

## ANALYSIS OF BAKUOK LAKE FISHERY POTENTIAL AND ITS ZONE IN KAMPAR REGENCY, RIAU PROVINCE

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**ABSTRACT:** Fishery reserves are part of inland public waters in the form of lakes, swamps, rivers or protected puddles. The purpose of this study is to assess fisheries reserves based on social culture, analyze the suitability of locations and analyze zoning in Bokuok lake fishery reserves. The results of the socio-cultural analysis show that the fishery reserves are determined based on the system or customary law regulated in Ninik Mamak Decree No. 04/N.M/TB/IV/2014, have easy access to visit, have Pokmaswas who play an active role, have local wisdom that is Ma'awu activity. The results of the analysis of conformity, station I obtained a score of 75, classified as a fishery sanctuary functioning well and very effective. Station II obtained a score of 62 classified as fisheries asylum functioning well and is very effective. Station III obtained a score of 59 classified as fisheries asylum functioning moderately and quite effectively. The total area of Bokuok lake fishery reserves covers an area of 7.31 ha which is divided into 3 zones, the core zone with an area 1.63 ha, sustainable fishery zone with an area of 3.03 ha, utilization zone with an area of 2.65 ha.

*Keywords: Suitability, Fishery Reserves, Bokuok Lake, Kampar.*



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### 1. INTRODUCTION

Riau Province is an area that has a wide enough inland public waters with a variety of potential fishery resources. The total area of inland public waters in Riau Province reaches 296,506 ha consisting of 22,955 ha of lakes, swamps of 181,006 ha and 92,545 ha of rivers. The potential of the inland public waters either from rivers, swamps, and lakes is 14 232 tonnes per year and has been utilized more than 96,73 % [1].

The Regency in Riau Province that has this potential is Kampar Regency. The potential of the Kampar Regency is the area fisheries reserves. Its formerly referred to as reserves fisheries are part of a well inland public water such as lakes, swamps, rivers, or other protected puddles. Ecologically, fishery reserves can function as a place to conserve fishery resources, protect rare fish, fishery germplasm sources and naturally as a source of seed for the surrounding waters [2].

Fisheries sanctuaries in Kampar Regency, one of them is Bokuok lake fishery reserves. Bokuok lake is located in Aursati Village, Tambang sub-district, Kampar Regency with a geographical position at coordinates 00°21'47.3" and 101°15'57.6" [3]. Bokuok lake shaped extends north-south in line with the direction of the Kampar River water flow. The location is exactly on the eastern side of the Kampar River and has a depth of 4-6 m with a length of about 1.5 km around the lake [4].

The use of Bokuok lake as a fishery sanctuary has been done for a long time, which is only allowed

to catch once a year, i.e at Ma'awuo activities. Ma'awuo is well-known local wisdom and has been followed by people across the province.

The problem that has not been studied and identified in the management of Bokuok lake fishery reserves is the lack of information and research that discusses the social culture of the community, there are no studies related to the potential in terms of location suitability, and the unclear zonation system in Bokuok lake fishery reserves. Based on this, research related to the Potential Analysis of Bokuok lake fishery reserves and the zoning of Kampar Regency, Riau Province was conducted. This study aims to 1) assess the condition Asylum Fisheries based social culture; 2) analyzing potential in terms of suitability; and 3) analyzing the zoning on Asylum fishing Bokuok lake (core zone, zone utilization, and sustainable fisheries zone).

### 2. METHODS

The study was conducted in December 2018-February 2019 at the Bokuok lake fishery sanctuary, Aursati Village, Kampar Regency, Riau Province. The method used is descriptive and survey methods that retrieval of data using the method of purposive sampling. This research sample of respondents was taken as many as 25 respondents consisting of stakeholders. Data collection was obtained from direct observations in the field which included water quality data,

interview data with respondents related to social culture, Pokmaswas and local wisdom of the surrounding communities, as well as library studies and documentation studies through related agencies/research institutions.

Water sampling is carried out at three points, namely at stations I, II and III, water samples are taken in the morning and evening. Water sampling

in the lake follows the APHA method [5]. After the water sample is obtained, the sample is analyzed at the Laboratory. The marine Chemistry University of Riau.

