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Strategies for Strengthening Coastal Environmental Governance to Support Marine Ecosystem Sustainability in Pancana Village, Tanete Rilau District, Barru Regency

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ABSTRACT

This study examines strategies for strengthening coastal environmental governance to support marine ecosystem sustainability in Pancana Village, Tanete Rilau District, Barru Regency, Indonesia. It focuses on multi-stakeholder coordination, community participation, institutional commitment, and the implementation of coastal environmental protection initiatives. A qualitative approach was used to explore governance dimensions reflected in interview data. The data were organized and analyzed thematically using NVivo, with coding structures and word-cloud visualizations used to identify recurring concepts and relationships among research themes. The analysis highlights several interconnected dimensions, including coordination and collaboration among village government, community leaders, communities; community involvement in coastal management; village government commitment; institutional and community factors; and strategies for strengthening environmental governance. The word-cloud visualization emphasizes terms associated with environmental protection, coastal management, community participation, governance, stakeholders, coordination, and ecosystem sustainability. These themes indicate that coastal environmental governance requires more than government initiatives. It depends on shared responsibilities, effective communication, institutional capacity, and sustained participation by local actors. The findings also point to the importance of integrated strategies, environmental monitoring, and collaboration in supporting the protection of coastal and marine resources. The study concludes that strengthening coastal environmental governance in Pancana Village requires a participatory and collaborative approach that connects institutional commitment with community engagement and continuous environmental management. It recommends improving coordination among stakeholders, expanding community-based conservation and waste management activities, strengthening institutional capacity, and conducting monitoring and evaluation. Further empirical assessment using measurable indicators of coastal environmental quality is needed to determine the outcomes of these governance strategies.

Keywords: Coastal Environmental Governance; Marine Ecosystem Sustainability.

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A.INTRODUCTION

Coastal areas and marine ecosystems are essential components of ecological systems that play a strategic role in supporting human life. Coastal ecosystems, including mangroves, seagrass beds, coral reefs, and coastal waters, provide various ecological, economic, and social benefits. These include serving as habitats for marine biodiversity, providing natural protection against coastal erosion, supplying food resources, and supporting the livelihoods of coastal communities. Furthermore, coastal areas contribute significantly to fisheries, aquaculture, tourism, and other local economic activities. Therefore, marine ecosystem sustainability is not solely concerned with biodiversity conservation but is also closely associated with community welfare and sustainable regional development. From a social-ecological systems perspective, the sustainable management of natural resources is strongly influenced by the interactions among ecosystem conditions, institutions, regulations, and the behavior of communities that utilize these resources (Ostrom, 2009).

At the global level, marine ecosystem sustainability faces numerous threats, particularly marine pollution, increasing plastic waste, overexploitation of fisheries resources, coastal habitat degradation, and climate change. The United Nations Environment Programme (UNEP, 2021) highlights that plastic constitutes one of the most dominant and persistent components of marine litter, posing significant risks to marine organisms, ecosystem balance, and human health. These challenges demonstrate that marine ecosystem protection requires integrated actions that extend beyond environmental restoration to include pollution prevention and changes in community behavior. Global commitments to addressing these challenges are reflected in the Sustainable Development Goals (SDGs), particularly Goal 14, known as Life Below Water, which emphasizes the conservation and sustainable use of oceans, seas, and marine resources. Specifically, SDG Target 14.1 focuses on reducing marine pollution, while Target 14.2 emphasizes the protection and sustainable management of marine and coastal ecosystems (United Nations, 2015; United Nations Department of Economic and Social Affairs [UN DESA], n.d.).

In Indonesia, coastal management is strategically important because coastal areas serve as living spaces for fishing communities, aquaculture practitioners, and various other economic activities. The Indonesian government has established a legal framework for coastal management

through Law No. 27 of 2007, as amended by Law No. 1 of 2014 concerning the Management of Coastal Areas and Small Islands. This regulation emphasizes the importance of integrated planning, utilization, supervision, and control of coastal resources (Republic of Indonesia, 2014). One region with significant coastal characteristics is Barru Regency, South Sulawesi, which has approximately 78 kilometers of coastline and considerable maritime and fisheries potential (Barru Regency Government, n.d.). Specifically, Pancana Village, located in Tanete Rilau District, is a coastal village situated along the Makassar Strait. These geographical characteristics make the coastal environment an important component of the local community's social and economic life (Ministry of Population and Family Development/National Population and Family Planning Board, n.d.).

