International Journal of Technology and Education Research

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E-ISSN: 2986-0733

Collaborative Governance Model in the Preservation of Lake Ayamaru Based on Local Wisdom in Maybrat Regency

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Abstract

Lake Ayamaru is one of the strategic freshwater ecosystems in Maybrat Regency, Southwest Papua Province, which possesses significant ecological, social, and cultural values. However, the lake currently faces various environmental challenges, including sedimentation, declining water levels, environmental pollution, and threats to endemic fish species. These conditions require the involvement of multiple stakeholders in environmental conservation efforts. This study aims to analyze the implementation of Collaborative Governance based on local wisdom in the preservation of Lake Ayamaru.

This research employed a qualitative descriptive approach. Data were collected through observation, in-depth interviews, and documentation. Informants were selected using purposive sampling and consisted of local government officials, indigenous leaders, community leaders, local residents, and environmental organizations. Data were analyzed using the interactive model of Miles, Huberman, and Saldaña, including data condensation, data display, and conclusion drawing. Data validity was ensured through source, technique, and time triangulation.

The findings indicate that the implementation of Collaborative Governance in Lake Ayamaru preservation is reflected through the dimensions of starting conditions, institutional design, facilitative leadership, and collaborative process. Environmental degradation has become the primary driving factor for collaboration among stakeholders. The study also reveals that local wisdom of the Maybrat indigenous community serves as social capital that strengthens trust, participation, and collective commitment in environmental conservation efforts. The integration of collaborative governance and local wisdom contributes to sustainable environmental management of Lake Ayamaru.

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International Journal of Technology and Education Research

https://e-journal.citakonsultindo.or.id/index.php/IJETER

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Keywords: ***Collaborative Governance, Local Wisdom, Environmental Conservation, Lake Ayamaru, Maybrat Regency.***

INTRODUCTION

Lakes are one of the terrestrial aquatic ecosystems that have ecological, social, economic, and cultural functions that are important for people's lives. In addition to acting as a source of water, the lake is also a habitat for various biodiversity and supports the economic activities of the surrounding community. However, various lakes in Indonesia are currently facing pressure due to environmental changes, human activities, and weak sustainable natural resource management (Emerson et al., 2012; Irwandi et al., 2021).

Lake Ayamaru is one of the largest karst lakes in Southwest Papua Province which has an area of about 8.9–10.85 km² with an average depth of 3–9 meters. The lake area covers at least nine villages and is a source of livelihood for about 25,000 people of the Ayamaru Tribe spread across approximately 40 villages. For the local community, Lake Ayamaru not only serves as a source of livelihood, but also has social and cultural values that are closely related to the life of the Maybrat indigenous people.



Figure 1. Panorama of Lake Ayamaru as a Karst Water Ecosystem
Source: Directorate General of Civil Aviation (2024)

The existence of Lake Ayamaru which has karst water characteristics with high water clarity makes this area a habitat for various species of endemic fish of Papua as well as an important resource that supports the lives of local communities.

Despite having a strategic role in the lives of the Maybrat people, Lake Ayamaru faces various increasingly complex environmental threats. One of the main problems is sedimentation which causes siltation of the lake at a rate of about 10–15 cm per year due to material carried from the surrounding highland area (Sagrim, 2012). In addition, there is a decrease in water

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discharge, shrinkage of water area, and degradation of buffer forest areas that function as water catchment areas for lakes. If these conditions are not handled in a sustainable manner, the sustainability of the ecological function of Lake Ayamaru will be increasingly threatened.

This threat is further exacerbated by the increase in environmental pollution due to domestic waste and waste. Observation results (Redaksi New Guinea Kurir, 2025), in June 2025 shows that the Lake Ayamaru and Lake Uter areas have experienced a significant increase in waste pollution. The observation team found various types of plastic waste and domestic waste that deposited and floated in the lake area. In addition, plantation activities have shifted, settlement growth, road access opening, and direct disposal of household waste into water bodies have also accelerated the degradation of lake environmental quality. This condition has the potential to threaten endemic fish habitats, reduce water quality, and reduce the function of the lake as a source of livelihood for the surrounding community.



Figure 2. Condition of Waste Pollution in the Ayamaru Lake Area
Source: Maybrat Spatial Care Foundation (Petarung) (2025).

