Environmentally Sustainable Regional Development Management

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ABSTRACT

Environmental degradation in Indonesia is becoming increasingly alarming due to growing demographic pressures, industrialisation, and weak natural resource management. This study aims to analyse the factors causing environmental degradation and formulate strategies for environmentally sustainable regional development as a means of achieving sustainability. This study employs a literature review method, drawing from 45 relevant scientific documents, books, and government policies. Literature selection was conducted using purposive sampling based on topic relevance and depth of analysis. The analysis was conducted thematically to identify patterns of relationships between demographic, economic, socio-cultural, and institutional factors and environmental conditions. The results of the study indicate that environmental degradation in Indonesia is the result of complex interactions between these factors, which reinforce each other. Environmental development efforts will only be effective if they are systematically integrated into national and regional development strategies, combining ecological perspectives, environmentally friendly technological innovations, good governance, and ethical values and local wisdom. The implications of this research emphasise the need to strengthen cross-sectoral synergies, public participation, and the adoption of clean technology as key pillars in maintaining ecosystem sustainability while promoting inclusive economic growth.

INTRODUCTION

The global environmental crisis has now entered a phase that threatens the sustainability of socio-ecological systems at the local level. Climate change, land degradation, deforestation, air pollution, and land use change have significant impacts on ecosystems and public health (IPCC, 2023). In Indonesia, the rate of forest cover loss reaches 0.5 million hectares per year, while unplanned urbanisation triggers increased emissions and disaster vulnerability (KLHK, 2022). Urban and peri-urban areas such as Bandung and its surroundings are increasingly vulnerable to flooding, air quality decline, and environmental carrying capacity decline (Bappenas, 2023). In this context, research on environmentally sustainable regional development management is important and urgent, as it can address the need for integration between economic growth and natural resource conservation for long-term well-being.

Unlike development studies that generally focus on economic indicators or infrastructure alone (Setiadi et al., 2020), this study places environmental conservation, community participation, and cross-sectoral coordination as its main foundations. This approach is relevant to areas with rapid development dynamics but high risk of environmental damage. The uniqueness of this research lies in the application of the comprehensive operational approach to sustainable development ( ), which combines a system approach, an inter-programme and inter-sectoral approach, a multidisciplinary approach, and an educational approach—a model that is still rarely applied simultaneously in Indonesia (Sukardi & Pramono, 2021).

This study examines three main variables: regional management (independent variable), environmental sustainability awareness (intervening variable), and sustainable development (dependent variable). Effective regional management serves as a guide for development strategies, while environmental sustainability awareness acts as a link to ensure that all policies and programmes consider ecological sustainability. Multi-actor involvement—local government, community, NGOs, and the private sector—strengthens the positive effect of regional management on the achievement of sustainable development goals (Sustainable Development Goals/SDGs) (UNDP, 2022).

Previous studies have discussed environmentally conscious development from the perspective of macro policies and natural resource management principles (Hidayat & Putri, 2019; Sitorus et al., 2020). However, research examining the integration of PKMD-based regional management with environmental sustainability principles in a local context remains limited. PKMD has been effective in increasing community participation in health (Mutia, 2014), but its potential to strengthen integrated regional development management aligned with environmental conservation agendas has not been extensively studied. This gap is increasingly relevant given the high demand for development models that harmoniously integrate health, environment, and economic sectors in developing regions.

This study aims to address this gap by developing a community-based sustainable regional development management model based on PKMD principles, which integrates a systemic, cross-sectoral, multidisciplinary, and educational approach. The novelty of this research lies in the integration of community empowerment aspects, which have traditionally focused on public health, into an inclusive and sustainable regional development management framework. The theoretical benefit is to contribute to the literature on sustainable development with a model of cross-sectoral integration; the practical benefit is to provide strategic guidance for local governments in designing environmentally friendly, participatory, and locally-based development policies and programmes. The objective of this study is to formulate and test an effective, participatory, and environmentally sustainable regional development management model in accordance with the socio-economic and ecological context of the region.

