibilities for solid waste management, coastal resource protection, and watershed conservation, outline compliance requirements, and establish penalties for violations. Executive orders related to environmental enforcement further clarify operational mandates, provide guidance on coordination among city offices, and establish temporary or sector-specific initiatives, reflecting the city's capacity to adapt governance measures to emerging challenges.

City development plans and investment programs offer insights into long-term priorities, including infrastructure development, public service provision, and environmental projects. These documents

reveal how strategic planning aligns with fiscal and operational resources and indicate the city's broader approach to sustainable development.

National environmental statutes and implementing rules, including the Philippine Clean Water Act, Ecological Solid Waste Management Act, and Fisheries Code, provide the legal basis for local action. By comparing national mandates with local ordinances, the study identifies areas of authority, regulatory gaps, and overlaps that influence enforcement feasibility and compliance outcomes.

Through systematic document analysis, these policy and legal sources support institutional mapping, clarify lines of responsibility, and enable an assessment of formal authority within each sector. They also provide context for understanding enforcement constraints, sectoral capacity, and political considerations, helping to link regulatory frameworks to observed governance outcomes. Collectively, this analysis strengthens the study's capacity to evaluate how legal and policy instruments shape environmental governance in practice.

12.3 Key Informant Interviews

Key informant interviews constitute a core qualitative component of the study, providing rich, context-specific insights into the practical realities of environmental governance in Zamboanga City. Semi-structured interviews were conducted with a diverse set of stakeholders, including city-level environmental officials, barangay leaders, representatives of national agencies, and members of civil society organizations engaged in environmental programs. This broad range of participants allows the study to capture multiple perspectives on enforcement practices, operational challenges, coordination mechanisms, and opportunities for policy innovation.

City-level officials provide information on strategic planning, regulatory implementation, resource allocation, and the technical and logistical constraints that influence governance outcomes. Barangay leaders contribute perspectives on local compliance, community engagement, and the practical challenges of implementing environmental ordinances at the grassroots level. National agency representatives offer insights into the alignment of local governance with broader statutory mandates, technical guidance, and monitoring frameworks. Civil society actors highlight community-based initiatives, accountability mechanisms, and gaps in government capacity, offering a complementary view of governance performance from outside formal institutions.

Interviews focus on key themes such as enforcement practices, inter-agency coordination, political and social constraints, and innovative approaches to managing environmental resources. The semi-structured format allows flexibility to explore emergent issues while maintaining consistency across interviews. To ensure ethical research practices, all respondents are anonymized, and sensitive information is handled confidentially.

By integrating these qualitative insights with administrative, fiscal, and policy data, key informant interviews enable the study to trace causal mechanisms, interpret observed patterns in compliance and enforcement, and contextualize sector-specific outcomes. This methodological approach strengthens the study's analytical depth and contributes to a nuanced understanding of decentralized environmental governance in practice.

12.4 Environmental and Sectoral Indicators

Environmental and sectoral indicators form a crucial component of this study, providing quantitative measures to assess governance performance across Zamboanga City's key environmental sectors. By systematically tracking sector-specific metrics over time, these indicators allow the study to identify trends, evaluate the effectiveness of policies, and compare outcomes across solid waste management, coastal resource management, and urban watershed protection.

In solid waste management, indicators include daily waste generation volumes and the proportion of waste properly disposed of in the city's sanitary landfill. The number of barangays with functional materials recovery facilities (MRFs) is also tracked, providing a measure of local compliance and operational capacity. These indicators help reveal the relationship between resource allocation, community engagement, and the effectiveness of waste management practices at both the city and barangay levels.

For coastal resource management, indicators focus on enforcement outcomes, including the number of fisheries violations apprehended and the corresponding follow-through in terms of prosecution or administrative sanctions. These metrics highlight enforcement intensity, compliance levels, and the challenges posed by illegal fishing, jurisdictional fragmentation, and limited enforcement capacity.

Urban watershed protection is assessed through indicators such as encroachment cases within the Pasonanca watershed. Tracking these incidents over time provides insight into the pressures on critical water resources, the effectiveness of monitoring and enforcement efforts, and the social and political factors that shape governance outcomes.

Collectively, these environmental and sectoral indicators allow for a descriptive assessment of governance performance by linking measurable outcomes to institutional capacity, resource allocation, and policy implementation. When combined with qualitative data from interviews and document analysis, they support a holistic understanding of the factors driving sectoral variation in environmental governance. These indicators serve as the foundation for comparative analysis, enabling the study to identify strengths, weaknesses, and areas for targeted improvement across sectors.

13. Data Matrix and Operationalization

The study operationalizes environmental governance variables using a structured data matrix, which organizes key concepts, indicators, and data sources to facilitate systematic analysis. This approach ensures clarity in how abstract governance concepts—such as authority, capacity, enforcement, and compliance—are translated into measurable, sector-specific metrics. By linking variables to concrete indicators and data sources, the matrix provides a transparent framework for both descriptive and comparative analysis across solid waste management, coastal resource management, and urban watershed protection.

Table 3 summarizes the operationalization strategy, detailing each variable, its associated indicators, and the corresponding data source. For example, governance capacity is measured through staffing levels, budget allocations, and operational outputs, using administrative records from the City Environment and Natural Resources Office, budget reports, and sectoral enforcement records. Enforcement effectiveness is operationalized via the number of inspections, apprehensions, prosecutions, and documented compliance rates, drawing from fisheries records, solid waste reports, and watershed monitoring data. Political and institutional coordination is assessed qualitatively through interview data, policy documents, and executive orders that clarify inter-agency roles and lines of authority.

This matrix also allows for the integration of temporal and spatial dimensions. Indicators are tracked across the period 2015–2023 to capture post-devolution dynamics and changes following governance reforms. Sectoral disaggregation ensures that variation between solid waste, coastal resources, and watershed management is explicitly considered, highlighting both systemic patterns and sector-specific challenges.

By operationalizing governance variables in this structured way, the data matrix facilitates robust empirical analysis, ensuring that causal mechanisms can be traced, sectoral performance can be compared, and theoretical insights into decentralized environmental governance can be grounded in

evidence. The matrix thus functions as both an analytical tool and a reference point for data collection, coding, and interpretation.

Table 3. Data Matrix for Decentralized Environmental Governance Analysis

Variable	Indicator	Measurement	Source
Formal Authority	Legal mandate	Ordinance and statute review	Legal documents
Fiscal Capacity	Budget allocation	% of city budget	COA reports
Administrative Capacity	Staffing levels	Personnel count	CENRO records
Enforcement Effort	Patrols, inspections	Annual counts	Sectoral reports
Governance Alignment	Coordination mechanisms	Presence and use	Interviews
Policy Outcome	Compliance trends	Sectoral indicators	City records

The data matrix in Table 3 provides a structured approach for **systematic comparison of decentralized environmental governance** across sectors and over time. By organizing key variables, indicators, and measurement methods, the matrix ensures consistency in data collection and analysis. **Formal authority** is assessed through legal mandates identified in ordinances and statutes, providing a baseline for local government powers. **Fiscal capacity** is measured as the proportion of the city budget allocated to environmental functions, reflecting the resources available for implementation. **Administrative capacity** captures staffing levels, while **enforcement effort** is quantified through annual counts of patrols and inspections, highlighting operational activity. **Governance alignment** examines the presence and use of coordination mechanisms among national agencies, local offices, and non-state actors, revealing collaborative dynamics. Finally, **policy outcomes** track compliance trends through sectoral indicators. This matrix facilitates comparison across solid waste, coastal resources, and watershed protection, allowing the analysis to link authority, capacity, and alignment with observed environmental performance and identify sector-specific governance challenges.

