



# Analysis of Adaptive Governance: Overview of the Concept of Structure in Limboto Lake Management in Indonesia

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**Abstract.** One of the features of adaptive governance to create resilience to uncertain environmental changes is structure. The concept of structure in question is a pattern between the civil, private, and Government sectors. This article aims to explain how the design was created by the coordination and synergy between the three sectors, namely the civil, private, and Government sectors in the management of Limboto Lake. This research uses a qualitative approach, with case study research and data collection techniques with in-depth interviews, observation, and FGD. The management of Lake Limboto in Gorontalo seen from the structure concept, especially related to coordination, has not shown maximum results, especially between the civil sector and the Government. Some of the programs that have been discussed together, most of which are not implemented and are not sustainable. On the other hand, the findings show that coordination within the same sector experiences problems in synergy.

**Keywords:** Adaptive Governance · Structure · Limboto Lake

## 1 Introduction

The term governance as one of the new concepts has brought the spirit that the implementation of government prioritizes the principles of synergistic governance, which is the latest study in public administration. The concept of governance was born as a reaction to the failure of the ideas of new managerialism [1], new public management [2], and new old and new public management [3], to realize a socially just and socially oriented public administration. Community interest. The concept of new managerialism from [1], in principle, assumes that the performance of the public sector can increase if managerial principles are applied as well as private companies. Several paradigms after that emerged, among others, what [4] called the new public service, then in the Public Administration literature, it is also known as the governance paradigm [4], sound governance [5], public governance [6], collaborative governance [7], adaptive governance [2], and dynamic governance [8].

Further development of this concept is that governance is a conceptual basis for administering government under normal conditions and responding to environmental changes [9]. The idea of adaptive governance emerges. The principle of adaptive governance is to apply governance principles concerning ecological changes that occur. This concept is used to explain the adaptability of governance in the face of external challenges or obstacles. The study of adaptive governance has attracted scholars, especially in responding to climate change and ecology [10, 11]. For more than a decade, Adaptive Governance (AG) has been the focus of facilitating public administration positions in environmental studies. This can be seen from the Journal article [12] entitled “A decade of adaptive governance scholarship: synthesis and future directions.” They said that adaptive governance is a form of governance related to the environment that is currently emerging more and more and is in demand by scholars and practitioners to coordinate resource management regimes in the face of the complexities and uncertainties associated with the rapidly changing environment. Although the term “adaptive governance” is not exclusively applied to the governance of socio-ecological systems, research related to adaptive governance is a significant result of the literature on resilience, socio-ecological systems, and environmental governance. They then define adaptive governance as a series of interactions between actors, networks, organizations, and institutions that emerge to pursue the desired state for a socio-ecological system [10, 13, 14].

Adaptive governance/AG has been suggested as a suitable approach for ecosystem management in a changing environment. It rests on the assumption that landscapes and seascapes need to be understood and managed as complex socio-ecological systems rather than as ecosystems alone. Adaptive governance develops the capacity to manage multiple ecosystem services and respond to changes across ecosystems and enables collaboration across various interests, sectors, and institutional settings [15]. Adaptive Governance capacity as a concept which was later born from several cross-sectoral experts in environmental, political, and public administration who then focused on how the Government’s ability to respond to ecological change issues occurred very quickly by involving related institutions and stakeholders, including civil society [14, 16, 17].

In terms of the development of studies related to AG, there are several studies with similar study areas, namely, Adaptive Management (AM), Collaborative Management (CM), and Adaptive Co-Management (ACM). Still, at least three assumptions form the basis for AG to be more up to date than the perspective of AG. Others, described by [18], argue that first, “scientific management” as the basis of the other three perspectives is inadequate in analyzing the nature of “uncertainty” inherent in the dynamics of ecosystem management; Second, the different three perspectives are challenging. To be implemented due to the short-lived political nature associated with current political cycles [19] and Third AG employs a network capable of coordinating many adaptive management learning processes across levels of government that make up the complex social system in which management objectives are set [10].

