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Collaborative Governance in Sustainable Lake Management: A Systematic Literature Review and its Implications for Lake Limboto

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ABSTRACT

Lakes are common-pool resources that are vulnerable to degradation due to overlapping interests across jurisdictions, weak regulatory enforcement, and limited community involvement. *Collaborative governance* is proposed as an alternative paradigm to replace sectoral and hierarchical management models with a governance approach that involves government, communities, academics, and the private sector as equal partners in decision-making. This article presents a systematic literature review (SLR) of the literature on *collaborative governance* in sustainable lake management, following the stages of identification, screening, eligibility, and inclusion commonly applied in SLR approaches. A total of 48 initial documents were identified from Google Scholar, Garuda, Neliti, and Scopus, of which 25 documents met the inclusion criteria and were subsequently analyzed thematically. The review identified five main themes: (1) initial conditions and conflict history, (2) formal institutional design, (3) facilitative leadership, (4) iterative collaborative processes involving dialogue, trust, commitment, and shared understanding, and (5) outcomes and adaptive learning. These findings were subsequently reflected upon in relation to the case of Lake Limboto, Gorontalo Province, which has experienced critical degradation due to sedimentation and conflicts over spatial utilization between Gorontalo Regency and Gorontalo City. The review concludes that the future success of Lake Limboto management depends on the definitive demarcation of the lake boundaries, the establishment of a permanent cross-jurisdictional collaborative forum, the strengthening of institutional capacity among lakeside communities, and the implementation of transparent and accountable joint monitoring mechanisms.

Keywords: Collaborative Governance; Lake Management; Systematic Literature Review; Sustainability; Lake Limboto

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INTRODUCTION

Lakes are inland aquatic ecosystems that serve ecological, economic, and socio-cultural functions at once. As catchment areas, habitats for biodiversity, sources of fisheries, and tourist destinations, lakes sustain the livelihoods of millions of people living around them (Akibu, 2017). However, lakes are also *common-pool resources*, which are non-excludable in their use yet limited in carrying capacity, making them prone to the *tragedy of the commons* if they are not managed by adequate institutions. In Indonesia, the Ministry of Environment has recorded that most national priority lakes, including Lake Limboto in Gorontalo Province, suffer serious degradation in the form of siltation, eutrophication, and shrinking surface area caused by sedimentation and land-use change in their catchment areas (Febrila Taha et al., 2026).

The complexity of lake problems is generally cross-sectoral and cross-jurisdictional, so a *command-and-control* management approach centralized in a single government institution has often proven inadequate (Lamangida, 2019). The failure of this hierarchical, sectoral approach has encouraged the emergence of the *collaborative governance* paradigm, that is, an arrangement in which public and private actors jointly participate in a collective, consensus-oriented forum to make public decisions. Ansell and Gash emphasize that *collaborative governance* arose in response to the failure of *top-down* policy implementation and the high costs of conflict in adversarial regulatory models, offering a deliberative mechanism that integrates local knowledge, resources, and legitimacy from diverse stakeholders (Ansell & Gash, 2008).

Lake Limboto is the largest lake in Gorontalo Province and plays a strategic ecological and economic role, especially for lakeside communities whose livelihoods depend on capture fisheries and aquaculture (Hasim, 2018). Unfortunately, the condition of Lake Limboto is increasingly critical: its surface area and depth continue to shrink due to massive sedimentation, and several studies even project that the lake could disappear by 2035 if adequate governance interventions are not made. The problem is compounded by the lake's location across two different administrative areas, namely Gorontalo Regency and Gorontalo City, which creates overlapping authority and weak regulatory integration among local governments.

Various studies show that the regulation of Lake Limboto management remains weak in terms of harmonization and problem focus, that the demarcation of the lake boundary has not been completed and could trigger land disputes, and that community participation in the spatial planning of the lake's strategic area remains low because of weak cooperation between the government and residents at every stage of planning. This situation underscores the urgency of systematically examining how the principles of *collaborative governance* can be applied to sustainable lake management, and how relevant those principles are as a policy reference for saving Lake Limboto.

This article aims to: (1) map the development and main themes of the literature on *collaborative governance* in sustainable lake management through a *systematic literature review* (SLR) approach; and (2) formulate the theoretical and practical implications of these findings for the collaborative governance of Lake Limboto. The study is thus expected to contribute both to the development of the water resource governance literature and to the formulation of more participatory, integrated, and sustainable management policies for Lake Limboto.

