Publica: Jurnal Pemikiran Administrasi Negara
Vol 15 No. 3 | November 2023: 157-168

P-ISSN 2085-6555
E-ISSN 2715-9256

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Strategic Direction of Public Policy in Scenario Planning for Sustainable Conservation of Lake Limboto

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Received: July 7, 2023; In Revised: September 23, 2023; Accepted: November 14, 2023

Abstract

Lake Limboto, classified among the 15 national priority lakes, is undergoing a critical condition and is predicted to transform into dry land by 2035 due to an annual decrease in area of 65.89 hectares. This situation demands strategic policies that have not been fully visible or effectively implemented, necessitating a more comprehensive approach and initiative. To address these challenges, scenario planning becomes crucial. The research method employed is qualitative, focusing on "Scenario Planning for the Sustainable Conservation of Lake Limboto in Gorontalo Regency. Data were gathered through interviews, observations, and documentation, analyzed using an interactive analysis model, assisted by SWOT analysis, and PEST-Plus analysis. Serious threats to the sustainability of Lake Limboto in Gorontalo Regency emanate from three main aspects: economic, climatic, and political. The economic aspect creates an imbalance in the utilization of lake resources, requiring strengthening through training and the development of related sectors. Climatic conditions, especially the rise in air temperature, pose a serious threat that necessitates scenario planning and in-depth risk analysis. The political aspect indicates a lack of attention to lake preservation, requiring political commitment, resource allocation, and community participation. Despite the use of the TAIDA Approach (Tracking, Analyzing, Imaging, Deciding, Acting) in scenario planning, there are still some weaknesses in its implementation. In the context of sustainable development, further attention is needed regarding environmental protection and the sustainable management of lake resource consumption.

Keywords: *Strategic Direction, Public Policy, Scenario Planning, Lake Limboto, Sustainability.*

Introduction

Lake Limboto, one of 15 national priority lakes, is facing critical conditions and is expected to turn into land in 2035 due to an average decrease in area of 65.89 hectares per year. To overcome this challenge, scenario planning is required. The Gorontalo Regency Government projects Lake Limboto as a priority development area for developing tourism, fisheries, an economic center and meeting the needs of communities around the lake. Hesty (2013) explains that lakes, as important ecosystems, require comprehensive understanding because their existence is greatly influenced by the conditions of the surrounding environment. Therefore, maintaining its sustainability is important. The statement emphasizes the need for strong efforts from various parties to control damage, maintain, restore and restore the condition and function of the lake so that it can provide sustainable benefits for the welfare of the community.

Lake Limboto faces serious problems related to sedimentation, silting, decreased water volume, and narrowing of the lake area due to changes in land use in the River Watershed (DAS). Other challenges involve the impacts of climate change, eutrophication, water hyacinth growth, increased river erosion, and the massive spread of floating net cages (KJA). Public policy is important in the management of Lake Limboto, as emphasized by Bardach, E. (2012), who provides a practical guide for environmentally focused policy analysis. Even though the government has issued policies, the condition of Lake Limboto is increasingly worrying, especially as seen from the shallowing and narrowing of the lake area. This is a serious problem because most of the residents in the 17 villages around the lake are very dependent on the lake economically.

P-ISSN 2085-6555
E-ISSN 2715-9256

In planning the conservation of Lake Limboto, public administration helps coordinate activities to meet community needs in a sustainable manner. Waldo (1992) describes public administration as management and organization to achieve government goals. Accountability in policy implementation is key to maintaining the sustainability of conservation efforts, and with public administration principles, planning can be directed towards optimal results for the environment and local communities. Nigro & Nigro (1988) that public administration provides input and analysis to policy makers and ensures effective policies. Thus, public administration contributes to developing scenarios that consider climate change, water needs, ecological aspects and community needs using data analysis and potential modeling.

Faced with the threat of the disappearance of Lake Limboto and the loss of biodiversity, including the various types of fish that inhabit the lake, alternative solutions are needed through the formulation of planning scenarios. Schoemaker (2017) emphasizes the importance of scenario analysis in formulating policy strategies and development planning systems. Scenario planning provides a clear picture of the desired future strategy, noting that change and community support regarding sustainable development are the main prerequisites.

