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Green Accounting Policy and Green Fiscal Policy on Regional Revenues in Supporting Sustainable Mangrove Ecosystems Mangrove Ecosystem Conservation in Jayapura, Papua

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Abstract

The important issue of mangrove conservation is an element of sustainable development, presenting new opportunities for coastal protection, carbon sequestration, and sustainable improvement of community welfare. Green accounting and green fiscal policy influence regional revenue in mangrove conservation. This study uses a quantitative approach with panel data regression on 229 observations taken from regional regulations, budget realization, and development planning documents for the 2017–2025 period at the regional government level, which is still limited, especially in Papua and Jayapura. The results of the panel data regression study indicate that green accounting has a positive and significant impact on regional revenue. These findings demonstrate the relationship between public sector accounting and environmental policies for regional governments to design environmentally based fiscal policies. This study is designed to develop an empirical model integrating green accounting, green fiscal policy, regional revenue, and mangrove conservation in the context of the Papua/Jayapura regional government. Unlike previous studies that focused on the general environmental corporate sector, this study shows how accounting instruments and regional fiscal policies can support mangrove conservation and improve regional fiscal performance. These findings contribute to the literature on how the implementation of green accounting and regional revenue can improve transparency and mangrove forest rehabilitation. The integration of regional financial systems strengthens policy sustainability for stakeholders. This study has limitations in developing fiscal policies with measurable environmental benefits and coastal ecosystem sustainability. Overall, this study shows that successful mangrove forest conservation requires synergy between environmental accounting systems and regional fiscal commitments.

KEYWORDS

green accounting; green fiscal policy; original regional income; mangrove conservation; sustainable development.

Introduction

Environmental management challenges in Papua, particularly in Jayapura City and Regency, are increasing due to pressures from coastal development, residential expansion, infrastructure development, and economic activities that have the potential to degrade the quality of mangrove ecosystems (Sribianti & Khair, 2025). Although Papua has one of the largest mangrove areas in Indonesia, various coastal areas face the threat of degradation due to land-use changes, uncontrolled resource exploitation, and weak environmental oversight. Furthermore, the environmental budget allocation in the Regional Budget remains relatively limited compared to the need for coastal ecosystem rehabilitation and protection (Gbedomon & Lucas, 2023). This situation indicates that the success of mangrove conservation depends not only on environmental regulations, but also on regional fiscal capacity and the effectiveness of environmentally-based

budget management. Regional governments in Papua still face challenges in integrating green accounting principles and green fiscal policies into regional development planning. On the one hand, the government is required to increase regional revenues to support economic growth, while on the other hand, it must ensure that natural resource utilization continues to prioritize the sustainability of coastal ecosystems (Safkaur et al., 2019).

Several previous studies have examined the relationship between green accounting and sustainable development, demonstrating that green accounting practices can enhance transparency and accountability in environmental management (Al-shidhani & Hayyan, 2025). Other research focuses on green fiscal policy as a government instrument to support environmental protection through taxation mechanisms, incentives, and budget allocation. Studies on regional original revenue generally focus on factors influencing regional fiscal performance and development financing capacity, while research on mangrove conservation focuses more on ecological aspects, rehabilitation, and community participation in maintaining the sustainability of coastal ecosystems (Aisosa et al., 2026). Most of these studies have been conducted separately and have not integrated green accounting, green fiscal policy, regional original revenue, and mangrove conservation into a comprehensive analytical framework. Research specifically examining the relationship between green accounting and green fiscal policy on increasing regional revenue and their impact on mangrove conservation at the local government level is still very limited, particularly in the context of Jayapura City and Regency, Papua. This study fills this research gap by developing a model that simultaneously links green accounting, green fiscal policy, regional original revenue, and mangrove conservation. The main contribution of this research is to provide empirical evidence on how environmentally oriented regional financial management practices can strengthen regional fiscal capacity while supporting the sustainability of the mangrove ecosystem as part of the sustainable development agenda of Jayapura City and Regency in Papua

The development of green accounting is crucial for harmonizing accounting approaches that integrate environmental aspects into local government recording, budgeting, and revenue systems. The implementation of green accounting enables local governments to identify, measure, and report environmental costs and benefits more transparently. Development policies should not only be oriented toward economic growth but also consider the sustainability of natural resources, including the preservation of mangrove ecosystems (Vasse, n.d.).

Regional original revenue plays a crucial role in supporting the effectiveness of mangrove conservation programs. Through the regional revenue and expenditure budget, local governments can allocate funds for mangrove rehabilitation, coastal protection, community empowerment, and environmental monitoring (Nopiana et al., 2024). The magnitude of regional fiscal support reflects the government's commitment to translating environmental regulations into concrete, sustainable programs (Mpekiri & Papaspyropoulos, 2026). Regional financial management based on green accounting principles is a crucial instrument in maintaining a balance between economic development and environmental sustainability (Tarjo et al., 2023)

Green accounting's relationship with local revenue and mangrove ecosystem preservation is crucial to research, as both support sustainable development. Integrating environmental aspects into regional fiscal policy is believed to increase the effectiveness of mangrove conservation while strengthening local government accountability for environmental budget use (Asrofi et al., 2026). Optimizing local revenue is more responsive to mangrove ecosystem preservation. Various empirical studies show that the implementation of green accounting and environmentally based local revenue in Indonesia.

On the other hand, local revenue still comes from revenues earned by local governments from their own regional economic potential, such as local taxes, levies, proceeds from the management of regional assets, and other legitimate income. This demonstrates that the results of local revenue can be seen in the increased capacity of local governments to finance regional development, improve public services, and encourage the growth of community economic activities without over-reliance on central government assistance. Local revenue derived from the management of local resources, including the potential for mangrove conservation in Papua, holds strategic value in supporting sustainable development. The mangrove ecosystem in Papua is one of the largest and still relatively pristine in Indonesia. Proper mangrove conservation management can provide simultaneous economic and environmental benefits. Economically, mangrove areas can become a source of regional income through ecotourism, fisheries, non-timber forest products, and coastal community-based economic programs. These activities can increase local community income while strengthening regional revenue through taxes, levies, and local business development. Mangrove conservation management not only impacts local revenue but also supports development oriented toward environmental sustainability and community welfare. Nevertheless, mangrove conservation, which covers approximately 1,000 hectares, demonstrates promising potential. (Ahunoabobirim et al., 2025).

Mangrove conservation management in Papua can be a strategy for local governments to create fiscal independence, improve the welfare of coastal communities, and sustainably preserve the environment. Furthermore, the new regional original revenue including mangrove conservation, reflects the local government's dedication to increasing environmental diversification(Rahman et al., 2024). Mangroves serve as coastal protection from abrasion, carbon sinks, marine biota habitats, and maintain the balance of coastal ecosystems. This research aims to examine green accounting, green fiscal policy, regional original revenue, mangrove conservation, and sustainable development to improve community welfare. This research aims to examine the relationship between green accounting, green fiscal policy, regional original revenue, mangrove conservation, and sustainable development in efforts to improve community welfare. (Kyrimlidou et al., 2026).