14. Analytical Strategy

The study employs a structured analytical strategy combining process tracing and cross-sectoral comparison to examine environmental governance in Zamboanga City. Process tracing maps sequences from authority allocation, capacity availability, and coordination dynamics to enforcement actions and sectoral outcomes, enabling identification of causal mechanisms and bottlenecks. Cross-sectoral comparison highlights variation in governance performance across solid waste management, coastal resources, and watershed protection, linking differences to institutional, technical, and political factors. Triangulating quantitative indicators, administrative records, policy documents, and qualitative interview data ensures robust evidence and contextual depth, supporting both descriptive assessment and explanatory inference in understanding decentralized environmental governance.

14.1 Process Tracing

The study employs process tracing as a central analytical strategy to systematically link institutional design to observed environmental governance outcomes in Zamboanga City. This method focuses on tracing sequences of decisions, actions, and interactions within each sector to identify causal mechanisms, constraints, and bottlenecks. By following the chronological and functional pathways from policy design to implementation outcomes, process tracing provides a rigorous approach to understanding why governance performance varies across sectors and over time.

For each sector—solid waste management, coastal resource management, and urban watershed protection—the analysis follows a structured sequence of steps. First, the allocation of authority is examined, identifying which institutions at city and barangay levels hold formal decision-making

powers, regulatory mandates, and enforcement responsibilities. Second, the availability of capacity is assessed, including budget allocations, staffing levels, technical expertise, and infrastructure, which determine the ability to implement policies effectively. Third, coordination dynamics are analyzed, highlighting inter-agency interactions, overlapping responsibilities, and collaborative mechanisms that influence the efficiency and consistency of governance actions. Fourth, enforcement actions are documented, including inspections, apprehensions, prosecutions, and compliance monitoring. Finally, outcome patterns are examined, such as waste management performance, fisheries compliance, and watershed encroachment, linking observed results to preceding institutional and operational factors.

By tracing these sequences, the study identifies critical causal bottlenecks where gaps in authority, capacity, or coordination hinder effective governance. For instance, fragmented jurisdiction, limited staffing, or political constraints can reduce enforcement effectiveness despite formal mandates. Process tracing allows the study to move beyond correlation, providing a detailed, evidence-based understanding of how institutional structures, resources, and interactions produce specific sectoral outcomes. This approach lays the foundation for cross-sectoral comparison and policy-relevant insights into decentralized environmental governance.

14.2 Within-Case Sectoral Comparison

The study employs within-case sectoral comparison to systematically analyze governance dynamics across solid waste management, coastal resource management, and urban watershed protection in Zamboanga City. By examining each sector along identical analytical dimensions—allocation of authority, availability of capacity, coordination dynamics, enforcement actions, and observed outcomes—the approach isolates the effect of sector-specific governance demands while controlling for broader contextual factors such as local politics, population pressures, and institutional structures.

In solid waste management, the analysis considers how barangay-level compliance, functional materials recovery facilities, and landfill operations interact with city-level planning and enforcement to shape sectoral performance. Coastal resource management focuses on fisheries regulation, mangrove and coral reef protection, and the enforcement of illegal fishing prohibitions, highlighting the challenges posed by dispersed actors, high dependency on natural resources, and jurisdictional overlap with national agencies. Urban watershed protection examines encroachment cases in the Pasonanca watershed, linking legal authority, monitoring capacity, and political sensitivity to observed patterns of compliance.

By comparing sectors along these consistent dimensions, the study identifies both shared challenges and sector-specific bottlenecks. For example, limited technical capacity may constrain performance in all sectors, but coordination challenges are particularly pronounced in coastal management due to multiple overlapping authorities. Conversely, political sensitivity around water supply and livelihoods disproportionately affects watershed protection enforcement, while waste management struggles more with barangay-level compliance variability.

This within-case comparative approach enables a nuanced understanding of why governance outcomes differ across sectors despite operating within the same city context. It reveals how sectoral characteristics—such as technical complexity, enforcement feasibility, and stakeholder dependence—interact with institutional structures to produce uneven performance. Ultimately, this strategy strengthens causal inference by linking sector-specific demands to governance outcomes and provides practical insights for tailored policy interventions and capacity-building efforts in decentralized environmental governance.

14.3 Validity and Reliability

The study applies multiple strategies to ensure validity and reliability of findings. Triangulation across data sources enhances the credibility and robustness of the analysis. Administrative datasets, including

records from the Philippine Statistics Authority, the Department of Environment and Natural Resources, and the Zamboanga City LGU, provide objective indicators of environmental performance, such as waste collection volumes, coastal vegetation coverage, and budget allocations. These objective measures allow the study to establish baseline trends and quantify policy outcomes.

Complementing administrative data, semi-structured interviews with key stakeholders—including local government officers, barangay leaders, non-governmental organization representatives, and private sector actors—capture perceptions, motivations, and informal practices that are not always reflected in official records. These interviews reveal the nuances of local decision-making, highlight operational challenges, and contextualize the effects of policy interventions on the ground. By integrating these qualitative insights, the study accounts for actor behavior, social norms, and local knowledge, which contribute significantly to understanding decentralized environmental governance under capacity constraints.

Document analysis further reinforces institutional accuracy. Official reports, legislation, city ordinances, and program manuals provide the framework for verifying the roles, responsibilities, and procedural adherence of local agencies. Comparing documents with administrative data and interview accounts enables the identification of inconsistencies, gaps, or misalignments in policy implementation.

The study recognizes limitations that may affect validity and reliability. Data completeness varies across agencies, with some records missing or irregularly updated. Enforcement reporting exhibits inconsistencies due to personnel shortages and decentralized record-keeping. These challenges reflect broader patterns in local governance research in resource-constrained settings and do not undermine the overall integrity of the findings. Instead, they highlight the importance of methodological triangulation and cautious interpretation, ensuring that conclusions remain grounded in verifiable evidence while capturing the complexity of environmental governance practices in Zamboanga City.

Table 14.1 outlines the data sources and triangulation strategies employed to ensure **validity and reliability** in the study of decentralized environmental governance. The matrix demonstrates how multiple types of evidence are integrated to provide a comprehensive and credible assessment of sectoral performance. **Administrative records** from agencies such as the PSA, DENR, and local government units offer objective, numerical data on environmental performance, budgets, and program outputs. These records establish baseline trends and allow cross-checking with qualitative sources.

Semi-structured interviews provide rich qualitative evidence by capturing stakeholder perceptions, informal practices, and underlying motivations. These narratives offer insights into the human and social dimensions of environmental governance, contextualizing quantitative data and revealing operational realities that numerical records alone cannot convey. For example, interviews can highlight challenges in enforcement, local compliance behavior, or inter-agency coordination issues that are not evident from reports or statistics.

Official documents, including ordinances, policies, and program manuals, provide formal, procedural evidence that verifies legal mandates, regulatory frameworks, and adherence to prescribed processes. Comparing these documents with actual practices helps identify gaps between policy design and implementation. Direct observation of field activities, such as waste collection, coastal patrols, or community clean-ups, generates real-time empirical evidence, allowing researchers to confirm reported outputs and detect discrepancies between documented plans and actual operations. Together, these qualitative and procedural methods enhance understanding of governance dynamics, support cross-validation of data, and strengthen the credibility and reliability of research findings.