It was further stated that the uncertainty associated with global environmental changes, including climate change and significant changes in land use, environmental management systems in the future must be highly adaptive. Governance systems, mainly top-down, country-based ones, rarely match the relevant scale of ecological complexity, especially in the face of rapidly changing environmental conditions [20,

21]. Through top-down directives or command-and-control policies, centralized governance fails to provide practical solutions to highly contextual situations and often falls in attempts to coordinate governance across large-scale ecosystems across multiple jurisdictional boundaries [22]. In response to this, a growing number of bottom-up approaches to governance have emerged through local actor groups, social networks, and various collaborations. Found in the Adaptive Governance approach [23, 24].

Of the many issues regarding environmental damage currently occurring, the ecological damage in Lake Limboto, precisely in Gorontalo Regency, is an object of urgent problems to be studied. How not Lake Limboto is currently in the “rescue” phase to restore the function of the lake as a reservoir for water flow from several large rivers flowing in Gorontalo Province. Lake Limboto is in the central part of Gorontalo Province, namely in the Gorontalo City area and the Gorontalo Regency area. The current conditions regarding the problems that exist in Lake Limboto are almost the same as several lakes in Indonesia, but what is currently happening in Lake Limboto by several experts who are concerned with conducting studies and research on Lake Limboto is now considered worrying [25, 26]. The rate of silting of the lake due to erosion from rivers that empties into the lake is tremendous. In 74 years (1932–2006), Lake Limboto was reduced to 3000 hectares with an average depth of 2.5 m, from the previous area of about 7000 hectares and 30 m. The silting of the lake causes the appearance of plains, both in the middle of the lake and on the shores of the lake [27]. Lake Limboto shows visible degradation from silting, pollution, and the community’s occupation of the lake area. Limboto lake management is in dire need of serious attention in terms of centralized institutional responsibility. The basic assumption related to this statement is that the management of Lake Limboto is still partial so that both at the Central level through several related Ministries, Provincial Levels and City Regency Governments, there is a lack of synchrony in the execution of activities related to the management of Limboto Lake itself. The problem of coordination, overlapping authorities and differences in handling in terms of policies then became some of the things that became the impact of this reality.

If we return to the concept of governance, especially in the concept of adaptive governance, there are things that have not been implemented and these require answers for future solutions. As revealed by [28], that to see adaptive governance itself, it must be seen from Three features/indicators, namely the motivations/issues of each party participating in a governance; then there is a structure that focuses on discussing the coordination system that is built both at the horizontal and vertical levels and the network that looks at how the exchange of resources occurs between stakeholders in a governance. Specifically, in this article, the research looks at the management of Limboto Lake by using the structural features that exist in adaptive governance. The structure in it discusses the system of coordination and cooperation of all horizontal and vertical network dimensions. This also affects the decision-making process and networking thus, this process refers to the participation and collaboration of multi-stakeholders in sharing information and resources [29].

Several previous studies on adaptive governance have been carried out, such as by [30–32]. Each of these studies explains how adaptive governance is a concept that can be projected to address environmental resilience, the existence of an ecological system to

strategies that can be prepared in dealing with disasters. What distinguishes this article is that this article uses explicitly a structural approach that is considered more specific to see coordination issues across sectors and at various levels of authority. Specifically for the locus in this article, we look at Lake Limboto, where the condition of the existing lake is included in the 15 Priority Lakes that must be saved in Indonesia.

## 2 Methods

The implementation of this research will use a qualitative deductive approach. The main reason for this approach was chosen because this study will seek to find out, describe, and analyze the reality of the events being studied, making it easier for the authors to obtain objective data to know and understand the adaptive governance capacity in the management of Lake Limboto in Gorontalo Regency. The technique of collecting data in this study uses observation techniques, interviews, Focus Group Discussions (FGD), and related data searches regarding Limboto Lake documents, research results, and other reports. Informants who will be interviewed in this study are determined by purposive sampling by looking at the suitability of the prospective informants with the required information. Related to this, informants and key informants who have direct contact with Limboto lake management policies include Regional Research and Development Planning Agency (BAPPEDA) Province and Gorontalo Regency, Public Works and Spatial Planning Office (PUPR) Gorontalo Province; Gorontalo Regency and Provincial Environment Office, Gorontalo Regency Village Community Empowerment Office, Gorontalo Regency Fisheries and Marine Service, Gorontalo Regency Agriculture and Plantation Office, Gorontalo Regency Tourism Office, Bone Bolango Watershed and Protected Forest Management Center (BPDAS), Regional River Basin Center Sulawesi (BWSS) II Gorontalo, Biota Community, JAPESDA Gorontalo, PT. Selaras Mandiri Sejahtera (SMS), PT. Bumi Karsa, NGOs observe Lake Limboto, academics/researchers attending Lake Limboto, and several community leaders in zoning the lake area. The data processing technique used is data reduction through data categorization and classification. Then, the pattern matching analysis technique [33], where the pattern that becomes the reference is the theoretical pattern of the effectiveness of network governance, namely trust, size, goal consensus, and the nature of the task.