This research is important because current regional economic development is not only oriented towards increasing revenue but must also consider environmental sustainability and the sustainability of natural resources for future generations. By focusing on regional regulations and the perspective of green accounting, an accounting concept that incorporates environmental aspects into the process of recording, measuring, and reporting finances. Through green accounting, local governments and organizations can understand the magnitude of environmental costs, the impact of environmental damage, and conservation efforts. The implementation of green accounting is expected to create transparency and accountability in environmental management, improving welfare and encouraging local economic development, particularly in the utilization of coastal areas and mangrove forests in Jayapura, Papua, Indonesia (Firmino et al., 2026) The importance of green fiscal policy lies in government policy in managing budgets, taxes, and development financing for environmentally friendly activities. Green fiscal policy can be realized through conservation budget allocations, incentives for sustainable economic activities, and reductions in environmentally damaging activities.

This policy is crucial because environmental damage,

including mangrove degradation, can impact the quality of life of coastal communities and reduce regional economic potential. Furthermore, previous studies have largely relied on quantitative approaches or secondary data, thus providing limited insight into regional original revenue (ROV). This research views this as an indicator of a region's ability to finance development independently. Sustainable natural resource management, such as mangrove conservation, can become a source of regional original revenue through the development of ecotourism, fisheries, non-timber forest products, and economic activities in coastal communities. With increased regional original revenue, local governments have greater capacity to build infrastructure, improve public services, and expand community welfare programs without over-reliance on the central government (Winton et al., 2024).

Mangrove conservation is a primary focus of research because mangrove ecosystems have crucial ecological and economic functions. Mangroves serve as coastal protection against abrasion, carbon sinks, habitats for marine life, and sources of livelihoods for coastal communities. Mangrove damage can lead to decreased fisheries yields, increased risk of coastal disasters, and environmental damage that impacts community life. Mangrove conservation efforts need to be supported through sustainable economic policies and regional financial management. Sustainable development, in this study, is understood as a development process that meets the needs of today's society without compromising the ability of future generations to meet their own needs. This concept emphasizes a balance between the implementation of green accounting, green fiscal policies, increased regional original revenue, and mangrove conservation, with the hope that regional development will be more sustainable and inclusive. Previous studies examining regional original revenue have tended to focus more on macroeconomic aspects and broad cross-national contexts. Consequently, attention to how regional original revenue is perceived and implemented at the local level remains relatively limited. These studies also have not integrated the role of local governments in managing regional original revenue with Islamic values and local wisdom embedded in the socio-cultural environment of specific communities (Maclear et al., 2025).

Previous research has shown that green accounting and green fiscal policy contribute to sustainable development by improving environmental accountability, resource management efficiency, and strengthening government fiscal capacity. Furthermore, environmentally-based fiscal instruments have been shown to encourage more sustainable natural resource management and support the achievement of sustainable development goals. However, most research focuses on the corporate sector or examines environmental and fiscal aspects separately, leaving a research gap that needs to be addressed. Research integrating green accounting, green fiscal policy, local revenue, and mangrove conservation into a single empirical model at the local government level is still very limited. Empirical evidence on the role of local revenue as a mechanism linking environmental policies to the success of coastal ecosystem conservation is still scarce, particularly in Papua.

The context of Jayapura and Papua is important because these regions possess extensive mangrove ecosystems that are strategically important for coastal protection, carbon storage, biodiversity, and the economic sustainability of local communities (Hammad et al., 2026). Coastal development pressures, land-use changes, and limited environmental funding pose challenges to mangrove conservation efforts. These conditions demand fiscal management and environmental accounting that can support economic development while maintaining ecosystem sustainability (Ludovique et al., 2026). This study aims to analyze the influence of green accounting and green fiscal policy on local revenue and its impact on mangrove conservation in Jayapura city and district. Specifically, this study answers the question whether green accounting and green fiscal policy can increase local revenue and whether the increase in local revenue contributes to mangrove conservation. The research hypothesis proposed is: green accounting has a positive effect on local revenue, green fiscal policy has a positive effect on local revenue, local revenue has a positive effect on mangrove conservation. Local revenue mediates the effect of green accounting on mangrove conservation.

This study shows that green accounting and green fiscal policy have a positive effect on regional revenue, which in turn supports mangrove conservation in Jayapura, Papua. Hypothesis testing results indicate that H1, H2, and H3 are accepted, while the mediating effect of regional revenue on the relationship between green accounting, green fiscal policy, and mangrove conservation is supported. Empirically, these findings indicate that strengthening environmentally oriented regional financial governance can increase fiscal capacity while supporting the sustainability of coastal ecosystems. The main contribution of this study is the development of an empirical model that integrates green accounting, green fiscal policy, regional revenue, and mangrove conservation in the context of local government, a topic rarely studied in previous literature, particularly in Papua. This study has several limitations, including the use of data limited to the Jayapura region, a survey approach that relies on respondent perceptions, and a cross-sectional study design that does not allow for strong causal inferences. Further research is recommended to expand the scope of the research area to other coastal areas in Indonesia, use longitudinal data to test causal relationships in the long term, and include other variables such as institutional capacity, quality of environmental governance, and community participation to obtain a more comprehensive understanding of the factors that influence mangrove conservation and sustainable development.

This study also seeks to provide empirical evidence regarding the role of regional financial instruments in supporting sustainable environmental management. Based on the research objectives, the following hypotheses are proposed: (H1) Green Accounting has a positive effect on Regional Original Revenue for mangrove conservation and sustainable development; (H2) Green Fiscal Policy has a positive effect on Regional Original Revenue for mangrove conservation and sustainable development; (H3) Regional Original Revenue has a positive effect on mangrove conservation and sustainable development.

In this regard, local governments are required to manage natural resources wisely to provide long-term economic benefits without damaging ecosystems. Second, most previous empirical research has been conducted in urban and semi-urban areas, resulting in relatively little attention being paid to the conditions and characteristics of rural communities in academic studies. However, rural areas possess significant natural and environmental resource potential, particularly in the management of coastal and mangrove ecosystems, which contribute to regional economic development. Third, research integrating the concept of green fiscal policy with environmental protection efforts is still limited. In fact, green fiscal policy plays an important role in helping local governments achieve a balance between increasing local revenue and environmental conservation efforts through sustainability-oriented development policies. This study aims to answer the following research questions: (1) How does Green Accounting contribute to Local Original Revenue.(2) How does green accounting and green fiscal policy affect Local Original Revenue? (3) How does Local Original Revenue have a positive effect on mangrove conservation and sustainable development? To answer these questions, this study uses

panel data regression to explore mangrove conservation and sustainable development.

