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Review article

Local Green Leadership for Sustainable Futures and Climate Change Mitigation: A Science-Based Overview on Environmental Policies and Initiatives Among Selected Local Government Units in the Philippines

Nathaniel E. Quimada* and Chiena L. Palconite

Department of Environmental Engineering, College of Engineering and Technology, University of Science and Technology of Southern Philippines, Claveria, 9004, Philippines

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Abstract

Green leadership is an emerging paradigm in environmental governance that emphasizes visionary, ethical, and participatory approaches to sustainable development. It aligns policies, behaviors, and institutional practices with ecological priorities and the Sustainable Development Goals (SDGs). As environmental degradation and climate change continue to threaten ecosystems and livelihoods, the need for science-based, locally driven action becomes increasingly urgent. This paper explores the role of Local Government Units (LGUs) in the Philippines in advancing green leadership at the grassroots level. By synthesizing secondary data and case studies, it examines local environmental initiatives and highlights key themes such as solid waste management, climate adaptation, and public participation. Despite paper underscores the need for capacity-building, inclusive governance, and strategic planning to strengthen local green leadership and achieve long-term environmental resilience. Future research to develop adaptable frameworks that integrate green leadership into broader policy and performance structures is recommended.

Keywords: environmental governance; green leadership; local government units; sustainable development

1. Introduction

In recent decades, the study of environmental policy has emerged as a significant and growing area of discourse. Across the globe, governments are seeking ways to streamline efforts in tackling environmental challenges (Batel, 2018; Nurasa et al., 2024). The concern arises due to various environmental issues that have led to the evident degradation of the environment. The increasing environmental pressure can be attributed to a range of anthropogenic factors, including unsustainable resource consumption, uncontrolled population growth, accelerated industrialization, urban sprawl, inefficient consumption patterns, technological advancement, deforestation, and suboptimal agricultural practices.

*Corresponding author: E-mail: nathaniel.quimada@ustp.edu.ph
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These drivers collectively contribute to the depletion of natural resources and the escalation of various forms of environmental pollution (Huelgas & Arellano, 2021; Javed et al., 2024; Quimada et al., 2020, 2022, 2023, 2024; Quimada & Ogdiman, 2025) In recent years, the detrimental effects of global environmental issues have become increasingly evident, presenting a major challenge for humanity. Many countries have set timelines for achieving carbon neutrality, and the reduction of greenhouse gas emissions has evolved into a collective effort for self-improvement (Ye, 2022).

The Philippines is home to one of the most unique and biodiverse natural environments globally. However, the past century has seen significant degradation of its ecosystems, leading to the loss of habitats and a decline in biodiversity (Lasco, 2022), (Domingo et al., 2024). Environmental degradation is now regarded as one of the country's most pressing challenges (Aruta & Ballada, 2022). Major environmental concerns in the Philippines include deforestation, plastic pollution, air pollution, rapid population growth, global competitiveness, and, more broadly, the impacts of climate change. These issues not only threaten the country's rich biodiversity and natural resources but also exacerbate social and economic challenges, undermining long-term sustainability and resilience. Addressing these concerns requires integrated policies that promote environmental protection, sustainable development, and climate action (Tribe, 2018; Aruta & Ballada, 2022; Lu, 2022; Briones, 2005).

Governance and institutional quality influence environmental outcomes by effectively enforcing regulations, mitigating corruption, and fostering accountability. Strong governance frameworks are essential for driving sustainable environmental practices and ensuring the proper implementation of environmental policies (Saba et al., 2025). Green leadership and green communication involve collaboration among allies and partners to develop and promote decisions and practices that effectively mitigate the environmental impact of human activities in a positive way (Javed et al., 2024). The Philippine government is exploring various strategies and initiatives to address environmental challenges, with the goal of preserving and conserving the country’s natural resources and ecosystems (Ross, 1994; Tribe, 2018).

Local Government Units (LGUs) are integral to the development and implementation of policies, particularly at the local level, where they serve as key actors in addressing region-specific issues and advancing sustainable development. LGUs play a critical role in translating national policies into localized actions, ensuring that environmental, economic, and social initiatives align with the unique needs and conditions of their communities. By facilitating public participation and managing local resources, LGUs contribute significantly to enhancing governance, promoting resilience, and achieving sustainable outcomes (Geollegue, 2000).

Local Government Units (LGUs) and other stakeholders are increasingly recognized for their role in empowering and enabling efforts to preserve and protect the environment. This review paper aims to explore the various initiatives undertaken by selected LGUs across the Philippines. By analyzing diverse sources, including peer-reviewed journals, published articles, and other verified and legitimate online resources, this paper seeks to provide a comprehensive overview of the strategies implemented at the local level. The purpose of this review is to assess the effectiveness of these environmental initiatives, identify best practices, and highlight the challenges faced by LGUs in fostering sustainable environmental management. Ultimately, this paper aims to contribute to a deeper understanding of local governance and green leadership in the context of environmental stewardship and offer insights into the potential for scaling these initiatives nationwide.

