

## Building Community Resilience through Adaptive Governance: An Institutional Approach in Gorontalo

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### ABSTRACT

**Purpose:** This study aims to examine the role of adaptive governance in strengthening community resilience in Gorontalo, Indonesia, particularly in communities surrounding Lake Limboto that are vulnerable to environmental degradation, flooding, and socio-economic challenges. The study focuses on governance effectiveness, stakeholder participation, institutional responsiveness, and resilience-building strategies within local communities.

**Subjects and Methods:** This study employed a quantitative research approach using a descriptive survey design. Data were collected from 200 respondents selected through purposive sampling techniques in communities surrounding Lake Limboto. Structured questionnaires using Likert-scale measurements were distributed to assess perceptions regarding adaptive governance, institutional capacity, public participation, flood risk awareness, and community resilience. The collected data were analyzed using descriptive statistical analysis, including frequencies, percentages, mean scores, standard deviations, and reliability testing with SPSS software.

**Results:** The findings indicate that community participation and social capital recorded relatively high mean scores, demonstrating strong public involvement in environmental governance and resilience-building activities. Trust in local institutions was also relatively high, although respondents perceived governance responsiveness and policy implementation as moderate. Stakeholder collaboration between local governments and civil society organizations contributed positively to governance effectiveness, while institutional coordination, resource limitations, and weak policy responsiveness remained major challenges. Adaptive governance also improved institutional capacity, environmental sustainability, and social cooperation within communities.

**Conclusions:** Adaptive governance contributes significantly to strengthening community resilience in Gorontalo through participatory governance, stakeholder collaboration, and institutional development. However, improving policy responsiveness, institutional coordination, and sustainable environmental management remains essential to enhance long-term resilience and governance sustainability.

### INTRODUCTION

In recent years, communities around the world have faced numerous challenges, ranging from environmental disasters to social and economic crises. One of the most pressing issues in this regard is the ability of communities to adapt to these challenges and build resilience in the face of adversity. Resilience, in this context, refers to the capacity of a community to withstand,

recover from, and ultimately thrive in the wake of disruptions. The ability to adapt and recover is influenced by a variety of factors, including the community's governance structures, the effectiveness of its institutions, and the strength of its social fabric (Carmen et al., 2022; Masud-All-Kamal & Monirul Hassan, 2018). In this regard, adaptive governance has emerged as a key approach for fostering resilience, particularly in areas vulnerable to climate change, natural disasters, and socio-economic shifts.

Adaptive governance, in essence, refers to a system of governance that is flexible, responsive, and capable of adjusting to changing conditions. According to Kaur et al. (2025), it emphasizes collaboration, learning, and the ability to adjust policies and strategies based on new information or evolving circumstances. For communities to build resilience, adaptive governance needs to be embedded within local institutions, where decision-making processes are inclusive, transparent, and participatory. In this sense, institutions play a central role in enabling communities to cope with change and navigate uncertainties (Chauhan, 2024). The institutional approach, which focuses on the structures, rules, and practices that govern community interactions, is crucial for understanding how adaptive governance can be implemented effectively (DeCaro et al., 2017).

Gorontalo, a province located on the northern tip of Sulawesi Island in Indonesia, provides an interesting case study for examining the role of adaptive governance in community resilience. Fisher et al. (2017), this region is characterized by its unique geography, a mix of coastal and mountainous areas, and a population that relies heavily on agriculture and fisheries for their livelihoods. Gorontalo is particularly vulnerable to environmental risks such as floods, landslides, and climate-related events, which makes it an ideal setting for studying how communities adapt to and recover from such challenges. Yuan et al. (2008) said that, the province has also been the site of significant social changes, with growing urbanization, demographic shifts, and increased demand for local resources putting pressure on traditional governance systems.

In response to these challenges, Gorontalo has been exploring ways to strengthen its governance framework, particularly through adaptive governance practices that emphasize community involvement, local knowledge, and flexible decision-making. This approach acknowledges that traditional, top-down models of governance may not be sufficient in the face of rapidly changing conditions. Instead, adaptive governance requires that communities themselves play a more active role in decision-making, recognizing their unique needs, priorities, and capacities (DeCaro et al., 2017; Dressel et al., 2020). By involving local actors, including community leaders, civil society organizations, and government agencies, adaptive governance can create a more inclusive and responsive governance system.