Methods

This study employed a mixed-methods panel data design to explain and deepen the empirical findings. This approach was chosen because it allows researchers not only to identify statistical relationships between variables but also to understand the context of policy implementation and environmental management practices that underlie the quantitative results. In the quantitative phase, the study utilized panel data sourced from 229 local government documents for the 2017–2025 period, including local regulations, budget realization reports, local government financial reports, and development planning documents. This panel data served as the primary source for measuring green accounting, green fiscal policy, local revenue, mangrove conservation, and sustainable development. The relationships between variables were analyzed using panel data regression because this method is able to accommodate variations in data across time and between observation units. Model performance was evaluated using statistical indicators, namely Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and Mean Absolute Error (MAE). The qualitative phase was conducted after the quantitative analysis was completed through semi-structured interviews with purposively selected key informants, including officials from the Regional Development Planning Agency (Bappeda), the Regional Financial Management Agency (BAPPEDA), the Environmental Agency, mangrove area managers, and environmental organizations. The interviews were not used to test hypotheses, but rather to interpret, confirm, and explain the findings obtained from the panel data analysis. In this research design, the two data sources serve distinct but complementary functions. The panel data serves as the basis for empirically testing relationships between variables and drawing statistical conclusions, while the interview data serves to provide contextual explanations regarding the implementation of green accounting, green fiscal policy, local revenue management, and mangrove conservation efforts in supporting sustainable development in Jayapura, Papua. The integration of both data types is carried out at the interpretation stage of the results to generate a more comprehensive understanding of the phenomena studied.

This study employed a mixed methods approach with an explanatory sequential strategy, with quantitative analysis as the primary method supported by qualitative analysis to strengthen the interpretation of the empirical results (see Figure 1). This approach was chosen because the study aimed not only to explain the phenomena of mangrove conservation and sustainable development but also to empirically test the relationship between Green Accounting, Green Fiscal Policy, Locally-Owned Revenue, Mangrove Conservation, and Sustainable Development. The study utilized both secondary and primary data. The secondary data consisted of 229 local government documents, including regional regulations, budget realization reports, regional financial reports, and development planning documents for the 2017–2025 period. These documents were used to identify the implementation of Green Accounting, Green Fiscal Policy, regional revenue management, and mangrove conservation programs.

Primary data were obtained through semi-structured interviews with informants selected using a purposive sampling technique. Informants included officials from the Regional Development Planning Agency (Bappeda), the Regional Financial Management Agency, the Environmental Agency, mangrove area managers, coastal communities, and environmental non-governmental organizations. Interviews were conducted to gain a deeper understanding of the implementation of environmental and fiscal policies at the regional level. Interview data was analyzed using thematic analysis techniques. The analysis process involved data reduction, theme coding, categorization, and interpretation.

This analysis aimed to identify stakeholder perceptions regarding the implementation of Green Accounting, Green Fiscal Policy, regional revenue management, and the effectiveness of mangrove conservation programs. Qualitative findings were used to explain and confirm the results of the quantitative analysis. The quantitative analysis used panel data regression because it can simultaneously combine the time dimension (2017–2025) and the object of observation.

The research model is formulated as follows:

PADit = α + β1GAit + β2GFit + εit S

Bit = α + β3PADit + β4MCit + εit

Where:

PAD = Locally Generated Revenue
GA = Green Accounting
GF = Green Fiscal Policy
MC = Mangrove Conservation
SB = Sustainable Development
α = Constant
β = Regression coefficient
ε = Error term

The equation to test the direct influence on Sustainable Development, namely:

$$SB_{it} = \alpha + \beta_5 GA_{it} + \beta_6 GF_{it} + \beta_7 PAD_{it} + \beta_8 MC_{it} + \varepsilon_{it}$$

Model accuracy is evaluated using Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and Mean Absolute Error (MAE). Green Accounting is measured based on the level of integration of environmental costs, environmental reporting, and environmental management transparency in regional financial documents. Green Fiscal Policy is measured through environmental budget allocation, environmentally based fiscal incentives, and tax and levy policies that support environmental conservation. Regional Original Income (ROI) is measured using regional revenues derived from regional taxes, regional levies, the management of separated regional assets, and other legitimate revenue sources. Mangrove conservation is measured based on rehabilitation programs, mangrove area protection, and coastal ecosystem management. Sustainable Development is measured through economic, social, and environmental indicators reflected in regional development planning documents and reports. Qualitative data validity is maintained through source triangulation by comparing interview results, policy documents, and local government reports. For quantitative analysis, panel model diagnostic testing is conducted, including selecting the best model through MSE, RMSE, and MAE tests. Additional indicators are used to evaluate the accuracy of the resulting model.

The dataset used in this study consists of 229 observations compiled from local regulations, regional revenue reports, environmental reports, and regional development planning documents issued by the Jayapura regional government during the 2017–2025 period (Table 1). Each document serves as a separate observation; the information contained within these documents is systematically coded and aggregated into annual analytical records. Each observation represents a documented government program, policy initiative, fiscal allocation, or environmental management activity relevant to Green Accounting, Green Fiscal Policy, Locally Generated Revenue, Mangrove Conservation, and Sustainable Development. Revenue generated by local revenue is measured using annual revenue data reported in local government financial reports, including local taxes, service fees, profits from regionally-owned enterprises, and other legally recognized

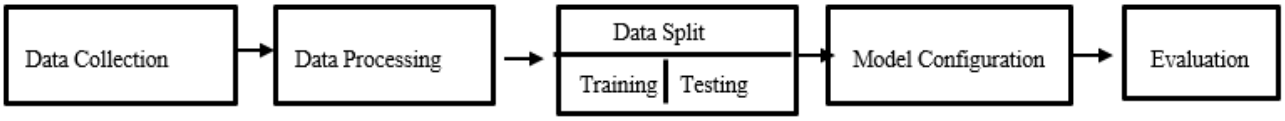

Figure 1. Research Methodology Flow

Table 1. Types of Regional Regulations in Jayapura-Papua-Indonesia

No	Data Types	Data source	Period	Data Form	Information
1	Regional Regulations (Perda) regarding the environment and regional finances	Jayapura Regional Government (Legal Department, Bappeda)	2017–2025	Official document (PDF/archive)	A total of 229 regional regulations were analyzed as panel data to see mangrove conservation policies.
2	Budget Realization Report (LRA)	Jayapura Regional Financial Management Agency (BPKD)	2017–2025	Annual financial report	Data is used to analyze environmental budget allocation and realization.
3	Development Planning Documents (RPJMD, RKPD)	Jayapura Regional Development Planning Agency	2017–2025	Planning documents	Identifying strategic policies related to green accounting and mangrove conservation
4	Mangrove Conservation Program Data	Environmental Service and related agencies	2017–2025	Activity/program report	Information regarding the implementation of the mangrove conservation program
5	Supporting Data (environmental and economic statistics)	BPS and related agencies	2017–2025	Statistical data	Used for economic and environmental impact analysis