2. Methods

This study employed a purposive narrative review, which involves selectively gathering and synthesizing literature to address specific objectives rather than exhaustively covering all available works (Green et al., 2006; Macalisang et al., 2024; Largo et al., 2025). This review was prepared by searching for relevant studies through online platforms such as Google Scholar, Scopus, Web of Science, and ResearchGate. Keywords and phrases related to the topic—such as *green leadership, Philippine environmental policies, Philippine climate change, Philippine Local Government Unit,* and *Philippine Environmental Governance* were used to generate results. From these, only materials that were credible, appropriate, and aligned with the objectives of the paper were selected. Since the focus also includes environmental policies in the Philippines, the process extended beyond academic studies. A careful and comprehensive reading of relevant laws, executive orders, and official issuances available through online and other reliable policy sources was carried out to ensure accuracy in presenting the policy context. To assess the effectiveness of environmental initiatives, the review considered criteria commonly used in the literature and policy evaluations. These included relevance to local environmental needs, level of implementation by LGUs, stakeholder participation, and observable outcomes such as improvements in waste management, conservation practices, or climate change mitigation efforts. Sustainability and scalability were also taken into account.

The gathered materials, both from research studies and policy documents, were then organized and synthesized thematically. This made it possible to highlight common trends, identify best practices, and point out challenges faced in implementing environmental programs and policies at the local government level.

3. Philippine Climate Change Landscape

The Philippines consistently ranks among the world's most disaster-vulnerable nations, owing to its location along the Pacific "Ring of Fire" and its exposure to the typhoon-laden waters of the western Pacific Ocean. Volcanic eruptions and earthquakes occur regularly as tectonic plates shift beneath the archipelago, while an average of twenty tropical storms make landfall each year (Bollettino et al., 2020). Compounding these hazards, global climate change is altering regional weather patterns, intensifying rainfall in some areas and prolonging drought in others and driving a gradual rise in sea level. Coastal cities and low-lying communities now face an increased risk of chronic flooding, saltwater intrusion, and storm surges, threatening livelihoods, infrastructure, and ecosystems (Tito et al., 2024).

3.1 Local government unit climate change action plans guide

Local governments begin by engaging stakeholders through mapping exercises and participatory workshops to build ownership, clarify roles, and establish governance arrangements for climate action. They then assess local vulnerabilities and risks, identifying exposures, sensitivities, and adaptive capacities while compiling a greenhouse gas inventory to set a baseline for mitigation targets. Adaptation and mitigation measures are woven into existing land use and development plans, ensuring that climate priorities align with broader growth objectives. Clear, time-bound projects, programs, and activities are defined with detailed cost estimates and identified funding sources, then incorporated into the annual investment program to secure budget allocations. Throughout planning,

standardized toolkits, such as impact-chain diagrams, risk-scoring matrices, and planning templates promote consistency and data-driven decision-making. To track progress, governments establish both quantitative and qualitative indicators, schedule regular reviews, and outline procedures for course-correction. Multi-sectoral partnerships with national agencies, academic institutions, civil society, and the private sector are cultivated to leverage technical expertise and additional resources. By following this structured yet flexible roadmap from stakeholder engagement and technical assessment through budgeting and adaptive management, local government units can strengthen community resilience and advance low-emission, climate-smart development (Mias-Cea et al., 2017). In today's context, advancing local initiatives for sustainable energy and climate mitigation is crucial to realizing lasting environmental goals (Arazo et al., 2016; Tagarda et al., 2024).

3.2. Greenhouse gas management

The Philippines accounted for just 0.48 percent of global greenhouse gas emissions in 2021, with a total national output of 204.33 Tg CO_2e in 2020—down 12.3 percent from 2015 levels. The energy sector remains the largest emitter, responsible for over 41 percent of CO_2 emissions, followed by the transport (35%), agriculture, industry, and waste management sectors. In recognition of these challenges, the government institutionalized the Philippine Greenhouse Gas Inventory Management and Reporting System under Executive Order 174, mandating regular, sector-specific GHG inventories led by the Climate Change Commission and partner agencies. This system provides the foundation for setting science-based mitigation targets, tracking progress toward Nationally Determined Contributions, and guiding policy interventions—ranging from energy-efficiency standards to transport modernization and reforestation programs. By integrating robust inventory management with cross-sectoral collaboration, the Philippines aims to strengthen its greenhouse management framework and accelerate its transition to a low-carbon, climate-resilient future (Boyle, 2024).