LITERATURE REVIEW

Regional Development Management

Regional development management is the process of planning, organising, implementing, and controlling development activities in a specific region to achieve predetermined objectives (Todaro & Smith, 2020). In the context of sustainable development, regional management requires cross-sectoral coordination and multi- e actor involvement, including government, private sector, and community (Bappenas, 2023). A comprehensive operational approach that integrates systems, cross-programmes, multidisciplinary, and educational elements has proven to enhance the effectiveness of regional policies (Sukardi & Pramono, 2021).

A relevant theory is the *Core Region* Theory proposed by John Friedmann (1964) in *A General Theory of Polarised Development*. This theory emphasises that regional development often begins in growth centres (core regions) that have advantages in infrastructure, market access, and resources. Furthermore, the influence of development spreads (spread effect) to surrounding areas. However, without proper management, the backwash effect can exacerbate disparities between regions (Friedmann & Alonso, 1975).

Environmental Sustainability Perspective

Environmental sustainability is a perspective that places the protection and wise use of natural resources as an integral part of the development process (KLHK, 2022). This principle refers to meeting the needs of the present generation without compromising the ability of future generations to meet their needs (Brundtland Commission, 1987). In regional management, environmental sustainability is translated into spatial planning policies, conservation, disaster risk mitigation, and efficient resource use (Prasetya, 2024).

The implementation of this concept is highly relevant in the context of developing regions in Indonesia, where pressure on natural resources is often high due to urbanisation and industrialisation (Wahanisa & Adiyatma, 2021). The integration of environmental sustainability into regional development policies is an important factor in achieving the Sustainable Development Goals (UNDP, 2022).

Sustainable Development

Sustainable development is a development process that integrates economic, social, and environmental aspects in a balanced manner (Todaro & Smith, 2020). In this framework, success indicators are not only measured by economic growth but also by equitable welfare and ecosystem sustainability (Cahyani & Aji, 2017).

The relationship between sustainable development and environmentally conscious regional management is very close. Effective regional management ensures that economic development does not sacrifice the sustainability of natural resources, while environmental awareness provides ethical and practical guidance for development decision-making (Bappenas, 2023).

Conceptual Framework

This study is based on John Friedmann's Core Area Theory (1964), which states that regional development begins from growth centres that have competitive advantages ( ). In the context of environmentally conscious development, these growth centres must be designed to maintain environmental carrying capacity while triggering the equitable distribution of benefits to surrounding areas.

The relationships between variables in this study can be explained as follows:

1. Regional Development Management (independent variable) is the primary driver that determines the direction and strategy of development.
2. Environmental Sustainability Perspective (intervening variable) acts as a filter ensuring that all regional development policies align with sustainability principles.
3. Sustainable Development (dependent variable) is the desired outcome, encompassing economic, social, and environmental aspects.

Integrated regional management aligned with environmental sustainability is expected to maximise the spread effect and minimise the backwash effect, as explained by Friedmann, ensuring that development is not concentrated in the core areas but spreads evenly to surrounding regions.

RESEARCH METHOD

This study uses a *literature review* method with a Systematic Literature Review (SLR) approach. This approach was chosen because it is able to identify, evaluate, and synthesise previous research findings in a systematic, transparent, and structured manner. The SLR procedure facilitates researchers in filtering literature relevant to the research variables, namely *regional development management, environmental*

sustainability, and *sustainable development,* so that the review results have a strong scientific basis (Kitchenham & Charters, 2007).

The data sources for this study come from scientific articles, books, conference proceedings, and official government documents directly related to the research topic. Literature review was conducted through online databases such as Google Scholar, ScienceDirect, Scopus, DOAJ, and national journal portals indexed by SINTA. To enrich the policy perspective, official documents from Bappenas and the Ministry of Environment and Forestry (KLHK) were also used as references.

The literature review process began with the determination of inclusion and exclusion criteria. Inclusion criteria include publications within the time frame of 2012–2024, addressing topics relevant to the research variables, written in Indonesian or English, and available in *full-text* format. Conversely, literature is excluded if it is a duplicate article, popular or non-scientific writing such as news articles and blogs, or does not have a direct connection to the research variables.

The search phase was conducted by compiling keywords using *Boolean operators*, for example: "regional development management" AND "environmental sustainability" and "sustainable regional development" AND "environmental sustainability". The initial search yielded approximately 350 documents from five main databases. After an initial selection of s based on titles and abstracts, the number of documents was reduced to 120. Further screening based on inclusion–exclusion criteria resulted in 45 documents, which were then analysed in depth.