The significance of this study lies in the scarcity of literature syntheses that specifically bridge *collaborative governance* theory from the global public administration literature with the empirical context of lake management in Indonesia, particularly Lake Limboto. Most existing publications are stand-alone single case studies, so cross-study accumulation of knowledge remains limited. Through the SLR approach, this article seeks to fill that gap by providing a thematic map that can serve as a reference for researchers, policymakers at the provincial and regency/city levels, and civil society organizations working on lake conservation.

METHODS

This study uses an SLR approach to identify, evaluate, and synthesize prior research relevant to the topic. The review was conducted systematically through the stages of defining the review focus, searching the literature, setting inclusion and exclusion criteria, selecting articles, and analyzing and synthesizing research findings (Kraus et al., 2020). The SLR approach was chosen because it allows the literature review to be carried out systematically, transparently, and replicably in identifying and synthesizing findings from the available studies (Snyder, 2019).

Search Strategy

The literature search was conducted in the Google Scholar, Garuda (Garba Rujukan Digital), and Neliti databases, using the following keyword combinations: "collaborative governance" AND "pengelolaan danau" (lake management); "tata kelola kolaboratif" (collaborative governance) AND "sumber daya air" (water

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resources); "co-management" AND "lake"; and "Danau Limboto" AND "kebijakan" (policy). The search was limited to documents published between 2007 (the year Ansell and Gash's reference framework was published) and 2025.

Inclusion and Exclusion Criteria

Table 1. The document selection criteria are presented in below.

Inclusion Criteria	Exclusion Criteria
Journal articles, proceedings, and policy reports in Indonesian or English, published 2007–2025	Articles without a clear methodology, popular opinion pieces without data, or duplicate publications
Discusses *collaborative governance*, *co-management*, or collaborative governance of water resources or lakes	Does not address the dimension of multi-stakeholder collaboration (purely technical limnological work without institutional aspects)
Fully accessible (*full text*) through academic databases	Only an abstract available, without the full manuscript
Relevant to the context of managing lakes, watersheds, or shared water resources (*commons*)	Solely focused on non-environmental governance (e.g., village finance), with no link to natural resources

Selection Process and Data Analysis

The initial search identified 48 documents (identification stage). After the removal of 8 duplicates, 40 documents entered the title and abstract screening stage, in which 7 documents were excluded because they were not relevant to the topic of collaborative governance. A total of 33 documents were then assessed for eligibility through full-text reading (*eligibility stage*); at this stage, 8 documents were excluded because they lacked a clear methodology or were popular opinion pieces without supporting data. Ultimately, 25 documents met all the inclusion criteria and were analyzed further at the inclusion stage (*inclusion*).

Data were analyzed thematically (*thematic synthesis*) using the concept of collaborative governance from Ansell and Gash (2008) and the integrative framework of collaborative governance from Emerson et al. (2012). The framework of Ansell and Gash (2008) was used to identify the aspects of *starting conditions*, *institutional design*, *facilitative leadership*, and *collaborative process*. Meanwhile, the framework of Emerson et al. (2012) was used to enrich the analysis of collaboration dynamics, particularly *principled engagement*, *shared motivation*, *capacity for joint action*, as well as collaborative actions and their impacts.

Thematic coding was carried out manually by recording the findings of each article in a data extraction matrix containing the author, year of publication, focus of study, research method, and key findings. The extracted findings were then grouped according to conceptual themes relevant to the collaborative governance framework. To maintain the consistency of the coding process, the theme categories were compared with the conceptual definitions in the main theoretical literature and the terms used in empirical research. This process also took into account the terminological variations found in the literature, such as "collaboration," "partnership," "co-management," and "cross-sector synergy," as long as these terms substantively correspond to the concept of *collaborative governance*.

RESULTS

Table 2. presents a summary of nine representative studies out of the 25 documents reviewed, covering both the core theoretical literature on *collaborative governance* and empirical studies on the management of Lake Limboto and other lakes in Indonesia.