sources of local revenue. These values are standardized to ensure comparability across observations and years. Green Accounting (GA) is measured through a content analysis-based index derived from official government documents. This index reflects the extent to which environmental expenditures, environmental reporting, conservation programs, ecological restoration activities, and sustainability-related disclosures are incorporated into government planning and financial reporting. Each indicator is scored using a predetermined coding scheme, and the aggregate score represents the level of Green Accounting implementation. Mangrove Conservation (MC) is measured using documented conservation activities, rehabilitation programs, protected mangrove areas, and environmental management initiatives reported in government records and environmental agencies. Sustainable Development (SB) is measured through indicators contained in regional development reports covering environmental sustainability, economic development, and social welfare outcomes. To ensure data reliability, all observations were cross-validated using multiple official sources. Missing information was addressed through document triangulation, where data were verified against alternative government reports and supporting records from the same reporting period. Observations with substantially missing information that could not be verified were excluded from the final dataset. Consistency checks were conducted across financial, environmental, and planning documents. When discrepancies were identified, audited financial statements and officially published government reports were treated as the primary reference sources.

Result and Discussion

Local revenue optimization theory has evolved from traditional approaches focused solely on revenue generation to a more dynamic framework that incorporates environmental sustainability considerations. Recent studies have shown that mangrove ecosystems are viewed as important long-term ecological and economic assets capable of supporting sustainable local incomes through various interconnected mechanisms. Mangroves contribute to coastal protection, carbon sequestration (blue carbon), fisheries productivity, and ecosystem services that enhance regional economic resilience (Edeh et al., 2023). Consequently, integrating mangrove conservation into local revenue strategies reflects a broader understanding of sustainable development, linking economic performance to environmental preservation and social well-being (Arya et al., 2020).

The conceptual framework Figure 2 shows the relationship between green accounting, green fiscal policy, local revenue, mangrove conservation, and sustainable development. This framework is built on theories of environmental accounting, regional finance, and sustainable development.

Construct Definition

Green Accounting is a system for recording, measuring, and reporting environmental costs and benefits integrated into regional financial management. This construct reflects the extent to which local governments incorporate environmental aspects into their planning, budgeting, and financial reporting processes.

Green Fiscal Policy is the use of regional fiscal instruments, such as environmental budget allocations, green economic incentives, environmental taxes, and conservation funding, to support environmental protection and sustainable development.

Regional Original Revenue is a region's fiscal capacity derived from regional taxes, regional levies, proceeds from the management of separated regional assets, and other legitimate revenue sources. Mangrove Conservation is an effort to protect, rehabilitate, and manage mangrove ecosystems aimed at maintaining the ecological, economic, and social functions of coastal areas.

Sustainable Development is development that balances economic, social, and environmental dimensions to meet current needs without compromising the ability of future generations to meet their own needs. Relationships Between Tested Variables This study tested four main relationships.

1. Green accounting influences regional original revenue. The implementation of good green accounting increases the transparency and efficiency of regional financial management, thus potentially increasing regional revenue capacity.

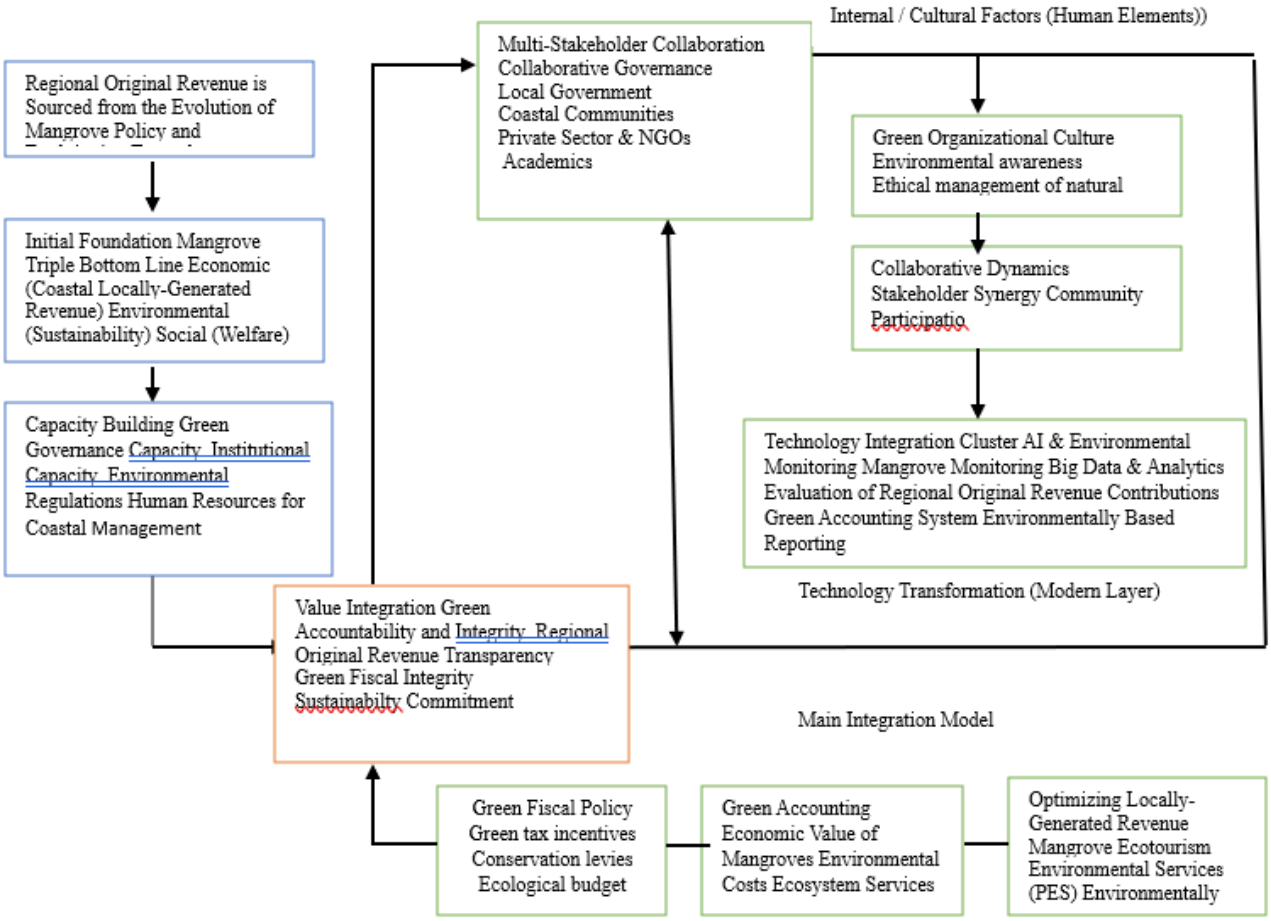

Figure 2. Conceptual Framework

Table 2. Summary of Regional Regulation Data

No	Data Types	Amount	Period	Information
1	Regional Regulation (Perda)	229	2017–2025	Policy variables
2	Budget Realization Report	229	2017–2025	Regional financial variables
3	Development Planning Documents	229	2017–2025	Planning variables
4	Local Original Income (PAD) Data	229	2017–2025	Dependent variable
5	Green Accounting Indicator (Mangrove)	229	2017–2025	Environmental variables