Building community resilience through adaptive governance involves fostering an environment where local institutions are able to respond to crises in a way that minimizes harm and facilitates recovery. This requires the development of strong institutional frameworks that can effectively coordinate responses to emergencies, while also promoting long-term sustainable development. Local governance systems must be able to integrate scientific knowledge with indigenous knowledge, balancing technical expertise with cultural and social norms. This fusion of knowledge is crucial for ensuring that governance strategies are relevant, effective, and acceptable to the local community.

The institutional approach to adaptive governance highlights the importance of the relationships between various actors within the governance system (Wang et al., 2018). In Gorontalo, the role of local institutions such as village councils, local government agencies, and traditional leaders has been pivotal in shaping the community's ability to respond to challenges. These institutions have the potential to build social capital by fostering trust, cooperation, and communication between different stakeholders. The involvement of local institutions in the decision-making process ensures that governance is grounded in the realities of the community, making it more likely that resilience-building efforts will be embraced and supported by the population.

At the heart of adaptive governance is the principle of learning. For communities to become more resilient, they must be able to learn from past experiences and incorporate those lessons into future actions. This continuous learning process is facilitated by institutions that encourage feedback, reflection, and the sharing of knowledge. In Gorontalo, mechanisms for monitoring and

evaluating resilience-building initiatives have been established to track progress, identify gaps, and adjust strategies accordingly. This adaptive learning process not only improves the effectiveness of resilience-building efforts but also strengthens the governance system itself.

In the context of Gorontalo, community resilience is closely linked to the capacity of local institutions to manage natural resources sustainably. The province's economy is heavily dependent on agriculture, fisheries, and forestry, all of which are vulnerable to climate change. Adaptive governance in Gorontalo involves integrating climate change adaptation strategies into local development planning, while ensuring that the rights and needs of local communities are prioritized. The challenge lies in balancing environmental sustainability with the socio-economic well-being of the population, ensuring that the benefits of development are equitably distributed (Hariram et al., 2023; Henderson & Loreau, 2023).

The role of government agencies in supporting adaptive governance is also crucial. In Gorontalo, local government institutions have made efforts to strengthen their capacity to manage disaster risks, promote sustainable development, and enhance community resilience. However, the success of these efforts depends on the active participation of community members and the alignment of local government policies with the needs of the people (Lee & Kim, 2018). It is essential for government institutions to work in partnership with local communities, recognizing that they possess valuable knowledge and insights into the challenges they face. This collaborative approach can lead to more effective governance, where policies are better suited to local realities and can be more easily implemented.

In addition to government and local institutions, civil society organizations (CSOs) also play a significant role in building community resilience. CSOs in Gorontalo have been involved in a range of initiatives aimed at strengthening adaptive governance, from community-based disaster risk management programs to environmental conservation efforts. These organizations often serve as bridges between the community and the government, facilitating communication, advocacy, and capacity-building. By empowering local communities to take an active role in governance, CSOs contribute to the development of a more resilient and adaptive society.

The involvement of women and marginalized groups in governance processes is crucial for ensuring that resilience-building efforts are inclusive. In Gorontalo, women's participation in decision-making has been recognized as an essential component of adaptive governance. Women, who are often the primary caregivers and managers of household resources, have unique insights into the challenges faced by communities and are vital agents of change. According to Lwamba et al. (2022), Promoting gender equality in governance structures helps to ensure that the needs of all community members are addressed, fostering a more inclusive and sustainable approach to resilience building.

Building community resilience through adaptive governance requires a multi-faceted approach that integrates local knowledge, inclusive decision-making, and effective institutional frameworks. In Gorontalo, the application of adaptive governance is an ongoing process, with local institutions and communities working together to address the challenges posed by environmental, social, and economic changes. By fostering an environment of collaboration, learning, and flexibility, Gorontalo can continue to build resilience, ensuring that its communities are better equipped to withstand future challenges. Through this institutional approach, the province can serve as a model for other regions facing similar challenges, demonstrating the power of adaptive governance in building sustainable and resilient communities.

## **METHODOLOGY**

### **Research Design**

This study employed a quantitative research approach using a descriptive survey design to examine the role of adaptive governance in strengthening community resilience in Gorontalo, Indonesia, particularly in the management of Lake Limboto. A quantitative approach was considered appropriate because the study focused on measuring public perceptions regarding governance effectiveness, institutional capacity, adaptive strategies, and resilience conditions through numerical data analysis. The descriptive survey design enabled the researchers to

identify trends, patterns, and levels of community responses related to adaptive governance practices and institutional resilience in environmentally vulnerable areas.