Author / Source	Focus of Study	Key Findings
(Ansell & Gash, 2008)	Meta-analysis of 137 cases of *collaborative governance* across policy sectors (US)	Formulates a contingency model of *collaborative governance*: starting conditions, institutional design, facilitative leadership, and collaborative process (face-to-face dialogue, trust building, commitment to process, shared understanding, intermediate outcomes).

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Author / Source	Focus of Study	Key Findings
(Emerson, Nabatchi & Balogh, 2012)	Synthesis of the conceptual framework of the *collaborative governance regime* (CGR)	Offers a tiered integrative framework: system context, collaborative dynamics (principled engagement, shared motivation, capacity for joint action), and outcomes or adaptation.
(Hasim, 2018) – Publik: Jurnal Ilmu Administrasi	Analysis of Lake Limboto management policy from a political ecology perspective	Lake Limboto management regulation remains weak in integration, harmonization, and problem focus between the jurisdictions of Gorontalo Regency and Gorontalo City.
(Akibu, 2017) – Jurnal Dialektika	Implementation of Lake Limboto management policy	Implementation requires demarcation of the lake boundary, *collaborative management*, and locally based collective action as its three main pillars.
(Basalama & Sumanto, 2024) – Sultan Amai Staatsrecht Journal	Participation of the Lake Limboto lakeside community (Hutadaa Village) regarding Regional Regulation No. 9/2017	Community participation is low due to limited environmental knowledge, weak law enforcement, economic pressure, and minimal cooperation between the government and the community at every stage of spatial planning.
(Akbar et al., 2023)	Lake Limboto rescue model based on Adaptive and Networking Governance	Recommends network collaboration among three stakeholder groups (government, community, private sector or academia) as the basis for saving the lake, which is threatened with disappearing due to sedimentation by 2035.
(Partomo et al., 2011) – JPSL	Lake management based on co-management, with a case study of Rawa Pening, particularly the relationship and division of roles between the government and the community in managing lake resources.	Management of Rawa Pening still shows an imbalance of roles between the government and the community. The co-management model is seen as able to strengthen the community's role and encourage a better division of responsibilities in lake resource management.
(Muqni Melliyani Harahap, 2024)	*Collaborative governance* in the revitalization of Lake Toba tourism to increase international tourist visits.	Collaboration involves the government, the private sector, and the community through dialogue, trust building, commitment to the process, and the achievement of shared outcomes.
(Sururi, 2018) – Humanika	*Collaborative governance* in cultural heritage management	Emphasizes that the success of cross-actor collaboration depends heavily on *trust building* and *shared understanding* from the early phases, relevant as a cross-sector analogy for public resources.

Starting Conditions and Conflict History

The reviewed studies show that the success of collaboration is influenced by *starting conditions*, including the history of conflict or cooperation among stakeholders, imbalances in power and resources, and the incentives and obstacles for actors to participate (Ansell & Gash, 2008). In the integrative framework (Emerson et al., 2012), these conditions are placed within the *system context*, which can create both opportunities and constraints for the formation and development of collaboration. This context includes political, legal, socio-economic, and cultural conditions, as well as the history of conflict and the level of trust among actors.

In the specific case of Lake Limboto, these starting conditions are further complicated because the lake has long been a living space for residents who have built settlements and aquaculture areas on accreted land, that is, land that has emerged as the lake has become shallower (Farishi et al., 2025). When the government tries to reaffirm the lake boundary according to the old reference map, residents' ownership claims to this accreted

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land may collide with the conservation agenda, so the boundary demarcation process itself risks triggering new conflicts if it is not managed carefully and participatively from the outset. Related issues also concern the tenure, use, and clarity of the boundaries and zoning of the lake area. The government therefore needs to clarify the lake's riparian boundary line and the zoning of the area, and to record evidence of land tenure, in order to reduce ambiguity in spatial use (Lahabu, 2016).

Formal Institutional Design

Formal institutional design, which includes participation rules, process transparency, and clarity of mandates and division of authority, is an important element in building effective collaboration (Ansell & Gash, 2008). In lake ecosystem management, the *co-management* approach emphasizes the sharing of responsibility and authority between the government and the community in managing resources (Partomo et al., 2011). In the context of Lake Limboto, the need for an institution capable of coordinating the various stakeholders is increasingly important because its management involves diverse actors and interests. Studies of Lake Limboto governance show that institutional aspects, division of authority, and coordination among actors remain problems in lake management (Akbar et al., 2023). This condition indicates that strengthening institutional design and cross-actor coordination mechanisms is necessary so that collaboration in managing Lake Limboto does not stop at formal involvement but can produce a more effective division of roles and joint action.

