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by Rizki Arfiani Paramata

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Author Details: Rizki Arfiani Paramata
Faculty of Marine Sciences and Fisheries, Gorontalio State University
Email: arfianiparamata@gmail.com

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Abstract
To ensure the sustainability of manggabai fish (Glossogobius giuris) as an endemic species of Limboto lake, its management should be based on that lake ecosystem. Therefore manggabai fish management requires an integrated management plan that involves all stakeholders. This research Aimed 1) finding the sustainable aims at of the fish based on the fish resources, habitats and ecosystems, technological, social, economic and institutional dimensions; 2) finding the status of the sustainability level of the manggabai fish based on the dimensions (multi-dimension); 3) to identifty the most priorities of manggabai's management. The research was conducted in the Limboto's Lake from January through April 2014. The Data were collected through the survey methods and direct measurement of the field. (RapFish) Analytical and AHP (Analytical Hierarchy Process) for strategic management. The results indicated resources to that as for the status of the sustainability of the manggabai for the fish resources dimension, technological, social, economic and institutional dimensional fall under categorizy less (index 25 □ X <50%), while for of habitat and ecosystems dimensions under categorizy bad (index <25%). The multi-dimensional analysis of the sustainability status of the manggabai is poor of 34.44%. Therefore, the primary priorites for the manggabai fish should be on the habitats and ecosystem dimensions with conservation areas and upstream watershed buffer of Limboto lake synergistic action of all stakeholders.
Keywords: *Endemic species, Manggabai's, Limboto's lake, RapFISH, Analytical Hierarchy Process*

INTRODUCTION

Limboto freshwater lake is one of the aquatic ecosystems that have a functional role for the region and the surrounding population as a source of livelihood and assets of the region because it has beauty and natural phenomena save natural resources, but endangered native fish that is endemic.

According to Akuba (2006), manggabai fish (*Glossogobius giuris*) is one of the endemic fish in Lake Limboto Gorontalo province. This fish is a fish belle favored by many people of Gorontalo and sold at a price range of 10,000-50,000 / tail. Manggabai fish populations once very abundant but lately started are difficult to find, so it catches the wane. This is a strong indication that this species has experienced excess fishing or over exploitasion. According to the Department of Marine Fisheries Gorontalo Province (2010), there has been a decline in populations of fish species in the lake manggabai Limboto from 2005 to 2008 amounted to 83.95%.

The threat of extinction of endemic fish in the waters occurs due to excessive exploitation of fishing gears which are not environmentally friendly, as well as competition with other fish, especially fish from the introduction of up due to overlapping fisheries management policy. Many fisheries management policies allowing or failing to prevent overfishing of the productive fish phase thus causing degradation of the stock (Gislason et al., 2000).

Preservation of endemic species, especially fish manggabai require strategic direction management or conservation of endemic species as a framework requiring priority handling, integrated and involve all parties (stakeholders) because it has the nature of complexity in order management objectives are not only based on the biology and ecology but also including social and economic goals with EAFM approach (Ecosystem Approach to Fisheries Management).

EAFM is a multi-attribute approach, the approach to the symptom, or indication Performance of the general condition of aquatic ecosystems (Tallis et al., 2010). EAFM implementation requires planning policy (policy planning), strategic planning (strategic planning), and operational planning management (operational

management planning) its the same thing with conventional management approaches. Planning policy will be needed in the context of the macro focusing on a statement of commitment from decision makers at national and regional levels related to the implementation EAFM that make statements basic purpose and ultimate goal of implementation EAFM through the incorporation of socio=economic objectives and environment considerations and fish resources and include mechanisms for coordination centers and regional, inter-sector coordination,

Therefore, given the utilization of fish resources manggabai in sustainable requires fishery management strategies of various dimensions are quite complex in evaluating the potential and status of water environmental condition, it is necessary to study the sustainability of this resource in formulating strategic steps policy-based management of ecosystems comprehensively taking into account factors that affect the management of fish resources in the lake Limboto manggabai.

The purpose of this study was to analyze the status of sustainable management of fish resources and priorities the manggabai policy based on the dimensions of the fish resources, habitats and ecosystems, fishing techniques, social, economic, and institutional based on an ecosystem approach in fisheries management (EAFM).