Despite its coastal and marine resource potential, environmental sustainability in coastal areas cannot be separated from local management and governance challenges. Issues requiring attention include waste and wastewater management that may contribute to water pollution, pressure from settlement activities and coastal resource utilization, limited environmental monitoring, and suboptimal community participation in environmental protection initiatives. Research by Suryadi et al. (2026) in Tanete Rilau District, Barru Regency, identified environmental pressures associated with anthropogenic activities, including settlements, aquaculture ponds, and coastal development. The study also found variations in macrozoobenthos diversity across observation sites, indicating differences in aquatic environmental conditions. These findings demonstrate the importance of addressing coastal ecosystem conditions in the Tanete Rilau area. However, environmental challenges cannot be adequately addressed through ecological approaches alone. Strengthening institutional capacity, inter-organizational coordination, community participation, and monitoring mechanisms is also necessary to ensure the sustainability of environmental protection initiatives. In this regard, adaptive and collaborative governance is essential for connecting local knowledge, government policies, and community actions (Berkes, 2009).

Several previous studies have examined coastal resource potential and management in Pancana Village and the wider Barru Regency area. Kaseng et al. (2019), for example, investigated the diversification of marine fishery product processing in Pancana Village and highlighted the considerable potential of fisheries resources to improve the economic value of local communities.

Meanwhile, Nahriana et al. (2019) examined community empowerment through the development and processing of coastal resources, particularly by improving skills and diversifying marine-based products. These studies provide insights into the importance of coastal economic potential and community empowerment; however, they do not specifically position environmental governance as their primary analytical focus. At the national level, Mursyid et al. (2021) identified various governance challenges in the management and conservation of mangrove ecosystems in Indonesia, including institutional and policy coordination issues. Furthermore, Triyanti et al. (2026) emphasized that institutional fragmentation and increasing climate risks can undermine the effectiveness of coastal ecosystem governance, highlighting the need for adaptive approaches that integrate inter-institutional coordination and community capacity.

From a public administration perspective, coastal environmental management is a governance issue involving interactions among government institutions, communities, the private sector, and other relevant stakeholders. The government plays not only a regulatory role but also acts as a facilitator, coordinator, supervisor, and promoter of community participation in environmental protection. Effective coastal resource management requires a clear distribution of roles and responsibilities, information transparency, coordination mechanisms, and decision-making processes that consider both ecological and socioeconomic interests. Mursyid et al. (2021) demonstrate that institutional and governance issues are important aspects of mangrove ecosystem management and conservation in Indonesia. Similarly, the adaptive governance approach emphasizes the ability of institutions to adjust management policies and actions in response to changing environmental conditions, social dynamics, and uncertainties affecting coastal communities (Triyanti et al., 2026). Therefore, strengthening coastal environmental governance should focus on developing a management system that is participatory, collaborative, adaptive, and oriented toward ecosystem sustainability.

Based on the review of previous studies, several research areas remain open for further investigation, particularly concerning the relationship between village government capacity, community participation, institutional coordination, and marine ecosystem sustainability within the context of coastal environmental governance. Kaseng et al. (2019) and Nahriana et al. (2019) primarily focused on the utilization of marine resource potential and the economic empowerment of communities in Pancana Village. Meanwhile, Mursyid et al. (2021) and Triyanti et al. (2026)

addressed institutional and governance challenges in coastal ecosystem management at a broader scale. Suryadi et al. (2026), on the other hand, focused on the ecological conditions of aquatic environments through macrozoobenthos diversity indicators in Tanete Rilau District. Although these studies provide valuable contributions, further investigation is needed to integrate village government institutions, multi-stakeholder collaboration, community participation, and coastal environmental protection strategies specifically within the context of Pancana Village. Accordingly, this study seeks to address this research gap by examining coastal environmental management through an environmental governance perspective within the field of public administration.

The novelty of this study lies in developing a coastal environmental governance strengthening perspective that integrates the roles of village government, community participation, stakeholder coordination, and environmental monitoring within a unified analytical framework. Rather than viewing marine ecosystem sustainability solely as an ecological issue, this study conceptualizes it as a public governance challenge requiring institutional capacity, responsive policies, and community collaboration. The proposed strengthening of coastal environmental governance focuses on several key dimensions: institutional capacity building, enhanced community participation, multi-stakeholder collaboration, stronger environmental monitoring and regulatory enforcement, and improved environmental education and awareness. Through this approach, the study is expected to develop a contextual strategy framework for strengthening coastal environmental governance that reflects the social, economic, and institutional characteristics of the Pancana Village community. Thus, the study's contribution extends beyond its geographical research setting by connecting public administration perspectives with marine ecosystem sustainability and the achievement of SDG 14.

Based on the discussion above, this study aims to analyze strategies for strengthening coastal environmental governance to support marine ecosystem sustainability in Pancana Village, Barru Regency. Specifically, it seeks to identify the existing conditions of coastal environmental governance, analyze the roles of village government and local communities in marine ecosystem protection, identify supporting and inhibiting factors in environmental management, and formulate strategies for strengthening participatory and collaborative governance. Theoretically, this study is expected to contribute to the development of public administration scholarship, particularly in

the areas of environmental governance and collaborative governance. Practically, its findings are expected to provide recommendations for village governments, regional governments, and other stakeholders in designing more integrated, responsive, and sustainable coastal environmental management policies and programs.