The threat to the quality of the environment not only has an impact on the physical condition of the waters, but also threatens the sustainability of various endemic species living in Lake Ayamaru. One species of concern is the Rainbow Boesemani (*Melanotaenia boesemani*), endemic fish of Papua which has high ecological and economic value as an ornamental fish commodity. High market demand, the entry of invasive species, and changes in habitat conditions have put pressure on the fish population in its natural habitat. This condition shows that the preservation of Lake Ayamaru is not only important to maintain the sustainability of the aquatic ecosystem, but also to protect the endemic biodiversity that is the ecological identity of the region (Universitas Airlangga, 2024).

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Figure 3. Rainbow Boesemani (*Melanotaenia boesemani*) as a Rich Biodiversity Endemic to Lake Ayamaru
Sources: (Universitas Airlangga, 2024).

These various threats encourage the central government and local governments to implement a number of Lake Ayamaru rescue programs. The programs that have been carried out include the preparation of a master plan for the conservation and revitalization of lake areas, sedimentation dredging, the development of water control infrastructure, the rehabilitation of water catchment areas, and the arrangement of areas based on conservation and sustainable tourism. However, the complexity of the problems faced shows that the preservation of Lake Ayamaru cannot be done by the government independently.

The preservation of Lake Ayamaru involves a variety of actors who have different interests, authorities, and resources, such as local governments, indigenous peoples, local communities, academics, civil society organizations, and environmental communities. Therefore, a governance mechanism is needed that is able to integrate these various interests collaboratively. (Ansell & Gash, 2008), explained that collaborative governance is a public decision-making process that involves government and non-government actors in achieving common goals through dialogue, trust building, and collective commitment.

In the context of Lake Ayamaru, the existence of the Maybrat indigenous people is an important factor in environmental conservation efforts. Indigenous peoples have customary rights, social norms, and cultural values that govern the relationship between humans and nature. According to (Sibarani, 2012), local wisdom is a value system that develops in society and functions as a guideline in maintaining a balance of social and environmental life. Thus, local wisdom can be seen as social capital that is able to strengthen the implementation of collaborative governance in the preservation of Lake Ayamaru.

Various previous studies have examined collaborative governance in environmental management and the role of local wisdom in natural resource conservation. However, previous studies have not adequately explained how local wisdom functions as a mechanism that strengthens stakeholder collaboration in environmental governance, particularly in lake ecosystem conservation. Research on collaborative governance in lake areas generally focuses on stakeholder relationships and collaboration effectiveness, while studies on local wisdom tend

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to emphasize socio-cultural values and indigenous knowledge. Furthermore, no previous study has specifically investigated the integration of collaborative governance and local wisdom in preserving Lake Ayamaru, despite the lake's ecological importance and the strong influence of indigenous institutions in environmental management.

The novelty of this research lies in the analysis of collaborative governance in the preservation of Lake Ayamaru by placing the local wisdom of the Maybrat indigenous people as an element that strengthens the inter-stakeholder collaboration process. This research not only examines the relationship between government and community in environmental management, but also explains how indigenous values contribute to building trust, participation, and sustainability of collaboration in environmental conservation.

Based on this description, this study aims to analyze the implementation of collaborative governance based on local wisdom in the conservation of Lake Ayamaru in Maybrat Regency and identify the role of various actors in realizing sustainable environmental management.

LITERATURE REVIEW

Collaborative Governance

Collaborative governance developed in response to the government's limitations in solving complex public problems. (Ansell & Gash, 2008), defines *collaborative governance* As a decision-making process that involves government agencies and non-government actors directly in formal, consensus-oriented, and deliberative forums to formulate and implement public policies. This concept emphasizes the importance of collaboration between actors in achieving common goals that cannot be solved by one party alone.

(Emerson et al., 2012), explaining that *collaborative governance* It is a form of governance that involves various actors across sectors through interaction, joint commitment, and collective use of resources. In the context of environmental conservation, this approach is relevant because natural resource management requires the involvement of governments, communities, academics, and civil society organizations.

According to (Ansell & Gash, 2008), success *collaborative governance* It is influenced by four main components, namely:

1. Starting Conditions

   The initial conditions behind the collaboration include the level of trust, the distribution of resources, the history of the relationship between the actors, and the incentive to work together.

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2. Institutional Design

Rules, procedures, and mechanisms that govern the collaboration process to run in a transparent and participatory manner.