### **Research Setting and Participants**

The research was conducted in communities surrounding Lake Limboto, Gorontalo Province, Indonesia. The area was selected because Lake Limboto faces various environmental challenges, including flooding, sedimentation, ecosystem degradation, and climate-related risks that directly affect local livelihoods and socio-economic stability. These environmental pressures make the region highly relevant for assessing the effectiveness of adaptive governance and community resilience strategies. The study population consisted of local residents living in communities affected by environmental changes around Lake Limboto. Respondents included household representatives, community members involved in environmental activities, and individuals with knowledge of local governance and disaster management practices. The sample was selected using purposive sampling techniques to ensure that participants possessed relevant experience and understanding regarding governance implementation and environmental adaptation. A total of 200 respondents participated in the survey process.

### **Data Collection Techniques**

Data were collected using structured questionnaires distributed directly to respondents in selected communities around Lake Limboto. The questionnaire was designed using Likert-scale measurements to assess respondents' perceptions regarding adaptive governance, institutional effectiveness, public participation, flood risk awareness, adaptive capacity, and community resilience. Several indicators examined in the questionnaire included stakeholder involvement, trust in local institutions, policy responsiveness, institutional flexibility, knowledge sharing, social capital, environmental sustainability, and institutional challenges affecting governance implementation. The questionnaire instrument was developed based on the conceptual framework of adaptive governance and community resilience discussed in previous studies. Prior to data collection, the questionnaire was reviewed to ensure that the questions were clear, relevant, and consistent with the objectives of the study. The survey process was conducted over several weeks to obtain sufficient responses representing the conditions of communities surrounding Lake Limboto.

### **Data Analysis Technique**

The quantitative data obtained from the survey were analyzed using descriptive statistical analysis. This analysis aimed to summarize and interpret respondents' perceptions regarding governance effectiveness, adaptive capacity, institutional barriers, and resilience conditions within the community. The descriptive analysis included the calculation of frequencies, percentages, and mean scores to identify dominant trends and response patterns among participants. The findings were presented in tables and figures to facilitate the interpretation of governance conditions and resilience indicators in Gorontalo. The analysis process was conducted using Microsoft Excel and SPSS software to ensure the accuracy and consistency of the statistical calculations. Through descriptive statistical analysis, the study was able to provide an overview of the strengths and limitations of adaptive governance practices in supporting community resilience around Lake Limboto. This study adhered to ethical research principles throughout the research process. All respondents participated voluntarily and were informed about the objectives of the study before completing the questionnaire. Participants were assured that their personal information and responses would remain confidential and would only be used for academic purposes. The research also emphasized informed consent, anonymity, and the responsible use of data to maintain the integrity and credibility of the study.

## **RESULTS AND DISCUSSION**

Before conducting the descriptive statistical analysis, a reliability test was performed to evaluate the internal consistency of the research instrument. Cronbach's Alpha analysis was used to assess the reliability of the questionnaire items related to adaptive governance, institutional capacity, public participation, and community resilience.

Table 1. Reliability Statistics

Variable	Number of Items	Cronbach's Alpha	Interpretation
Adaptive Governance	8	0.821	Reliable
Community Participation	6	0.804	Reliable
Institutional Capacity	7	0.793	Reliable
Community Resilience	10	0.847	Highly Reliable
Flood Risk Awareness	5	0.776	Reliable

Source: Processed SPSS Data, 2025

The results presented in Table 1 indicate that all research variables obtained Cronbach's Alpha values above 0.70, demonstrating that the questionnaire instrument possessed acceptable reliability and internal consistency. The highest reliability value was found in the community resilience variable (0.847), indicating strong consistency among the questionnaire items used to measure resilience dimensions within the community.

### Community Perceptions of Adaptive Governance

The quantitative findings indicate that public awareness regarding adaptive governance in communities surrounding Lake Limboto was relatively high. Most respondents demonstrated an understanding of the importance of institutional coordination, public participation, and environmental adaptation in strengthening community resilience. The findings also revealed that while respondents generally trusted local institutions, levels of satisfaction with governance implementation and policy responsiveness remained moderate. These findings suggest that communities recognize the importance of adaptive governance but still perceive several limitations in the implementation of governance programs. Descriptive statistical analysis was conducted to identify the general distribution of respondents' perceptions regarding adaptive governance, institutional effectiveness, public participation, and community resilience in Gorontalo.