RESEARCH METHODS

Location and Time Research

The research was conducted from January to April 2014 in Lake Limboto Gorontalo Province.

Population and Sample

The population of the research activities is fishing Lake Limboto. Fishermen Lake Limboto, a manggabai fish resource user. Respondent is done through purposive sampling approach, namely by contacting and interviewing respondents who are considered to have the information and knowledge concerning fisheries activities at the sites. The number of respondents fishermen are as many as 20 people in addition to the expert, is also determined by 5 experts (expert) as respondents. Beyond the respondents, as additional information, unstructured interviews are also conducted on a variety of informants in an amount not limited.

Data collection

The required data are primary and secondary data relating to the attributes of the development dimension of sustainability, namely: the dimensions of the fish resources, habitats and ecosystems, arrest techniques, social, economic, and institutional. Primary data were obtained from the measurement results and direct observation and survey research in the form of observations and interviews with selected respondents and experts, while secondary data obtained from literature sources and documents several related agencies. Depth discussions carried out by experts include academics, non-governmental organizations, government officials and community leaders.

Data analysis

Analysis of the sustainability of fish resources management manggabai in Lake Limboto, Gorontalo Province in multi-dimensional methods RAP-FLYING FISH (Rapid Appraisal for Fisheries Sustainability) developed by Fisheries Center University of British Columbia (Kavanagh, 2001) which has been used by Fauzi et al. , 2002; Hartono et al., 2005; Nababan et al., 2007; Nur 2011; Nadiarti 2012. The index drafting and the status of sustainability of fish manggabai each dimension as well as the criterion of good and evil refers to the concept used Pitcher et al., 2001), Rapifish Group (2006), and Allahyari (2010) and the opinion of experts and relevant stakeholders the system being studied. Each attribute is determined to score, i.e., a score of 3 for good condition (good), 1 means bad (bad) and between 1-3 for mediocrity. The definitive score is the value of the mode, which is analyzed to determine the points that reflect the sustainability position relative to the good and bad points with statistical techniques MDS ordination.

Rapfish analysis stage: First, an analysis of the data manggabai management of fish resources and environmental conditions. Second, do the scoring aspect of sustainability management of fish resources in the lake Limboto manggabai. Third, analysis Multi-Dimensional Scaling (MDS) with an excel template to determine ordinated and stress value through the ALSCAL Algorithm. Fourth, do a rotation to determine the

position of fishing on ordinated bad and good. Fifth, do sensitivity analysis (Leverage analysis) and Monte Carlo Analyisis to take into account the aspect of uncertainty.

Sustainability index scale management of fish resources has a manggabai interval of 0 - 100. Status manggabai sustainable management of fish resources are divided into several categories or status, namely the interval from 0 to 24.9 in bad status, interval from 25 to 49.9 in less status, interval 50 - 74.9 in sufficient status, and hose 75-100 in good status (Adriman et al., 2012).

Fish Resources Management Sustainability Analysis Based on Multidimensional Manggabai

Overall sustainability status can be assessed by performing weighting to each dimension by using a five-person expert opinion of the lake. Results weighted and then analyzed using Dimensions Weight Determination Program by using Analytical Hierarchy Process (AHP) with 9.5 Expert Choice software. Then each dimension of sustainable index value multiplied by the weighted weight of each dimension of AHP analysis results. Total by multiplying the sustainability index with weights weighted dimensions show the value of status is multidimensional or overall management (Budiharsono, 2007). Overall sustainability value are grouped into three categories; First, if the value of index <50, means that the status of bad management; Second if the index value of 50-75,

Priority Scale Analysis Manggabai Fish Resources Management Policy-Based Ecosystem

Dimensions are top priority management is a dimension that has the greatest value of the results of the combined weight of 5 *experts* against manggabai fish resources management strategy. The next dimension attributes that have the greatest value from analysis of leverage (leverage factor) be the reference for the formulation of management strategies.

RESULTS

Sustainability Status of Fish Resources Management Manggabai In Different Dimensions

Results ordinated Rap-FISH analysis on four attributes that affect the dimensions of the fish resources indicate that the value of the fishery resources dimension of the sustainability index is 42.18 percent, while the Monte Carlo analysis values obtained 41.83 percent. The results of the analysis that attributes the trend seen laverage fish size has the highest RMS value of 7.65.