Land suitability analysis is carried out with the function and effectiveness analysis approach to Fishery Reserves [2, 6] with the total score criteria can be seen in Table 1 below.

Table 1. Criteria for Suitability of Fishery Asylum Interests

No	Parameters	Score Value					
		Low functioning fishery reserves	Score	Fisheries reserves that have medium & effective functions	Score	A good and highly effective function of fishery reserves	Score
1	Area of Water (ha)	<200	1	200-500	2	> 500	3
2	Average Water Depth (m)	<2	1	2-15	2	16-25	3
3	Water quality	Bad	1	Is	2	Well	3
4	The diversity of aquatic plants	<1-2	1	> 2 - <10	2	> 15	3
5	Fish nursery (% area)	<5	1	5-10	2	> 10 -25	3
6	Spawning place	There is no	1	Limited	2	Available	3
7	Species diversity	Small	1	Is	2	High	3
8	Protection	Open water	1	Open bay area	2	Bay area	3
9	Ease of access	Difficult	1	Is	2	Easy	3
10	The role of POKMASWAS	Small	1	Is	2	High	3
Total score			10		20		30

Information :

0 – 30 : low functioning

> 30-60 : moderate and quite effective

> 60 : good and very effective.

Making zoning maps of conservation areas with the application of Geographic Information Systems (GIS) using Arc Map Software Version 10.3. The zoning of the conservation area is divided into three zones, namely the core zone, the sustainable fishing zone, and the use zone, which is by the Minister of Maritime Affairs and Fisheries Regulation No. 30 of 2010 concerning Management and Zoning of the Water Conservation Area.

### 3. RESULTS AND DISCUSSION

#### *Regional Description*

Bokuok lake is a type of oxbow lake (lake flooded or dead river). This lake was formed through the interruption of the river due to the natural process of sedimentation of the Kampar River. Bodies oxbow lake namely waters swamp lake that receives water from the main river [7].

Bokuok lake is about 50 km southwest of Pekanbaru City, with a distance of about 6 km from the provincial road [8]. The road leading to the lake can be traversed by two-wheeled and four-wheeled vehicles with relatively good road conditions. For people who want to visit the Bokuok lake fishery sanctuary area, there are no fees and around the area, there are also facilities that can be used by visitors who come.

#### *Social and Cultural Conditions*

Utilization of the lake as a fishery sanctuary has been going on for a long time or about decades ago. The Bokuok lake fishery sanctuary area is determined based on customary law which is hereditary by the community and regulated in Ninik Mamak Decree No. 04/NM/TB/IV/2014 April 16, 2014, concerning the Utilization of Natural Resources in the Bokuok lake fishery reserved area. According to the community around the Bokuok lake fishery sanctuary, there has never been a conflict due to the use of the lake, marked by the ongoing Ma'awuo activity every year so that visitors who come feel safe and comfortable. Ma'awuo is a fishing activity together without restrictions using environmentally friendly fishing gear and is only held once a year. No less important, this activity has been developed into an annual event in the form of a party of the people and local wisdom which is quite well known to the outside of the province. Local wisdom is all forms of knowledge, beliefs or insight understanding and habits that guide human behavior in the life of biological communities [9].

Bokuok lake fishery sanctuary has Pokmaswas (Community Watch Group) which regulates the use, protection, capture activities, as well as sanctions and restrictions. Fishing in the Bokuok lake Fishing Asylum only allowed when Ma'awuo activities, beyond time Ma'awuo prohibited from making arrests. Pokmaswas is the implementation of a community supervision system involving an

active role society should be a Rakat in supervising and controlling the management and utilization of marine resources and fisheries responsibly, to obtain the benefits of a sustainable [10].