Table 2. Descriptive Statistics of Research Variables

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Adaptive Governance	200	2.00	5.00	3.87	0.642
Institutional Capacity	200	2.00	5.00	3.54	0.711
Community Participation	200	1.00	5.00	4.02	0.587
Flood Risk Awareness	200	2.00	5.00	3.76	0.695
Environmental Sustainability	200	2.00	5.00	3.69	0.624
Social Capital	200	2.00	5.00	3.95	0.603

Source: Processed SPSS Data, 2025

The descriptive statistical results indicate that community participation obtained the highest mean score ( $M = 4.02$ ;  $SD = 0.587$ ), suggesting that respondents perceived local participation as an important component of adaptive governance implementation. Social capital also demonstrated a relatively high mean value ( $M = 3.95$ ), indicating the presence of strong social cooperation and community engagement within the study area. In contrast, institutional capacity recorded a comparatively lower mean score ( $M = 3.54$ ), reflecting respondents' concerns regarding institutional responsiveness and governance effectiveness in addressing environmental challenges.

Table 3. Mean Score Interpretation

Mean Range	Interpretation
1.00 – 1.80	Very Low
1.81 – 2.60	Low
2.61 – 3.40	Moderate
3.41 – 4.20	High
4.21 – 5.00	Very High

Source: Adapted from Likert Scale Interpretation, 2025

The mean score interpretation was used to classify respondents' perceptions regarding governance effectiveness, institutional capacity, and community resilience dimensions. The interpretation categories facilitated the analysis of the overall tendency of respondents' responses within the descriptive statistical analysis.

Table 4. Community Perceptions of Adaptive Governance

Perception Category	Frequency (n)	Percentage (%)
Awareness of Adaptive Governance	130	65.0
Trust in Local Institutions	140	70.0
Satisfaction with Governance Practices	120	60.0
Perceived Governance Effectiveness	110	55.0
Perception of Community Participation	128	64.0
Perceived Transparency in Governance	118	59.0

Source: Survey Data Processed, 2025

Demonstrate that trust in local institutions recorded the highest percentage (70.0%), indicating that respondents generally perceived local institutions as important actors in managing environmental challenges around Lake Limboto. Awareness regarding adaptive governance also showed a relatively high percentage (65.0%), suggesting that communities have become increasingly familiar with governance approaches related to environmental adaptation and resilience-building. The level of perceived governance effectiveness remained relatively moderate (55.0%). This finding indicates that despite increasing awareness and trust, respondents still considered governance implementation to be insufficiently responsive to environmental and socio-economic challenges. Transparency in governance practices was perceived as moderate, reflecting the need for stronger communication and accountability mechanisms between local institutions and communities. The findings also indicate that community participation has become an important aspect of governance implementation in Gorontalo. More than half of the respondents perceived that local-residents were actively involved in environmental programs, public discussions, and resilience-building activities related to flood management and ecosystem protection.

### Stakeholder Involvement in Adaptive Governance

The study also examined the involvement of stakeholders in adaptive governance practices surrounding Lake Limboto. Stakeholder participation is considered essential because adaptive governance requires collaboration between government institutions, civil society organizations, academic institutions, and local communities to address environmental challenges effectively.

Table 5. Stakeholder Involvement in Lake Limboto Management

Stakeholder Group	Level of Involvement	Main Activities
Local Government	High	Policy formulation and environmental management
Community Leaders	Moderate	Community mobilization and public education
Civil Society Organizations	High	Environmental advocacy and monitoring
Private Sector	Low	Limited support for sustainability programs
Academic Institutions	Moderate	Research and community capacity building

Source: Survey Data Processed, 2025

The findings indicate that local governments and civil society organizations demonstrated the highest levels of involvement in adaptive governance activities. Local governments were primarily responsible for environmental policy formulation, disaster management coordination, and resource allocation. Civil society organizations contributed significantly through environmental advocacy, awareness campaigns, and monitoring activities. The private sector demonstrated relatively limited participation in governance activities related to environmental sustainability.

This finding suggests that adaptive governance efforts in Gorontalo still rely heavily on public institutions and civil society actors rather than private investment and partnership initiatives.