3. Facilitative Leadership

The role of leadership in facilitating communication, building consensus, and resolving conflicts between actors.

4. Collaborative Process

A collaborative process that includes dialogue, trust building, shared commitment, mutual understanding, and collaborative goal achievement.

The four components are used as the focus of analysis in this study to understand the implementation of *collaborative governance* based on local wisdom in the preservation of Lake Ayamaru in Maybrat Regency.

Local Wisdom

Local wisdom is a system of knowledge, values, norms, and social practices that develop in society as a result of long-term interaction with the surrounding environment. According to (Sibarani, 2012), local wisdom is the original knowledge of the community that is used as a guideline in regulating social life and human relations with nature.

In natural resource management, local wisdom has an important role as a social mechanism that encourages conservative behavior towards the environment. Local wisdom not only serves as a cultural heritage, but also as an instrument of social control that can support the sustainability of ecosystems (Keraf, 2010).

In the Maybrat indigenous people, customary values, customary rights, social norms, and traditional knowledge about the use of natural resources are an important part of maintaining the sustainability of the Lake Ayamaru area. Therefore, local wisdom is seen as social capital that can strengthen collaborative governance in environmental conservation.

Environmental Conservation

Environmental conservation is an effort made to maintain the sustainability of environmental functions so that they are still able to support the lives of current and future generations. The concept of sustainable development introduced by (WCED, 1987), emphasizing the importance of a balance between environmental, social, and economic aspects in natural resource management.

In the context of lakes, environmental conservation includes water quality protection,

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biodiversity conservation, pollution control, and sustainable management of aquatic resource utilization. These efforts require the involvement of various parties due to the complexity of environmental problems that cannot be solved sectorally.

Table 1. Previous Research

Yes	Researcher	Research Focus	Research Results	Research Gap
1	(Ansell & Gash, 2008)	Collaborative Governance	Model Collaborative Governance	Not discussing local wisdom
2	(Emerson et al., 2012)	Collaborative Governance Framework	Collaboration dynamics	Not focusing on the lake environment
3	(Lukman et al., 2021)	Collaborative Environmental Management	The importance of stakeholder collaboration	Not studying indigenous peoples
4	(Permana & Yudistira, 2025)	Collaborative Governance based on local wisdom	Local wisdom strengthens collaboration	Not on the lake ecosystem
5	(Candra et al., 2025)	Mangrove Management	Government and community collaboration	Not studying Lake Ayamaru
6	(Kissiya & Biczó, 2025)	Indigenous Knowledge	Local knowledge supports conservation	Does not use collaborative governance theory

Source: The author's synthesis results from various previous studies (2026).

Based on Table 1, research on *Collaborative Governance* and local wisdom has been carried out a lot. However, there are still limitations in research that integrates the two concepts in the context of lake ecosystem conservation. In addition, there has been no research that specifically examines *Collaborative Governance* based on local wisdom in the preservation of Lake Ayamaru in Maybrat Regency. Therefore, this research was conducted to fill the research gap.

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Conceptual Framework

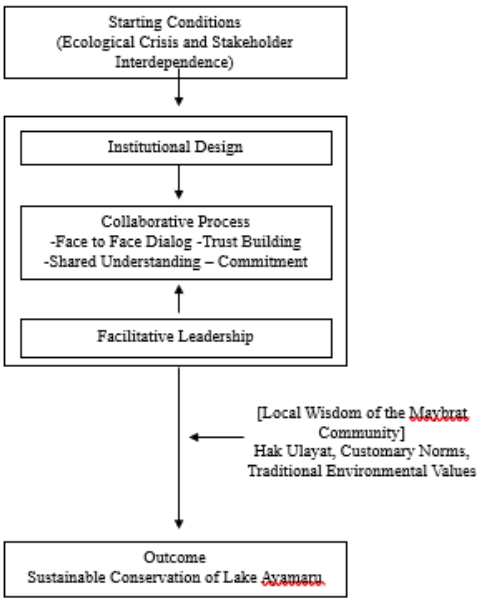


Figure 4. Conceptual Framework of Collaborative Governance Based on Local Wisdom in the Preservation of Lake Ayamaru
Source: Developed by the author (2026).