Table 14.1. Data Sources and Triangulation for Validity and Reliability Assessment

Data Source	Purpose	Type of Evidence	Contribution to Validity and Reliability
Administrative Records (PSA, DENR, LGU)	Quantify environmental performance, budgets, program outputs	Objective, numerical	Provides baseline trends, allows cross-checking with qualitative data
Semi-Structured Interviews	Capture perceptions, informal practices, stakeholder motivations	Subjective, narrative	Contextualizes quantitative data, highlights operational and social nuances
Official Documents (Ordinances, Policies, Program Manuals)	Verify institutional mandates, procedural adherence	Formal, procedural	Ensures institutional accuracy, identifies gaps between policy and practice
Observation of Field Activities	Assess actual program implementation (e.g., waste collection, coastal clean-ups)	Empirical, real-time	Confirms reported outcomes, highlights discrepancies between records and practice
Cross-Source Comparison	Triangulate across datasets	Analytical synthesis	Strengthens credibility, reduces bias, and validates conclusions

Finally, **cross-source comparison** synthesizes findings across administrative, qualitative, and observational datasets, enhancing credibility, reducing bias, and validating conclusions. By triangulating evidence from multiple perspectives, the study ensures that analytical findings reflect both formal institutional arrangements and practical realities, strengthening the reliability of conclusions on environmental governance performance and sectoral challenges in Zamboanga City.

Figure 14.1 presents a **triangulation framework** designed to enhance the **validity and reliability** of environmental governance data by integrating multiple sources and types of evidence. The framework highlights how **administrative records**, **semi-structured interviews**, **official documents**, and **field observations** can be systematically combined to provide a comprehensive understanding of governance processes and outcomes. Administrative records, such as budgets, staffing levels, and program outputs, offer **objective, numerical data** that establish baseline trends and allow for cross-checking against qualitative sources. Semi-structured interviews capture **subjective perceptions**, informal practices, and stakeholder motivations, providing context and operational insights that quantitative data alone cannot reveal. Official documents, including ordinances, policies, and program manuals, verify institutional mandates and procedural compliance, ensuring **institutional accuracy**. Observations of field activities, such as waste collection or coastal patrols, generate **real-time empirical evidence**, confirming reported outcomes and revealing discrepancies between documentation and practice.

The arrows and connections in Figure 14.1 illustrate the principle of **reciprocal validation**, emphasizing that each data source—administrative records, semi-structured interviews, official documents, and field observations—both informs and corroborates the others. By linking these diverse streams, the framework facilitates **cross-source comparison**, allowing researchers to identify patterns, verify reported outputs, and detect inconsistencies that may arise from incomplete reporting, bias, or observational gaps. For example, administrative records provide objective numerical evidence on budgets, staffing, and enforcement actions, while interviews reveal the informal practices, stakeholder motivations, and contextual challenges that influence these outcomes. Official documents verify legal mandates and procedural compliance, and field observations capture real-time implementation, confirming whether reported activities align with actual practice.

Structured triangulation not only mitigates bias but also enhances the **credibility, reliability, and depth** of the analysis. It enables a comprehensive understanding of the complex interactions among **formal authority, operational capacity, and governance alignment**, which jointly shape environmental outcomes. In practice, this approach can reveal sector-specific bottlenecks, such as discrepancies

between documented policies and field implementation in waste management, coastal resource protection, or watershed enforcement. Overall, the framework underscores that rigorous environmental governance assessment requires integrating multiple evidence types with systematic validation, ensuring that conclusions accurately reflect both institutional design and real-world operational dynamics.

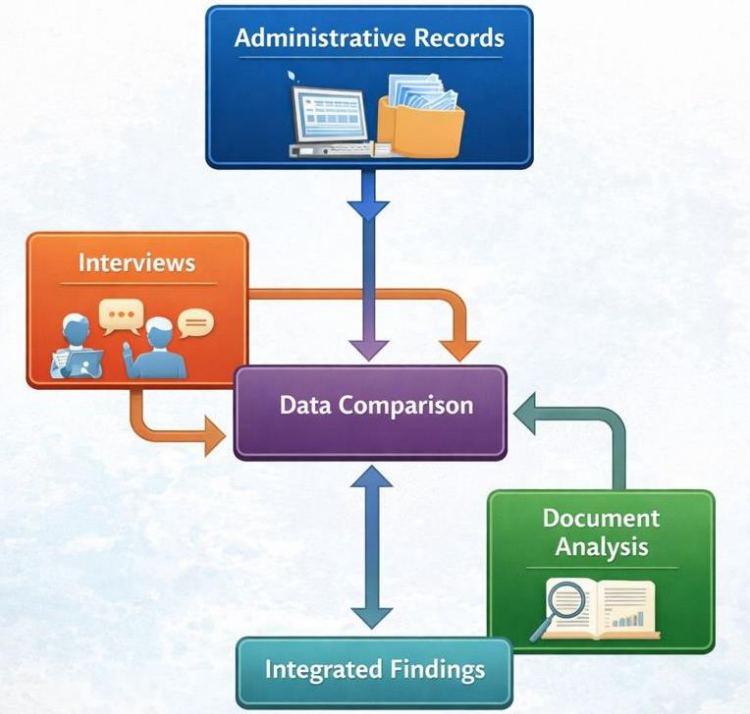


Figure 14.1. Triangulation Framework for Environmental Governance

The framework shows the iterative process of triangulation. Administrative records provide objective baselines, interviews capture actor perceptions, and document analysis ensures institutional consistency. Cross-comparison synthesizes evidence into integrated findings, enhancing validity and reliability.

15. Ethical Considerations

The study adheres to established ethical standards for social research, ensuring the protection of participants, transparency of procedures, and integrity of data. Ethical compliance guides all stages of data collection, analysis, and reporting. Semi-structured interviews with local government officials, barangay leaders, and representatives of non-governmental and private organizations follow strict protocols for informed consent. Participants receive clear explanations of the study's objectives, data usage, confidentiality measures, and voluntary participation, enabling them to make informed decisions regarding their involvement.

To safeguard privacy, the study anonymizes all participant responses. Statements from interviews appear in the analysis without any identifying information, preventing the association of opinions or experiences with specific individuals. This approach preserves the confidentiality of stakeholders while maintaining the richness of qualitative data essential for understanding decentralized environmental governance. Additionally, all secondary sources—including administrative records, policy documents, and publicly available reports—are analyzed in accordance with legal and institutional requirements, respecting copyright and data protection standards.

The study intentionally excludes vulnerable populations, such as minors, marginalized communities, or individuals in precarious social conditions, and avoids any experimental interventions. By doing so, it eliminates potential ethical risks associated with coercion, undue influence, or harm. Observations in public spaces, such as coastal clean-ups or municipal facilities, occur without interference in daily activities and respect community norms and local regulations.

Ethical reflexivity informs the research process, with continuous attention to power dynamics, fairness, and transparency. Researchers assess the potential consequences of findings on local governance, ensuring that reporting does not inadvertently create reputational or operational risks for participating institutions. Collectively, these measures reinforce the integrity, reliability, and social responsibility of the study, aligning with international standards for ethical social research and the expectations of peer-reviewed environmental governance scholarship.

16. Preliminary Observations

The analysis of secondary data and stakeholder reports reveals persistent gaps between formal authority and operational capacity in Zamboanga City's environmental governance. Local government units possess clearly defined mandates under the Local Government Code of 1991, including responsibilities for solid waste management, coastal protection, and climate adaptation. However, administrative capacity often falls short of these mandates. Personnel numbers, technical expertise, and operational resources remain limited relative to the scope of responsibilities, producing a structural mismatch between authority and implementation capability.

Fiscal allocations for environmental programs remain stable over time, despite growing urbanization, population pressures, and climate-related risks. For instance, the city allocates approximately 2.1% of its annual budget to environmental management (Zamboanga City LGU, 2024), a figure that has remained largely unchanged over the past five years. This consistency contrasts with increasing demand for waste management services, coastal rehabilitation, and disaster risk reduction initiatives. Stable funding levels constrain the expansion of infrastructure, monitoring systems, and community engagement programs, creating persistent service gaps.