The data analysis technique in this study uses the Spiral model popularized by [34]. In the early stages of data collection (data collection), both primary and secondary data and data are in the form of text and images. In the second stage, the process of reading (reading) and making notes (memoing) is carried out as a reflection of several answers to research questions. In the third stage, the recorded data is described, classifying, and interpreting all data based on context and categories. The last step is to represent and visualize by making conclusions that can be made in the form of a matrix/table.

## 3 Results and Discussions

Lake Limboto is the largest lake in Gorontalo Province and is in the central part of the province. Based on the watershed approach, the geographical location of Lake Limboto is at  $122^{\circ} 42' 0.24''$  –  $123^{\circ} 03' 1.17''$  east longitude and  $0.0^{\circ} 33' 0.35''$  -  $0.0^{\circ} 47' 0$ ,



**Fig. 1.** Efforts to clean up water hyacinth in Lake Limboto (Primary Data)

49'' LU. Lake Limboto, according to [35], is an inundated lake formed because of a relatively shallow depression. In contrast to lakes generally located in the highlands, Lake Limboto is in the lowlands and on the outskirts of the Regency and City of Gorontalo. As explained earlier that Lake Limboto in Gorontalo is currently included in the 15 priority lakes to be saved because the condition of Lake Limboto has entered a critical phase. Lake Limboto functions as a provider of clean water, habitat for plants and animals, regulator of hydrological functions, prevention of natural disasters, stabilization of natural systems and processes, producer of biological natural resources, means of transportation, recreation, and sports, fishery resources (both aquaculture and capture fisheries), a source of income, flood control, and as a means of research and education. Lake Limboto is an integral part of the aquatic ecosystem that functions as a place for living organisms, with several types of organisms [25, 36, 37].

Lake Limboto is one of the natural resource assets currently owned by Gorontalo. The Limboto Lake system covers an area of 920 km<sup>2</sup>, and about 23 rivers and tributaries enter the lake. [38] stated that the catchment area of Lake Limboto is 89,000 ha with incoming sediment of 1,506,155.51 m<sup>3</sup>/yr. These conditions pose a serious threat to the extinction of the lake. These problems are caused by sedimentation issues, occupation, decreasing water quality, illegal logging in the upstream sector, illegal fishing, and the massive growth of water hyacinth [39] (Fig. 1).

The Government has carried out various kinds of efforts, ranging from revitalization, rehabilitation, conservation programs both implemented by the central Government, Gorontalo Provincial Government, and Regency/City Governments whose territory is included in the area/zoning of Lake Limboto. However, until now, these efforts have not been very successful optimally by looking at the current condition of the Lake, which is still experiencing degradation. The results of observations that researchers have carried out show that one of the obstacles to save the Lake from all the complexity of the problem is the problem of the ineffectiveness of the existing structure both from the level of authority levels vertically and between sectors that are at the same level/horizontally.

Related to structure, researchers in the context of this research take the concept/approach of adaptive governance as a guide for discussion. Adaptive governance is a concept that fits to see how a system can be built in a collaboration that involves many sectors with the same goal to anticipate how environmental changes are increasingly unpredictable [15]. As one of the features of adaptive governance expressed by Berkes (2008), the concept is a coordination model of coordination and cooperation of stakeholders to achieve goals and influence decision making. The structure is also identical

in a policy plan to see the position of actors in the implementation of network policies [40]. The structure describes the pattern of relationships seen from the role of each actor in working and interacting.