This weakness in institutional design is also evident in the lack of operational provisions on the mechanism for dividing roles between the Gorontalo Provincial Government, as the holder of authority over the spatial planning of provincial strategic areas, and the Regency/City Governments, as the holders of authority over basic services in their respective areas. Without clarity in this division of roles, the coordination forums that have been formed tend to be merely consultative and non-binding, so their decisions are easily ignored when they conflict with sectoral development interests in each region.

Facilitative Leadership

Facilitative leadership that can bridge differing interests, build communication, and sustain the dialogue process has been identified as one of the important factors in the success of *collaborative governance* (Ansell & Gash, 2008; Emerson et al., 2012). In a cross-jurisdictional context such as Lake Limboto, which involves the Gorontalo Provincial Government, Gorontalo Regency, and Gorontalo City, differences in authority and interests among actors require leadership that can steer the process while building trust and shared goals (Christensen, 2024; Ulibarri et al., 2023).

Ansell and Gash (2008) distinguish between leadership that steers (*steering*) and leadership that empowers (*empowering*); the former focuses on keeping the process on track, while the latter focuses on strengthening the capacity and voice of weaker participants, including marginalized community groups around the lake. Ideally, both forms of leadership are present together in a single figure or facilitator team of the Lake Limboto collaborative forum, given that the complexity of the issues faced cannot be resolved through administrative leadership alone without sensitivity to the imbalance in bargaining positions among actors.

The Iterative Collaborative Process

Referring to the model of Ansell and Gash (2008), a healthy collaborative process is cyclical and includes *face to face dialogue*, *trust building*, *commitment to process*, *shared understanding*, and the achievement of *intermediate outcomes* that reinforce the next cycle. Studies on village fund and cultural heritage management in Indonesia affirm that these five elements are relevant across public resource sectors, including lake management, where deliberation forums among the lakeside villages/sub-districts can serve as a space for this process to take place (Ode et al., 2022; Sururi, 2018).

A study on the participation of the Lake Limboto lakeside community in Hutadaa Village shows that, in practice, this cycle of the collaborative process often stalls at the very first stage, face-to-face dialogue, because community involvement only takes place at the stage of socializing an already finalized plan rather than during its formulation. As a result, *trust building* and *shared understanding* have no chance to develop adequately, so that the community tends to be passive or even resistant to the spatial planning policies that have been set, even though in substance these policies are intended to protect the community's own long-term interests (Basalama & Sumanto, 2024).

Outcomes and Adaptive Learning

The fifth theme highlights the importance of *adaptive governance* and *networking governance* as a continuation of the collaborative process, in which collaboration outcomes are evaluated periodically and institutions are

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adjusted based on shared learning (Akbar et al., 2023). A dissertation study on saving Lake Limboto explicitly recommends applying *adaptive governance* reinforced by *networking governance* to manage the lake as a network, involving three main stakeholder groups: the government, the community, and the private sector or academia.

This adaptive learning should ideally be supported by consistent ecological monitoring data, for example periodic measurements of the sedimentation rate, lake surface area, and water quality, so that the collaborative forum has a shared evidence base to evaluate the effectiveness of the interventions that have been carried out. The absence of a shared database agreed upon by all parties may lead to repeated debates over the actual condition of the lake, which in turn hinders swift, evidence-based collective decision-making.

Comparison with the International Context

The international literature on collaborative governance of water resources shows patterns consistent with the findings in the Indonesian context, albeit with different emphases. Ansell and Gash (2008), in a meta-analysis of 137 cases across policy sectors in the United States, found that the success of collaboration depends heavily on the balance between incentives for participation and the transaction costs borne by each actor; the higher the *mutual dependence* among actors, the greater the chance that collaboration will produce durable consensus. Yi et al. (2021), in a study of collaboration networks in water resource governance, showed that the structure and connectivity of collaboration networks can influence governance performance. These findings indicate that the effectiveness of *collaborative governance* is determined not only by the presence of various actors but also by the patterns of relationships and connectedness among actors in the network. This is relevant to the context of Lake Limboto, which involves various actors with different authorities and interests.