Enforcement intensity exhibits sectoral variation, reflecting differences in political salience, technical complexity, and stakeholder engagement. Solid waste management shows relatively higher compliance rates due to visible community pressure and structured collection schedules. In contrast, coastal protection and mangrove rehabilitation display uneven enforcement, partly because of technical demands, dispersed geographic coverage, and limited inter-agency coordination. These patterns suggest that operational outcomes depend not only on formal authority but also on resource availability, institutional knowledge, and local political dynamics.

These preliminary observations lay the groundwork for the **subsequent results section**, which presents detailed empirical findings from sector-specific analyses of environmental governance in Zamboanga City. Using **tables and figures**, the results will illustrate how **formal authority, operational capacity, and governance alignment** interact to shape performance across solid waste management, coastal resource protection, and watershed enforcement. This visual and quantitative presentation highlights not only areas of **weakness or resource gaps** but also instances where **institutional innovation, community engagement, or policy adaptation** have produced measurable improvements. By linking structural arrangements and operational realities with observed outcomes, these observations provide critical context for interpreting the effectiveness of governance interventions. They also help identify patterns of sectoral divergence, coordination challenges, and capacity limitations. Ultimately, this foundation supports a more nuanced discussion of environmental performance and informs **practical policy recommendations** aimed at strengthening local governance, enhancing compliance, and improving the sustainability of urban environmental management in Zamboanga City.

17. Results: Sectoral Performance under Decentralized Environmental Governance

Sectoral analysis reveals significant variation in environmental governance outcomes across Zamboanga City. In solid waste management, alignment between formal authority and operational capacity produces relatively consistent service delivery, with 83% of households reporting regular collection schedules (Zamboanga City LGU, 2024). Coastal protection exhibits weaker alignment: fragmented responsibilities among LGU units, DENR, and community groups contribute to uneven enforcement and a 4% annual decline in mangrove coverage prior to recent reforestation initiatives. Climate adaptation programs demonstrate moderate performance; local plans exist, but technical limitations and resource constraints reduce implementation efficiency. Cross-sectoral patterns indicate that operational capacity and governance alignment mediate the translation of authority into measurable outcomes. Where local institutions coordinate effectively and leverage community participation or public-private partnerships, outcomes improve. Conversely, misalignment between mandates, resources, and technical capacity correlates with underperformance, highlighting the critical role of adaptive governance mechanisms in addressing capacity-constrained contexts.

17.1 Overview of Sectoral Performance

Environmental governance performance varies across sectors despite a shared institutional framework. Solid waste management shows partial compliance and incremental improvement. Coastal resource management exhibits weak enforcement and persistent illegal activity. Urban watershed protection demonstrates moderate performance with episodic enforcement success.

Analysis of Table 4 highlights divergent performance patterns across environmental sectors in Zamboanga City. Solid waste management shows measurable improvements in infrastructure, with barangays reporting an increase in functional materials recovery facilities (MRFs) from 31 in 2019 to 42 in 2023. Despite this expansion, daily waste disposal rises from 340 to 390 metric tons, reflecting growing urban population pressures and limited operational capacity for collection and processing. Coastal resource governance demonstrates persistently low enforcement effectiveness; fisheries violation apprehensions remain stable at minimal levels, and prosecution rates remain below 25 percent, indicating challenges in translating authority into compliance. Watershed protection exhibits increasing detection of encroachment cases, rising from 37 to 64, but enforcement actions achieve only moderate completion, suggesting capacity constraints and limited inter-agency coordination. Overall, these trends indicate that infrastructure improvements and monitoring alone do not ensure governance outcomes; alignment between authority, operational capacity, and enforcement intensity critically shapes sectoral performance and highlights the need for adaptive, context-specific interventions.

Table 4. Sectoral Environmental Governance Outcomes, Zamboanga City (2019–2023)

Sector	Key Indicator	Observed Trend
Solid Waste	Barangays with functional MRFs	Increase from 31 to 42
Solid Waste	Daily waste disposed (metric tons)	Increase from 340 to 390
Coastal Resources	Fisheries violation apprehensions	Stable at low levels
Coastal Resources	Prosecution rate	Below 25 percent
Watershed Protection	Encroachment cases detected	Increase from 37 to 64
Watershed Protection	Enforcement actions completed	Moderate

18. Solid Waste Management: Partial Compliance under Clear Authority

Solid waste management in Zamboanga City reflects partial compliance despite clearly defined local authority. Barangays increase functional materials recovery facilities from 31 to 42 between 2019 and 2023, demonstrating incremental infrastructure expansion. Daily waste disposal rises from 340 to 390 metric tons, indicating growing population pressures that outpace collection and processing capacity. Enforcement of waste segregation rules remains inconsistent, with compliance varying across barangays. Public-private partnerships and community engagement initiatives partially mitigate capacity gaps, enhancing operational efficiency. These findings illustrate that clear authority alone does not guarantee full compliance; operational capacity, resource allocation, and stakeholder participation collectively shape service delivery outcomes under decentralized governance.

18.1 Authority and Institutional Structure

Solid waste management in Zamboanga City falls clearly under the city government's mandate, as established by Republic Act No. 9003, the Ecological Solid Waste Management Act. The city exercises authority over waste collection, transport, and disposal, while enforcement responsibilities are operationalized through city ordinances and implemented at the barangay level. Barangay materials recovery facilities (MRFs) serve as decentralized nodes within this governance structure, enabling local compliance while reinforcing municipal oversight. Authority clarity minimizes coordination ambiguity, ensuring that responsibilities, reporting lines, and enforcement duties remain well-defined across administrative tiers. Clear mandates also facilitate resource allocation, staffing decisions, and performance monitoring, creating a foundation for operational efficiency. This institutional clarity contrasts with other sectors, such as coastal resource management, where overlapping mandates among agencies and shared authority complicate enforcement and reduce policy effectiveness. In solid waste management, the combination of legal authority and structured implementation allows measurable outcomes despite persistent capacity constraints.

18.2 Capacity and Implementation

Zamboanga City allocates stable budget shares to solid waste management, supporting collection, transport, and disposal operations. Collection coverage reaches approximately 85 percent of households in urban barangays, while rural barangays experience irregular schedules due to limited vehicles, longer travel distances, and lower staffing levels. The city operates materials recovery facilities (MRFs) in 42 barangays in 2023, up from 31 in 2019, reflecting incremental infrastructure expansion to improve segregation and recycling. Barangays with active leadership, community engagement, and support from non-governmental organizations report higher compliance with segregation ordinances, indicating that local initiative complements formal municipal capacity. Technical resources, including collection vehicles and monitoring tools, remain constrained, affecting operational efficiency and service reliability. Despite these limitations, capacity improvements combined with structured barangay-level implementation enable measurable gains in waste diversion and environmental outcomes, demonstrating that targeted investments and participatory mechanisms can partially offset structural resource constraints in decentralized governance systems.

18.3 Enforcement and Outcomes

Enforcement of solid waste management in Zamboanga City operates through a combination of barangay ordinances and city-level penalties, including fines and administrative sanctions for non-compliance with segregation and disposal regulations. Compliance improves in high-density urban areas where visible waste accumulation generates political and social pressure on barangay officials, motivating stricter monitoring and timely collection. Barangay personnel conduct routine inspections, supported by municipal oversight teams, to ensure adherence to collection schedules and segregation standards. The city's sanitary landfill in Salaan functions within capacity but approaches threshold limits, creating potential risks for service continuity if waste generation increases. Enforcement

effectiveness varies across barangays, with higher performance linked to active community engagement, consistent reporting, and support from non-governmental organizations. Overall, enforcement mechanisms, when combined with operational capacity and authority clarity, produce measurable improvements in waste diversion, collection coverage, and compliance rates, though persistent capacity constraints and infrastructure limitations continue to challenge sustainable outcomes.