In overcoming threats to the environment, Maria et al. (2023) in their journal highlights the importance of identifying distribution centers and evacuation centers, as well as selecting the best route in unexpected and actual disaster scenarios. According to the level of disaster, it is crucial to determine how many facilities are needed and place them in locations that are safe and free from danger. Second, evacuation route planning must consider the placement of facilities in areas where they are least needed, making it an important factor in preparing for emergency situations.

Strategic policies are not yet visible, so the initiative approach has not been fully recognized. Mintzberg et al. (2005) stated that strategic management is a design process, emphasizing creativity and flexibility in decision making. They contrast formal approaches to planning with freer approaches to design, emphasizing that strategy is not the result of rigid planning, but rather of a design process that involves creative and flexible action. Birkland (2015) added that strategic policy is not only influenced by organizational decisions, but also by factors that occur in the public policy process. In other words, strategic policies must be responsive to changes in the dynamic external environment.

The importance of scenario planning in development is emphasized by Lindrgen and Benhold (2003: 25) as a tool for effective strategic planning in the long term and certain conditions. The use of scenarios helps formulate strategies, develop plans for unexpected situations, and maintain vigilance in pursuing the right direction and dealing with relevant issues. Kathya and Etienne (2023) in their journal explain that scenarios have a temporal nature that is rooted in the future and is a reference to external forces in that context. Scenarios must also be possible and internally plausible, while taking the appropriate form of action in the form of a story or narrative description. Thus, the scenarios appear to be part of a series systematically prepared for meaningful coexistence.

Scenario planning provides a clear picture of the desired future, considers the possibilities that could occur, and really supports the development process as well as early evaluation of potential problems. Therefore, Lindgren and Bandhold (2003:48) emphasize the importance of arranging steps in planning scenarios, called TAIDA, which stands for 1) Tracking, 2) Analyzing, 3) Imaging, 4) Deciding, and 5) Acting. An illustration of these steps can be seen more clearly in the following image:

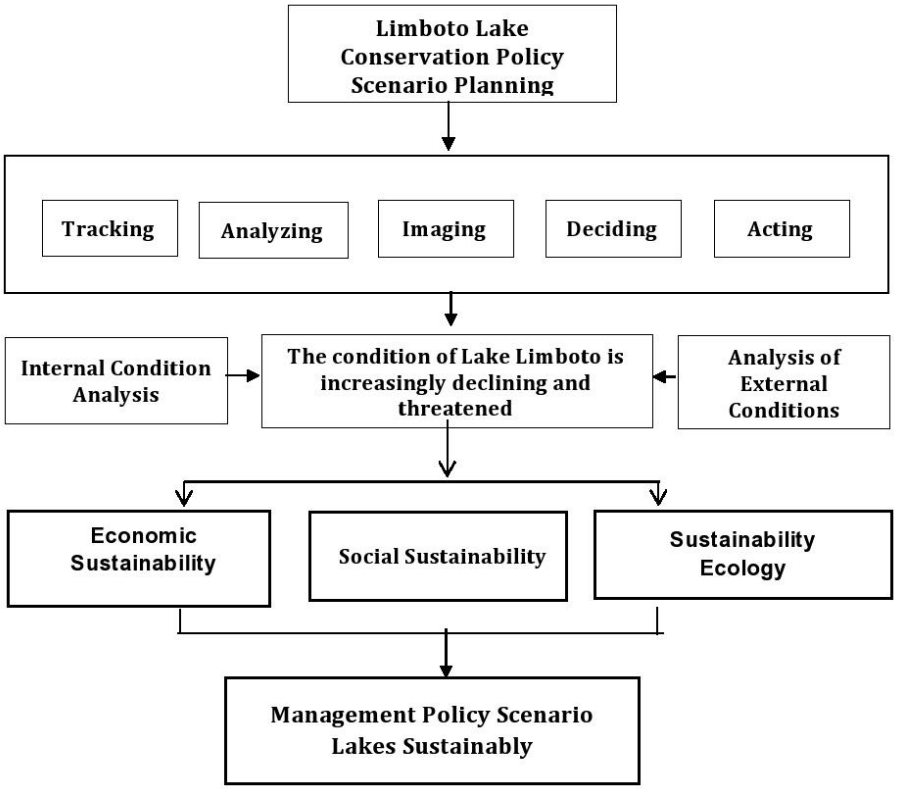

Figure 1. Scenario Planning Model
Source: Lindgren & Bandhold (2003:48).