The role of the government and other agencies in the effort to preserve and protect the Bokuok lake fishery reserved area is marked by the restocking activities through government programs every year in the preserves efforts and also assist in facilities and infrastructure to support facilities around the lake. Based on the results of interviews with respondents obtained a percentage of 90% of the need for government intervention and presence. The government, in this case, be allowed to handle problems and issues exceed reach in local provision and to provide assistance and services for the

protection, conservation and utilization, for the sake of the sustainability of fisheries resources [11]. In the preserves of Bokuok lake fishery sanctuary, besides the existence of a community watchdog group (Pokmaswas) and the government, this lake is also guarded collectively by the local community. Community perception and interaction are considered important factors in ensuring the success of conservation of fishery reserve management [8].

#### Analysis of the Suitability of Fisheries Asylum Locations

Based on the measurement results of water quality parameters in the Bokuok lake fishery sanctuary in Table 2 as follows.

Table 2. Measurement Results of Bokuok Lake Fishing Reservoir Aquatic Quality Parameter

Parameter	Station I		Station II		Station III		*Quality standards The waters	
	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon		
<b>Aquatic Physics</b>								
Water temperature	°c	27.1 ± 0.40	26.9 ± 0.26	26.0 ± 0.10	26.2 ± 0.10	27.0 ± 0.10	26.3 ± 0.20	
Brightness	cm	33 ± 0.20	31 ± 0.50	31.3 ± 0.40	30.4 ± 0.53	32.2 ± 0.46	30.6 ± 0.20	
Depth	m	4.5	4.5	5.5	5.5	6	6	
<b>Basic Substrate</b>								
Mud								
<b>Aquatic Chemistry</b>								
pH	-	7.1 ± 0.10	6.9 ± 0.20	7.2 ± 0.30	7.0 ± 0.10	7.5 ± 0.20	7.0 ± 0.10	5-9
DO	mg / l	6.22 ± 0.03	6.11 ± 0.01	6.35 ± 0.02	6.34 ± 0.02	6.22 ± 0.02	6.17 ± 0.02	3-6
BOD	mg / l	2.06 ± 0.02	2.57 ± 0.02	2.07 ± 0.02	2.03 ± 0.02	2.09 ± 0.02	2.51 ± 0.05	2-12
COD	mg / l	10.12 ± 0.07	12.73 ± 0.03	10.04 ± 0.02	11.76 ± 0.02	11.86 ± 0.02	11.20 ± 0.02	10-100
Total-P	mg / l	0.23 ± 0.02	0.24 ± 0.02	0.19 ± 0.02	0.22 ± 0.03	0.20 ± 0.01	0.30 ± 0.01	0.2-5
Total-N	mg / l	0.94 ± 0.01	1.06 ± 0.02	0.89 ± 0.01	0.92 ± 0.03	0.87 ± 0.02	0.91 ± 0.02	1.0
Chlorophyll-a	mg / l	2.98 ± 0.01	2.73 ± 0.02	2.87 ± 0.02	2.63 ± 0.02	2.75 ± 0.03	2.65 ± 0.02	-
<b>Biology</b>								
Diversity of aquatic plants	K angkung A ir ( <i>Ipomoea aquati</i> c ), Grass ( <i>Panicumrepens</i> ), Growing Grass ( <i>Scirpus mucronatus</i> ), Water Hyacinth ( <i>Eichhornia crassipes</i> ), Azolla ( <i>Azolla pinanta</i> ), Apu-apu mini / kayambang ( <i>Lemna minor</i> )							

Based on the results of the study, the type of habitat in this lake has the basic characteristics of muddy waters, with a very weak current velocity, reddish-brown watercolor and relatively high dissolved oxygen content. In Table 2 it is known that the water quality in Bokuok lake fishery reserves between morning and evening water quality does not show a significant difference, and between samples at stations I, II and II show no real

influence and have not exceeded the threshold according to the Regulatory Quality Standard Government No. 82 the Year 2001. Based on the results of research on socio-cultural conditions (ease of access, the role of Pokmaswas) and water quality parameters (physical, chemical and biological), the data is tabulated with score, so that the calculation of suitability criteria for fisheries reserves can be seen in Table 3, as follows.