Community leaders and academic institutions were identified as having moderate involvement in governance activities. Community leaders played an important role in mobilizing local participation and facilitating communication between communities and local institutions, while academic institutions contributed through research, training, and environmental education programs. The findings suggest that stakeholder collaboration has contributed positively to adaptive governance implementation. Stronger integration between stakeholder groups remains necessary to improve governance coordination and long-term environmental resilience.

### Adaptive Capacity and Institutional Responsiveness

The study further examined the adaptive capacity of local governance systems in responding to environmental and socio-economic challenges in Gorontalo. Adaptive capacity refers to the ability of institutions and communities to adjust policies, mobilize resources, and respond effectively to environmental risks. Table 6 presents the descriptive statistical results regarding adaptive capacity indicators.

Table 6. Adaptive Capacity Indicators

Indicator	Mean Score (1–5)	Interpretation
Institutional Flexibility	3.2	Moderate
Resource Mobilization	4.0	High
Knowledge Sharing	3.1	Moderate
Community Participation	4.1	High
Policy Responsiveness	2.8	Low

Source: Survey Data Processed, 2025

The findings show that community participation obtained the highest mean score (4.1), indicating that local residents actively participated in resilience-building activities, environmental programs, and public decision-making processes. Resource mobilization also demonstrated a relatively high score (4.0), suggesting that local institutions were moderately capable of allocating financial and organizational resources to support governance programs. Policy responsiveness recorded the lowest mean score (2.8), indicating that respondents perceived governance responses to environmental challenges as relatively slow and less adaptive. Institutional flexibility and knowledge sharing were categorized as moderate, reflecting the need for stronger institutional learning mechanisms and improved communication among stakeholders. These findings indicate that while adaptive governance in Gorontalo has developed several positive capacities, institutional responsiveness and policy adaptation remain significant areas requiring improvement.

### Flood Risk Awareness and Community Preparedness

Flooding remains one of the major environmental risks affecting communities surrounding Lake Limboto. Therefore, the study examined public awareness regarding flood risks and preparedness measures implemented at the community level. The study also examined respondents' levels of awareness regarding flood risks and disaster preparedness in communities surrounding Lake Limboto.

Table 7. Frequency Distribution of Flood Risk Awareness

Awareness Level	Frequency	Percent	Valid Percent	Cumulative Percent
High	100	50.0	50.0	50.0
Moderate	60	30.0	30.0	80.0
Low	40	20.0	20.0	100.0
Total	200	100.0	100.0	—

Source: Processed SPSS Data, 2025

Table 3 shows that 50.0% of respondents demonstrated high awareness regarding flood risks and preparedness measures. Meanwhile, 30.0% of respondents possessed moderate awareness, while 20.0% demonstrated relatively low awareness. These findings indicate that although public understanding regarding disaster risks has improved, several communities still require additional environmental education and preparedness training programs to strengthen resilience capacities.

### Institutional Challenges in Adaptive Governance

The study also identified several institutional barriers affecting the implementation of adaptive governance in Gorontalo. Respondents were asked to evaluate the primary challenges limiting governance effectiveness and resilience-building initiatives.

Table 8. Institutional Challenges in Adaptive Governance

Institutional Challenge	Frequency (n)	Percentage (%)
Lack of Coordination	90	45.0
Insufficient Resources	80	40.0
Limited Public Participation	70	35.0
Inadequate Policy Frameworks	60	30.0

Source: Survey Data Processed, 2025

The findings indicate that lack of coordination among institutions represented the most significant challenge affecting adaptive governance implementation (45.0%). Respondents emphasized that overlapping responsibilities and weak inter-agency communication often reduced the effectiveness of environmental management programs. Insufficient resources were identified as another major challenge (40.0%), particularly regarding financial support, technical expertise, and institutional infrastructure. Limited public participation and inadequate policy frameworks were also perceived as important barriers affecting governance effectiveness. These findings demonstrate that adaptive governance in Gorontalo continues to face institutional limitations despite ongoing efforts to improve resilience and environmental management. Strengthening institutional coordination, increasing resource allocation, and improving participatory governance mechanisms are therefore essential to enhance governance effectiveness.

### Impact of Adaptive Governance on Community Resilience

The study further examined the perceived impact of adaptive governance on different dimensions of community resilience. Respondents evaluated how governance practices contributed to strengthening social, economic, environmental, and institutional resilience.