B.RESEARCH METHOD

This study employed a qualitative descriptive approach to analyze strategies for strengthening coastal environmental governance in supporting marine ecosystem sustainability in Pancana Village, Barru Regency, South Sulawesi, Indonesia. A qualitative approach was selected because it enables an in-depth examination of governance processes, institutional roles, community participation, stakeholder collaboration, and the factors influencing coastal environmental management. The study was conducted in Pancana Village, Tanete Rilau District, Barru Regency, considering its coastal characteristics and the importance of marine resources to the livelihoods of the local community. Research informants were selected purposively based on their knowledge, experience, and involvement in coastal environmental management. They included village government officials, community leaders, local community members, fishermen, and other relevant stakeholders. Primary data were collected through in-depth interviews and field observations, while secondary data were obtained from village documents, government regulations, policy reports, and relevant scientific publications.

Data collection was conducted through semi-structured interviews, direct observations, and documentation. Interviews focused on several key aspects, including the role and capacity of village government in coastal environmental management, community participation in environmental protection, coordination among relevant stakeholders, environmental monitoring mechanisms, and supporting and inhibiting factors affecting marine ecosystem sustainability. Observations were undertaken to examine the actual conditions of the coastal environment and community activities related to coastal resource utilization and environmental protection. Documentation was used to complement and verify information obtained from interviews and observations. The collected data were organized and analyzed using an interactive qualitative data analysis model consisting of data condensation, data display, and conclusion drawing and verification (Miles et al., 2014). This process involved identifying relevant information, grouping

data into thematic categories, examining relationships among emerging themes, and interpreting findings in accordance with the research objectives.

To ensure the credibility of the research findings, data triangulation was applied by comparing information obtained from different informants, data collection techniques, and documentary sources. The analysis focused on five main dimensions of coastal environmental governance: institutional capacity, community participation, stakeholder collaboration, environmental monitoring and regulatory enforcement, and environmental education and awareness. These dimensions were used to identify governance strengths, institutional challenges, and opportunities for improving coastal environmental management in Pancana Village. The findings were subsequently interpreted to formulate strategies for strengthening coastal environmental governance in support of marine ecosystem sustainability. The proposed strategies were developed by considering the local institutional context, community needs, stakeholder roles, and the principles of sustainable coastal resource management.