4. Key Insights from the World Bank's Country Climate and Development Report

The World Bank's Country Climate and Development Report for the Philippines warns that unchecked climate impacts could erode up to 13.6% of national GDP by 2040, and driven by both extreme events and slow-onset changes. These risks fall most heavily on coastal and farming communities through sea-level rise, storm surges, and shifting rainfall while cities confront rising heat and infrastructure pressures. Although the Philippines contributes little to global emissions, it has significant mitigation opportunities in scaling up renewables, boosting energy efficiency, and greening transport. Many high-impact solutions like mangrove restoration, climate-smart agriculture, and green building standards already exist and need only to be expanded. Meeting these needs will require substantial but feasible investments, especially if climate actions are woven into regular development planning and budgets. Strengthening capacities at both national and local levels, mainstreaming climate considerations across all sectors, and forging multi-stakeholder partnerships are identified as essential enablers. Finally, by pairing mitigation with adaptation measures, the country can unlock co-benefits such as cleaner air, better public health, and new livelihood opportunities, laying the groundwork for a resilient, inclusive growth trajectory (World Bank Group, 2022).

4.1 Green leadership in policy making

Green leadership plays a vital role in promoting sustainable development, particularly in countries like the Philippines where environmental degradation is a pressing issue. Green leadership refers not only to the policies that leaders create but also to their ability to influence others to adopt pro-environmental behaviors. As stated by Nurasa et al. (2024) "Green leadership is defined by the environmental policies that leaders implement... [but] also refer to how organizational members behave in support of such policies". In the Philippine context, where the impacts of climate change such as rising sea levels and increased typhoon activity are severe, green leadership is essential for creating long-term resilience.

In the business sector, sustainability leadership is evolving to address environmental, social, and economic concerns simultaneously. Yabut et al. assert that "sustainability leadership has emerged in business organizations" due to growing environmental pressures, highlighting that it must involve strategy, communication, and stakeholder collaboration to be effective (Yabut et al., 2024). The Philippines, being a highly vulnerable country to environmental risks, needs leaders who can guide both the public and private sectors toward ecologically responsible practices.

Moreover, green transformational leadership has been identified as a driver for sustainable project success, especially when paired with green learning and government regulation. It was noted that “green transformational leadership has significant positive effect on sustainable project success via green learning” (Apostu et al., 2024). This suggests that empowering Filipino leaders in energy and infrastructure sectors to adopt green strategies can significantly boost the success rate of sustainability projects in the country. The growing urgency to address environmental challenges has positioned sustainability as a key focus across various disciplines. This is particularly evident in management, where industries are increasingly adopting sustainable practices to reduce their environmental impact (Quimada & Ogdiman, 2025).

The manufacturing and industrial sectors in the Philippines can also benefit from green leadership by improving environmental knowledge sharing. Khan et al. emphasize that “firms’ sustainable performance can be improved by adopting green leadership practices and by sharing environmental knowledge in the workplace”. For a developing country, this practice not only enhances competitiveness but also aligns with global sustainability goals (Khan et al., 2023). In policymaking, green leadership is increasingly recognized as pivotal. As shown in a systematic literature review by Nurasa et al., green leadership is closely linked to “the implementation of pro-environmental policies in a country, organization, or business”. This indicates a crucial need for policy leaders in the Philippines to adopt and champion green leadership as part of national strategies for sustainable development (Nurasa et al., 2024). Thus, as green leadership gains global traction, Filipino leaders are urged to not only adopt international best practices but to also cultivate local innovation in sustainability. Leadership that aligns with Filipino values of community and stewardship can effectively mobilize grassroots participation in environmental initiatives.

4.2 The role of LGUs in environmental governance

Local Government Units (LGUs) play a fundamental role in environmental governance in the Philippines, especially under a decentralized system established by the Local Government Code of 1991 (Republic Act No. 7160). The Code provides LGUs with

significant authority over environmental management, empowering them to legislate local ordinances, enforce regulations, and implement policies related to the protection and conservation of natural resources (Gatmaytan, 2014).

One key function of LGUs is in disaster risk reduction and climate change adaptation. According to Magno and Hecita (2023), LGUs are mandated by laws such as the Climate Change Act of 2009 and the Disaster Risk Reduction and Management Act of 2010 to develop and implement localized plans for climate adaptation and disaster resilience. These responsibilities include creating action plans, managing risks, and conducting community-based planning using information and communications technology tools to enhance local planning capacities (Magno & Hecita, 2023).

Environmental governance also requires collaboration, and LGUs are encouraged to form inter-LGU alliances. For instance, cooperative frameworks have emerged in areas such as watershed and coastal management, reflecting the importance of shared governance to address ecosystem-level challenges (Magno & Hecita, 2023). Such partnerships reduce enforcement costs, distribute resources, and overcome collective action problems. Institutional transformation at the local level is another critical aspect. Catacutan et al. (2004) argue that effective natural resource management (NRM) hinges on political and institutional reforms that enable LGUs to exercise their devolved functions responsibly (Catacutan et al., 2004). However, challenges such as limited technical capacity, resource constraints, and bureaucratic hurdles continue to impede local NRM initiatives. In addition, LGUs have the legal authority to enact ordinances that may impose environmental restrictions—even against large-scale industries like mining—when aligned with their general welfare mandate (Gatmaytan, 2014). This has resulted in some LGUs actively resisting environmentally harmful activities, asserting their role in protecting local interests and ecological integrity.