Data analysis was conducted using *content analysis*. Each piece of literature was coded based on the definitions and key concepts of the variables, relevant empirical findings, the regional or policy context discussed, and identified research gaps. The results of the analysis were presented in the form of narrative descriptions supported by tables and diagrams to map the relationships between concepts visually.

The validity of the study was ensured by documenting the entire search process, recording sources, publication years, and search results in a structured *log sheet*. Meanwhile, reliability was strengthened through *cross-checking* between sources and triangulation of literature from national and international journals, ensuring that the study results are scientifically accountable.

RESULTS AND DISCUSSION

Results

Analysis of 45 scientific documents, books, and policy documents shows that environmental damage in Indonesia is a consequence of the complex interaction between demographic, economic, socio-cultural, and institutional factors. These four factors operate simultaneously and reinforce each other's impact.

Demographic factors

The population growth rate of approximately 1.17% per year (BPS, 2023) increases pressure on natural resources, including land, energy, and food. This pressure triggers the conversion of forests into agricultural land, settlements, and industrial areas, as well as the exploitation of natural resources beyond their regenerative capacity.

Economic factors

The industrialisation process in Indonesia is still dominated by a *linear economy* paradigm—take, produce, dispose—which generates large amounts of waste. The Ministry of Environment and Forestry

(KLHK, 2022) notes that industrial waste is the main contributor to pollution in 68% of national strategic river basins. This indicates weak implementation of *green economy* principles in the production sector.

Social-cultural factors

Consumption patterns focused on short-term needs and an anthropocentric paradigm encourage the exploitation of resources without regard for environmental carrying capacity. Literature highlights the need for a shift towards an anthroposmic paradigm (Whitehead, 1929), which views humans as an integral part of the ecosystem, with a responsibility as *stewards* to prosper the earth.

Institutional factors

National regulatory frameworks such as the Basic Agrarian Law No. 5/1960, Law No. 4/1982 on Basic Provisions for Environmental Management, and Government Regulation No. 24/1986 on Environmental Impact Assessment (EIA) are in place. However, their effectiveness is limited due to weak law enforcement, overlapping authorities, and minimal coordination across sectors (Sukardi & Pramono, 2021). Forest rehabilitation programmes, coastal conservation, and the million trees movement have not been fully able to halt the rate of environmental degradation.

Common obstacles identified include low public participation, limited funding, and insufficient integration of local development programmes with the national *Sustainable Development Goals* (SDGs) and commitments to climate change mitigation and adaptation.

Discussion

The findings of this study reinforce the urgency that environmentally sustainable development must be *mainstreamed* in national and regional development planning, rather than merely serving as a complement to sectoral policies. This paradigm is consistent with the mandate *of the Earth Summit* in Rio de Janeiro (1992), which emphasised two main pillars: (1) meeting basic human needs, and (2) protecting the environment for future generations. Integrating these two pillars requires synergy between ecological strategies, economic policies, governance, and ethical values inherent in the Indonesian socio-cultural context.

Integrating Ecological and Regional Development Perspectives

Environmental degradation in Indonesia is a reflection of the disruption of ecosystem balance due to continuous anthropogenic pressures (Haeckel, 1866). Sustainable regional development requires a holistic approach that integrates economic, social, and ecological dimensions.

The Core–Periphery Theory proposed by Friedmann (1964) is relevant for positioning core areas as centres of economic growth and conservation innovation. By maximising *the spread effect,* core regions can become the driving force of the surrounding areas' economies, while *the backwash effect* is minimised through adaptive spatial planning policies, green economic incentives, and strengthening local institutional capacity. The implementation of this theory also enables regional economic diversification while maintaining the ecological functions of the area.

Economic Dynamics and Technological Innovation

Schumpeter (1934) viewed development as a dynamic process supported by leaps in innovation, not merely linear growth. In the Indonesian context, strategic innovation includes the application of *clean*

technology, *circular economy* systems for waste management, and accelerating the transition to renewable energy.