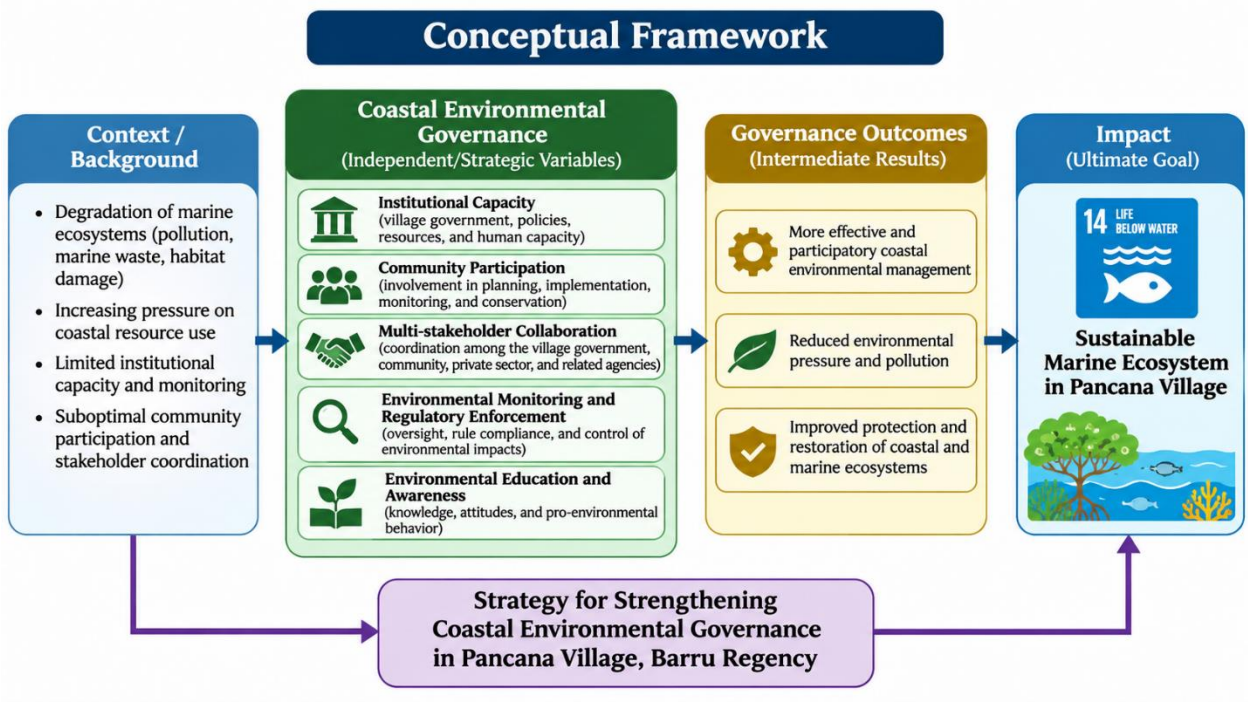


Figure 1 Conceptual Framework for Strengthening Coastal Environmental Governance to Support Marine Ecosystem Sustainability in Pancana Village, Barru Regency

Figure 1 illustrates the conceptual framework of this study, which explains the relationship between coastal environmental challenges, governance strategies, and marine ecosystem sustainability in Pancana Village, Barru Regency. The framework begins with the existing coastal environmental conditions, including marine ecosystem degradation, pollution, increasing pressure on coastal resources, limited institutional capacity, and suboptimal community participation. These challenges require strengthening coastal environmental governance through five strategic dimensions: institutional capacity, community participation, multi-stakeholder collaboration, environmental monitoring and regulatory enforcement, and environmental education and awareness. The implementation of these dimensions is expected to produce more effective and participatory coastal environmental management, reduce environmental pressure and pollution, and improve the protection and restoration of coastal and marine ecosystems. Ultimately, these interconnected processes are expected to support marine ecosystem sustainability in Pancana Village and contribute to the achievement of Sustainable Development Goal 14 (Life Below Water).

C.RESEARCH RESULTS AND DISCUSSION

- Results

This study involved three informants who were selected purposively based on their institutional positions and involvement in village governance and community affairs in Pancana Village, Barru Regency. The informants consisted of Arfan Amir, a staff member of the Pancana Village Government; Sudirman, the Head of Pancana Hamlet; and Muhammad Asse, the Head of the Neighborhood Association (RT) in Pancana Village. These informants were considered relevant to the research because they represent different levels of local governance, ranging from village administration to hamlet and neighborhood leadership. Their perspectives are expected to provide insights into institutional capacity, community participation, stakeholder coordination, environmental monitoring, and strategies for strengthening coastal environmental governance.

Institutional capacity is an important factor in determining the effectiveness of coastal environmental management at the village level. In this study, the role of the Pancana Village Government is examined through the perspectives of Arfan Amir as a village government staff

member, Sudirman as the Head of Pancana Hamlet, and Muhammad Asse as the Head of the Neighborhood Association. The analysis focuses on the availability of institutional regulations, the division of responsibilities, human resources, and the village government's ability to develop environmental protection initiatives. Interview findings should identify the extent to which village institutions have incorporated coastal environmental protection into their administrative activities and development priorities. This dimension is essential for understanding whether existing institutional arrangements are adequate to support sustainable coastal management.

The village government plays a strategic role in facilitating environmental protection through policy formulation, program implementation, coordination, and community engagement. Arfan Amir's perspective is particularly relevant for examining the administrative and institutional dimensions of coastal environmental management. Meanwhile, the perspectives of Sudirman and Muhammad Asse can provide information about how village-level policies and programs are communicated and implemented within local communities. The research examines the existence of village initiatives related to environmental cleanliness, waste management, coastal protection, and public awareness. The findings in this section should explain the actual programs implemented, their implementation mechanisms, and the extent to which environmental protection has become part of village governance priorities.

Community participation is a fundamental element of sustainable coastal environmental governance because local residents are directly involved in utilizing and interacting with coastal resources. This study examines community involvement in environmental planning, implementation of environmental activities, monitoring, and conservation initiatives. The roles of the hamlet head and neighborhood association leader are important in understanding how community participation is mobilized at the grassroots level. In particular, the research explores whether residents participate in activities such as coastal clean-up campaigns, waste management, environmental education, and collective environmental protection initiatives. Interview evidence from the three informants should be used to identify the forms of participation, community motivation, and factors that encourage or constrain public involvement.

Strengthening coastal environmental governance requires collaboration among village government institutions, community leaders, residents, and relevant government agencies.

Coordination is necessary to ensure that environmental management programs are implemented consistently and that responsibilities are distributed effectively among stakeholders. This study examines the coordination mechanisms involving the Pancana Village Government, hamlet leadership, neighborhood associations, and other relevant parties. Arfan Amir's account can help explain institutional coordination, while Sudirman and Muhammad Asse can provide perspectives on communication and cooperation at the community level. The findings should identify whether collaboration is conducted through formal meetings, community consultations, joint activities, or other coordination mechanisms, as well as the challenges encountered in maintaining such cooperation.