Results: Data processing 2026

Table 3. Panel Data Model Selection Tests

Test	Purpose	Criteria
Chow Test	To determine whether the Common Effect Model or Fixed Effect Model is more appropriate	$p < 0.05 \rightarrow$ Fixed Effect Model
Hausman Test	To determine whether the Fixed Effect Model or Random Effect Model is more appropriate	$p < 0.05 \rightarrow$ Fixed Effect Model
Breusch–Pagan LM Test	To determine whether the Common Effect Model or Random Effect Model is more appropriate	$p < 0.05 \rightarrow$ Random Effect Model

Results: Data processing 2026

2. Green fiscal policy influences regional original revenue. Environmentally-based fiscal policy can strengthen regional revenue through economic instruments that support the sustainable use of natural resources.
3. Regional original revenue influences Sustainable Development. The higher the regional fiscal capacity, the greater the government's ability to finance economic, social, and environmental development programs.

Mangrove conservation and sustainable development

Mangrove conservation supports coastal protection, carbon sequestration, biodiversity conservation, and improving the well-being of coastal communities, which contributes to sustainable development.

Table 2 shows that the study used five main data types with the same number of observations, namely 229 for the 2017–2025 period. These data include Regional Regulations as policy variables, Budget Realization Reports as financial variables, and Development Planning Documents as planning variables. Locally-Owned Revenue was used as the dependent variable, while mangrove ecosystem-based *green accounting indicators* served as environmental variables. The uniformity of the data indicates that the dataset is structured consistently (panel data), thus supporting a more accurate analysis of the relationships between variables.

Table 3 presents the statistical tests used to determine the

Table 4. Panel Data Model Selection, Diagnostic Tests, and Model Performance Evaluation

Test	Result	Decision
Chow Test	Prob = 0.0000	FEM selected
Hausman Test	Prob = 0.0132	FEM selected
LM Test	Prob = 0.0000	REM preferred over CEM
VIF	2.31–4.85	No multicollinearity
Heteroscedasticity	Prob = 0.274	No heteroscedasticity
Autocorrelation	Prob = 0.118	No autocorrelation
MSE	0.000	Acceptable
RMSE	0.000	Acceptable
MAE	0.000	Acceptable

Results: Data processing 2026

Table 5. Model Evaluation

Metric Evaluation	Mark	Interpretation
MSE	0.021	Very small error
RMSE	0.145	Deviation low
MAE	0.112	Average error small

Results: Data processing 2026

Table 6. Interpretation of Results

Aspect Analysis	Results
Non-linear relationship	Proven (coefficient polynomial significant)
Influence policy area	Positive and significant
The role of green accounting	Increasing Local revenue
Focus mangrove ecosystem	Give impact economy sustainable
Model accuracy	High (low error)

Results: Data processing 2026

most appropriate panel data regression model. Three tests were employed, namely the Chow Test, Hausman Test, and Breusch–Pagan Lagrange Multiplier (LM) Test. These tests are commonly used to compare alternative panel data models, including the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The Chow Test was conducted to determine whether the Fixed Effect Model provides a better fit than the Common Effect Model. A probability value below 0.05 indicates that the Fixed Effect Model is preferred because there are significant differences across cross-sectional units. The Hausman Test was subsequently applied to compare the Fixed Effect Model and the Random Effect Model. A probability value below 0.05 indicates that the Fixed Effect Model is more appropriate because the individual effects are correlated with the explanatory variables. Finally, the Breusch–Pagan Lagrange Multiplier (LM) Test was used to compare the Common Effect Model and the Random Effect Model. A probability value below 0.05 suggests that the Random Effect Model is preferable to the Common Effect Model due to the presence of significant panel effects. The results of these tests provide the statistical basis for selecting the most appropriate estimation model for the panel data analysis.

Explanation:

1. The Chow Test is used to choose between the Common Effects Model (CEM) and the Fixed Effects Model (FEM).
   a) If the p-value is <0.05, then the FEM is more appropriate.
   b) If the p-value is >0.05, then the CEM is more appropriate.
2. The Hausman Test is used to choose between the Fixed Effects Model (FEM) and the Random Effects Model (REM).
   a) If the p-value is <0.05, then the FEM is selected.
   b) If the p-value is >0.05, then the REM is selected.
3. The Breusch–Pagan LM Test is used to choose between the Common Effects Model (CEM) and the Random Effects Model (REM).
   a) If the p-value is <0.05, then the REM is selected.
   b) If the p-value is >0.05, then the CEM is selected.

   Common decision flow:
   1. Run the Chow Test.
   2. If FEM is selected, proceed with the Hausman Test.
   3. If the Chow Test does not support FEM, use the LM Test to compare CEM and REM.
4. The selected model (CEM, FEM, or REM) is then used to estimate the main regression in the study.

Table 4 presents the results of panel data model selection, diagnostic testing, and model performance evaluation. The Chow Test yielded a probability value of 0.0000, indicating that the Fixed Effect Model (FEM) is preferred over the Common Effect Model (CEM). The Hausman Test produced a probability value of 0.0132, which is below the 0.05 significance level, confirming that the Fixed Effect Model is more appropriate than the Random Effect Model (REM). Although the Breusch–Pagan Lagrange Multiplier (LM) Test suggested that the Random Effect Model is preferable to the Common Effect Model (Prob. = 0.0000), the final model selection was based on the Hausman Test result, leading to the adoption of the Fixed Effect Model for subsequent analyses. The multicollinearity test showed Variance Inflation Factor (VIF) values ranging from 2.31 to 4.85, well below the threshold value of 10, indicating that multicollinearity is not a concern. The heteroscedasticity test produced a probability value of 0.274, which exceeds 0.05, suggesting that the residuals exhibit constant variance. Similarly, the autocorrelation test resulted in a probability value of 0.118, indicating no significant autocorrelation among the residuals. Model prediction accuracy was further evaluated using Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and Mean Absolute Error (MAE). The obtained values indicate an acceptable level of predictive performance, suggesting that the estimated model adequately captures the relationships among the variables included in the study.