The image above explains the stages of the scenario. The first stage, Tracking, involves tracking future changes and identifying internal and external conditions. The second stage, Analyzing, involves analyzing the consequences of opportunities and threats, taking into account political, technological, economic, and social (PEST) factors. The third stage, Imaging, is creating a picture of the desired future through a long-term vision. The fourth stage, Deciding, involves making joint decisions regarding the scenarios and strategies to be adopted. The final stage, Acting, is the action stage of the strategy that has been decided, integrating scenarios and facilitating organizational learning to adapt to climate change. To answer this research, the author uses the theory put forward by Lindgren and Benhold (2003:48).

A number of studies from various scientific disciplines have been conducted by researchers, including Hasim (2014), who investigated the political ecology of Limboto lake management policies. This lake has great tourism economic potential with promising development prospects. Despite this, specific research on scenario planning for sustainable lakes has not yet been conducted. The regional government shows strong support for sustainable lake development, as reflected in the 2019 Gorontalo Province Bappeda portal regarding Limboto Lake in the Sustainable Development Goals (SDGs). Activities at the Bappeda Building, including the formation of an SDGs secretary and multi-stakeholder discussions, reflect the seriousness in facing the challenges of managing Lake Limboto.

Referring to sustainable development, especially Goal 14 which emphasizes preserving and sustainably utilizing marine and ocean resources, the Gorontalo Regency Government shows a strong commitment through organizing events such as the Limboto Lake Festival. This event aims to promote conservation and sustainable use of waters (seas, lakes, rivers). The important missions of the Limboto Lake Festival involve increasing tourist visits, preserving the nature of the Limboto Lake area, developing community cultural creativity, and empowering the community to improve welfare.

In managing Lake Limboto, it is important to achieve a balance between preserving and utilizing the lake for the good of the community. However, several issues need attention, including economic issues. Community dependence on lakes can cause a decrease in lake productivity due to excessive use for economic purposes. This can damage water quality, reduce fish populations, and disrupt the ecosystem. Actions such as overfishing and use of chemicals can also harm the lake's environment. Climate change is an important factor, with risks such as rising air temperatures and water shortages. Changing rain patterns can cause a decrease in water supplies, posing a serious problem for communities and ecosystems around lakes. Political factors also influence, where political policies that do not support lake preservation can disrupt lake management plans and reduce attention to the environment.

To support the aspirations of local communities who are highly dependent on Lake Limboto economically, it is important to understand the close relationship between the economy, society and the environment. This approach, as explained by Sachs (2015), prioritizes these three pillars as key elements in emphasizing sustainable development. The Principles of Sustainable Development (SDGs) are a framework introduced to achieve sustainable development goals.

Methods

This research uses a qualitative approach, a choice of a qualitative approach because this research was carried out through a process of discovering, understanding, explaining and obtaining an overview of social phenomena and public phenomena related to Limboto Lake Conservation. The reason for using a qualitative approach in this research is also based on the explanation by Lincoln and Guba (1985:78) that qualitative research or *naturalistic inquiry* is a method of research intended to understand actuality, social reality and existing human perceptions. Also referring to the view according to Mulyana (2006:15) that qualitative research is carried out in research field situations that are "natural" or natural as they are, without being manipulated and regulated through experimentation.

Research focus in this type of qualitative research is closely related to problem formulation, because the research problem becomes a reference in determining the research focus. However, the research focus can develop according to the situation of the research problem in the field. This is in accordance with the flexible nature of the qualitative approach, which follows an *empirical inductive pattern of thinking. Where* everything in this research is determined from the final results of actual data collection in the field. According to Maleong (2010:237), through determining the focus of a research, there are two things achieved by the researcher, namely: 1) limiting the study with the intention of limiting the field of research (*inquiry*)*: 2)* the researcher knows for sure that the data that has been collected is relevant and supports the research focus. This research is focused on understanding the important conditions that threaten the sustainability of Lake Limboto, with the main aspects including Economic Conditions, Climate Change Conditions, and Political Change Conditions. Furthermore, the research aims to formulate effective scenario planning in achieving sustainable lake conservation in Gorontalo Regency. The scenario planning stages involve: tracking, analyzing, imaging, decaiding, and acting, which are directed at achieving sustainability. Ultimately, this research will produce a scenario planning model for sustainable conservation of Lake Limboto, combining these elements in an effort to maintain the sustainability and balance of the lake ecosystem. In addition, this research will find a recommendation model to provide guidance in policy actions and actions that support sustainable conservation of Lake Limboto.