Table 3. Calculation Results for Bokuok Lake Fisheries Asylum Suitability Criteria

Parameter	Station I				Station II				Station III			
	Weight	Results Criteria	Results	Calculation Results (X)	Weight	Results Criteria	Results	Calculation Results (X)	Weight	Results Criteria	Results	Calculation Results (X)
Area of Water (ha)	4	> 200	1	4	4	> 200	1	4	4	> 200	1	4
Average Water Depth (m)	5	2-15	2	10	5	2-15	2	10	5	2-15	2	10
Water quality	4	Well	3	12	4	Well	3	12	4	Well	3	12
The diversity of aquatic plants	3	> 2 - <10	2	6	3	> 2 - <10	2	6	3	> 2 - <10	2	6
Fish nursery (% area)	3	5-10	2	6	3	> 5	1	3	3	> 5	1	3
Spawning place	3	Available	3	9	3	Limited	2	6	3	There is no	1	3
Species diversity	2	High	3	6	2	Medium	2	4	2	Medium	2	4
Protection	2	Open bay	2	4	2	Open Water	1	2	2	Open Water	1	2
Ease of access	3	Easy	3	9	3	Easy	3	9	3	Easy	3	9
The role of Pokmaswas	3	High	3	9	3	Medium	2	6	3	Medium	2	6
Total score				75				75				62

Based on results of suitability assessment of Bokuok lake fishery reserves, obtained as follows.

1. Station I (core zone) obtained the results of 75 classified as fisheries reserves that function well and are very effective.

2. Station II (utilization zone) obtained the result of 62, also classified as fisheries reserves that function well and are very effective.

3. Station III (sustainable fisheries zone) obtained the results of 59 medium functioning and quite effective.

[6]. an assessment of the suitability of the location of prospective fishery asylum development in the Koto Panjang reservoir in Kampar Regency, obtained that from 10 locations observed, 8 of them were eligible to be developed as sanctuaries with a score of >30 ->60 which is an asylum that function was/is quite an effective da n good/very effective, while the other two sites is not recommended as asylum fisheries (score <30).

### Fisheries Asylum Zoning Analysis

The determination of zoning refers to the Minister of Maritime Affairs and Fisheries Regulation No. 30 of 2010 concerning Management and Zoning Plans of Aquatic Conservation Areas. The Bokuok lake fishery sanctuary area is divided into three zones, i.e the core zone, the utilization zone and the sustainable fishing zone through the establishment of functional boundaries according to resource potential, which can be seen in Table 4, as follows.

Table 4 Coordinates and Area of Bokuok Lake Fishery Reserves Zoning

No	The zone	Coordinate	Area (ha)	Zone Presentation (%)
1	Core Zone	0° 22 '14.3 " - 0° 22' 8.8" 101°19 '44.3 " - 101°19' 47.4"	1.63 ha	22.30
2	Sustainable Fisheries Zone	0° 22 '11.4 " - 0° 22" 14.7 " 101° 20 '6.3 " - 101° 19' 56.7"	3.03 ha	41.44
3	Use Zone	0° 22 '15.8 " - 0° 22' 17.9" 101° 19 '44.8 " - 101° 19' 58"	2.65ha	36.26
Total area			7.31 ha	100%

This core zone has an area of 1.63 ha, located at the coordinates of 0°22'14.3"-0°22'8.8" and 101°19'44.3"-101°19'47.4", which has a depth of 4,5 m. Based on visual observations in the field, this zone is a place for fish spawning because there are many water hyacinth plants (*Eichhornia crassipes*) compared to other zones. The use of water hyacinth in fish farming will make the surface of the pond lush, so that fish can lay eggs freely after making it a nesting place [12]. In this zone, it is also a habitat for fish care because of the discovery of endangered belida fish and motan fish which are endemic/typical in Bokuok lake Fishery Sanctuary. The typical fish species in Bokuok lake are motan fish [8].

Determination of the core zone by the Minister of Maritime Affairs and Fisheries Number 30 the Year 2010 article 9 paragraph (1) letter a regarding zoning of conservation areas is carried out based on criteria namely, is a spawning area, and fish feeding, as a priority and endemic aquatic biota habitat, has conditions waters that are relatively pristine and have not been disturbed by humans, and have characteristics as a source of germplasm for the area of water conservation.