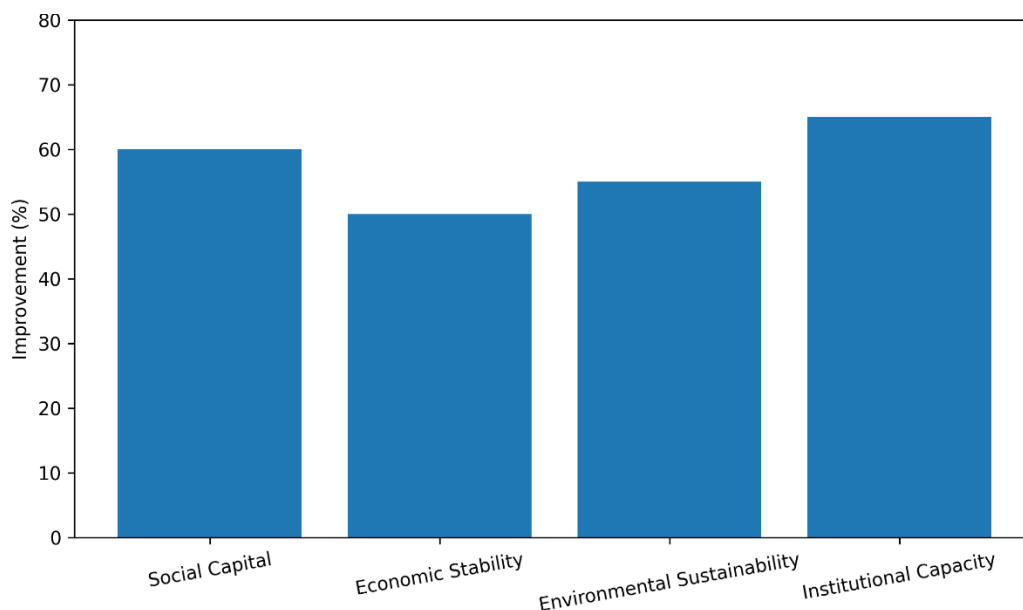


Figure 1. Impact of Adaptive Governance on Community Resilience

The results indicate that institutional capacity experienced the highest level of perceived improvement (65.0%). Respondents believed that adaptive governance practices had strengthened institutional coordination, governance awareness, and public engagement in environmental management activities. Social capital also demonstrated relatively high improvement levels (60.0%), indicating that governance programs contributed positively to community cooperation, social trust, and collective action. Environmental sustainability showed moderate improvement (55.0%), reflecting increasing public awareness regarding environmental protection and ecosystem management. Economic stability recorded the lowest improvement percentage (50.0%), suggesting that despite governance improvements, many communities still face economic vulnerability due to environmental risks and limited livelihood diversification. The findings demonstrate that adaptive governance has contributed positively to strengthening community resilience in Gorontalo. Governance effectiveness remains dependent on stronger institutional coordination, policy responsiveness, public participation, and sustainable environmental management strategies.

## **Discussion**

### ***Adaptive Governance and Community-Based Institutional Strengthening***

The findings of this study demonstrate that adaptive governance has become an important institutional mechanism for strengthening community resilience in Gorontalo, particularly in communities surrounding Lake Limboto. The relatively high levels of public trust in local institutions and community participation indicate that governance processes are increasingly recognized as essential components of environmental adaptation and resilience-building efforts (Seduikyte et al., 2025; Sienkiewicz-Małyjurek, 2022). This condition suggests that local governance systems have gradually developed greater legitimacy within the community, especially in addressing environmental risks such as flooding, ecosystem degradation, and resource management challenges.

The strong perception of community participation also reflects the growing importance of collaborative governance approaches in environmental management (Newig et al., 2018; Lindgren et al., 2021; McNaught, 2024). Communities no longer function solely as passive beneficiaries of government programs but are increasingly involved in local discussions, environmental monitoring activities, and disaster preparedness initiatives. This finding supports the argument that adaptive governance is most effective when decision-making processes are participatory and capable of integrating local knowledge with institutional planning. In the context of Gorontalo, participation appears to strengthen not only governance effectiveness but also social cohesion and collective responsibility among residents.

Nevertheless, the moderate perception of governance effectiveness indicates that institutional trust does not automatically translate into satisfaction with policy implementation. Respondents acknowledged the importance of governance institutions but still perceived several weaknesses in policy responsiveness and implementation consistency. This gap highlights the challenge faced by many local governance systems in developing countries, where institutional structures may exist formally but often experience limitations in coordination, communication, and operational capacity. As a result, governance systems may struggle to respond quickly and effectively to rapidly changing environmental conditions.