Although written in the context of the Philippine Development Plan 2017-2022, Sandhu (2021) emphasized the enduring relevance of integrating ecological integrity into socio-economic planning. His insights remain applicable today, as LGUs continue to be expected to localize the Sustainable Development Goals (SDGs) and implement innovative governance mechanisms in line with evolving national policy directions (Sandhu, 2021). In summary, LGUs are at the forefront of implementing environmental policies in the Philippines. Their effectiveness depends not only on legal empowerment but also on capacity-building, inter-agency collaboration, and sustained political will to uphold environmental sustainability.

4.3 Linking green leadership with sustainable development

Green leadership is a vital driver of sustainable development as it promotes visionary, inclusive, and environmentally responsible practices. The study by Ahmed et al. (2021) illustrates how transformational and behavioral leadership at the Frangipani Green Hotel in Malaysia enabled the integration of circular economy principles—such as waste management, water conservation, and community engagement—into daily operations, thereby aligning with the Sustainable Development Goals. Meanwhile, Dartey-Baah (2014) emphasizes that effective leadership, especially transformational leadership, significantly contributes to sustainable development by motivating followers, encouraging innovation, and embedding sustainability into organizational culture. Together, these studies highlight that green leadership—when grounded in values, strategy, and collaboration—plays a critical role in achieving long-term sustainability goals, particularly in climate-vulnerable countries like the Philippines (Ahmed et al., 2021; Dartey-Baah, 2014).

4.4 Environmental policies and initiatives of LGUs in the Philippines

Environmental policies and initiatives of Local Government Units (LGUs) in the Philippines reflect their critical role in promoting sustainable development at the grassroots level. Empowered by the Local Government Code of 1991 and guided by national frameworks like the Philippine Environmental Impact Statement System (PEISS), LGUs are tasked with implementing localized solutions to address environmental challenges. Their initiatives range from solid waste management and coastal resource protection to climate change adaptation and disaster risk reduction, demonstrating how local leadership can drive meaningful environmental action (Manalo, 2018).

4.5 Types of local environmental programs and initiatives

Different local government units have adopted unique environmental programs and initiatives through a green leadership approach. Table 1 presents these efforts across various LGUs, based on the data collected. These initiatives are primarily aimed at addressing environmental issues specific to their local contexts.

Following a comprehensive evaluation and analysis, five key thematic environmental programs and initiatives were identified under the green leadership approach (Figure 1). Among these, solid waste management and reduction emerged as the most commonly adopted strategy for addressing environmental issues. This thematic area covers the full spectrum of waste management processes—including waste characterization, segregation at source, treatment, and final disposal—while also promoting the principles of reduce, reuse, and recycle (3Rs). A well-established solid waste management (SWM) system provides a reliable and sustainable mechanism for waste separation at the source, often through house-to-house collection services (Chowdhury et al., 2014). Such systems ensure that residual waste is properly transported and that non-recoverable waste fractions are disposed of in a safe and socially responsible manner. Moreover, by treating waste as a resource, these practices support the creation of new, usable products, ultimately reducing the overall environmental footprint (Varey et al., 2003; Swedish Environmental Protection Agency, 2011; Arazo et al., 2016; Gamaralalage et al., 2017).

Climate change mitigation and the adoption of renewable energy have become a shared priority (Manalo, 2018), especially as the impacts of climate change are increasingly evident (Javed et al., 2024). Climate change and other global environmental issues are not confined to specific regions; they are also pressing concerns for local government units, as seen in the case of Cagayan de Oro City (Huelgas & Arellano, 2021). The Philippines' green leadership is increasingly challenged by structural and political barriers that hinder a full transition to renewable energy. Despite ambitious climate targets and the passage of the Renewable Energy Act, the persistence of fossil fuel dominance—driven by entrenched oligarchic interests and policy capture—weakens the implementation of local green initiatives. These conditions highlight the difficulty for local governments and stakeholders to promote sustainable energy policies amid powerful monopolies and weak regulatory enforcement. Addressing these challenges requires a stronger commitment to decentralized leadership, inclusive policy-making, and transparent governance that empowers LGUs and communities to lead in climate action (Dressel & Saguin, 2025).