P-ISSN 2085-6555
E-ISSN 2715-9256

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Results and Discussion

Conditions that Threaten the Sustainability of the Lake

The crucial conditions that threaten the sustainability of Lake Limboto in Gorontalo Regency can be analyzed through three main aspects: economics, climate and politics. The economic aspect is a serious challenge due to the lack of optimal development in lake-related sectors, creating an imbalance in the use of lake resources. The lack of infrastructure that supports lake sustainability and integrated management strategies is a major problem. Efforts are needed to strengthen the economy through training, education and support to improve community skills and develop related economic sectors. To support the aspirations of local communities who are highly dependent on Lake Limboto economically, it is important to understand the close relationship between the economy, society and the environment. This approach, as explained by Sachs (2015), prioritizes these three pillars as key elements in emphasizing sustainable development. The Principles of Sustainable Development (SDGs) are a framework introduced to achieve sustainable development goals.

Climatic conditions, especially a significant increase in air temperature, are a major concern because they threaten the quality of lake water and the potential for a water crisis which could have a direct impact on the sustainability of the lake ecosystem. Despite efforts to adapt plans to climate change, the level of sensitivity to risk still requires improvement. Careful scenario planning and in-depth risk analysis are needed to anticipate the possibility of more extreme climate change in the future. Nigro & Nigro (1988) added that public administration provides input and analysis to policy makers and ensures effective policies. Thus, public administration contributes to developing scenarios that consider climate change, water needs, ecological aspects and community needs using data analysis and potential modeling.

The political aspect shows low attention to lake maintenance, with policies tending to prioritize economic aspects. Policy conflicts and regulatory changes that do not support lake conservation are also challenges. To overcome this, stronger political commitment, adequate resource allocation, and community participation in formulating sustainable policies are needed.

In the context of important conditions that threaten the sustainability of Limboto Lake, especially crucial economic issues, climate change and political change, Mizberg's (2015) views in Strategic Management theory provide insight into the importance of designing creative and flexible solutions to face these challenges. The application of scenarios helps this research in honing strategies and designing plans that can deal with uncertainty in accordance with the concept of scenario planning. Strategic Policy Theory by Birkland (2015) emphasizes that strategic policy is not only influenced by organizational decisions but also by factors that occur in the public policy process. This provides support for the relevance of research in identifying the influence of external factors, such as political change, on lake conservation. The importance of being responsive to changes in the dynamic external environment, in line with the principles of sustainable development, in accordance with the SDGs theory expressed by Wilfer (2014), provides a basis for formulating policies that combine sustainability and balance of the Limboto lake ecosystem.

Strategic Policy for the Development of Sustainable Lake Conservation Scenarios

Scenario development, if seen from several published articles as described by Kathya and Etienne (2023), provides the view that scenarios have a temporal nature that is rooted in the future and becomes a reference for external forces in that context. Scenarios are also expected to be internally possible and plausible, while taking appropriate action in the form of a story or narrative description.

A series of important strategic policy steps for Lake Limboto includes five stages in the TAIDA approach, as explained by Lindrgen & Benhold (2003: 25). These stages involve tracking, analysis, imagination, decision making, and action. In the tracking stage, SWOT analysis is used to identify internal strengths and relevant external factors. In the context of lake management, it was found that positive potential has not been utilized optimally, and weaknesses have not been effectively addressed. A number of challenges need to be overcome so that internal strengths can be utilized and respond to external factors. However, the application of the SWOT method is not optimal in evaluating environmental conditions.

The second stage, analysis (Analyzing), revealed a lack of integration of environmental, social and economic aspects in the PLES Plus analysis. A holistic approach is needed that considers environmental and social impacts in balance with economic aspects. Comprehensive analysis can help identify potential conflicts and sustainable solutions. In the environmental context, O'Connor (1999) stated that ethical considerations are involved in assessing environmental values. The article discusses the difficulties and tensions in trying to reconcile economic approaches with ethical values in an environmental context, including issues of sustainability and nature conservation.

The third stage, imagination (Imaging), shows a lack of involvement of relevant stakeholders. Further efforts are needed to increase engagement through open meetings and dialogue with local communities. This will create a plan that is more inclusive and takes into account the needs of all parties. Lack of involvement of relevant stakeholders can have a negative impact on the image and understanding of lake management efforts in the context of scenario planning. The image of sustainable environmental management can be considered as a performance indicator that needs to be evaluated.