Results ordinated Rap-FISH analysis on six attributes that affect the dimensions of habitats and ecosystems indicates that the index value habitats and ecosystems sustainability dimension is 21.19 percent. The results of Monte Carlo analysis has obtained the value of 22.45 percent. Results laverage analysis shows that the attributes of water pollution and turbidity levels had the highest RMS value of 11.39 and 9.35.

Results ordinated Rap-FISH analysis on four attributes that affect the technical dimensions of the arrest shows that the value of sustainability index technical dimension arrest was 32.75 percent. The results of Monte Carlo analysis has obtained the value of 33.05 percent. The analysis result shows that the attribute modification laverage gear and destructive and illegal fishing had the highest RMS values of 12.65 and 10.92.

Rap-ordinated, the analysis results of FISH on three attributes that affect the social dimension, show that the value of the social dimension of the sustainability index was 49.63 percent. The results of Monte Carlo analysis has obtained the value of 49.05 percent. The analysis result shows that the attributes conflict laverage fisheries have the highest RMS value of 0.22.

Rap-ordinated, the analysis results of FISH on three attributes that affect the economic dimension of the sustainability index shows that the economic dimension is 25.71 percent. The results of Monte Carlo analysis has obtained the value of 27.63 percent. Results laverage analysis shows that the household income attribute fishermen have the highest RMS value of 26.05.

Results ordinated Rap-FISH analysis on six attributes that affect the institutional dimensions of sustainability indexes indicates that the value of ecosystem institutional dimension manggabai fish resources is 40.76 percent. The results of Monte Carlo analysis has obtained the value of 40.72 percent. Results laverage analysis shows that the fisheries management plan has the highest RMS value of 6.05. Stress value and R-aquared with MDS on each dimension can be seen in (Table 1).

Table 1. Values Stress and R-aquared with MDS

No.	Dimension	Stress value	Squared correlation (R2)
1	Fish resources	0.17	0.92
2	Habitats and ecosystems	0.14	0.94
3	arrest techniques	0.17	0.93
4	Social	0.20	0.91
5	economy	0.17	0.91
6	Institutional	0.16	0.93

Source: Primary Data Once processed, 2014

Sustainability Management of Fishery Resources Based on Multidimensional Manggabai

Results of the analysis of sustainability based multidimensional dimensional weighting program using Analytical Hierarchy Process (AHP) of five experts who analyzed 9.5 choise experts obtained a value of 34.44 percent. The value of all dimensions of sustainability aspects was calculated from analysis of AHP and sustainability indexes every dimension can be seen in (Table 2).

Table 2. Values Sustainability Aspects whole Dimensional Computed From the results of AHP Analysis And Sustainability Index Every Dimension

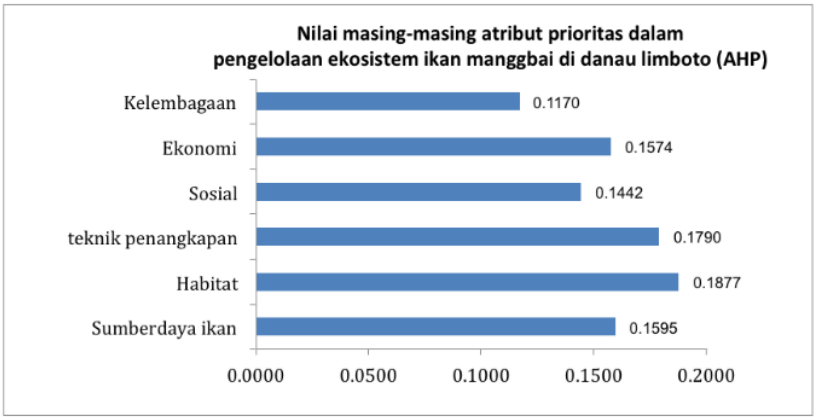
Attribute	eC					Weight compound	Weight weighted	Aspect continuity	amount score
	R1	R2	R3	R4	R5				
fish resources	0131	0177	0194	0114	0201	0159	0169	42 180	7119
habitat	0088	0222	0312	0119	0321	0188	0199	21 196	4,211
fishing techniques	0264	0156	0136	0254	0129	0179	0189	32,751	6204
Social	0222	0175	0073	0220	0100	0144	0153	49 636	7,578
economy	0187	0124	0143	0188	0155	0157	0167	25 711	4,284
Institutional	0108	0146	0142	0104	0094	0117	0124	40 768	5048
amount	1	1	1	1	1	1	1	212 242	34.44