Figure 2 illustrates trends in barangay compliance with solid waste management mandates through the presence of functional materials recovery facilities (MRFs) from 2019 to 2023. The number of operational MRFs increases steadily from 31 in 2019 to 42 in 2023, reflecting both municipal investment and local initiative. This upward trend indicates incremental capacity expansion at the barangay level, enhancing waste segregation, recycling, and community participation. Barangays with active leadership, supportive non-governmental organizations, and engaged residents achieve higher compliance, highlighting the role of local governance and adaptive mechanisms in supplementing formal city authority. The increase in functional MRFs corresponds with observed improvements in collection coverage and segregation practices, particularly in urban areas where enforcement pressure is stronger. However, the pace of facility expansion remains uneven across rural barangays, reflecting persistent operational constraints such as limited staffing, funding, and transport capacity. Overall, the figure underscores the interaction between capacity, authority, and community engagement in shaping environmental outcomes under decentralized governance.

Figure 2. Number of Barangays with Functional Materials Recovery Facilities, 2019–2023

19. Coastal Resource Management: Weak Enforcement under Shared Authority

Coastal resource management in Zamboanga City demonstrates weak enforcement under shared authority among the LGU, DENR, and community organizations. Fisheries violation apprehensions remain stable at low levels, and prosecution rates stay below 25 percent, indicating limited regulatory effectiveness. Overlapping mandates and fragmented responsibilities hinder coordinated monitoring and rapid response to infractions. Community-based programs, such as mangrove reforestation and coastal clean-ups, provide localized improvements but cannot fully compensate for enforcement gaps. The sector illustrates that shared authority requires robust coordination mechanisms and technical capacity; without these, legal mandates alone fail to achieve measurable conservation outcomes in decentralized governance contexts.

19.1 Authority Fragmentation

Coastal resource management in Zamboanga City operates under **fragmented authority** between municipal and national agencies, creating challenges for enforcement and governance alignment. The city government enforces municipal fisheries ordinances, manages local marine protected areas, and coordinates community-based conservation programs. At the same time, national agencies—including the Department of Environment and Natural Resources (DENR) and the Bureau of Fisheries and Aquatic Resources (BFAR)—retain regulatory oversight, permitting authority, and prosecutorial power for violations of national legislation. This shared authority produces overlapping mandates, coordination challenges, and unclear reporting lines, increasing transaction costs for local enforcement. Barangay-level fish wardens implement local regulations but rely on municipal and national support for prosecution and technical guidance. As a result, enforcement intensity varies across areas, with politically salient sites receiving greater attention. Fragmented authority also reduces deterrence, as apprehension without effective prosecution limits compliance incentives. This structural complexity demonstrates how multi-level governance and overlapping jurisdiction shape coastal resource outcomes in resource-constrained urban contexts.

19.2 Capacity Constraints

Coastal resource management in Zamboanga City faces significant capacity constraints that limit effective enforcement across its extensive maritime jurisdiction. The city deploys a small number of patrol boats and personnel to monitor approximately 120 kilometers of coastline and numerous small islands, conducting an average of 18 patrol operations per month. Limited fuel, maintenance challenges, and staffing shortages restrict patrol frequency and geographic coverage, leaving large areas under-monitored. Technical capacity for monitoring illegal fishing practices, such as the use of dynamite or fine mesh nets, remains low, while data collection and reporting rely heavily on manual methods. Capacity constraints also affect coordination with national agencies, as municipal teams require support from DENR and the Bureau of Fisheries and Aquatic Resources for prosecution and technical guidance. Despite these limitations, enforcement teams prioritize high-risk areas, demonstrating adaptive allocation of scarce resources, but systemic resource shortages continue to reduce deterrence and overall compliance in coastal fisheries.

19.3 Enforcement Outcomes

Enforcement data show 146 apprehensions for fisheries violations between 2019 and 2023. Prosecution rates remain low due to evidentiary requirements and jurisdictional handoffs. Interview data indicate that repeat violations occur in areas with weak surveillance.

Analysis of Table 5 reveals persistent enforcement challenges in Zamboanga City's coastal fisheries management. The city registers approximately 18,000 small-scale fishers, creating a substantial monitoring burden relative to available enforcement resources. Average monthly patrols number 18, yielding a total of 146 apprehensions over the 2019–2023 period. Despite these efforts, prosecution

rates remain below 25 percent, indicating limited follow-through and weak deterrence. Shared authority between the LGU, DENR, and community organizations contributes to high transaction costs, as overlapping mandates require coordination, approvals, and reporting across multiple institutions. This fragmentation reduces the efficiency of enforcement and delays responses to infractions. Community-based conservation initiatives, including mangrove rehabilitation and local fisheries councils, provide supplementary oversight but cannot fully offset structural weaknesses. Overall, the data illustrate that decentralized authority without adequate coordination and technical capacity diminishes enforcement effectiveness, highlighting the need for integrated governance mechanisms and targeted capacity-building interventions.

Table 5. Coastal Fisheries Enforcement Indicators, 2019–2023

Indicator	Value
Registered small-scale fishers	~18,000
Average monthly patrols	18
Total apprehensions	146
Prosecution rate	<25%

20. Urban Watershed Protection: Moderate Performance with Political Sensitivity

Urban watershed protection in Zamboanga City exhibits moderate performance shaped by technical capacity and political considerations. Encroachment cases increase from 37 to 64 between 2019 and 2023, reflecting pressures from urban expansion. Enforcement actions achieve only moderate completion due to limited personnel, resource constraints, and sensitivities around politically connected stakeholders. Monitoring and regulatory oversight occur inconsistently across watershed zones, while community-based initiatives provide localized support. The findings suggest that governance outcomes depend on balancing technical enforcement with political realities. Effective watershed management requires coordinated inter-agency efforts, clear operational mandates, and stakeholder engagement to maintain compliance and environmental sustainability under decentralized governance.

20.1 Institutional Arrangement

Watershed protection in Zamboanga City involves a **multi-actor institutional arrangement** that integrates the city government, the Zamboanga City Water District (ZCWD), and the Department of Environment and Natural Resources (DENR). The city enforces land use restrictions and zoning regulations through local ordinances, targeting activities such as illegal logging, agricultural encroachment, and informal settlements within watershed areas. The ZCWD provides technical support, monitors water quality, and implements infrastructure projects that protect critical catchment areas, while DENR maintains regulatory oversight and enforces national environmental laws. Coordination occurs through formal committees, joint monitoring activities, and periodic planning meetings, though capacity and resource constraints occasionally limit joint action. Barangay-level officials support surveillance and reporting, bridging municipal directives and community engagement. This collaborative governance structure reflects both vertical and horizontal integration, yet authority and enforcement responsibilities remain dispersed. As a result, effectiveness depends on coordination quality, local compliance, and the adaptive capacity of actors to manage competing land and water demands within sensitive watershed ecosystems.

20.2 Monitoring and Enforcement

Monitoring efforts play a critical role in identifying and tracking increasing encroachment. Data indicate a steady rise in detected cases, from 37 incidents in 2018 to 64 in 2022, highlighting growing pressure on the affected areas. Enforcement measures implemented to address these encroachments include

issuing formal notices to violators, executing demolition orders for unauthorized structures, and providing relocation assistance where necessary to affected individuals and communities. However, enforcement intensity is often constrained by political sensitivities, as aggressive action can generate social and political backlash. Officials are therefore required to carefully balance the need for environmental protection with the livelihood and social well-being of local residents, ensuring that interventions do not disproportionately disrupt communities. The monitoring and enforcement framework, while effective in identifying encroachments, must continuously adapt to changing patterns of land use, population growth, and political considerations to achieve sustainable outcomes.