The findings further reveal that adaptive governance in Gorontalo is strongly influenced by the interaction between multiple stakeholders, including local governments, civil society organizations, community leaders, and academic institutions. The high level of involvement demonstrated by government institutions and civil society organizations suggests that environmental governance around Lake Limboto has become increasingly collaborative. This collaborative structure is important because environmental problems are multidimensional and cannot be addressed effectively by a single institution alone.

Civil society organizations were found to play a particularly significant role in environmental advocacy, awareness campaigns, and monitoring activities. Their involvement contributes to strengthening public engagement and increasing transparency in governance processes. In many local contexts, civil society organizations function as intermediaries between communities and

formal institutions, helping to bridge communication gaps and promote accountability. The active participation of these organizations in Gorontalo indicates that non-governmental actors have become essential contributors to adaptive governance implementation.

The limited involvement of the private sector remains a significant institutional weakness. Environmental governance initiatives continue to rely heavily on government funding and civil society support, while private investment in sustainability programs remains relatively low. This condition may reduce the long-term sustainability of resilience-building initiatives, particularly when public resources are limited. Increasing private sector participation through environmental partnerships, sustainable investment programs, and corporate social responsibility initiatives could therefore strengthen the overall governance framework and improve long-term institutional resilience (Zhao, 2021; Owojori & Erasmus, 2025; Khalfi & Bami, 2025).

The findings also suggest that academic institutions possess untapped potential in supporting adaptive governance. Although universities and research institutions have contributed through research and capacity-building activities, their role in policy formulation and community-based innovation remains relatively moderate. Stronger collaboration between academic institutions and local governments could improve evidence-based policymaking and facilitate the development of more adaptive environmental management strategies.

### ***Adaptive Capacity and Institutional Responsiveness***

One of the most important findings of this study concerns the imbalance between community participation and institutional responsiveness. Although community participation achieved a high mean score, policy responsiveness remained comparatively low. This indicates that local communities are willing to engage actively in environmental governance, but institutional systems may not yet possess sufficient flexibility to respond effectively to public needs and environmental changes.

The relatively low score for policy responsiveness reflects broader institutional challenges frequently observed in adaptive governance systems. According to Mees & Driessen (2019), governance institutions often operate through bureaucratic procedures that limit rapid decision-making and reduce the ability to adapt policies in response to emerging environmental risks. In the context of Lake Limboto, delayed responses to flooding, environmental degradation, and infrastructure challenges may contribute to public perceptions that governance systems remain insufficiently adaptive.

Institutional flexibility and knowledge sharing also recorded moderate scores, indicating that governance systems still require stronger institutional learning mechanisms. Adaptive governance depends heavily on the ability of institutions to learn from past experiences, integrate new information, and adjust governance strategies continuously (Van et al., 2019; Carlisle & Gruby, 2019). Weak communication between institutions and limited cross-sectoral coordination may hinder this learning process, reducing institutional effectiveness in responding to environmental uncertainty.

At the same time, the relatively high score for resource mobilization demonstrates that local institutions possess some capacity to allocate financial and organizational resources for governance activities. Resource availability alone is insufficient if not accompanied by effective coordination, transparency, and institutional responsiveness. Therefore, strengthening adaptive governance requires not only additional resources but also institutional reforms that improve flexibility, collaboration, and accountability mechanisms.

The findings regarding flood risk awareness indicate that environmental education and disaster preparedness efforts have produced positive impacts within communities surrounding Lake Limboto. Half of the respondents demonstrated high awareness regarding flood risks and emergency preparedness measures, suggesting that environmental campaigns and public awareness programs have increased community understanding of local environmental threats (Diakakis et al., 2018; Ezugwu & Okpoko, 2025).

The presence of respondents with moderate and low awareness levels indicates that disaster preparedness remains uneven across different social groups and communities. This disparity may

reflect differences in access to information, educational background, geographic vulnerability, and levels of community engagement. Communities located in remote or economically vulnerable areas may possess fewer opportunities to participate in environmental training and disaster preparedness activities, increasing their vulnerability during environmental emergencies.

The findings suggest that improving community resilience requires more inclusive and continuous environmental education strategies. Public awareness campaigns should not only focus on increasing knowledge but also encourage practical preparedness behaviors, such as evacuation planning, emergency response coordination, and community-based disaster management activities (Rizal et al., 2025; Abid & ul, 2025). Adaptive governance becomes more effective when communities possess both institutional support and practical capacities to respond independently during environmental crises.