#### Sustainable Fisheries Zone

The sustainable fishery zone is at the coordinates of 0°22'11.4"-0°22'14.7" and 101°20' 6.3"-101°19'56.7" with an area of 3.03 ha and a depth of 6 m. Sustainable fisheries function as an area that is allowed to utilize the resources within it for the needs of the surrounding community or even communities outside of the lake area.

In this zone, it is permissible to catch fish which is only done once a year, i.e at Ma'awuo activities.

In this activity, the community is allowed to fish without limits in this zone, but still, by using environmentally friendly fishing gear not by using poisons, stun and other prohibited and dangerous fishing gear has been regulated in the Decree of the Ninik Mamak Kenagarian Mining Village of Aursati.

Determination of sustainable fishing zones by the regulation of the Minister of Maritime Affairs and Fisheries Number 30 the Year 2010 article 9 paragraph (1) letter b regarding zoning conservation areas is carried out based on the criteria: have a conservation value, which can tolerate the use of environmentally friendly aquaculture and fishing with tools and methods which is environmentally friendly, has the characteristics of an environmentally friendly ecosystem and supports sustainable fisheries, has a diversity of species of aquatic biota, has sufficient area to guarantee the management of aquaculture, sustainable capture fisheries, and socio-economic and cultural activities of the community.

#### Use Zone

The utilization zone is at the coordinates of 0°22'15.8"-0°22'17.9" and 101°19'44.8"-101°19'58" with an area of 2.65 ha and a depth of 5.5 m. In this zone of utilization, there are vegetable gardens that are used by local people without damaging the ecosystem around the lake. This area has a fairly wide area and a pretty good tourist attraction because of the community-owned vegetable gardens which make this area has its attraction for visitors. Based on local community information, this utilization zone area is also widely used by

students and the government as objects of research and education both in waters, plants, and land.

Determination of sustainable fishing zones by the regulation of the Minister of Maritime Affairs and Fisheries Number 30 the Year 2010 article 9 paragraph (1) letter c regarding zoning of conservation areas is carried out based on the criteria: having a tourist attraction, beautiful and unique aquatic ecosystems, having sufficient area to guarantee potential and attractiveness for tourism, have relatively good water conditions for various utilization activities without damaging the original ecosystem. The zoning map for Bokuok lake fishery reserves, Kampar Regency can be seen in Fig. 1 below:

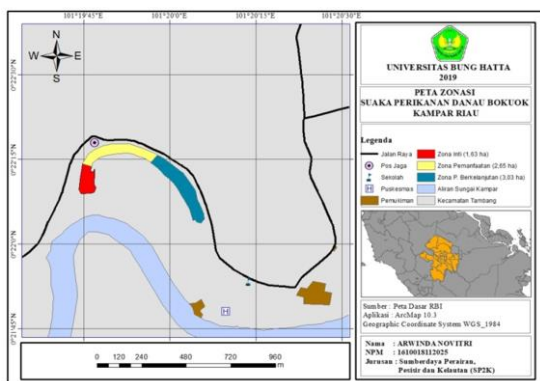


Fig 1. Map of Bokuok lake Marine Reserve Zoning

#### 4. CONCLUSION

Based on the results of socio-cultural observations, Bokuok lake fishery sanctuary is still determined based on the system of customary law of the community regulated in Ninik Mamak Decree No. 04/NM/TB/IV/2014, has easy access to visits, has a Community Monitoring Group (Pokmaswas) that plays an active role, has local knowledge that is quite interesting and widely known, namely Ma'awuo activities. the results of the fisheries asylum conformity calculation results obtained a score at a station I that is, 75 classified as fisheries asylum is functioning well and is very effective. Station II obtained a score of 62 classified as fisheries asylum functioning well and is very effective. Station III obtained a score of 59 classified as fishery sanctuary which is functioning moderately and is quite effective. The area of fisheries reserves is 7.31 ha which is divided into three zoning areas: 1) Core Zone with an area of 1.63ha, percentage 22, 30 %; 2) Sustainable Fisheries Zone with an area of 3, 03 ha, percentage of 41.44%; 3) Use zone with an area of 2, 65 ha, percentage 36.26%.

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