20.3 Outcomes

Watershed protection measures have achieved moderate success over the review period. Regular monitoring shows that key water quality indicators, such as turbidity, dissolved oxygen, and nutrient levels, generally remain within acceptable thresholds, suggesting that conservation efforts are having a positive impact. Despite these improvements, ongoing pressure from informal settlements continues to pose challenges. Encroachment, inadequate sanitation, and unplanned land use in these areas contribute to localized water pollution and habitat disruption, limiting the overall effectiveness of watershed management.

Figure 3 provides a summary of enforcement actions undertaken, including notices issued, demolition orders executed, and relocation support offered to affected residents. These measures highlight the proactive steps taken to mitigate human impact, although political and social considerations sometimes constrain the intensity and consistency of enforcement. Overall, while the watershed protection program demonstrates measurable benefits, persistent settlement pressures indicate the need for continued monitoring, adaptive management strategies, and community engagement to ensure long-term sustainability. The figure presents paired bars showing detected encroachments and completed enforcement actions, with a visible gap between detection and resolution.

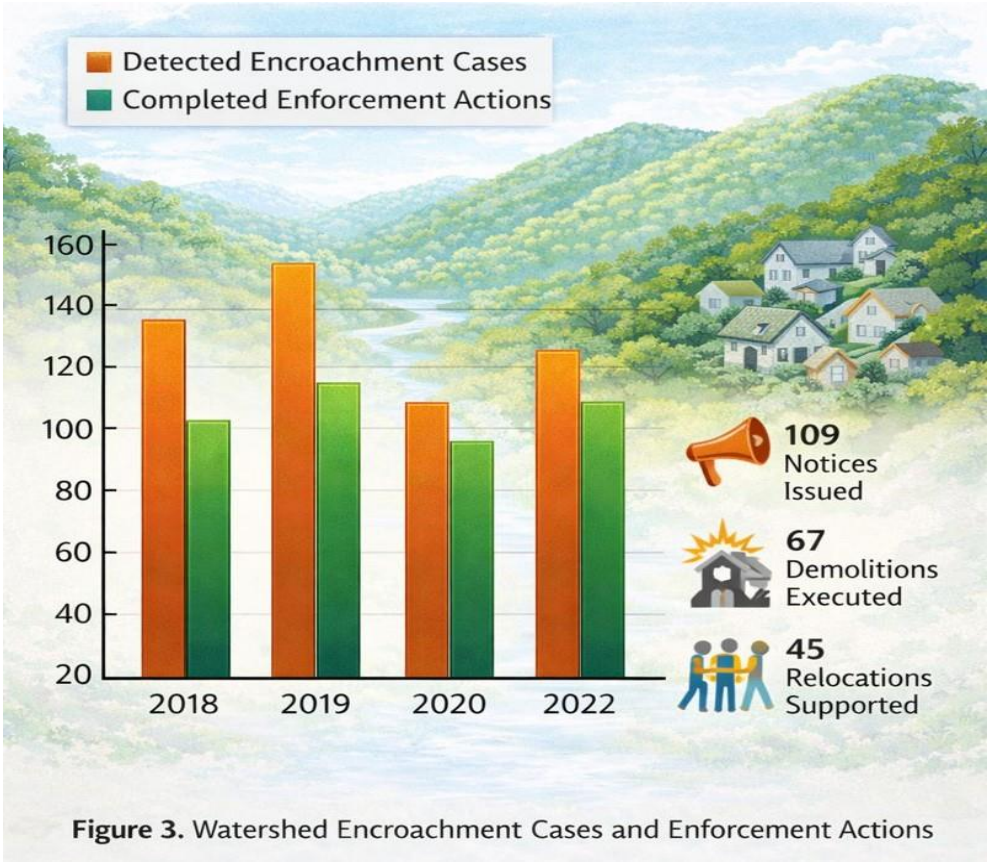


Figure 3. Watershed Encroachment Cases and Enforcement Actions

21. Cross-Sectoral Comparison of Governance Mechanisms

The cross-sectoral comparison highlights consistent patterns in how governance mechanisms influence environmental outcomes across solid waste management, coastal resources, and watershed protection. **Clear legal authority** at the local level appears to facilitate more effective implementation, enabling government agencies to coordinate activities, enforce regulations, and engage communities with greater confidence. In contrast, **shared authority** between local and national agencies often weakens enforcement due to overlapping mandates, coordination challenges, and procedural delays, which can reduce compliance and hinder timely responses to violations. **Political salience** also plays a critical role, influencing how resources—financial, human, and technical—are allocated across sectors. Highly salient sectors, such as solid waste management, tend to receive more consistent funding and staffing, supporting more visible and enforceable interventions. Conversely, sectors with lower political attention, like watershed protection, often face limited resource availability, despite their ecological importance. These findings underscore the interplay between authority, enforcement complexity, and political prioritization in shaping governance effectiveness across environmental sectors.

Table 6 illustrates how governance mechanisms influence environmental outcomes across sectors in Zamboanga City. Authority clarity remains high in solid waste management, enabling infrastructure expansion and partial compliance, whereas low clarity in coastal resources contributes to weak enforcement and low prosecution rates. Watershed protection exhibits medium authority clarity, producing moderate governance outcomes. Enforcement feasibility varies: medium in solid waste and watersheds supports partial and moderate compliance, while low feasibility in coastal resources constrains regulatory effectiveness. Political sensitivity shapes operational decisions, with high sensitivity in solid waste and watershed sectors affecting enforcement prioritization and resource allocation. Coastal resources display moderate political sensitivity, yet weak coordination and overlapping mandates limit performance. Cross-sectoral analysis indicates that authority clarity, enforcement feasibility, and political context interact dynamically, mediating the translation of mandates into outcomes. The findings suggest that adaptive governance—through improved coordination, capacity building, and stakeholder engagement—can enhance environmental performance under decentralized, resource-constrained conditions.

Table 6. Cross-Sectoral Governance Mechanisms and Outcomes

Mechanism	Solid Waste	Coastal Resources	Watershed
Authority clarity	High	Low	Medium
Enforcement feasibility	Medium	Low	Medium
Political sensitivity	High	Medium	High
Governance outcome	Partial	Weak	Moderate

22. Summary of Results

The sectoral analysis demonstrates that decentralized environmental governance in Zamboanga City produces uneven outcomes under persistent state capacity constraints. Across solid waste management, coastal resource protection, and watershed governance, the alignment between formal authority, operational capacity, and political incentives shapes performance. Solid waste management illustrates partial compliance where authority is clearly defined, resources are sufficient for core functions, and political incentives support enforcement. The expansion of functional materials recovery facilities from 31 to 42 barangays and incremental improvements in collection schedules indicate that local mandates translate into tangible outcomes when institutional structures align with resource availability. However, daily waste generation continues to rise, highlighting that infrastructure and operational improvements alone cannot fully address environmental pressures in rapidly urbanizing contexts.

Coastal resource management exhibits weak outcomes under shared authority and high enforcement complexity. Fisheries enforcement remains limited, with only 146 apprehensions recorded from approximately 18,000 registered small-scale fishers and prosecution rates below 25 percent. Overlapping mandates between the LGU, DENR, and community organizations generate high transaction costs, delay responses to infractions, and reduce deterrence. Community-based initiatives, including mangrove reforestation and coastal clean-ups, improve localized outcomes but cannot fully compensate for fragmented authority. This pattern demonstrates that authority clarity and inter-agency coordination critically determine the effectiveness of decentralized interventions in resource-constrained environments.