In the context of the management of Lake Limboto, the concept of this structure is, of course, an effort made by the government as the leading sector, in this case, the Regional Government in maximizing strategic steps in dealing with environmental changes that are difficult to predict, primarily related to the condition of Lake Limboto so that a collaborative approach between stakeholders' interests is prioritized. About stakeholders in the context of Lake Limboto management based on the term adaptive governance, which divides stakeholder involvement into the Government, Private and civil sectors (Communities and NGOs'S) as follows:

From the Table 1 described previously, there are several stakeholders in their respective sectors, namely the civil sector, the private sector, and the government sector. The civil sector, which is filled explicitly by the community, cannot be categorized in terms of numbers due to the diverse conditions of the community as well as academics from several campuses who continuously carry out research and empowerment activities so that the exact number cannot be identified, for NGOs from the search results. Obtained a total of 5 NGO's that are activities related to the Limboto Lake problem. For the Private Sector, from the effects of field searches, it was found that there were about 4 companies that carried out activities related to Lake Limboto. For the Government sector there were 9 OPDs in Gorontalo Regency as the leading lake management sector, and eight related agencies, both Provincial and Central Government OPDs, that passed vertical institution.

Several policies related to the Limboto Lake issue, such as the Gorontalo Regent's Decree No. 280/26/IV/2019 regarding establishing a forum for the Limboto Lake area, emphasize cross-sectoral coordination and cooperation in saving and managing Lake Limboto. In addition, another important thing is how efforts to protect Lake Limboto must be carried out by building synergy, participation, and partnership between the public and private sectors. Structures and networks support coordination and cooperation efforts in each of the horizontal and vertical dimensions of the adaptive governance dimension. The concept of structure as a social system is then conceptualized and measured as a pattern of relationships between actors [41]. The structure is identical to how the network characterizes and affects how the actors work and interact. With this pattern of relationships, we can see the structure and relationships between actors in the network. In Lake Limboto's management, structure refers to the decision-making process and network that aims to solve problems in policy implementation. Thus, this concept focuses on participation and deliberation to build a consensus to increase cooperation and coordination between various stakeholders. Because of this, the forum/platform for adaptive governance is very urgent in the context of implementing the rescue and sustainable management of Lake Limboto.

The existing platform is then sought to facilitate the primary strategy and coordination of planning and management of activities by delegates from several sectors of society (public, private, and civil society) who then represent the needs and interests of stakeholders at different levels. Coordination can also be improved with the development of social learning by transferring knowledge and new approaches in a collaborative

**Table 1.** Stakeholders in Limboto Lake Management

<b>Horizontal Dimension</b>	<b>Category</b>	<b>Institution</b>	<b>Vertical Dimension</b>	<b>Quantity</b>
<b>Civil Sector</b>	NGO's	Japesda	Regional	5
		Yayasan Biota	Regional	
		Forum DAS Limboto	Regional	
		Forum Komunikasi Pemuda Peduli) 45 Gorontalo Laskar Lahilote	Regional	
		LSM Hijau Daun	Regional	
Civil Society	Diverse	Local	Unidentified	
Academic Community	Diverse	Regional	Unidentified	
<b>Private Sector</b>	PT/CV	PT SMS	Nasional	4
		PT Bumi Karsa	Nasional	
		PT. Tamael Grup	Nasional	
		PT. Nindya Karya Gorontalo	Regional	
<b>Public Sector/ Government</b>	Leading Sector	Gorontalo Government (OPD)	Local	9
	Coordination	BWSS II	Regional	8
		BPDAS-HL	Regional	
		Dinas PU Province	Regional	
		Bappeda Province	Regional	
		BLHRD Province	Regional	
		DKP Province	Regional	
		Dinas Pariwisata Province	Regional	
		DLH Province	Regional	

Source: Research interpretation results After processing (2021)

system between the leading sector and other stakeholders at different levels. In highly complex adaptive systems, this concept also encourages discussion between sectors and the production of new knowledge. The extent to which leading sector initiatives can build forums/platforms to coordinate management activities can also indicate their level of adaptive capacity [10, 13].