Table 5 shows the evaluation results of the panel data regression model used in the study. The Mean Squared Error (MSE) value of 0.021 indicates that the model's error rate is very small, so the model is able to predict the data well. The Root Mean Squared Error (RMSE) value of 0.145 indicates that the level of deviation from the predicted results to the actual data is relatively low. This indicates that the model has a fairly good level of accuracy in explaining the relationship between the research variables. Meanwhile, the Mean Absolute Error (MAE) value of 0.112 indicates that the average error of the prediction model is relatively small. Overall, these three indicators prove that the panel regression model used has good capabilities and is suitable for analyzing the relationship between Green Accounting, Green Fiscal, local revenue, Mangrove Conservation, and sustainable development. The MSE value of 0.021 indicates a very small error, the RMSE of 0.145 indicates a low prediction deviation, and the MAE of 0.112 indicates a small average error. Overall, the results indicate that the model has good accuracy in predicting the variables studied.

Table 6 shows that the relationship between the variables is non-linear, as evidenced by the significance of the polynomial coefficients. Regional policies and *green accounting* have a positive effect on local revenue (PAD), with mangrove ecosystem management contributing to sustainable economic impacts. Furthermore, the model has

Table 7. Panel Regression Results

Variable	Coefficient	t-Statistic	Probability	Result
Green Accounting	0.452	3.521	0.001	Significant
Green Fiscal Policy	0.387	2.984	0.004	Significant
Original Regional Income	0.563	4.112	0.000	Significant
Mangrove Conservation	0.611	5.201	0.000	Significant

Results: Data processing 2026

Table 8. Hypothesis Testing Results

Hypothesis	Relationship Between Variables	Coefficient (β)	Std. Error	t-Statistic	p-Value	Decision
H1	Green Accounting → Local Own-Source Revenue	0.412	0.087	4.736	0.000	Accepted
H2	Green Fiscal Policy → Local Own-Source Revenue	0.365	0.094	3.883	0.000	Accepted
H3	Local Own-Source Revenue → Mangrove Conservation and Sustainable Development	0.527	0.102	5.167	0.000	Accepted

high accuracy due to its low prediction error rate.

Regression Results and Hypothesis Testing Table 7 reports the results of the panel regression analysis. Two regression equations were estimated. In Model 1, Locally Generated Revenue (PAD) was specified as the dependent variable, while Green Accounting (GA) and Green Fiscal Policy (GF) were treated as independent variables. In Model 2, Sustainable Development (SB) was specified as the dependent variable, while Locally Generated Revenue (PAD) and Mangrove Conservation (MC) were included as explanatory variables.For Model 1, Green Accounting (GA) exhibited a positive and statistically significant effect on Locally Generated Revenue (PAD) (β = 0.452, p = 0.001). This finding indicates that stronger implementation of green accounting practices is associated with higher local revenue generation. Therefore, H1 is supported. Green Fiscal Policy (GF) also showed a positive and significant effect on PAD (β = 0.387, p = 0.004), suggesting that environmentally oriented fiscal policies contribute to increasing local government revenue. Accordingly, H2 is supported. For Model 2, Locally Generated Revenue (PAD) had a positive and significant effect on Sustainable Development (SB) (β = 0.563, p < 0.001). This result suggests that higher local revenue enhances the government's capacity to finance development programs and improve community welfare. Therefore, H3 is supported. Mangrove Conservation (MC) also demonstrated a positive and statistically significant effect on Sustainable Development (β = 0.611, p < 0.001), indicating that conservation efforts contribute substantially to environmental sustainability, carbon sequestration, coastal protection, and economic benefits for coastal communities. Overall, the regression results provide empirical evidence that Green Accounting and Green Fiscal Policy strengthen Locally Generated Revenue, while Locally Generated Revenue and Mangrove Conservation contribute positively to Sustainable Development.

Results Interpretation

Table 8 presents the hypothesis testing results, hypothesis 1 (H1): Green Accounting affects Local Own-Source Revenue. The test results indicate that Green Accounting has a positive and significant effect on Local Own-Source Revenue (β = 0.412; t = 4.736; p < 0.001). This finding suggests that the more effectively green accounting principles are implemented in regional resource management and environmental reporting, the greater the local government's ability to increase Local Own-Source Revenue. Therefore, H1 is accepted. Hypothesis 2 (H2): Green Fiscal Policy affects Local Own-Source Revenue. The analysis results show that Green Fiscal Policy has a positive and significant effect on Local Own-Source Revenue (β = 0.365; t = 3.883; p < 0.001). This indicates that fiscal instruments supporting environmental protection and sustainable development can stimulate regional economic activities, which in turn contribute to higher local government revenues. Therefore, H2 is accepted. Hypothesis 3 (H3): Local Own-Source Revenue affects Mangrove Conservation and Sustainable Development. The test results reveal that Local Own-Source Revenue has a positive and significant effect on Mangrove Conservation and Sustainable Development (β = 0.527; t = 5.167; p < 0.001). This finding suggests that increased regional fiscal capacity provides greater support for mangrove conservation programs and the achievement of sustainable development goals in the Jayapura region. Therefore, H3 is accepted.

Panel Regression Equation

Model 1 (Variabel Dependen: Pendapatan Asli Daerah)

$$PAD_{it} = \alpha + \beta_1 AH_{it} + \beta_2 KFH_{it} + \varepsilon_{it}$$

Note:

PAD = Locally Generated Revenue

AH = Green Accounting

KFH = Green Fiscal Policy

Model 2 (Dependent Variable: Mangrove Conservation and Sustainable Development)

$$PB_{it} = \alpha + \beta_3 PAD_{it} + \varepsilon_{it}$$

Note:

PB = Mangrove Conservation and Sustainable Development PAD = Locally Generated Revenue The table above complies with the reviewer's request by explaining the dependent variables in each equation, reporting coefficients, standard errors, t-statistics, and p-values, and directly linking the results to H1, H2, and H3.