Environmental monitoring is necessary to identify potential environmental problems and ensure compliance with applicable regulations. At the village level, monitoring may involve observing waste disposal practices, identifying activities that potentially damage coastal ecosystems, and communicating environmental concerns to the relevant authorities. This research examines the monitoring responsibilities of village officials, hamlet leaders, and neighborhood representatives in relation to coastal environmental protection. Particular attention is given to the availability of reporting mechanisms, the frequency of monitoring activities, and the response to environmental complaints. Information from the three informants will help clarify whether existing monitoring arrangements are sufficiently coordinated and whether village institutions have the authority and resources required to address environmental problems.

Environmental education and public awareness are important instruments for encouraging responsible behavior toward coastal and marine ecosystems. Community understanding of the impacts of marine pollution, improper waste disposal, and unsustainable coastal resource utilization can influence the effectiveness of environmental protection initiatives. This study investigates the role of village institutions and community leaders in communicating environmental information and encouraging environmentally responsible practices. The perspectives of Sudirman and Muhammad Asse are particularly relevant for examining how environmental messages are conveyed to residents at the hamlet and neighborhood levels. The analysis should identify existing educational activities, communication channels, community responses, and opportunities to strengthen environmental awareness through continuous socialization and community-based initiatives.

The effectiveness of coastal environmental governance is influenced by several supporting and inhibiting factors. Potential supporting factors include the commitment of village government officials, community leadership, local cooperation, public awareness, and support from relevant government agencies. Meanwhile, potential obstacles may include limited financial resources, inadequate institutional capacity, insufficient environmental facilities, weak coordination, and varying levels of community participation. Through interviews with Arfan Amir, Sudirman, and Muhammad Asse, this study seeks to identify the actual factors influencing environmental management in Pancana Village. The analysis should distinguish between institutional, social, economic, and technical factors to provide a comprehensive understanding of the conditions affecting coastal environmental governance.

Based on the analytical dimensions of this study, strengthening coastal environmental governance requires an integrated strategy involving institutional improvement, community empowerment, stakeholder collaboration, environmental monitoring, and public education. Institutional improvement can be directed toward clarifying the responsibilities of village government institutions and incorporating environmental protection into village development planning. Community empowerment can be developed through regular environmental activities and increased involvement of residents in decision-making and implementation. Furthermore, stakeholder collaboration needs to be strengthened through communication and coordination with relevant agencies and community organizations. These strategic directions should be validated against the actual interview findings to determine which interventions are most appropriate for the institutional and social conditions of Pancana Village.

The strengthening of coastal environmental governance is expected to contribute to marine ecosystem sustainability through more effective institutional arrangements and meaningful community involvement. The integration of village government capacity, community participation, stakeholder collaboration, environmental monitoring, and environmental education provides a governance framework for addressing coastal environmental challenges. The three informants offer complementary institutional perspectives that can help identify opportunities for improving local environmental management. The findings of this study are expected to support the development of coastal governance strategies that are responsive to local needs and consistent with Sustainable Development Goal 14 (Life Below Water). Ultimately, the research seeks to

formulate practical recommendations for improving the role of village institutions and communities in protecting coastal environments and sustaining marine resources in Pancana Village, Barru Regency.

- Data Analysis Using NVivo

Data analysis in this study was conducted using a qualitative approach supported by NVivo 12 Pro software. The utilization of NVivo was intended to assist the researcher in managing, organizing, coding, and systematically analyzing qualitative data related to strategies for strengthening coastal environmental governance to support marine ecosystem sustainability in Pancana Village, Barru Regency. The primary data were obtained through in-depth interviews with three key informants, namely Arfan Amir, a staff member of the Pancana Village Government; Sudirman, the Head of Pancana Hamlet; and Muhammad Asse, the Head of the Neighborhood Association (Rukun Tetangga or RT) in Pancana Village. These informants were selected purposively based on their institutional positions and involvement in local governance and community affairs. Their perspectives were expected to provide insights into institutional capacity, the role of village government, community participation, stakeholder collaboration, environmental monitoring, and coastal environmental protection. In addition, interview data were complemented by field observations and documentary evidence, including village administrative documents, environmental management records, relevant government regulations, and policy documents concerning coastal and marine resource management. The application of NVivo enabled the researcher to systematically organize qualitative data, identify recurring patterns, and explore relationships among emerging concepts. Through this process, several key themes were identified, including institutional capacity, village government responsibilities, community participation, stakeholder collaboration, environmental monitoring and regulatory enforcement, environmental education, supporting and inhibiting factors, and strategies for strengthening coastal environmental governance.