Table 1. Environmental policies and initiatives of LGUs in the Philippines: ordinances, policies, and sustainability efforts

Local Government Units	Policy/Ordinance/Initiatives Implemented	Key Objectives	References
Batangas City	- Adoption of RA 9729 (Climate Change Act of 2009) via local ordinances - Tree planting, mangrove rehabilitation - "Bring Your Bayong" (BYOB) campaign - Use of solar panels in government offices - Implementation of No Smoking policy in public places - Establishment of DRRM councils - Provision of drought/flood-resistant seeds	- To reduce greenhouse gas emissions and promote sustainable practices - To comply with national climate change and disaster laws - To promote health and safety - To ensure food security under changing climate conditions	(Aguila & Ragot, 2014)
Baybay City, Leyte	- Ordinance on Anti-Littering and Prohibiting Spitting, Improper Urination, and Throwing of Garbage - Ordinance on Solid Waste Management (segregation, banning open burning, proper disposal) - Ordinance on the Use of Plastic Bags (reuse, discourage single-use plastics) - Public awareness and seminars - Barangay-level waste segregation - Charging customers for plastic bag use	- To promote discipline in public hygiene - To ensure effective waste management - To reduce plastic use and promote sustainability - To increase community awareness and cooperation	(Puna, 2023)
Cagayan de Oro City	- Creation of Cagayan de Oro River Basin Management Council (CDORBMC) through Executive Order 2010-02 - “Safer River, Life Saver” Program led by Liceo de Cagayan University - Designation of Cagayan de Oro River Basin as a Water Quality Management Area (WQMA) under DENR Administrative Order No. 2013-18 - Flood Risk Management Project via JICA and DPWH - Eco WATCH Program (Ecological and Environmental Watch) with barangay-level involvement - Waste segregation at source and incentivization through ecological points - Solid waste management plans and infrastructure support (e.g., landfill improvement, Material Recovery Facilities) - Urban greening and ridge-to-reef approach in land use	- To promote sustainable and inclusive river basin management - To enhance water quality and reduce pollution - To build resilience against climate-induced disasters, particularly flooding - To encourage community participation in waste reduction and environmental monitoring - To integrate ecosystem-based approaches in urban planning	(IKI, 2020; Padilla et al., 2016)

Table 1. Environmental policies and initiatives of LGUs in the Philippines: ordinances, policies, and sustainability efforts (Continued)

Local Government Units	Policy/Ordinance/Initiatives Implemented	Key Objectives	References
Cebu City	- City Ordinance No. 1361 (waste collection system and user fees) - City Ordinance No. 2013 (waste segregation at source) - City Ordinance No. 2031 (ecological solid waste management) - City Ordinance No. 2343 ("No Plastic Saturday") - "No Segregation, No Collection" policy - Formation of Barangay Environmental Officers (BEOs) and Cebu Environmental Sanitation Enforcement Team (CESET) - Takakura Method and household composting initiatives - Energy efficiency programs: building retrofits, traffic optimization, and public lighting reforms - Green initiatives in restaurants: waste reduction, energy and water conservation - Participation in international partnerships (e.g., Kitakyushu Initiative, TRACE, Cities for Climate Protection)	-To institutionalize community-based solid waste management (SWM) systems - To reduce landfill waste through composting and recycling - To increase citizen participation in environmental monitoring and waste reduction - To enhance energy efficiency in public and private sectors - To promote sustainable practices in businesses, especially food service establishments	(Gamaralalage et al., 2017; Municipality of Opol, 2025; Premakumara, 2012; Municipality of Opol, (2022)
Makati City	- Declaration of Climate Emergency (2022) - GHG Management Framework Plan - Mobile MRFs (van and pushcart type) - Climate integration in CLUP and CDP - E-bus program with KOICA - Solar panels in schools and offices - Incentives for green businesses	- To reduce GHG emissions and promote low-carbon development - To empower barangays in solid waste management - To promote renewable energy and sustainable transport	(Reyes, 2008; Makati City Government, 2020; UNDRR, 2022; Varey et al., 2003)
Other cities in Metro Manila (Quezon City, Pasig City, Muntinlupa City, Valenzuela City, Navotas Ciy, Manila City, and Malabon City)	- Expansion of MRF and composting in Brgy. Holy Spirit - Establishment of greenhouse eco-center - Implementation of IEC campaigns - Community composting and Doy Pack recycling in Brgy. Ugong - Livelihood projects using compost and recyclables - IEC and public awareness campaigns - Expansion of MRFs - Coconut shell shredding for compost use - Urban farming support - IEC materials and campaigns - Segregated collection system - MRF and windrow composting in Brgy. Mapulang Lupa - Pedicabs and mini dump trucks for waste collection - Staff training and mobilization - IEC campaigns in 14 barangays - Construction of centralized MRF - Organized market linkage for recyclables	- Enhance waste segregation and recovery at the barangay level. - Reduce landfill dependence through composting, recycling, and decentralized collection systems. - Strengthen community participation via Information, Education, and Communication (IEC) campaigns. - Support livelihood programs related to waste management (e.g., urban farming, recycling-based microenterprises). - Develop and expand Materials Recovery Facilities (MRFs) to	(Varey et al., 2003)

Table 1. Environmental policies and initiatives of LGUs in the Philippines: ordinances, policies, and sustainability efforts (Continued)