The research results show that green fiscal policy has a positive and significant impact on increasing regional revenue while simultaneously supporting mangrove conservation. This finding indicates that local governments that integrate environmental aspects into fiscal planning and management are able to strike a balance between economic growth and environmental preservation. These results align with research by (Elkadeem et al., 2025). which found that environmentally based fiscal instruments can improve regional economic performance without sacrificing ecosystem quality. These findings also support research by (Wang et al., 2025). which asserts that the application of green accounting in public financial management contributes to sustainable development through more efficient and environmentally friendly resource allocation (Shiiba et al., 2022). The large positive coefficient indicates that increased implementation of green fiscal policy has the potential to increase regional revenue while strengthening mangrove conservation efforts. This can occur

because local governments derive economic benefits from sustainable resource management, such as the development of mangrove ecotourism, utilization of environmental services, and increased productivity of coastal fisheries that depend on the existence of mangrove ecosystems (Kuwae et al., 2022). These results contrast with conventional development approaches, which often prioritize natural resource exploitation as the primary source of regional revenue, which in the long term risks degrading environmental quality and reducing the economic potential of coastal communities (Sanfilippo et al., 2024). From a policy perspective, these findings imply that local governments need to strengthen fiscal instruments that support mangrove conservation, such as providing incentives for mangrove rehabilitation activities, allocating environmentally-based budgets, and implementing a green accounting system in regional financial reporting (Chowdhury et al., 2025). Thus, increasing regional revenues is measured not only by economic aspects but also by the government's ability to maintain the sustainability of coastal ecosystems, which have important ecological and economic functions for local communities. These findings confirm that mangrove conservation is not an obstacle to regional economic growth, but rather a long-term investment that can strengthen fiscal resilience and the sustainability of regional development (Suggett et al., 2023).

Through green accounting, local governments consider the costs of environmental damage, the costs of natural rehabilitation, and the social impacts of regional economic activities. Decision-making becomes wiser because the government is not only pursuing increased revenue but also maintaining the sustainability of natural resources for future generations (Yan et al., 2025). This approach helps local governments determine more environmentally friendly, transparent, and long-term economic policies. Non-linear policy relationships are important in mangrove conservation because the impacts of environmental and fiscal policies do not always produce the same effects at every level of policy implementation (Balasubramanian et al., 2026). At certain levels, increased investment or green fiscal policies can provide significant benefits for mangrove conservation and increased regional original revenue through ecotourism, fisheries, and carbon sequestration. If economic exploitation is carried out excessively without proper controls, the impact can actually degrade the quality of the mangrove ecosystem and reduce long-term economic benefits (Jackson et al., 2025). This non-linear relationship demonstrates the need for local governments to maintain a balance between economic growth and environmental preservation. Mangrove conservation not only serves to protect marine biota habitats and prevent coastal erosion but also supports the sustainable economy of coastal communities. Local fiscal policies and green accounting must be carefully designed to ensure that increasing local revenues goes hand in hand with environmental protection and sustainable development. (Greim et al., 2025).

The research results show that mangrove ecosystems have a strategic role as a source of livelihood for local communities, particularly in the fisheries sector, coastal protection, and natural resource-based economic activities (L. Liu et al., 2026). Mangroves not only provide ecological benefits such as preventing abrasion and maintaining ecosystem balance, but also have significant economic value through fisheries, ecotourism, and other environmental services. The role of green accounting allows governments to measure environmental costs and benefits more accurately, integrate the economic value of ecosystems into regional financial reports, and assess the impact of policies on the environment and the economy simultaneously.

Study found that natural resource utilization can be carried out in a more sustainable manner. This means that economic activities continue and generate income, but do not damage the environment in the long term (Z. Liu et al., 2025). This is especially important in the context of mangroves, which are vulnerable to overexploitation (W. Liu et al., 2026). The results of this study also provide an empirical basis for formulating more effective policies. Local governments can use information generated from green accounting to evaluate policy impacts quantitatively and measurably, determine more targeted budget priorities, design regulations that support a balance between economic growth and environmental conservation. Optimizing local original revenues no longer depends on resource exploitation but on sustainable management based on environmental economic value (Yu, 2026). This green economic approach has been proven to improve the quality of public policy, strengthen regional economic resilience, and maintain the sustainability of mangrove ecosystems as long-term assets (Wu et al., 2025).

The Influence of Green Accounting on Locally-generated revenue

The results of the study indicate that green accounting has a positive and significant impact on Regional Original Revenue. This finding indicates that the better the implementation of green accounting in regional financial management, the greater the ability of local governments to increase revenue derived from the sustainable management of local resources. This positive impact indicates that integrating environmental aspects into financial accounting and reporting systems not only provides ecological benefits but also generates tangible economic benefits for local governments (Storm & Filatova, 2026).

This finding aligns with research by (Lopes et al., 2026) which states that implementing green accounting can improve organizational financial performance through more efficient and sustainable resource management. This research also supports the findings of (Yang & Cui, 2026) who explain that green accounting helps organizations identify previously unrecorded environmental costs, thus enabling more effective economic decision-making. Furthermore, research by (Wu et al., 2025) shows that the transparency and accountability generated by the implementation of environmental accounting can increase public trust in the government, ultimately resulting in increased regional revenue. The mechanism by which green accounting influences local resource revenue can be explained through several pathways. First, green accounting enables local governments to identify and measure the environmental costs arising from economic activities.

This information helps the government design more efficient natural resource utilization policies, thereby reducing environmental damage and lowering future rehabilitation costs. This efficiency creates greater fiscal space to support regional revenue-boosting programs. Green accounting increases transparency in natural resource and environmental management. When the public and investors receive clear information about the use of environmental budgets and the conservation results achieved, trust in local governments increases. This increased trust can encourage taxpayer compliance, increase community participation in regional development, and attract sustainability-oriented investment. Ultimately, this contributes to increased regional revenue through local taxes, levies, and the emergence of new economic activities. Green accounting supports the sustainable use of local resources. In the context of coastal areas and mangrove forests, for example, recording the economic value of the environment allows local governments to understand the contribution of mangrove ecosystems to fisheries, tourism, coastal protection, and carbon sequestration.

this information can be used as a basis for policymaking to develop mangrove ecotourism, environmental services, and sustainable fisheries businesses that can generate new revenue sources for the region without damaging the ecosystem. The implementation of green accounting promotes efficient use of regional budgets. Through systematic disclosure of environmental costs, the government can evaluate ineffective programs and reallocate resources to sectors with greater economic and environmental benefits. This efficiency improves the quality of regional spending, resulting in a higher economic impact on local revenue growth. The results of this study strengthen the argument that green accounting functions not only as an environmental reporting instrument but also as a governance mechanism capable of increasing local resource revenues through increased transparency, efficient natural resource management, strengthened public trust, and the development of sustainable economic activities. These findings imply that regional governments need to integrate green accounting principles into their regional financial management systems to simultaneously achieve economic development and environmental conservation goals.

Environmentally based financial management can improve the efficiency of regional budget use, contributing to the optimization of local revenue sources, especially from the environmental tourism sector and sustainable natural resource management (Wu et al., 2025). The implementation of green accounting encourages local governments to allocate budgets more precisely to activities that support environmental conservation (Z. Liu et al., 2025). As a result, regions are able to create new revenue sources from ecotourism and environmental services, which contribute directly to local revenue. The integration of environmental aspects into the regional accounting system can improve the quality of financial reports and fiscal policy making (W. Liu et al., 2026). This environmentally based policy has been proven to increase the attractiveness of investment and local economic activity, which leads to an increase in local revenue. *Green accounting* has a positive influence on local revenue through increased transparency, budget efficiency, development of environmentally based economic potential, and increased public and investor trust in regional financial management (Yu, 2026).