Through NVivo, the analysis was organized using three coding stages: open coding, axial coding, and selective coding. During the open coding stage, the researcher identified initial concepts emerging from interview transcripts, field observations, and supporting documents. Several preliminary codes were developed, including village government institutional capacity,

environmental policies and regulations, distribution of institutional responsibilities, human resource availability, coastal environmental management programs, community involvement, public awareness, stakeholder coordination, environmental monitoring, waste management, coastal pollution, environmental education, and marine ecosystem protection. These initial codes reflected the institutional, administrative, social, and ecological dimensions of coastal environmental governance in Pancana Village. The coding process also enabled the researcher to examine different perspectives among the village government staff, hamlet leadership, and neighborhood association leadership regarding the implementation of environmental management initiatives and community involvement in protecting coastal resources. By organizing interview statements into relevant coding categories, the researcher could identify similarities and differences in the informants' experiences, institutional responsibilities, and perceptions of coastal environmental management.

The second stage involved axial coding, in which related concepts were connected and grouped into broader thematic categories. The identified categories included institutional capacity and village government roles, community participation in coastal environmental management, multi-stakeholder collaboration and institutional coordination, environmental monitoring and regulatory enforcement, environmental education and public awareness, and supporting and inhibiting factors. This stage facilitated a deeper understanding of how institutional arrangements, local leadership, and community engagement influence the effectiveness of coastal environmental governance in Pancana Village. Finally, selective coding was employed to identify the central theme integrating all major categories, namely strategies for strengthening coastal environmental governance through institutional capacity building, participatory management, stakeholder collaboration, environmental monitoring, and community empowerment to support marine ecosystem sustainability. The analytical framework was designed to examine the relationships between local institutional capacity, governance practices, community participation, and environmental protection outcomes. The findings were interpreted by comparing information obtained from the three informants and examining its consistency with observational and documentary evidence. Therefore, the use of NVivo not only facilitated the systematic organization and interpretation of qualitative data but also supported analytical transparency,

methodological rigor, and the development of an evidence-based understanding of strategies for strengthening coastal environmental governance in Pancana Village, Barru Regency.