The most prominent difference in context lies in the level of *institutionalization*. In many cases in developed countries, the water resource *collaborative governance regime* has been institutionalized through a *river basin authority* or an interstate commission with regulatory authority and an independent budget (Emerson et al., 2012). In contrast, in the Lake Limboto context, the existing collaborative forum remains coordinative, without binding regulatory authority across regions. This institutional gap is one of the main arguments for why this study recommends the establishment of a legally grounded permanent forum as one of the policy implications in the next section.

DISCUSSION

The synthesis of the five themes above shows that *collaborative governance* in sustainable lake management cannot be understood as a *single event* but as a dynamic, layered *governance regime*, as affirmed by Emerson et al. (2012) through their integrative framework. This framework places the broader system context, including biophysical and socio-economic conditions and the regulatory framework, as a shaping factor of internal collaborative dynamics, which in turn generate impacts and adaptations in the system itself on an ongoing basis.

In the context of lake management, the fundamental challenge that distinguishes it from other public sectors lies in the character of the lake as a cross-jurisdictional *common-pool resource*. Unlike the management of village funds or cultural heritage, which generally fall within a single administrative boundary, lakes often cross regency/city and even provincial boundaries, so the collaboration required is horizontal (among local governments), vertical (among levels of government), and multi-stakeholder (government, community, private sector, academia) (Ode et al., 2022; Sururi, 2018). This complexity explains why studies of Lake Limboto consistently highlight weak regulatory harmonization and the demarcation of administrative boundaries as the root problems that must be resolved before substantive collaboration can proceed effectively.

These findings also reinforce the thinking of Ostrom (2015) on the importance of local institutions in managing common resources, which identifies a number of institutional principles, such as clear resource boundaries, congruence of rules with local conditions, user participation in rule-making, monitoring, conflict resolution mechanisms, and nested institutional arrangements. In subsequent developments, Yoder et al. (2022) showed that these principles remain relevant for understanding *commons* governance at broader and more complex scales. These principles can complement the *collaborative governance* framework, particularly in the context of managing Lake Limboto, which involves various actors and cross-regional authorities.

However, this review also reveals important gaps in the existing literature. First, most studies of Lake Limboto remain descriptive-evaluative of ongoing policies, and few explicitly operationalize the variables of the collaborative process (Ansell & Gash, 2008), for example by empirically measuring the level of *trust building* or *shared understanding* among actors. Second, the dimensions of collaborative financing and economic incentive

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mechanisms for communities around the lake to participate in conservation remain poorly discussed. In the context of Lake Toba, Muqni Melliyani Harahap (2024) showed that *collaborative governance* in tourism revitalization involves the government, the private sector, and the community through dialogue, trust building, commitment to the process, and the achievement of shared outcomes. These findings indicate that collaboration in lake management has involved various actors, but the aspects of collaborative financing and economic incentive mechanisms for communities remain an area that could be developed in studies of Lake Limboto. Third, few studies have evaluated the outcomes of collaboration longitudinally, making it difficult to assess the long-term sustainability of collaborative interventions.

Another gap identified is the limited attention in the literature to the dimension of *distributive justice* in collaboration, namely the extent to which the benefits and burdens of lake conservation are shared fairly among community groups. In the case of Lake Limboto, for example, capture fishers and floating net cage aquaculture farmers are likely to bear activity restrictions that differ from those borne by tourism operators or landowners along the lake's riparian zone, so a collaborative design that fails to consider this asymmetry risks provoking resistance from groups who feel disadvantaged. This issue is in line with the observation of Ansell and Gash (2008) that *power resource asymmetries* among collaboration participants are one of the important predictors of failure of the collaborative process if they are not managed through equal representation mechanisms.

Bryson et al. (2015) add that cross-sector collaboration involving government, non-government, and business actors tends to be more successful when there is clarity on a jointly agreed *theory of change* from the outset, that is, a collective understanding of how a series of collaborative activities is expected to produce gradual improvements in lake conditions. In the Lake Limboto context, the absence of an explicit theory of change agreed among local governments, the community, and development partners is one factor that makes it difficult to assess the success of the various lake rehabilitation programs that have been implemented over the past decade.