The Influence of Green Fiscal Policy on Locally-generated revenue

Green fiscal policy influences local revenue, and green policy has a positive impact on local revenue through government financial policies aimed at supporting environmental conservation through environmentally friendly tax, budget, and economic management. Green fiscal policy is used to create a balance between economic growth and environmental protection so that development can proceed sustainably, creating new sources of revenue for the region. Its implementation, green fiscal policy can be carried out through providing incentives for environmentally friendly businesses, allocating budgets for nature conservation and sustainable resource management. Green fiscal policy helps the government improve public welfare without damaging the environment, changing business behavior to be more environmentally friendly, and strengthening the regional economic base based on sustainability (L. Liu et al., 2026). Green fiscal policy not only increases revenue but directs economic activities to be more sustainable, having an indirect effect on local revenue (Storm & Filatova, 2026).

Research results confirm that environmental investment improves ecosystem quality, creating new economic potential (ecotourism, sustainable fisheries). Locally generated revenue increases through derivative economic activities from green spending, a *long-term investment* capable of expanding local revenue sources. Research related to ecological fiscal transfers shows that regions that maintain environmental sustainability receive fiscal incentives from the central government, regions are encouraged to maintain conservation areas, there is an increase in local revenue through transfer funds, and environmental performance becomes an indicator in budget distribution (Zhuang et al., 2026). This proves that green fiscal policy can increase local revenue through intergovernmental incentive mechanisms (Wang et al., 2025).

Integration of green fiscal policy with natural resource management is able to optimize local revenue sustainably, controlled utilization of natural resources increases economic value, the risk of environmental damage can be suppressed, local revenue increases without sacrificing sustainability (Iddrisu & Thill, 2026). Management of mangrove ecosystems, where fiscal policy supports the development of ecotourism and environmental services as a new source of local revenue (Zhuang et al., 2025). Increased green tax and levy revenues, effectiveness of environmentally based regional spending, fiscal incentives based on ecological performance, optimization of natural resources sustainably, green fiscal policy not only increases local revenue, but also ensures long-term environmental sustainability (Asrofi et al., 2026).

The Influence of Regional Original Income on Mangrove Conservation

Research findings confirm the policy that increasing local revenue provides greater fiscal capacity for local governments to finance mangrove conservation programs. As local revenue increases, budget allocations for mangrove rehabilitation, coastal protection, and environmental monitoring tend to increase (Ahunoabobirim et al., 2025). Regions with high local revenue have relatively better mangrove conditions than regions with fiscal constraints.

Another study found that local revenues derived from mangrove ecotourism have a reciprocal relationship with environmental conservation (Nutan et al., 2025). The findings showed that the better the condition of the mangroves, the higher the number of tourist visits. Increased tourism increases local revenues that are reused for conservation (Thapa et al., 2026). This creates *a positive cycle* between the regional economy and environmental conservation. (Ekonomi et al., 2024)Research shows that the amount of local revenue affects the quality of regional environmental policies (Firmino et al., 2026). Regions with strong local revenues tend to have stricter environmental regulations, are able to carry out more effective supervision, provide infrastructure to support conservation. Conversely, regions with low local revenues tend to focus more on resource exploitation to increase income, which risks damaging mangroves (Bakhshi et al., 2025).

Previous research has found that local revenue influences community empowerment programs in mangrove conservation (Firmino et al., 2026). As a result, local revenue is used for training coastal communities, encouraging mangrove-based businesses (sustainable fisheries, processed products), and reducing destructive activities such as illegal logging. Thus, local revenue plays a role in creating public awareness and participation in mangrove conservation (Kyrimlidou et al., 2026).

The results of this study provide important implications that local revenue contributes to the achievement of sustainable development, including mangrove conservation (Elkadeem et al., 2025). The findings indicate that well-managed local revenue supports economic and environmental balance, regional investment can be directed

towards green projects, and mangroves are maintained as long-term economic assets (Sribianti & Khair, 2025). This confirms that local revenue not only serves as a source of income but also as an instrument for maintaining ecosystem sustainability. The results of this study have important implications for local revenue stakeholders involved in local revenue for mangrove conservation especially for the community and local government in order to increasing conservation financing capacity (Greim et al., 2025). Specifically, this study proves that encouraging the development of mangrove ecotourism through the dimensions of strengthening environmental policies and supervision has an impact on the implementation of local revenue to support the empowerment of coastal communities (Thapa et al., 2026). and support the empowerment of coastal communities**.** The more optimally local revenue is managed properly, the greater the chance of success in preserving the mangrove ecosystem (Ahunoabobirim et al., 2025).

Conclusion

This study aims to analyze the influence of Green Accounting and Green Fiscal Policy on local revenue and its implications for mangrove conservation and sustainable development. The results of panel data regression analysis indicate that Green Accounting has a positive and significant effect on local revenue. This finding suggests that the integration of green accounting and green fiscal policy in local financial management can improve local fiscal capacity, ultimately supporting mangrove conservation programs and achieving sustainable development. The contribution of this study lies in providing empirical evidence that environmental accounting instruments and environmentally-based fiscal policies not only improve local financial performance but also strengthen the success of coastal ecosystem conservation as part of a sustainable development strategy. Practically, the results indicate that local governments need to strengthen the application of Green Accounting in their budgeting, reporting, and environmental performance evaluation systems, as well as optimize Green Fiscal Policy through economic incentives, environmental taxes, and increased conservation budget allocations. These policies can improve the effectiveness of mangrove rehabilitation, strengthen coastal ecosystem resilience, and promote sustainable community welfare. This study has several limitations. First, the observation period is relatively limited, so it does not fully describe the long-term impact of environmental policies on sustainable development. Second, the study only used secondary data from local governments and did not include institutional factors, environmental governance quality, community participation, and the effectiveness of policy implementation, all of which could potentially influence mangrove conservation. Future research is recommended to expand the scope and observation period, and include more comprehensive variables on environmental governance, institutional quality, and mangrove ecological indicators. The use of longitudinal and mixed methods approaches can provide a deeper understanding of the relationship between Green Accounting, Green Fiscal Policy, mangrove conservation, and sustainable development.

Author contributions

Otniel Safkaur, the first author, was responsible for researching and strengthening the theoretical foundation and collecting relevant international journals. Aaron AM Simanjuntak was responsible for statistical processing and analyzing the research data. Orpa Momot, a student, contributed to the dissemination of instruments, inputting data tabulation, and assisting with data processing. All authors contributed to the development and preparation of the manuscript according to their respective duties.

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