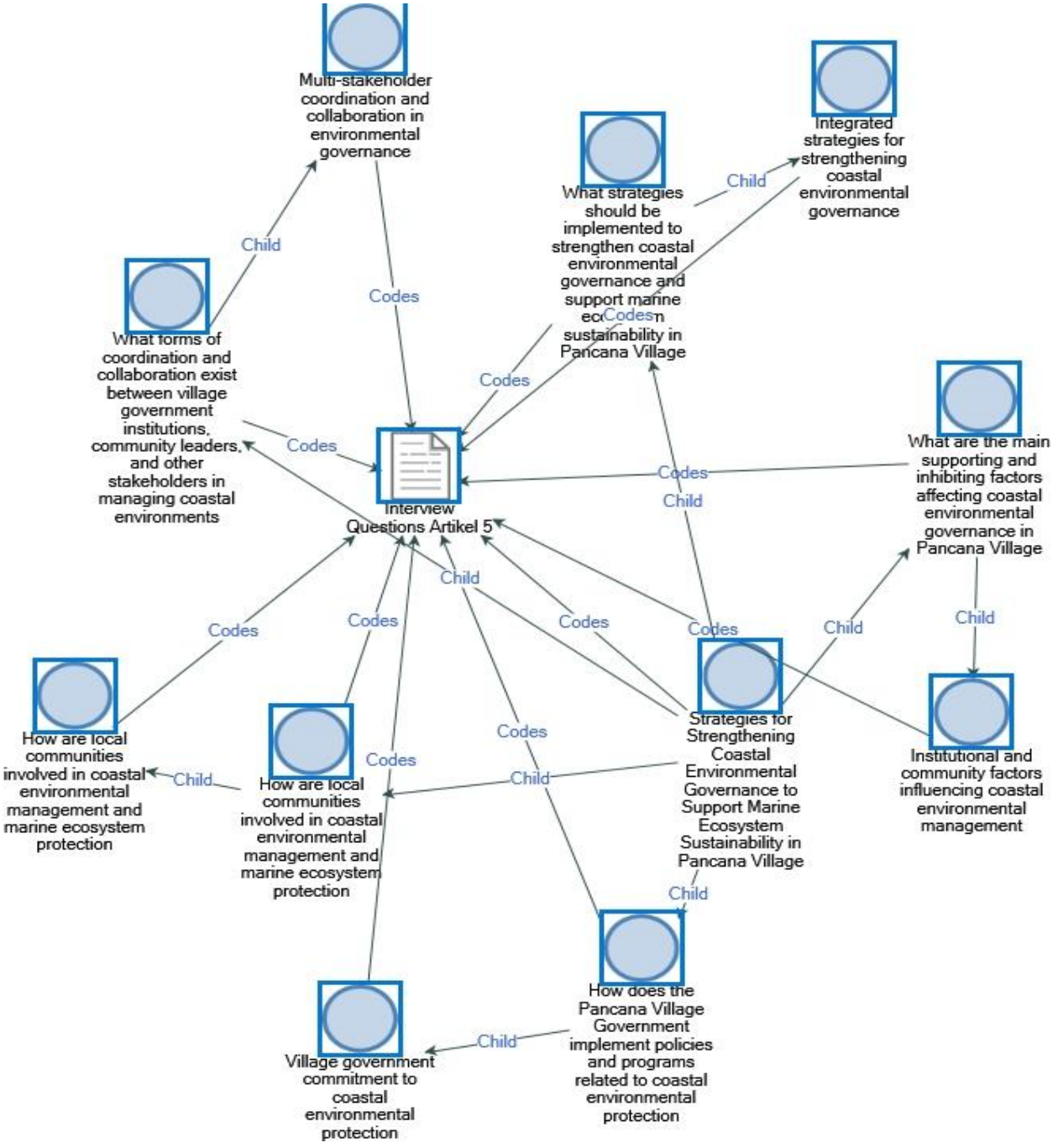


Figure 2 NVivo Coding Structure of Strategies for Strengthening Coastal Environmental Governance and Supporting Marine Ecosystem Sustainability in Pancana Village

Figure 2 illustrates the NVivo coding structure developed to analyze strategies for strengthening coastal environmental governance and supporting marine ecosystem sustainability in Pancana Village. The diagram presents several interconnected research dimensions, including forms of coordination and collaboration among village governments, community leaders, and other stakeholders; community involvement in coastal environmental management; village government commitment to environmental protection; and the implementation of policies and programs related to coastal conservation. These dimensions are connected to the central interview document, indicating how information obtained from interviews was organized into research questions and thematic codes. The structure demonstrates that coastal environmental governance involves multiple actors and institutional responsibilities rather than depending solely on village government initiatives.

Furthermore, the coding structure identifies multi-stakeholder coordination, institutional and community factors, supporting and inhibiting factors, and integrated strategies as important analytical themes. These themes provide a basis for understanding how institutional commitment, community participation, and collaboration influence coastal environmental management and marine ecosystem protection. The diagram also highlights the relationship between existing governance practices and proposed strategies for strengthening environmental sustainability in Pancana Village. The connections labeled Child and Codes represent hierarchical relationships between research questions, thematic categories, and coded interview data. Overall, this NVivo visualization provides an analytical foundation for examining the role of village government, local communities, and other stakeholders in developing collaborative, integrated, and sustainable coastal environmental governance.



Figure 3 NVivo Word Cloud of Interview Data on Coastal Environmental Governance and Marine Ecosystem Sustainability in Pancana Village

Figure 3 presents a word cloud generated through NVivo analysis of interview data concerning coastal environmental governance and marine ecosystem sustainability in Pancana Village. The visualization displays frequently occurring words and concepts, with larger words representing terms that appear more frequently in the analyzed interview data. The most prominent terms include environmental, coastal, village, community, governance, protection, and ecosystem. These terms reflect the central focus of the research, particularly the relationship between environmental protection, coastal management, community participation, and village governance. The prominence of these concepts indicates that coastal environmental management is closely associated with the involvement of local institutions and communities in maintaining the sustainability of marine and coastal resources.

Furthermore, the word cloud identifies other relevant themes, including stakeholders, participation, coordination, collaboration, government, commitment, monitoring, and policies. These concepts suggest that strengthening coastal environmental governance requires cooperation among village governments, community members, local institutions, and other stakeholders. The appearance of terms related to facilities, capacity, implementation, and support also highlights the importance of institutional resources and implementation capacity in environmental management. Overall, the visualization provides an overview of the dominant vocabulary emerging from the interviews and supports the thematic analysis of multi-stakeholder collaboration, community engagement, institutional commitment, and environmental protection. However, word frequency alone does not establish the relative importance or causal influence of each theme, so the findings need to be interpreted alongside interview narratives and other research evidence.

➢ DISCUSSION

The findings illustrate that strengthening coastal environmental governance in Pancana Village requires an integrated approach involving village government, local communities, community leaders, and other relevant stakeholders. The NVivo coding structure in Figure 2 identifies multi-stakeholder coordination and collaboration as important dimensions of coastal environmental governance. Meanwhile, the word cloud in Figure 3 highlights prominent concepts such as environmental, coastal, community, governance, protection, and ecosystem. These themes indicate that coastal environmental management is not solely the responsibility of village government but requires collective action among institutions and community members. Effective coordination is necessary to establish shared responsibilities, improve communication, and align environmental protection activities with local needs. Ostrom (1990) emphasizes that sustainable management of shared resources depends on collective-action arrangements, clear institutional rules, and the participation of resource users. In this context, strengthening coastal governance in Pancana Village requires institutional arrangements that encourage cooperation and shared responsibility for protecting coastal and marine resources.