Flood preparedness should be integrated into broader environmental governance strategies rather than treated as a separate disaster management activity. Flood risks around Lake Limboto are closely linked to environmental degradation, sedimentation, and unsustainable land use practices. Consequently, resilience-building efforts should combine disaster preparedness with long-term ecosystem management and environmental conservation policies.

### ***Institutional Constraints and Governance Sustainability***

Despite several positive governance developments, the findings demonstrate that adaptive governance in Gorontalo continues to face substantial institutional barriers. Lack of coordination emerged as the most significant challenge affecting governance effectiveness. Weak coordination among government agencies often creates overlapping responsibilities, fragmented policies, and inefficient environmental management programs. These institutional problems reduce the ability of governance systems to respond effectively to environmental and socio-economic challenges.

Insufficient resources were also identified as a major obstacle limiting governance performance. Yoseph-Paulus & Hindmarsh (2018) said that, financial limitations, shortages of technical expertise, and inadequate institutional infrastructure reduce the capacity of local governments to implement comprehensive adaptation programs. In many developing regions, environmental governance remains constrained by dependence on short-term project funding rather than sustainable institutional investment. As a result, many resilience-building initiatives struggle to achieve long-term continuity.

Limited public participation and inadequate policy frameworks further weaken governance sustainability (Menon & Hartz-Karp, 2019; Zhang et al., 2019; Merino, 2018). Although participation levels were generally perceived as high, not all community groups possess equal opportunities to influence decision-making processes. Marginalized populations may still face barriers in accessing governance forums and environmental information. Similarly, policy frameworks may remain insufficiently integrated across sectors, limiting the development of comprehensive environmental governance strategies.

These findings suggest that strengthening governance sustainability requires institutional reforms that improve coordination mechanisms, increase policy integration, and support inclusive participation. Adaptive governance should function not merely as a reactive environmental management system but as a long-term institutional framework capable of balancing ecological sustainability, social inclusion, and economic resilience.

The study ultimately demonstrates that adaptive governance has contributed positively to strengthening community resilience across several dimensions, particularly institutional capacity and social capital. Improved institutional coordination, stronger public engagement, and increased awareness regarding environmental risks indicate that governance reforms have produced meaningful social impacts within local communities (Yongqiang & Hadi, 2024; Liu et al., 2021; Ernst, 2019).

The relatively high improvement in social capital suggests that adaptive governance has strengthened collective action and cooperation among community members. Social trust and collaborative relationships are critical components of resilience because communities with stronger social networks are generally better equipped to respond to environmental disruptions

and recover from crises. In Gorontalo, adaptive governance appears to support the development of stronger community relationships and greater collective responsibility for environmental management.

The lower improvement observed in economic stability indicates that governance reforms alone are insufficient to address broader economic vulnerabilities. Many households surrounding Lake Limboto remain dependent on environmentally sensitive livelihoods such as fisheries and agriculture, making them highly vulnerable to climate variability and ecosystem degradation. Strengthening economic resilience therefore requires governance strategies that also promote livelihood diversification, sustainable economic development, and equitable access to environmental resources. The findings suggest that adaptive governance in Gorontalo has established a foundation for strengthening resilience, but long-term sustainability will depend on continued institutional learning, policy responsiveness, stakeholder collaboration, and inclusive community participation.

## CONCLUSION

This study concludes that adaptive governance plays a significant role in strengthening community resilience in Gorontalo, particularly in communities surrounding Lake Limboto. The findings demonstrate that public participation, social capital, and stakeholder collaboration contribute positively to governance effectiveness and resilience-building efforts. Communities generally showed high awareness regarding adaptive governance and environmental risks, while local institutions and civil society organizations were identified as key actors in environmental management and disaster preparedness activities. Nevertheless, several institutional challenges remain, including weak inter-agency coordination, limited resources, moderate institutional responsiveness, and insufficient policy integration, which continue to hinder the effectiveness of governance implementation. The study also reveals that adaptive governance has contributed positively to improving institutional capacity, environmental sustainability, and community cooperation, although economic resilience remains relatively vulnerable due to environmental pressures and limited livelihood diversification. Therefore, strengthening institutional coordination, increasing participatory governance mechanisms, improving policy responsiveness, and expanding sustainable environmental management programs are essential to enhance long-term community resilience and governance sustainability in Gorontalo.

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