Furthermore, based on the analysis results obtained during the research, both through interviews and FGDs with informants, the researchers designed the structure and network

**Table 2.** Structure and Network in Limboto Lake Management based on Adaptive Governance Dimensions

<b>Stake holders</b>	<b>Type of Cooperation</b>	<b>Type of Responsibility</b>	<b>Function</b>	<b>Resources</b>
<i>Civil</i>	Consultation and Participation	Volunteer	Monitoring and Implementation	Skills and information provider
<i>Private</i>	Contract/ Coordination	Must	Doing Revitalitation	Experts and Infrastructure
<i>Publik/Government</i>	Leading sektor, Cross-Sectoral Coordination	Must	Maker and Implementer Policy, Supervision	Policies, Budgets, Punishment

forms formed based on the perspective of adaptive governance. The involvement of multi-stakeholders in the context of saving and managing Lake Limboto can be seen from the analysis of the types of involvement, responsibilities, functions, and resources of each stakeholder (Table 2).

From the results of research on the involvement of stakeholders in efforts to save and manage Lake Limboto, it was found that the civil sector, in this case, the community and NGOs in terms of cooperation so far, has been placed as a party needed to conduct consultations as well as participate in the implementation of programs related to the management of Lake Limboto. Even though the interview results show that the civilians, especially NGOs, feel that the activities carried out are only repeated repeatedly without further concrete action. The number of discussion forums facilitated by the Regional Government so far is considered by some civil parties to have only ended in that forum. Their inputs seem to be only recorded without being followed up with other programs.

Regarding the structure that emphasizes the involvement of stakeholders, especially people who fall into the category of the public sector, there is a phenomenon that occurs in the community, especially in the Lake Limboto area, where some people feel that they have not been actively involved in the management of Lake Limboto itself so that later several emerged. A statement from the local community considers that the affairs/problems of Lake Limboto today are the affairs of the local government only, and they are only following what the provincial government will do. On the other hand, most of the Officials Government (OPD) such as the Department of Fisheries, Maritime Affairs, the Department of Community and Village Empowerment, the Department of Agriculture, and the Bappeda of Gorontalo Regency stated that the culture of the people in the Lake area is also challenging to explain regarding efforts to preserve the lake such as efforts to prohibit occupation, catching and aquaculture that is not environmentally friendly, throwing garbage around the lake, making settlements and other things that have been done by some people until now that have accelerated environmental degradation in Limboto Lake. The description of the phenomenon that has been explained

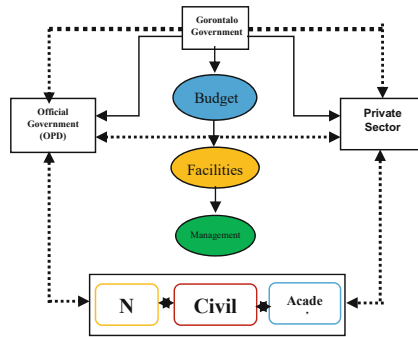


related to the synergy and coordination efforts between the civil sector and the local government still shows a less than the optimal bond in its implementation, especially from the civil sector, in this case, the community around Lake Limboto who is considered a party that contributes to environmental degradation in Lake Limboto. At the same time, the concept of adaptive governance emphasizes how the target group, in this case, the community, must be actively involved in supporting environmental resilience programs against conditions that cannot be predicted. Although in general in the context of governance, the community as a party in the category of limited authority due to the resources they have cannot necessarily be blamed because, in the context of a structural approach to the civil sector in the realm of consultation, it has an impact on the weakness of the power of this type of stakeholder in influencing decision making due to limited access to channels. Decision-making moreover disaggregating levels of capacity and the variety of issues in the civil sector directly limit the possibilities to produce new knowledge [10, 11].

Unlike the case with the civil sector, the type of involvement of the private sector in the context of Lake Limboto management has so far been more focused on the form of cooperation related to work contracts. For example, several companies such as PT SMS, PT Bumi Karsa, who have been assigned to carry out revitalization projects in the form of dredging projects, canal construction, dams, sediment control buildings, bridges, and road maintenance along the Limboto Lake area, have a cooperative relationship with the Directorate General of Water Resources and BWS Sulawesi II Gorontalo. These companies have been operating since the Limboto Lake Revitalization project was implemented in 2012 with a current budget of approximately 1 trillion Rupiah. From the observations of researchers in the field that the activities carried out by some of these companies are mainly in the procurement of heavy equipment and several other tools to revitalize the Lake area. In addition, several experts were also involved from these companies. Related to the relationship between the private sector and the civil sector around the Limboto Lake area, it also shows that there is an effort to participate by involving some communities as workers in several existing project activities, but for matters of social responsibility related to the existence of this company, which is still not going well. According to them, from the interviews with several informants when asked about the presence of Corporate Social Responsibility (CSR) funds for the surrounding community, there is no such thing until now.