Community participation also represents a fundamental element in maintaining coastal environmental quality and supporting marine ecosystem sustainability. The NVivo analysis identifies community involvement, stakeholder participation, environmental protection, and

collective action as relevant themes in the research framework. These themes suggest that local communities should not be positioned merely as recipients of government environmental programs but as active participants in planning, implementation, monitoring, and evaluation. Community involvement can take practical forms, including coastal clean-up activities, waste management, environmental education, monitoring of coastal conditions, and reporting activities that may damage marine ecosystems. Berkes (2009) explains that community-based conservation and resource management can contribute to sustainability when local knowledge, institutional arrangements, and cooperation are integrated into environmental governance. Therefore, the involvement of residents in Pancana Village needs to be supported by opportunities to participate in decision-making and by strengthening their capacity to manage coastal resources. Such participation can improve local ownership of environmental programs and strengthen the continuity of conservation initiatives.

The institutional and community factors identified in Figure 2 further demonstrate that coastal environmental governance depends on the capacity of local institutions to coordinate environmental protection activities. The themes of village government commitment, institutional support, multi-stakeholder collaboration, and integrated strategies indicate the importance of establishing clear responsibilities among stakeholders. Village governments can provide policy direction, facilitate environmental programs, mobilize resources, and coordinate cooperation with relevant institutions. Community leaders and residents can contribute local knowledge, participate in conservation activities, and support environmental monitoring. However, collaboration may be constrained by limited facilities, financial resources, institutional capacity, and inconsistent participation. Asio et al. (2025), in their systematic review of collaborative governance in marine and coastal management, emphasize the importance of coordination across governance levels, stakeholder engagement, trust, and shared decision-making.This perspective reinforces the need for Pancana Village to develop institutional arrangements that enable government and non-government actors to work together in addressing coastal environmental challenges. Thus, strengthening coastal governance requires not only formal government commitment but also sustained collaboration and shared responsibility among local stakeholders.

Furthermore, strengthening coastal environmental governance requires continuous monitoring, evaluation, and adaptive strategies to ensure that environmental programs respond to

changing local conditions. The themes of environmental protection, monitoring, institutional commitment, and integrated strategies in the NVivo analysis indicate the importance of connecting policy implementation with measurable environmental activities. The Pancana Village Government can strengthen this process by developing regular coastal monitoring, organizing community-based environmental activities, improving waste management, and evaluating the implementation of conservation programs. These activities should be supported by clear performance indicators, such as community participation, frequency of environmental monitoring, waste management activities, and the continuity of stakeholder collaboration. Berkes (2009) explains that adaptive co-management depends on knowledge sharing, institutional collaboration, and social learning, which enable stakeholders to respond to environmental challenges through continuous evaluation and adjustment.Similarly, Ostrom (1990) emphasizes the importance of collective-action institutions and locally appropriate rules in managing shared natural resources sustainably.Accordingly, coastal environmental governance in Pancana Village should be developed through an adaptive and participatory approach that integrates institutional coordination, community knowledge, environmental monitoring, and collective responsibility for protecting coastal and marine ecosystems.

D. CONCLUSION AND RECOMMENDATIONS

- Conclusion

This study concludes that strengthening coastal environmental governance in Pancana Village, Tanete Rilau District, Barru Regency, requires an integrated approach involving village government, local communities, community leaders, and other relevant stakeholders. The NVivo analysis identifies several important dimensions, including multi-stakeholder coordination, institutional collaboration, community participation, village government commitment, and environmental protection. These findings indicate that coastal environmental management cannot rely solely on government initiatives but requires collective action and shared responsibility among stakeholders. Community involvement in environmental management, coastal conservation, waste management, and ecosystem protection is essential to supporting the sustainability of coastal and marine resources.

Furthermore, the effectiveness of coastal environmental governance is influenced by institutional capacity, resource availability, stakeholder coordination, and the continuity of environmental programs. Strengthening governance requires clear institutional responsibilities, effective communication, active community participation, and regular environmental monitoring. Collaboration between village government, community organizations, and other relevant institutions can improve the implementation of coastal protection policies and strengthen local capacity to address environmental challenges. Therefore, sustainable coastal environmental management in Pancana Village depends on the integration of institutional commitment, participatory governance, and adaptive environmental management strategies.

- Recommendations

The Pancana Village Government should strengthen multi-stakeholder coordination by establishing more structured cooperation with local communities, community leaders, environmental organizations, and relevant government institutions. Community participation should be expanded through environmental education, coastal clean-up activities, waste management initiatives, and community-based monitoring of coastal conditions. Furthermore, institutional capacity should be improved through technical training, adequate facilities, and sustainable financial support for environmental protection programs. Regular monitoring and evaluation should also be conducted to assess program implementation and identify emerging environmental challenges. Future research is recommended to examine the effectiveness of coastal governance strategies using more extensive field data, including community perspectives and measurable indicators of coastal environmental quality and marine ecosystem sustainability.

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