This conceptual framework illustrates that the preservation of Lake Ayamaru is carried out through *a Collaborative Governance approach* that involves various actors in the collaborative process. The local wisdom of the Maybrat community plays a reinforcing factor in supporting the success of the collaboration towards the sustainable conservation of Lake Ayamaru.

RESEARCH METHODS

Types and Approaches to Research

This study uses a qualitative research method with a descriptive approach. The qualitative approach was chosen because the research aims to understand in depth the phenomenon *collaborative governance* based on local wisdom in the preservation of Lake Ayamaru in Maybrat Regency. According to (Creswell, 2018), qualitative research is used to explore and understand the meaning given by individuals or groups to a social problem. Through this approach, researchers can gain a comprehensive understanding of the collaborative process between governments, indigenous peoples, local communities, and other stakeholders in efforts

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to preserve Lake Ayamaru.

Research Location

This research was carried out in the Lake Ayamaru area, Maybrat Regency, Southwest Papua Province. The selection of the location was based on the consideration that Lake Ayamaru has important ecological, social, and cultural values and involves various actors in its management. In addition, the existence of indigenous peoples who still maintain the values of local wisdom makes this region relevant to be studied from the perspective of *collaborative governance*.

Research Focus

The focus of the research refers to the *Collaborative Governance* submitted by (Ansell & Gash, 2008) with the addition of aspects of local wisdom as a research context.

~~Research Focus~~	**Indicator**
Starting Conditions	The initial conditions of collaboration, the interests of actors, environmental problems of Lake Ayamaru
Institutional Design	Formal and informal rules, coordination mechanisms, stakeholder involvement
Facilitative Leadership	The role of local governments, customary institutions, and leadership in building collaboration
Collaborative Process	Inter-stakeholder dialogue, trust building, shared commitment, joint decision-making
Local Wisdom	Customary rights, customary norms, local knowledge, role of customary institutions
Outcome	Ayamaru Lake Conservation, environmental sustainability, socio-cultural sustainability

Source: Developed by the author (2026).

Data Source

The data sources in this study consist of primary data and secondary data.

- Primary data was obtained directly from informants through in-depth interviews and field observations. Informants were selected purposively based on their involvement and knowledge of the preservation of Lake Ayamaru.

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- Secondary data was obtained from government documents, research reports, scientific journals, books, laws and regulations, customary institutional archives, and various other documents relevant to the research.

Informant Determination Techniques

The determination of informants was carried out using *the purposive sampling technique*, which is the selection of informants based on the consideration that they have knowledge, experience, and direct involvement in the preservation of Lake Ayamaru.

The research informants include:

1. Maybrat Regency Government;
2. Related Regional Apparatus Organizations (OPDs);
3. A Man of Maybrat;
4. Community leaders;
5. People who live around Lake Ayamaru;
6. Environmental organizations or communities involved in lake conservation activities

Data Collection Techniques

The data collection techniques used in this study include:

1. Observations

Observations were carried out to obtain a direct picture of the condition of Lake Ayamaru, community activities, and forms of interaction between actors in efforts to preserve the environment.

2. In-Depth Interviews

Interviews were conducted in a semi-structured manner using interview guidelines that were compiled based on the focus of the research. This technique is used to dig up information in depth about the collaborative governance process and the role of local wisdom in the preservation of Lake Ayamaru.

3. Documentation

Documentation is carried out by collecting various documents related to research, such as government reports, regional regulations, photos of activities, news, and customary institutional documents.

Data Analysis Techniques

Data analysis in this study uses an interactive model (Miles et al., 2014), which consists of:

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1. Data Condensation

This stage is carried out by selecting, focusing, simplifying, and organizing the data obtained from the field so that it is in accordance with the focus of the research.

2. Data Display

The reduced data is then presented in the form of narratives, tables, and charts to make it easier for researchers to understand the patterns and relationships between data.

3. Conclusion Drawing and Verification

The last stage is carried out by drawing conclusions based on the patterns found in the data and verifying continuously during the research process.

Data Validity Test

To ensure the validity and credibility of the data, this study uses a triangulation technique. Triangulation is carried out through source triangulation, technique triangulation, and time triangulation.

1. Source triangulation is carried out by comparing information obtained from various informants.
2. The triangulation technique was carried out by comparing the results of interviews, observations, and documentation.
3. Time triangulation is carried out by collecting data at different times to ensure the consistency of the information obtained.