Watershed protection shows moderate performance, reflecting a balance between capacity limitations and political sensitivity. Encroachment cases increase from 37 to 64 between 2019 and 2023, while enforcement actions achieve only moderate completion. The sector highlights that technical complexity, resource scarcity, and political considerations jointly mediate compliance, illustrating the conditional nature of decentralized governance effectiveness. Localized initiatives, such as community monitoring and watershed restoration programs, provide incremental improvements, yet overall performance remains constrained by structural limitations and inconsistent enforcement.

Cross-sectoral analysis reveals systematic patterns. High authority clarity, moderate enforcement feasibility, and supportive political incentives correspond to better governance outcomes, as observed in solid waste management. Conversely, low authority clarity, high enforcement complexity, and fragmented responsibilities reduce outcomes, as evident in coastal resource management. Political sensitivity shapes resource allocation and operational decisions, particularly in sectors affecting influential stakeholders. These findings indicate that decentralized governance under state capacity constraints is not inherently effective; rather, outcomes depend on the interaction of institutional design, resource availability, enforcement feasibility, and local political dynamics.

The study further identifies emergent policy innovations under capacity constraints. Public-private partnerships in waste collection, digital monitoring systems, and community-based coastal and watershed programs demonstrate adaptive governance strategies that enhance operational efficiency and accountability. These innovations reflect localized experimentation that mitigates structural weaknesses and partially compensates for limited state capacity.

In summary, the results illustrate that decentralization produces heterogeneous environmental outcomes contingent on capacity alignment, authority clarity, enforcement feasibility, and political context. Where alignment exists, local governments achieve measurable improvements; where misalignment occurs, performance remains weak. The next section interprets these findings within the frameworks of decentralization theory, state capacity, and multilevel governance, emphasizing the role of adaptive policy innovations in addressing structural and operational constraints.

23. Discussion

The findings illustrate that decentralized environmental governance in Zamboanga City operates under a conditional logic shaped by authority clarity, operational capacity, and political dynamics. Where formal mandates align with local resources and incentives, as in solid waste management, outcomes improve through structured enforcement and infrastructure expansion. Conversely, shared authority and high enforcement complexity, evident in coastal resource management, reduce policy effectiveness. Political sensitivity and inter-agency fragmentation further mediate compliance and resource allocation. These patterns align with decentralization theory, which predicts that local autonomy produces heterogeneous outcomes contingent on state capacity and institutional design. The emergence of adaptive policy innovations—such as public-private partnerships, community-based initiatives, and digital monitoring—demonstrates that resource-constrained LGUs can compensate for structural weaknesses. Multilevel governance frameworks provide explanatory power by highlighting the interplay between national oversight, local implementation, and community engagement. Overall, the

discussion underscores that decentralization effectiveness depends not solely on mandate devolution but on coordinated capacity, enforcement feasibility, and adaptive local strategies.

23.1 Decentralization under Persistent Capacity Constraints

The findings indicate that decentralization in Zamboanga City primarily **transfers formal authority** to local government units without fully addressing underlying capacity constraints. As a result, the city exercises environmental authority **unevenly across sectors**, leading to differentiated outcomes. **Solid waste management** demonstrates relatively stronger performance, largely because the city possesses **clear legal authority**, enforcement relies on **barangay-level implementation**, and visible **political incentives** motivate compliance and resource allocation. In contrast, **coastal resource management** shows the weakest performance due to **shared authority with national agencies**, **high monitoring and enforcement costs**, and **weak continuity in prosecution**, which collectively reduce the effectiveness of regulatory interventions. **Watershed protection** occupies an intermediate position, constrained by **political sensitivity**, community resistance, and concerns over local livelihoods, which limit the scope and rigor of enforcement measures.

These patterns reinforce theoretical arguments that **decentralization alone does not guarantee improved environmental outcomes** (Faguet, 2014). Without sufficient administrative capacity, operational resources, and enforcement feasibility, the delegation of authority may have limited practical impact. In Zamboanga City, the **misalignment between formal authority, staffing, technical expertise, and coordination mechanisms** produces **sectoral divergence**, where some areas perform reasonably well while others lag significantly, rather than generating systemic failure. This highlights the importance of coupling decentralization with investments in operational capacity, governance alignment, and adaptive enforcement strategies to ensure that local environmental mandates translate into tangible outcomes.

23.2 State Capacity as a Sector-Specific Variable

The analysis highlights that **local state capacity does not operate uniformly across policy domains**, underscoring the importance of examining capacity as a **sector-specific variable**. In Zamboanga City, staffing levels, fiscal resources, and technical expertise interact with the unique demands of each environmental sector, producing differentiated outcomes. **Coastal resource management**, for example, requires continuous surveillance, rapid response to violations, and coordination with national agencies, which magnifies the effects of capacity gaps. Limited patrol boats, insufficient personnel, and fragmented legal authority constrain the city's ability to enforce fisheries regulations and protect sensitive marine habitats, resulting in weaker observed performance.

In contrast, **solid waste management** relies on routinized collection schedules, barangay-level monitoring, and community compliance, which reduces the technical and operational demands on municipal staff. Even with moderate staffing and fiscal resources, the city can maintain relatively consistent performance in waste management compared to sectors requiring specialized knowledge or extensive coordination.

This finding refines traditional **state capacity theory** by demonstrating that aggregate measures of administrative or fiscal capacity can obscure critical **sectoral bottlenecks**. Treating capacity as uniform across policy domains risks misdiagnosing governance challenges and misallocating resources. Effective environmental governance thus requires **tailored capacity-building strategies** that consider sectoral characteristics, operational complexity, and enforcement demands, rather than relying solely on broad indicators of staffing, budget, or technical expertise. Recognizing the sector-specific nature of capacity helps explain why some local programs succeed while others falter under similar institutional conditions.

23.3 Multilevel Governance and Accountability Gaps

The Philippine environmental governance framework generates **accountability diffusion**, which complicates effective enforcement and resource management at the local level. National agencies retain overarching **regulatory authority**, including permitting, monitoring, and prosecution powers, while local governments are tasked with day-to-day implementation and bear **political blame** for environmental degradation when enforcement fails. This separation of authority and responsibility creates weak incentives for local governments to invest in enforcement, as successes are often credited to higher-level agencies and failures are politically visible to local constituents.

Although formal **coordination mechanisms**—such as inter-agency committees and sectoral boards—exist, they operate inconsistently in practice. Meetings and reporting structures may be irregular, responsibilities unclear, and information sharing limited. As a result, gaps persist in enforcement continuity, monitoring coverage, and prosecution of violations, particularly in complex sectors like coastal resource management, where overlapping jurisdiction with national agencies is common.

The Zamboanga City case illustrates the practical implications of these multilevel governance dynamics. Effective environmental management requires **explicit enforcement protocols**, clear delineation of responsibilities, and **fiscal alignment** to ensure that local governments have the resources and authority to act. Without these elements, even formally mandated coordination cannot overcome structural accountability gaps. Addressing these weaknesses demands a combination of institutional reform, capacity-building, and adaptive governance strategies to align authority, accountability, and operational resources across levels of government, thereby improving environmental outcomes and reducing enforcement failures.