The following context is the Government sector which involves several Regional Government organizations at each different level of authority. In the concept towards adaptive governance as described by [42], there will be many components involved and, of course, must be active in realizing programs designed in very complex dimensions because each has the resources to carry out the realization. The complexity of the authority that occurs in the management of Lake Limboto itself from the secondary data obtained shows that one of the things that have not been discussed until now is an integrated institutional problem.

Coordination constraints faced at the level of government authority between the Province and the City Regency are indeed a different obstacle for the effectiveness of efforts in the management of Lake Limboto, the Gorontalo Regency Government as the most significant area related to the existence of the Lake, which is 70%, then took



**Fig. 2.** Structure Design Based on Adaptive Governance Approach to Limboto Lake Management (Primary Data)

the initiative to create a Limboto Lake Area Forum. In 2019. The hope is that efforts to manage Lake Limboto can be handled more effectively. In the Regent's decision Number 280/26/IV/2019, several tasks that must be carried out by each OPD and even individuals related to lake management efforts have been divided, and things related to these tasks are almost the same as those stated implicitly. Both in Regional Regulation Number 1 of 2008 and Regional Regulation Number 9 of 2017. The picture of good inter-sectoral and cross-stakeholder coordination in the management of Limboto Lake turns out to be complex in the collaboration to save the lake. This is due to the things that have been stated previously, especially on the issue of institutional autonomy in carrying out their duties. This shows that there is no good collaboration in cross-sectoral governance in problem-solving. The concept of collaboration is essential to see this phenomenon, as stated by [43]. The ability to overcome differences constructively is necessary, so collaboration is needed in which there is an exchange of resources, cooperation, coordination, and synergy.

Suppose it is described in a simple chart regarding the management structure of Lake Limboto regarding the involvement of parties in the adaptive governance feature. In that case, the Gorontalo Regency Government plays a vital role as a leading sector for Lake Limboto management by the authority given in Regional Regulation No. 1 of 2008 regarding the management of Lake Limboto. Regional Regulation Number 9 of 2017 concerning Spatial Planning for the Lake Limboto Strategic Area, the position of this leading sector can then be utilized by the Gorontalo Regency Government by directing all OPDs related to the resources they have both in terms of budget, infrastructure facilities, and governance management (Fig. 2).

The position of the private sector is to support the Government's system to revitalize the management of the lake and to synergize with the civil sector in activities related to efforts to save the lake. Although the study results indicate that the interaction is still weak, it is hoped that it can be realized, because after all, the role of the private sector is needed. After all, it has resources that can be used, especially those related to the provision of infrastructure technology. On the other hand, the civil society sector, especially the community category, should receive special attention because apart from being one of the objects most damaged by Lake Limboto, the community also has a vital

role to play in protecting and actively participating in efforts to save the lake, with support and guidance from NGOs and education from the academic community. Communities around the Limboto Lake area/zoning can be directed to understand the conditions of the rescue and management.

## 4 Conclusion

The description of the phenomenon that has been explained related to the synergy and coordination efforts between the civil sector and the local government still shows a less than the optimal bond in its implementation, especially from the civil sector, in this case, the community around Lake Limboto who is considered a party that contributes to environmental degradation in Lake Limboto. At the same time, the concept of Adaptive Governance emphasizes how the target group, in this case, the community, must be actively involved in supporting environmental resilience programs against conditions that cannot be predicted. In the end, the concept of Adaptive Governance in terms of structure to state the readiness and preparedness of the Gorontalo Regency Government in anticipating uncertain weather changes and their impact on the environmental conditions of Lake Limboto will later be believed to be well prepared if the problems of coordination, synergy, and collaborative efforts across sectors, across levels, can find patterns standard and sustainable so that it is hoped that the Gorontalo Regency Government can show resilience in dealing with changing conditions that can occur at any time.

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