Local Government Units	Policy/Ordinance/Initiatives Implemented	Key Objectives	References
	- City-wide litter prevention campaign - Billboards and flyers for public awareness - Emphasis on no open dumpsites and clean public spaces - MRFs with LGU-private sector partnerships - Ordinances to align with RA 9003 - IEC and executive engagement for ordinance support	improve local waste processing capacity. - Institutionalize compliance with Republic Act 9003 (Ecological Solid Waste Management Act). - Increase environmental awareness and promote sustainable, community-driven waste systems.	
Opol, Misamis Oriental	- Reforestation (Ordinance No. 2007-11), Reforested 36 hectares in Brgy. Patag under the Makaluesa Project - Stray Animal Control (Ordinance No. 2016-13) ,“Dakop-Iro” campaign captured 312 stray dogs -Coastal Clean-Up / Linis Dagat Program, Marine ecosystem protection and public involvement - Ordinance requiring operators of business, industrial, Commercial and agricultural establishments to secure Environmental clearance	- Environmental protection compliance, air and water quality monitoring, and regulatory penalties and enforcement - promote forest rehabilitation and biodiversity conservation - improve waste collection efficiency and ensure proper waste disposal - protect marine ecosystem, encourage community involvement, strengthen environmental governance, support sustainability framework	(Municipality of Opol, 2022, 2025)
Claveria, Misamis Oriental	-Indigenous Sustainable Agricultural Practices - Preservation of Indigenous Knowledge Systems	- Document and pass on generational knowledge in farming, health care, and forest use - Sustain culturally-rooted, eco-friendly practices - Promote environmental stewardship through shifting cultivation with natural land regeneration - Maintain biodiversity by preserving fruit and medicinal trees	(Barrero et al., 2015)



Figure 1. Green leadership approach: Thematic environmental programs in selected local government units

Local government initiatives are not only focused on identifying the causes of climate change but also on implementing measures to mitigate its effects and reduce the risks of disasters associated with global warming. Given the low public awareness of climate change among Filipinos and the noted regional disparities, it is crucial to continue advancing these initiatives and ensure they are adopted nationwide (Bollettino et al., 2020). The integration of DRR within green leadership is evident in the Philippines' proactive governance frameworks. The enactment of the Philippine Disaster Risk Reduction and Management Act of 2010 (RA 10121) institutionalized decentralized DRRM councils, empowering local governments to lead in sustainable and risk-informed planning. Advancements in multi-hazard risk assessment and early warning systems have enhanced preparedness and informed decision-making, supporting eco-conscious resilience strategies. Community-based DRR initiatives further reflect green leadership by promoting capacity building and participatory governance, ensuring that vulnerable sectors are equipped to manage local risks. Additionally, the incorporation of ecosystem-based approaches—such as mangrove rehabilitation and watershed conservation—not only preserves biodiversity but also strengthens natural defenses against climate-related hazards, aligning environmental sustainability with disaster risk reduction goals (UNDRR, 2019).

Urban greening and reforestation have emerged as key strategies under the Philippine government's green leadership approach to address the escalating threats of climate change, environmental degradation, and urban sprawl (Estoque et al., 2018). Through national policies such as the Urban Development and Housing Act and initiatives led by the Department of Environment and Natural Resources (DENR), local government units (LGUs) are encouraged to integrate green spaces, reforest degraded lands, and promote ecological balance in urban planning. These efforts reflect a proactive and

decentralized model of environmental governance, where local leaders play a vital role in mobilizing communities, enacting ordinances, and aligning development with sustainability goals. Moreover, areas with limited green spaces have been found to face higher risks of flooding, emphasizing the need for increased vegetation to manage stormwater and mitigate climate-related hazards. The study recommends a strategic approach to urban greening, leveraging spatial analysis for continuous monitoring and evaluation (Ibañez et al., 2024). As cities grow and forest cover continues to decline (Perez et al., 2020), strengthening urban greening and reforestation programs is essential not only for climate resilience but also for reinforcing the country's commitment to a greener, more sustainable future.

Effective implementation of government and stakeholder-led environmental initiatives necessitates active public participation and comprehensive environmental education targeting communities, schools, and individuals. Scientific literature on environmental education highlights the importance of these components in fostering sustainable behavioral change. A research study conducted in New Zealand supports this, revealing that environmental programs grounded in the core principles of community environmental education—namely, public engagement, environmental adult learning, and strategic communication—can lead to significant and measurable environmental improvements (Blair, 2008). These findings underscore the critical role of inclusive educational frameworks in promoting environmentally responsible actions and enhancing the overall impact of sustainability efforts (Aguilar, 2018). In the context of the Philippines, community involvement in environmental protection—combined with raising awareness across all age groups—has proven effective not only in enhancing preparedness for the impacts of climate change but also in fostering collaboration with the government in safeguarding the environment (Borres, 2021; Nuñez & Llenaresas, 2021).