In terms of theoretical contribution, this synthesis affirms that the *collaborative governance* framework, which originates from developed-country contexts, remains relevant when applied in developing-country contexts such as Indonesia, but requires adjustments at the level of variable operationalization, particularly regarding limited local fiscal capacity, overlapping regulations across levels of government, and a tradition of community participation that is still mobilization-based (*top-down*) rather than initiated from below (*bottom-up*). In terms of practical contribution, the synthesis of the five themes above provides a simple diagnostic framework that local governments can use to assess the extent to which existing lake governance meets the prerequisites of effective *collaborative governance*, before investing resources in establishing a new collaborative forum.

CONCLUSION AND IMPLICATIONS

Based on the synthesis of the SLR findings above, this study formulates several policy and practical implications for the sustainable management of Lake Limboto.

Boundary Demarcation of the Lake as a Prerequisite for Collaboration

As affirmed in the study of the implementation of Lake Limboto management policy, the most fundamental and most urgent step is the definitive demarcation of the lake boundary. Without clear boundaries, any collaborative forum risks getting stuck in recurring jurisdictional debates, while claims to accreted land by residents near boundary markers may trigger horizontal conflict between the government and the community. This boundary demarcation needs to be carried out participatively, involving lakeside communities from the measurement stage through to the socialization of results, so that the process itself becomes an initial space for *trust building*, as required in the model of Ansell and Gash (2008).

Permanent Cross-Jurisdictional Collaborative Forum

Given that the management of Lake Limboto involves government authority across more than one administrative area, a joint management forum that is sustainable and able to bring together the Gorontalo Provincial Government, the Gorontalo Regency Government, and the Gorontalo City Government is needed. Strengthening collaborative institutions is important so that the involvement of various actors does not remain merely coordinative but can develop into joint action. Partomo et al. (2011), in their study on the management of Rawa Pening, show that lake management involving many stakeholders faces the problem of an imbalance of roles between the government and the community. Therefore, the *co-management* model can be developed to increase the role and empowerment of the community in managing lake resources.

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The forum structure also needs to consider the representation of diverse actors, including the government, communities around the lake, business actors, academics, and civil society organizations. Such involvement is important so that decision-making is not dominated by the government alone but gives space for other actors to voice their interests and knowledge. The principle of involvement and equality among actors is in line with the *collaborative governance* framework, which emphasizes the importance of institutional design and participation in the collaborative process (Ansell & Gash, 2008). Accordingly, the Lake Limboto collaborative forum needs to be designed with a clear division of roles, coordination mechanisms, and participation space for all stakeholders.

Strengthening the Institutional Capacity of Lakeside Communities

The low participation of the Lake Limboto lakeside community in the spatial planning of the strategic area, as found in the study in Hutadaa Village (Basalama & Sumanto, 2024), indicates the need for a systematic capacity-building program, namely improving environmental literacy, mentoring fisher and fish farmer groups, and involving community leaders as partners in supervising spatial use. This capacity building is in line with the elements of *shared understanding* and *intermediate outcomes* in the collaborative process model, in which small successes felt directly by the community, for example improved fish catches following the normalization of part of the lake area, can strengthen the community's commitment to the next stage of collaboration.

The capacity-building program should ideally not stop at one-way training or socialization but be continued through the formation of a *community working group* with a real role in monitoring the use of lake space. Such a group could be involved in reporting potential spatial planning violations, such as the construction of buildings in the lake's riparian zone or resource use practices that may damage the ecosystem. This involvement could change the position of the community from a mere recipient of policy information into an active partner in the management and supervision of lake resources. This approach is in line with the principle of *co-management*, which positions the community as one of the important actors in managing shared resources and encourages the sharing of roles and responsibilities between the government and the community (Partomo et al., 2011).

Adaptive and Networking Governance for Long-Term Sustainability

Following the recommendations of the dissertation study on saving Lake Limboto, the application of *adaptive governance* combined with *networking governance* can broaden the base of collaboration to include the private sector and academia, for example through corporate social responsibility (CSR) funding for lake normalization, joint research on environmental carrying capacity, and participatory, citizen-based water quality monitoring (*citizen science*). Transparent joint monitoring and evaluation mechanisms are needed so that collaboration outcomes can be measured periodically and institutions can be adjusted as the lake's ecological conditions change, consistent with the principle of adaptive learning in the integrative framework (Emerson et al., 2012). The involvement of local universities, as pioneered through academic research on Lake Limboto, can be formalized through a *research-to-policy partnership* scheme, in which universities act as providers of independent data and analysis trusted by all parties, as well as neutral facilitators who bridge the interests of the government and the community, whose positions often differ. The role of a neutral facilitator is important given that facilitative leadership has been identified as one of the key themes that remains weak in the management practice of Lake Limboto to date.