Lessons from Vietnam show that the success of the renewable energy transition is greatly influenced by a combination of fiscal incentives, international partnerships, and technology transfer. However, the adoption of innovation in Indonesia is still hampered by high initial costs, limited skilled human resources, and slow technology transfer processes. Therefore, public policy must optimise *green financing* schemes, expand public-private partnerships, and provide tax incentives to industries that adopt low-emission technologies.

Integration of Islamic Values and Environmental Ethics

In the context of Indonesia's Muslim-majority society, Islamic values such as amanah (responsibility), 'adalah (justice), iqtisad (simplicity), and ri'ayah (stewardship) provide a strong ethical framework for achieving environmental sustainability. These principles are in line with the Qur'anic command to prosper the earth without destroying it (QS. Al-A'raf: 56).

The integration of Islamic ethics into public policy not only enhances the legitimacy of policies but also builds moral motivation that encourages active community participation in environmental conservation programmes. This bridges the gap between technocratic approaches and spiritual awareness, making policies easier to accept and internalise by the community.

Multi-Ecosystem-Based Conservation Strategy

Conservation strategies must be cross-ecosystem and interconnected, encompassing:

1. Land: reforestation, terracing, and community-based conservation techniques.
2. Air: reduction of motor vehicle emissions, urban greening, and low-carbon transportation.
3. Forests: selective logging, cut-and-plant, enforcement of *anti-illegal logging* laws.
4. Marine and coastal: mangrove rehabilitation, coral reef protection, and prohibition of destructive fishing gear.
5. Flora and fauna: establishment of nature reserves, prohibition of illegal hunting, and *restocking* of endangered species.

The use of *remote sensing*, *Geographic Information Systems* (GIS), and real-time environmental data analytics can enhance the accuracy of monitoring and the effectiveness of policies. This approach also enables *an early warning system* for environmental degradation.

Policy and Governance Implications

The transition to environmentally sustainable development requires collaborative, adaptive governance reform based on *good* governance principles of transparency, accountability, and public participation. At the local level, effective *local governance* serves as a link between central policies and local needs through participatory planning and cross-sectoral coordination.

The Regional Medium-Term Development Plan (RPJMD) must be integrated with SDG targets, climate change mitigation and adaptation strategies, and international sustainability standards. Implementation measures include:

1. Enhancing the capacity of human resources through training and certification in environmental planning.
2. Bureaucratic reform to reduce overlapping authorities and accelerate decision-making.

3. Strengthening regulatory instruments that are adaptive to global dynamics such as carbon trading, green investment, and international *environmental compliance*.

CONCLUSION

This study concludes that environmental degradation in Indonesia is the result of complex interactions between demographic, economic, social, and institutional factors that occur simultaneously and reinforce each other. Rapid population growth, industrialisation without the application of green economy principles, wasteful consumption patterns, and weak law enforcement are the main drivers of ecosystem degradation. Environmental development efforts will only be effective if positioned as the mainstream in national and regional development strategies, integrating ecological perspectives, environmentally friendly technological innovations, *good governance-based* management, and environmental ethical values that are in line with local wisdom and religious teachings.

Theoretically, this study reinforces the relevance of the Core Region Theory (Friedmann, 1964) and the concept of sustainable development post-Rio de Janeiro Earth Summit (1992) as a framework for regional development analysis that is in line with environmental sustainability. Practically, these findings provide guidance for policymakers to integrate sustainability principles into development planning documents such as the RPJMN and RPJMD, strengthen cross-sectoral synergies, encourage the adoption of clean technologies, and expand community participation in multi-ecosystem-based environmental conservation programmes.

This study has limitations due to its nature as a literature review, so all findings depend on the quality, completeness, and relevance of the sources analysed. Another limitation is the absence of field data collection or quantitative analysis that could strengthen empirical validity. Additionally, some of the literature used is general in nature and does not specifically address the local context in each region of Indonesia, so generalisations of findings should be made with caution.

For future research, it is recommended to conduct field studies based on primary data to measure the effectiveness of environmentally sustainable development policies at the local level. Subsequent research could also use a *mixed methods* approach to combine quantitative analysis of environmental impacts with in-depth interviews with stakeholders. In addition, comparative studies between regions or between developing countries with similar geographical and socio-economic conditions could provide new insights into effective development strategies while maintaining ecosystem sustainability.

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