RESULTS

Overview of Lake Ayamaru

Lake Ayamaru is one of the largest lakes in Southwest Papua Province located in Maybrat Regency. The lake has an area of about 980 hectares to 2,500 hectares depending on the weather conditions and is a source of livelihood for the indigenous people of Maybrat. In addition to functioning as a source of water, fisheries, and livelihoods for the community, Lake Ayamaru also has high ecological value because it is the habitat of various endemic species of Papua, one of which is Rainbow Boesemani (Melanotaenia boesemani).

However, the current condition of Lake Ayamaru faces various environmental threats such as sedimentation, shrinkage of water discharge, domestic waste pollution, and degradation of buffer forest areas. These problems encourage various parties to be involved in lake conservation efforts through a collaborative approach.

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Starting Conditions

The collaborative governance process in the preservation of Lake Ayamaru emerged due to increasing environmental degradation, including sedimentation, declining water levels, waste pollution, and threats to endemic fish species. These environmental challenges created a shared awareness among stakeholders regarding the urgency of conservation efforts. However, the initial stage of collaboration was characterized by differences in interests and resource capacities among actors. Government institutions possessed formal authority and policy-making power, while indigenous communities held customary legitimacy and local ecological knowledge. Such differences required intensive coordination to build mutual trust and a common understanding of conservation objectives. An informant from the local government stated:

"Currently, Lake Ayamaru is facing serious environmental pressures. Therefore, cooperation among government institutions, customary leaders, local communities, and environmental organizations is essential to ensure the sustainability of the lake ecosystem." (Informant A, 2026)

These findings indicate that environmental threats served as the primary incentive for collaboration, while stakeholder diversity created the need for trust-building and collective commitment, as emphasized by (Ansell & Gash, 2008).

Institutional Design

The preservation of Lake Ayamaru is supported by formal rules from the government and informal rules in the form of customary norms of the Maybrat people. These two forms of rules are the basis for regulating the relationship between actors involved in lake conservation.

"We still refer to government rules and customary norms in protecting the Lake Ayamaru area." (Informant B, 2026).

This shows that institutional design plays a role in supporting a more targeted collaboration process.

Facilitative Leadership

The findings reveal that indigenous leaders play a significant role in facilitating environmental conservation efforts in Lake Ayamaru. Their responsibilities extend beyond preserving cultural values to mediating conflicts, educating younger generations, and

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representing community interests in interactions with external stakeholders. As expressed by one traditional leader:

"Our role is to serve as guardians of traditional values and mediators within the community. We lead customary rituals, enforce customary laws against those who damage the lake, and educate younger generations about the importance of preserving nature. We also represent community interests when external parties propose development projects that may threaten the lake's environment." (Traditional Leader, Interview, 2026).

This finding highlights the importance of indigenous leadership in strengthening stakeholder collaboration and ensuring that environmental conservation efforts remain aligned with local cultural values.

Collabotative Process

The collaborative process in the preservation of Lake Ayamaru involves communication and coordination between government institutions, indigenous leaders, and local communities. However, stakeholder involvement has not always been fully optimized, particularly during the planning and implementation stages of conservation programs. One traditional leader stated:

"Communication between the government and indigenous communities already exists, but it has not yet been fully effective. Sometimes government programs are implemented without fully involving indigenous communities from the beginning. We hope that government institutions will not view the lake solely from a development or tourism perspective, but will work together with customary leaders to integrate state regulations with customary laws for the sustainability of Lake Ayamaru." (Traditional Leader, Interview, 2026).

These findings indicate that while collaborative efforts have been initiated, greater stakeholder participation and stronger integration between formal and customary institutions are needed to improve the effectiveness of environmental governance.

The Role of Local Wisdom

The ultimate goal of collaborative governance in the preservation of Lake Ayamaru is to ensure the sustainability of its ecological, social, and cultural functions for future generations. Stakeholders share a common expectation that the lake will remain a source of livelihood and cultural identity for the Maybrat community. As stated by one traditional leader:

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"My hope is that Lake Ayamaru will remain sustainable, its waters will stay clean, and its fish populations will not become extinct. I want future generations of Maybrat people to continue enjoying the beauty and resources of the lake rather than only hearing stories about them. We also hope that future development in Maybrat will be environmentally friendly and respectful of indigenous rights." (Traditional Leader, Interview, 2026).