Cross-Sector and Cross-Level Regulatory Harmonization

Finally, given the weak integration and harmonization of regulations found in the study of the political ecology of Lake Limboto policy, synchronization is needed between the Regional Regulation on the Spatial Plan for the Lake Limboto Provincial Strategic Area and the regulations of the forestry and agriculture sectors and the spatial plans of the surrounding regencies/cities (Hasim, 2018). Institutional and policy fragmentation in water resource governance can cause coordination problems and implementation gaps (Pambudi & Pramujo, 2026). Therefore, regulations for the Lake Limboto area need to be aligned with sectoral policies as well as the spatial plans of the surrounding regencies/cities.

Harmonization also needs to be supported by a clear division of authority and legal umbrella for inter-regional collaboration. The absence of a legal umbrella can become an obstacle to implementing collaborative governance in cross-regional water resource management. Thus, clear rules, division of roles, and coordination mechanisms are needed so that collaboration in managing Lake Limboto can proceed consistently and sustainably (Ansell & Gash, 2008).

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Implementation Roadmap

Table 3. The five implications above can be arranged into a phased roadmap so that they can be realistically adopted by stakeholders, as summarized

Stage	Focus of Activities	Main Driving Actors
Short Term (0–1 year)	Participatory demarcation of the lake boundary, inventory of stakeholders, socialization across the lakeside villages/sub-districts	Gorontalo Provincial Government, BPN (National Land Agency), Regency/City Governments
Medium Term (1–3 years)	Establishment of a cross-jurisdictional collaborative forum based on a memorandum of understanding, development of joint monitoring mechanisms, capacity-building programs for lakeside communities	Joint forum of the Province, Regency, and City; civil society organizations; universities
Long Term (3–5 years and beyond)	Cross-sector regulatory harmonization, institutionalization of *adaptive* and *networking governance*, longitudinal evaluation of collaboration outcomes	All stakeholders (government, community, private sector, academia)

This roadmap is indicative and needs to be adjusted to the results of agreements among stakeholders, given that one of the basic principles of *collaborative governance* is that its processes and outcomes must be formulated collectively, not determined unilaterally by any single actor, including researchers or donor institutions.

Limitations and Future Research

This *systematic literature review* identified five main themes in the *collaborative governance* literature for sustainable lake management, namely starting conditions, formal institutional design, facilitative leadership, iterative collaborative processes, and outcomes/adaptive learning. These five themes are interrelated and form a dynamic collaborative governance regime, as formulated in the frameworks of Ansell and Gash (2008) and Emerson et al. (2012).

When reflected on the case of Lake Limboto, these findings affirm that the lake's ecological crisis cannot be separated from a governance crisis, namely weak boundary demarcation, overlapping authority among regions, inadequate regulatory harmonization, and low participation of lakeside communities. This study recommends five strategic steps: participatory demarcation of the lake boundary; the establishment of a permanent, legally grounded cross-jurisdictional collaborative forum; strengthening the institutional capacity of lakeside communities; the application of *adaptive* and *networking governance* involving the private sector and academia; and cross-sector and cross-level regulatory harmonization.

This study has limitations in that its database coverage is focused on openly accessible literature in Indonesian and English, so it may not include all relevant studies published in paid databases. Future research is advised to conduct *empirical-longitudinal* studies that specifically measure the dynamics of the collaborative process (*trust building*, *shared understanding*, *intermediate outcomes*) in the Lake Limboto management forums that have been or will be established, so that the effectiveness of *collaborative governance* can be evaluated in a more measurable and evidence-based manner.

More broadly, this study affirms that saving Lake Limboto is ultimately not merely a matter of the technical engineering of sediment dredging or the physical normalization of the lake, but also a matter of institutional governance that involves reordering relations of authority, trust, and shared commitment among stakeholders. Without improvements in this institutional dimension, technical interventions of any scale risk being only temporary solutions that fail to address the root of governance problems that have persisted for several decades.

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