Source: Primary Data Once processed, 2014

Priority scale Manggabai Fish Resources Management Policy-Based Ecosystem

Based on the results from six experts combined weight, dimensions that have the highest value and become a top priority in the management of fish resources in the lake Limboto manggabai Gorontalo province is the dimension of habitats and ecosystems (value 0.1877). The value of each dimension of the policy priorities manggabai management of fish resources can be seen in (Figure 1).

Figure 1. The value of each Dimension Policy Priority Ecosystem Management of Fishery Resources in Lake Limboto Manggabai Gorontalo Province



DISCUSSION

This study shows the status of sustainable management of fish resources manggabai based on the dimensions of fish resources, habitats and ecosystems, arrest techniques, social, economic and institutional fall into the category of less or less continuity with an index value of 25 to 49.9. Status sustainability dimension of habitats and ecosystems in poor or unsustainable categories (index value <25). Sustainable management of fish resources overall manggabai (multidimensional) in the unfavorable category (value index of 25 to 49.9). Priorities manggabai management of fish resources is the dimensions of habitats and ecosystems. To improve the sustainability status of sensitive attributes of each dimension required attention in management.

Monte Carlo analysis shows that the value of the index status of sustainability management of fish resources manggabai at the 95% confidence interval, for each dimension, and not much of a difference (difference) with MDS analysis. Results indicate an error in the Monte Carlo analysis does not occur at the Flying Fish and analysis Rap Rap Flying Fish is best used as one means of evaluating the sustainability of fisheries management on Lake Limboto manggabai fish. Based on Rap-FISH analysis results obtained stress value and the value of determination (R^2). Stress value and the value of R^2 (Coefesien Determination) is quite good. This is consistent with the statement Kavanagh et al., (2004) that stress good value is less than 0.25 and R^2 values approaching 1.0.

In conducting the study of the ecosystem approach to fisheries management on Lake Limboto, manggabai fish, habitats and ecosystems dimension is very important as a determinant in the success of programs of sustainable management of fishery resources. Habitat conditions will largely determine the abundance and diversity of fish resources contained therein. In general, the better the condition of the habitat then the abundance and diversity of resources, the better. Various community activities in and around the lake also threaten the region and worsen the preservation of the lake. Currently Limboto lake water quality decreased due to domestic wastewater, aquaculture activities carried out in the lake and lake sedimentation due to erosion in upstream areas. Other than that, high phosphate and nitrate in the water cause eutrophication so that various weeds flourish, which absorb water and can accelerate the silting of the lake. Therefore, the necessary efforts to improve the water quality of the lake which can affect the fishing activities because it will increase water productivity, preventing damage to the habitat, and improve the quality of the marine environment as a medium of live fish.

Improvement strategies dimensional habitats and ecosystems starting from improvements upstream area and buffer the watershed of Lake Limboto handling of sediments that enter in order to minimize the rate of silting of lakes and handling of water plants bullies like water hyacinth as a result of eutrophication lot to absorb water and can accelerate the silting of the lake so it is necessary to control it wise and utilization for economic activity

CONCLUSIONS AND SUGGESTIONS

Based on the analysis *Rap-FISH*, The dimensions of habitats and ecosystems in the category of poor sustainability of fish resources while the dimension, fishing techniques. Viewed as a multidimensional, sustainability is 34.44% status or the status of fisheries management on Lake Limboto manggabai fish classified as poor management category. Management that needs more attention is the dimension of habitats and ecosystems

To maintain and improve the sustainability of ecosystem-based fishery resources manggabai it is necessary to increase conservation or improvement of the upstream area and buffer Limboto Lake watershed, sediment and water hyacinth handling, monitoring water quality and the recovery of fish biodiversity.

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