This finding suggests that environmental conservation is closely linked to cultural preservation and community welfare, emphasizing the need for sustainable and inclusive governance approaches in Lake Ayamaru conservation efforts.

Customary Rules and Sasi

Local wisdom in the Maybrat community is reflected through customary regulations that support environmental sustainability. One of the most prominent traditional practices is *Sasi*, a customary prohibition system that restricts the harvesting of fish and other natural resources within a certain period to allow ecological recovery. In addition, several areas surrounding the lake are considered sacred and protected from activities that may damage the environment. A traditional leader explained:

"Yes, we have local wisdom practices such as Sasi, which prohibits the harvesting of lake resources for a certain period so that fish populations and aquatic ecosystems can recover. We also have sacred areas around the lake that must not be damaged, cleared, or polluted. Anyone who violates these customary rules may be subject to traditional sanctions or fines imposed by the clan or customary institution." (Traditional Leader, Interview, 2026).

These findings suggest that local wisdom functions not only as a cultural value but also as an informal environmental management mechanism that contributes to the preservation of Lake Ayamaru.

Outcome

The ultimate goal of collaborative governance in the preservation of Lake Ayamaru is to ensure the sustainability of its ecological, social, and cultural functions for future generations. Stakeholders share a common expectation that the lake will remain a source of livelihood and cultural identity for the Maybrat community. As stated by one traditional leader:

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This finding suggests that environmental conservation is closely linked to cultural preservation and community welfare, emphasizing the need for sustainable and inclusive governance approaches in Lake Ayamaru conservation efforts.

DISCUSSION

The results of the study show that the preservation of Lake Ayamaru is carried out through collaboration between local governments, indigenous peoples, local communities, and various other stakeholders. The collaboration emerged in response to various environmental problems that threaten the sustainability of the lake ecosystem, such as sedimentation, environmental pollution, decreased water discharge, and threats to endemic species. These findings are in line with (Ansell & Gash, 2008), which states that starting conditions in the form of common problems can be a driving factor for the formation of collaborative governance.

This research also shows that the existence of formal government rules and customary norms of the Maybrat community plays a role in supporting the collaboration process. This condition shows that environmental governance does not only depend on government policies, but is also influenced by social and cultural values that develop in society. These findings support research (Permana & Yudistira, 2025), which states that local wisdom can strengthen the effectiveness of collaboration in natural resource management.

In addition, local government leadership and indigenous leaders play an important role in facilitating communication, building trust, and encouraging community participation. This role is in line with the concept of facilitative leadership put forward by (Ansell & Gash, 2008), that leadership that is able to bridge various interests is an important factor in the success of collaboration.

Other findings show that the local wisdom of the Maybrat community serves as social capital that strengthens the collaborative governance process. Customary values, customary rights, and the role of customary institutions encourage the growth of collective awareness in protecting the lake environment. The results of this study are in line with (Kissiya & Biczó, 2025), which explains that Indigenous Knowledge has an important contribution in supporting the

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sustainability of natural resource management.

Thus, this study shows that the success of the preservation of Lake Ayamaru is not only determined by inter-stakeholder collaboration, but also by the ability to integrate local wisdom into the collaborative governance process. This integration is an important factor in realizing the ecologically, socially, and culturally sustainable management of Lake Ayamaru.

CONCLUSION

Based on the results and discussion, it can be concluded that the preservation of Lake Ayamaru has been carried out through a Collaborative Governance approach involving various stakeholders, including the local government, indigenous communities, local residents, and environmental organizations. The collaboration emerged as a response to environmental challenges faced by Lake Ayamaru, such as sedimentation, declining water levels, pollution, and threats to endemic fish species.

The study found that the implementation of Collaborative Governance in Lake Ayamaru preservation is reflected in the existence of common concerns regarding environmental degradation, the support of formal and informal institutions, the role of facilitative leadership, and collaborative processes among stakeholders. In addition, local wisdom possessed by the Maybrat indigenous community serves as an important social capital that strengthens participation, trust, and collective commitment in environmental preservation efforts.

Therefore, the integration of Collaborative Governance and local wisdom can support sustainable environmental management in Lake Ayamaru. Strengthening cooperation among stakeholders while preserving indigenous values is essential to ensure the ecological sustainability of the lake and the socio-cultural well-being of the surrounding communities.

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