The fourth stage, decision making (Deciding), revealed a lack of involvement and active participation from all stakeholders. Decision making needs to involve all relevant parties and ensure transparency and accountability. This can create decisions that are more comprehensive and reflect the needs of all parties. The procedural approach by Andreas Faludi (1973) emphasizes the importance of inclusive public participation and transparency in the planning process. Scenario planning must involve stakeholders and take into account the needs and aspirations of the community.

The final stage, action (Acting), shows several main problems such as less effective action, lack of collaboration, lack of monitoring and evaluation, and lack of public awareness. Intensive efforts are needed to ensure successful implementation, build strong collaboration, improve monitoring and evaluation, and increase public awareness. The action stage in lake management requires the right strategy and approach. Hasim (2018) explains that there are at least several strategies that can be applied in taking action, including collaboration between related parties, community participation, monitoring and evaluation, as well as education and outreach. The challenges in planning lake management scenarios do not always run smoothly. Birkland (2015) suggests three appropriate strategic approaches, namely building close collaboration between government, local communities, environmental organizations and the private sector. In the context of public policy Bardach, E. (2012), policy analysis with the aim of formulating effective public policy strategies. This guide includes systematic steps in understanding policy issues, evaluating various policy alternatives, and detailing actions and their impacts in the management strategy for Lake Limoto, related to the problem of actions and evaluations that have not been optimal in the management of Lake Limoto. Howlett et al. (2009) emphasize the policy cycle and policy subsystems directing attention to the stages in the policy process, including agenda formation, policy formulation, implementation, evaluation and policy termination so that lake conservation can be sustainable.

P-ISSN 2085-6555
E-ISSN 2715-9256

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Sustainable Lake Environmental Protection

The environmental protection of Lake Limboto faces serious threats such as pollution, habitat degradation, climate change and decreasing water quality. Sustainable protection efforts are very necessary to maintain the sustainability of the ecosystem and its benefits for humans. The involvement of awareness, commitment and cooperation from the government, NGOs and civil society is the key to protecting Lake Limboto. A threat that has a significant impact is changes in the area and depth of Lake Limboto, which continue from time to time. Details of these changes can be found in the Table below:

Table 1. Changes in the Area and Depth of Limboto Lake from Time to Time

Year	Area (ha)	Depth (m)
1932	7,000	30
1934	7,222	14.2
1950	6,875	12.27
1952	6,873	12.27
1962	4,250	10
1982	3,362	2.52
1993	3,022	1.58
1999	1900-3000	2-4
2007	3000	2-3
2017	2,571	2-3

Source: Gorontalo Regency Bappeda

Amid the threat of the disappearance of Lake Limboto, the biodiversity of the lake is also threatened, especially the various types of fish that inhabit its waters. Populations of certain fish, such as Huluu, Payangga, Snakehead and Shrimp, have decreased, while a number of other types of fish have become extinct, including mangaheto (a type of red bobara), botua (a type of white tilapia without scales), bulaloa (a type of bonefish). slightly white, scaly), and boidelo (a type of scaly, gray tuna). This decline was caused by the ongoing phenomena of shallowing and drought. In a journal study by Maria et al. (2023), research shows that the identification of distribution centers and evacuation centers, as well as the selection of the best routes in unexpected and actual disaster scenarios, is crucial. The results of the survey conducted show that risk perceptions directly influence preparedness intentions and actions. Planning scenarios are developed based on the timing and severity of the threat. The research documentation also includes a visual depiction of the ongoing shallowing and drought, which can be seen in the image below:

Figure 2. Condition of Lake Limboto
Source: Researcher Documentation

Regarding the threat of shallowing and drought, various informants have conveyed a lot of information through interviews with researchers. Therefore, measures to protect Lake Limboto must consider how the environmental conditions around the lake affect the quality and sustainability of the lake. Environmental threats are not only influenced by internal factors of the lake itself, but also by interactions with the surrounding landscape. In the Ecological concept expressed by Khanna, Babu, & George (1999), protection must not only focus on the lake itself, but also consider the impact of human activities and environmental changes in the area around the lake.