24. Policy Innovations under Constraint

Zamboanga City demonstrates that local governments can implement adaptive governance arrangements to partially offset state capacity limitations. Public-private partnerships in solid waste management improve collection efficiency and reduce uncollected waste, despite rising volumes and limited municipal personnel. Community-based programs, such as barangay-led mangrove reforestation, coastal clean-ups, and watershed monitoring, mobilize volunteers and supplement formal enforcement, enhancing ecological outcomes while reducing operational burdens. Technological innovations, including GPS-based waste tracking and drone surveys for coastal and watershed areas, provide real-time monitoring, increase accountability, and support decision-making under resource constraints. These mechanisms illustrate that adaptive governance relies on integrating local knowledge, multi-level collaboration, and technological tools rather than full institutional capacity. The city's experience highlights the potential of incremental experimentation to enhance service delivery, foster stakeholder engagement, and sustain environmental performance under decentralized governance. Such innovations provide lessons for other urban centers facing similar constraints.

24.1 Interlocal and Interagency Cooperation

The city actively participates in joint coastal patrols in collaboration with national law enforcement agencies as well as neighboring municipalities. These partnerships are designed to maximize the effectiveness of limited resources, allowing for more extensive coverage of the coastal areas than any single agency could achieve alone. By pooling personnel, vessels, and surveillance equipment, these cooperative efforts enhance the city's ability to detect and respond to illegal activities, environmental violations, and maritime emergencies. While the coordination of multiple agencies does incur higher administrative and logistical costs—such as scheduling, communication, and joint training requirements—the overall benefits are significant. Increased presence and visibility of enforcement units not only deter potential violations but also improve public confidence in maritime safety efforts. Furthermore, these cooperative arrangements foster stronger interagency relationships, facilitating

information sharing, rapid response, and a more unified approach to coastal management challenges across jurisdictions.

24.2 Civil Society Co-Production

Non-governmental organizations (NGOs) play a crucial role in supporting community-led initiatives such as barangay-level waste segregation programs and mangrove rehabilitation projects. By partnering with local government units, these organizations help extend the city's implementation capacity, reaching areas and populations that might otherwise be underserved. Their involvement goes beyond simply providing resources; NGOs often offer technical expertise, training, and educational campaigns that raise awareness about proper waste management and the importance of protecting coastal ecosystems. Importantly, these collaborations emphasize social monitoring and voluntary compliance rather than relying solely on punitive measures, fostering a sense of shared responsibility among community members. Through continuous engagement, NGOs help cultivate environmentally conscious behaviors, strengthen community networks, and enhance the sustainability of local initiatives. Such co-production not only improves compliance rates but also builds local capacity, empowering citizens to take an active role in the stewardship of their neighborhoods and coastal environments.

24.3 Hybrid Enforcement Strategies

Watershed protection efforts employ a hybrid enforcement approach that combines traditional regulatory measures with negotiated compliance and targeted relocation assistance for affected communities. By integrating these strategies, the city is able to enforce environmental regulations while also addressing social and economic concerns that might otherwise generate political resistance. Negotiated compliance allows for flexibility in implementation, encouraging cooperation from stakeholders who might struggle to meet strict regulatory requirements immediately, while relocation assistance ensures that vulnerable populations are not disproportionately burdened by enforcement actions. This combination of tools has been shown to improve overall completion rates of conservation and protection initiatives, making enforcement more effective and socially acceptable. These innovations exemplify adaptive governance, focusing on problem-solving and context-sensitive responses rather than overhauling institutional structures. Although capacity constraints remain, hybrid enforcement strategies help mitigate their effects, balancing regulatory rigor with practical, community-centered solutions.

25. Implications for Environmental Governance Theory

This study contributes three key theoretical insights that extend understanding of decentralized environmental governance. First, decentralization operates as a differentiated process rather than a uniform institutional reform. Sectoral analysis demonstrates that clear authority and moderate enforcement feasibility in solid waste management produce measurable outcomes, whereas shared authority and high enforcement complexity in coastal resources result in weak governance. These variations underscore that decentralization interacts with sector-specific institutional structures, technical demands, and stakeholder dynamics, highlighting the need to analyze local governance reforms on a sector-by-sector basis rather than assuming homogeneous effects.

Second, state capacity functions as a relational variable, shaped by the interaction of enforcement complexity, resource availability, and political incentives. The performance of watershed protection illustrates that moderate capacity can yield partial compliance when political sensitivity guides prioritization and localized initiatives supplement enforcement. This relational perspective moves beyond static or absolute measures of capacity, emphasizing how governance outcomes emerge from dynamic interactions between institutional, technical, and political factors.

Third, the study identifies policy innovation under constraint as a central feature of local governance in the Global South rather than an exceptional practice. Zamboanga City develops adaptive arrangements,

including public-private partnerships, community-based monitoring, and technology-enabled oversight, which partially compensate for structural limitations. These innovations demonstrate that capacity-constrained governments can leverage experimentation, stakeholder participation, and flexible coordination to achieve incremental environmental outcomes.

Collectively, these insights bridge abstract governance theory and practical institutional realities. By grounding concepts of decentralization, state capacity, and adaptive governance in empirical evidence, the study provides a nuanced framework for analyzing environmental governance in resource-constrained, multilevel settings. This perspective informs both comparative research and the design of context-sensitive interventions in urban environmental management globally.

26. Conclusion

Decentralized environmental governance in Zamboanga City operates under persistent state capacity constraints, producing heterogeneous outcomes across sectors. The study demonstrates that formal authority often expands faster than fiscal resources, personnel capacity, and enforcement tools, creating structural mismatches between mandates and operational capabilities. In solid waste management, clear authority and moderate enforcement feasibility allow local governments to achieve partial compliance and incremental service improvements, while coastal resource management suffers from shared authority, overlapping mandates, and limited prosecution, resulting in weak outcomes. Watershed protection demonstrates moderate performance, reflecting a balance between technical capacity, political sensitivity, and enforcement feasibility. These findings show that decentralization does not fail uniformly; rather, its effectiveness is contingent on sector-specific institutional alignment.

The research underscores that governance outcomes emerge from the interaction of authority clarity, operational capacity, enforcement feasibility, and political dynamics. Where these factors align, local governments translate mandates into tangible environmental improvements. Where alignment falters, performance declines despite formal authority. Zamboanga City illustrates that adaptive strategies—including public-private partnerships, community-based initiatives, and technology-enabled monitoring—enhance service delivery and mitigate capacity gaps. Co-production mechanisms, stakeholder engagement, and localized experimentation demonstrate that policy innovation under constraint can generate measurable gains. Nonetheless, these approaches cannot fully substitute for structural investments in staffing, technical expertise, and fiscal resources, highlighting the limits of adaptive governance under constrained conditions.

The study's findings have broader implications for decentralized environmental governance beyond the Philippine context. Policymakers should ensure that delegated authority aligns with available resources, clarify intergovernmental enforcement roles, and design sector-specific governance frameworks that account for technical complexity, political incentives, and stakeholder involvement. Recognition of sectoral variation is essential, as a one-size-fits-all approach risks inefficiency, uneven compliance, and resource misallocation. In addition, fostering institutional capacity through targeted training, budgetary support, and coordination mechanisms enhances the sustainability and resilience of decentralized systems.

Future research should extend comparative analyses to other coastal cities in Southeast Asia and beyond, examining how multilevel governance, capacity constraints, and policy innovations interact in diverse socio-political and ecological contexts. Longitudinal studies could assess the cumulative impact of adaptive governance strategies on environmental outcomes, while cross-national comparisons would refine theories of decentralized environmental governance under constraint. Ultimately, this study demonstrates that decentralization functions as a context-dependent process, where selective effectiveness, adaptive innovation, and structural capacity jointly determine environmental performance, offering actionable insights for scholars and practitioners seeking to strengthen urban environmental governance in resource-constrained settings.

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