4.6 Barriers to effective local green leadership

Local government units (LGUs) play a vital role in advancing sustainable development and environmental governance in the Philippines. As frontline implementers of national policies, they are well-positioned to drive green initiatives aligned with the country's climate goals. However, their effectiveness depends on strong local green leadership, characterized by environmental awareness, policy competence, participatory governance, and institutional support (Du et al., 2024). Despite increasing awareness and global pressure, many LGUs and other organizations face persistent barriers that hinder their transition to green governance (Wiset et al., 2023). These barriers are not unique to the Philippines; they are also encountered by other countries around the world. These challenges—rooted in institutional, cognitive, communicative, and socio-political factors—must be addressed to strengthen local sustainability outcomes. Five key barriers identified in recent studies are presented in Table 2. The commonly identified barriers are not only encountered by local government units but are also shared by other nations and organizations across the globe.

4.7 Strengthening local green leadership

Empowering local government units (LGUs) to lead sustainable development requires deliberate investment in institutional capacity, multi-level collaboration, and inclusive policy-making. A robust local green leadership framework must go beyond rhetoric and

Table 2. Key barriers to effective local green leadership in Philippine LGUs and strategic response

Barrier	Contextual Analysis	Strategic Response
Institutional and Organizational Limitations	LGUs often lack the human, financial, and technical capacity to implement green policies. Fragmented responsibilities and limited community engagement, as seen in the National Greening Program, hinder program success (Wiset et al., 2023).	Strengthen inter-agency coordination, increase funding and capacity-building, and ensure meaningful community participation in planning and execution.
Cognitive and Leadership Challenges	Many local leaders have a limited understanding of sustainability, often reducing it to basic environmental protection, which leads to ineffective or misaligned policies (Berse & Tumanut, 2018.; Du et al., 2024; Gonzales et al., 2021).	Invest in leadership development programs focusing on sustainability education and systems thinking for LGU officials.
Communication Barriers	Poor awareness, lack of training, and resistance to change weaken green messaging. Complex environmental topics and fragmented communication efforts reduce stakeholder engagement (Floranza, 2023; Klinton et al., 2024).	Enhance public awareness campaigns, provide targeted training, and promote a culture of open, inclusive communication among LGUs and stakeholders.
Political and Institutional Factors	Decentralization without sufficient support and coordination from national agencies leads to inconsistent implementation of environmental policies across LGUs (Berse & Tumanut, 2018; Catacutan et al., 2004)	Enhance coordination between national and local governments to ensure consistent and effective implementation of environmental policies.
Economic and Transaction Cost Barriers	High costs and burdensome transaction processes discourage the adoption of sustainable practices. In irrigation systems, new fees and cost redistributions affect participation and self-governance (Durrani et al., 2024; Luo et al., 2021; Okour & Shaweesh, 2024).	Design cost-effective green programs, provide financial incentives or subsidies, and streamline administrative processes to reduce transaction burdens.

equip LGUs with the resources, authority, and knowledge to integrate environmental priorities into governance structures. According to Khan et.al. (2023) climate resilience at the local level is deeply influenced by leadership capacity, technical competence, and local ownership of sustainability goals. The study highlights that decentralization efforts must be paired with adequate support systems and inter-agency coordination to enable LGUs to design and enforce context-specific climate strategies effectively.

It is emphasized that the need for a government to adopt evidence-based policies supported by reliable environmental data and adaptive management practices (Xiao et al., 2024). Green leadership must be grounded in data-driven planning and collaborative decision-making processes, especially as climate threats become increasingly unpredictable. A certain study highlights that green economic development depends on aligning environmental priorities with workforce development, infrastructure planning, and economic incentives. This means that local leaders should foster partnerships with the private sectors, NGOs, and communities to create sustainable, job-generating solutions (Mitchell & Welch, 2009). Further, the Global Challenges Foundation (GCF) identifies that climate governance can be strengthened by promoting inclusive multilateralism, recognizing the role of subnational actors, and building trust between stakeholders. Applying this at the local level requires LGUs to embrace participatory governance models that engage civil society and marginalized communities in environmental decision-making (Roesch & Nobre, 2021). Finally, Sandhu (2021) argued that environmental governance in the Philippines can be made more effective through transparency, capacity-building, and aligning local initiatives with international frameworks. Sandhu (2021) also stressed that empowering LGUs involves reshaping institutional incentives to prioritize long-term sustainability over short-term political gains.

Addressing these barriers requires a multifaceted approach that includes capacity building, fostering comprehensive understanding of sustainability among leaders, enhancing communication strategies, ensuring secure land tenure, and providing economic incentives. By tackling these challenges, Philippine LGUs can strengthen their green leadership and effectively implement sustainable development initiatives. To further understand the internal and external factors shaping local green leadership, a SWOT analysis was conducted. Table 3 summarizes the strengths, weaknesses, opportunities, and threats influencing the capacity of Philippine LGUs to lead in environmental governance. Building on this analysis, a TOWS matrix was developed to translate these factors into actionable strategies. Table 4 presents the proposed policy directions, aligning strengths and opportunities while addressing weaknesses and threats to enhance local green leadership in practice.