In facing threats, it is important to manage natural resources wisely and sustainably. In the resource management perspective expressed by Rogers & Jalal (2008), it is important to involve local communities in decision making and implementation of environmental protection programs. Therefore, strategic policy is needed, as explained by Sabatier (2007), which provides a critical view of the understanding and development of strategic policy. He emphasized that strategic policy is not only formed from organizational decisions alone, but is influenced by complexity in the public policy process. By providing a critical perspective, Sabatier helps us understand how particular factors in the public policy process can shape and influence overall strategic policy. Of course, cooperation with organizations that have an interest in society is very important in environmental protection. Public administration, as a science that studies the relationship or cooperation between two or more people in an organization to achieve predetermined goals, also has an important role in this context. According to Waldo (1992), public administration is the management and organization of people and equipment to achieve government goals. From this opinion, it can be understood that public administration is a concept that connects the government with the people.

Betaley & Meaning (1997), in the context of sustainable development, stated that monitoring and evaluation must be the basis for improvements and changes in the Limboto Lake protection program. If weaknesses or problems are identified, corrective action must be taken to overcome existing obstacles and increase the effectiveness of the protection program. With continuous monitoring and evaluation, the Limboto Lake protection approach with a sustainable development theory perspective can become more adaptive and responsive to changes in the environment and community needs. Continuous evaluation allows stakeholders to continuously adapt protection strategies according to environmental dynamics and evolving social demands.

Environmental Protection for a Sustainable Future

Showing the urgency of sustainable consumption of natural resources in Lake Limboto, there are threats of pollution, residential growth, overfishing and climate change that threaten its sustainability. Cross-sector collaboration and community participation are the keys to maintaining lake ecosystems and fishermen's livelihoods. Biswas (2008) in the concept of sustainable development explains that managing wise consumption patterns in lakes, to meet human needs without exceeding the regeneration capacity and availability of natural resources, is an important step in maintaining the balance of the lake ecosystem and ensuring environmental sustainability. Efforts to regulate wise consumption patterns in lakes are vital to preventing permanent damage to the environment and ensuring that natural resources in lakes can continue to be sustainable, providing benefits to human life and the surrounding biodiversity.

Sachs (2015), highlights the importance of ensuring efficient and optimal use of natural resources in the context of sustainable development. By optimizing the use of natural resources, we can reduce waste and maximize the benefits generated. Therefore, each stage of scenario planning must prioritize sustainable consumption of natural resources as a top priority. In the

context of scenario planning to leapfrog Sustainable Development, Butler (2016) in his journal explains that managing consumption patterns wisely, so that they can meet human needs without exceeding the regeneration capacity and availability of natural resources in lakes, is a key step in maintaining the balance of lake ecosystems and ensuring environmental sustainability.

Efforts to regulate wise consumption patterns in lakes are vital to preventing permanent damage to the environment and ensuring that natural resources in lakes can continue to be sustainable, providing benefits to human life and the surrounding biodiversity. By adopting sustainable consumption of natural resources, we can maintain the balance of lake ecosystems, minimize negative impacts on the environment, and provide effective protection for lakes and their ecosystems. Discussions about excessive lake resource consumption practices and land use changes need to be evaluated in the context of achieving a balance between economic, social and environmental aspects. To do this, an analysis can be carried out based on the Sustainable Development theory of Sachs (2015), which emphasizes the importance of meeting current needs without compromising the ability of future generations to meet their needs.

Recommendation

Recommendations for the strategic direction of public policy in scenario planning for the management of Lake Limboto in Gorontalo Regency involve a comprehensive analysis of economic conditions, climate change and politics. Strategies such as diversification of economic sectors and consideration of the impacts of climate change are considered important to maintain the sustainability of lakes in accordance with real environmental conditions. Strategic plans must take into account internal strengths, such as natural potential and government commitment, as well as maximize external opportunities, such as the development of tourist areas. The scenario planning approach, with TAIDA steps, is considered an effective solution for coping with change, reducing uncertainty, and developing adaptive strategies.

Effective management scenario planning in providing strategic public policy direction requires strategic steps in maintaining lake sustainability. These steps are inseparable from the sustainability dimension, involving ecological, socio-economic, cultural, technological and institutional aspects, as explained as follows: First, the ecological aspect involves determining the zoning of the lake area, namely the process of dividing the lake area into several zones or areas with different objectives and regulations according to the needs of conservation, protection and utilization of natural and socio-economic resources. Second, increasing understanding and perception of all stakeholders as well as empowering and increasing the role of the community. Third, development of technology and information systems, as well as lake databases, to ensure effective and informed management. Fourth, the integration of cultural aspects in the lake management approach is an important thing that needs to be considered so that it is more accepted and relevant by the community. Fifth, the formation of lake institutions is a strategic step to coordinate the interests of all relevant parties in the study, monitoring and supervision of lake ecosystem management, as well as climate change.