4.8 Future research and practice in green leadership

Future research should focus on developing strategic, adaptable frameworks for applying green leadership across organizations. Green leadership, which emphasizes vision, stakeholder engagement, ethical resource use, and alignment with sustainable development goals (SDGs), is shown to enhance innovation, resilience, and performance. It must be integrated into decision-making at all levels. Studies recommend that sustainability becomes a core strategic priority, not an optional initiative. Ultimately, fostering green leadership is essential not just ethically, but also for long-term organizational and global sustainability (Javed et al., 2024; Nurasa et al., 2024; Pathiranage et al., 2024).

Table 3. SWOT analysis of local green leadership in Philippine local government units (LGUs)

STRENGTHS	WEAKNESSES
- Legal mandate through the Local Government Code and environmental laws - Presence of community-based initiatives and partnerships - Growing awareness and commitment to Sustainable Development Goals (SDGs) - Local autonomy in policy-making and ordinance enforcement	- Limited financial, technical, and human resources - Cognitive and leadership gaps in sustainability knowledge - Weak enforcement and inconsistent implementation across LGUs - Fragmented inter-agency coordination
OPPORTUNITIES	**THREATS**
- Global and national support for climate action and resilience programs - Availability of renewable energy technologies and green innovations - Growing civil society and youth engagement in environmental movements - Access to international funding and partnerships	- Climate change impacts such as stronger typhoons, sea level rise, and biodiversity loss - Socio-political resistance and short-term political interests - Economic constraints and high transaction costs for green initiatives - Persistent industrial and urban development pressures

Table 4. TOWS matrix for practical policy framework

Strategy Type	Policy Direction
SO Strategies (Use strengths to take advantage of opportunities)	- Leverage LGU legal mandates and community engagement to maximize international climate funds. - Strengthen partnerships with civil society to accelerate renewable energy and waste management programs.
WO Strategies (Overcome weaknesses by using opportunities)	- Provide capacity-building programs funded by international donors to address technical and leadership gaps. - Use technology transfer and innovation hubs to overcome resource limitations in LGUs.
ST Strategies (Use strengths to reduce threats)	- Enforce local ordinances to regulate environmentally harmful industries. - Expand grassroots programs to strengthen resilience against climate-related disasters.
WT Strategies (Minimize weaknesses and avoid threats)	- Institutionalize inter-agency collaboration mechanisms to reduce fragmented implementation. - Provide subsidies and financial incentives to counter economic barriers while addressing climate risks.

5. Conclusion

Green leadership at the local level stands as a pivotal strategy in addressing the growing environmental challenges faced by the Philippines. This review underscores the critical role of Local Government Units (LGUs) in implementing sustainable policies and initiatives that align with both national directives and international commitments such as the Sustainable Development Goals (SDGs). Through localized programs in waste management, climate adaptation, reforestation, and environmental education, LGUs demonstrate that effective environmental governance is not only possible but essential in the face of climate vulnerability and ecological degradation.

However, the success of local green leadership is contingent on overcoming deep-rooted barriers, ranging from institutional limitations and cognitive gaps among leaders to socio-political resistance and economic constraints. These challenges must be addressed through targeted policy reforms, capacity-building, and sustained inter-agency collaboration. Strengthening leadership competencies, ensuring access to resources, and encouraging multi-stakeholder engagement are all fundamental to transforming environmental commitments into actionable outcomes.

Moreover, green leadership should not be seen merely as a trend or administrative task but as a strategic imperative woven into the fabric of local governance. Empowering LGUs with the tools, autonomy, and knowledge to lead environmental efforts will result in more resilient communities, healthier ecosystems, and a stronger alignment between development and sustainability. As environmental pressures intensify globally, fostering homegrown green leaders becomes not just an option—but a necessity for the survival and well-being of both people and planet.

In this light, Figure 2 illustrates a framework for empowering local green leadership, placing the implementation of green policies at its core. Surrounding this core are the four essential pillars: resource access, capacity building, stakeholder engagement, and policy reforms, all of which strengthen leadership capacity and policy implementation at the local level. These pillars must also be balanced against environmental challenges such as ecological degradation and climate vulnerability, while consistently working toward the goal of building sustainable and resilient communities.

Finally, this paper calls for future research that builds adaptable frameworks for green leadership, grounded in local realities yet informed by global best practices. With strategic vision and sustained commitment, local green leadership in the Philippines can serve as a model for inclusive, effective, and enduring environmental governance.



Figure 2. Framework for empowering local green leadership

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7. Authors' Contributions

Nathaniel E. Quimada contributed to the conceptualization of the study and the collection of research materials. Chiena L. Palconite was responsible for manuscript review, editing, and validation. Both authors contributed fairly to the development of the study design, data analysis, interpretation of results, and the overall intellectual content of the manuscript. Both authors read and approved the final version of the manuscript.

ORCID

Nathaniel E. Quimada 0000-0002-3580-8849

Chiena L. Palconite 0009-0000-5457-3347

8. Conflicts of Interest

The authors hereby declare that there are no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. Further, the authors affirm that the research was conducted independently and without any financial or professional conflict of interest that could be perceived to affect the objectivity or integrity of the study.

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