The importance of improving community participation and establishing clear lake border standards is considered the main key in maintaining ecosystem sustainability and providing sustainable benefits for the community. The selection of four logical scenarios for improving future public policy, namely: increasing public awareness, environmental policy changes, economic growth, and climate change adaptation, is considered a strategic step to achieve sustainable lake management. All of these steps are recommended in order to consider the dimensions of sustainability and involve various stakeholders, as depicted in the recommendation image below:

P-ISSN 2085-6555
E-ISSN 2715-9256

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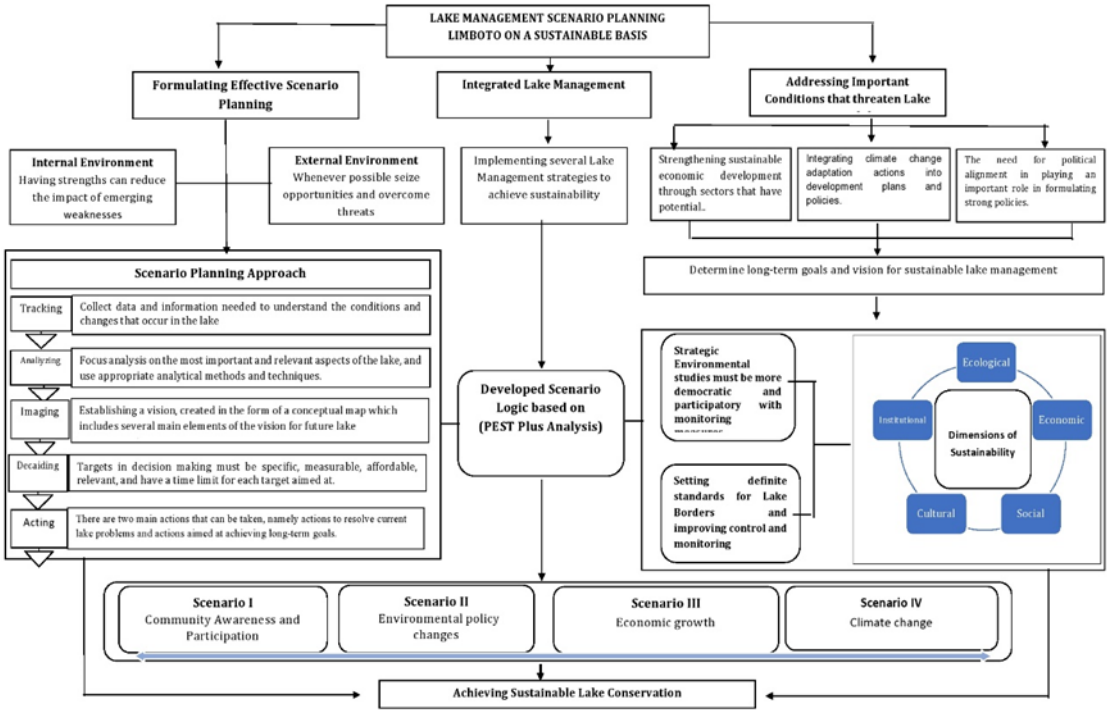

Figure 3. Recommendations

Conclusion

Serious threats to the sustainability of Lake Limboto in Gorontalo Regency can be identified through three main aspects: economics, climate and politics. The economic aspect creates an imbalance in the use of lake resources, requiring strengthening through training and development of related sectors. Climatic conditions, especially rising air temperatures, pose a serious threat that requires scenario planning and in-depth risk analysis. The political aspect shows the low level of political attention to lake maintenance, demanding political commitment, resource allocation and community participation. Development of conservation scenarios involves important steps, but shows several weaknesses in their implementation . Attention is needed to the integration of environmental, social and economic aspects, as well as the active involvement of all stakeholders. Protecting the Limboto Lake environment from threats such as pollution, habitat degradation and climate change requires awareness, commitment and cooperation from the government, NGOs and civil society. It is important to adopt a holistic approach in maintaining lake sustainability, addressing economic, climate and political challenges, and ensuring effective policy implementation .

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P-ISSN 2085-6555
E-ISSN 2715-9256

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