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DRAFT REVIEW AND RECOMMENDATION OF INTEGRATED FISHERIES MANAGEMENT BASED ON EAFM/EAA IN SPA PLANNING IN SOUTH BARITO REGENCY CENTRAL KALIMANTAN PROVINCE

Drafted by:
Tahasak Belum (Tabe) Foundation

For
Mainstreaming Biodiversity Conservation and Sustainable Use into Inland Practices in Freshwater Ecosystems of High Conservation Value (I-Fish)- Project

March 2020

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DRAFT REVIEW AND RECOMMENDATION OF INTEGRATED INLAND FISHERIES MANAGEMENT BASED ON EAFM/EAA IN SPATIAL PLANNING IN SOUTH BARITO REGENCY CENTRAL KALIMANTAN PROVINCE

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Draft Review and Recommendation of Integrated Inland Fisheries Management Based On EFM/EAA In Spatial Planning In South Barito Regency Central Kalimantan Province

For

Mainstreaming Biodiversity Conservation and Sustainable Use into Inland Fisheries Practices in Freshwater Ecosystems of High Conservation Value (II-Fish)- Project

Under Componen 1 - LoA#3 March 2020

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PREFACE

Review Land Management plans and drafting of Academic Paper on Inland Fisheries Management is a process currently initiated by the Food Agriculture Organization (FAO) in collaboration with the Tahasak Belum Foundation (TABE). This activity began in 2019

included meetings with district and provincial stakeholders, institutional mapping, Public Consultation and water quality sampling in South Barito and South Barito Districts.

Fisheries management is an obligation as mandated by Law No.31 / 2004 which is reaffirmed on the improvement of the law, namely Law No.45 / 2009. Naturally, management of fisheries systems cannot be separated from three dimensions that are inseparable from each other, namely: (1) the dimensions of fisheries resources and their ecosystems; (2) dimensions of utilization of fishery resources for the socio-economic interests of the community; and (3) the dimensions of fisheries policy itself (Charles, 2001). Related to these three dimensions, fisheries management nowadays still not corcern to these three balances. Based on that the approach to fisheries ecosystems in ecosystems is very important.

In the context of fisheries management an indicator is considered as good if it meets several elements such as (1) describing the carrying capacity of the ecosystem; (2) relevant to the goals of co-management; (3) able to be understood by all stakeholders; (4) can be used in a monitoring and evaluation framework; (5) long-term view; and (6) illustrates the linkages in the fisheries management system.

We extend our thanks and appreciation to all those who have participated and assisted in the preparation of this Academic Paper and hopefully can be used as a basis for consideration in the preparation of Regional Spatial Planning Plan and useful for the parties to strengthen the planning and implementation of sustainable fisheries sector development.

Palangka Raya, March 2020

Director of Tahasak Belum Foundation

(TABE)

Central Kalimantan Province

Murianson, SE

CONTENTS

LIST OF TERMS

Stakeholder	:	Parties, individuals or organizations that are actively involved in the practice of inland fisheries in freshwater ecosystems.
Oxbow Lake	:	The lake formed as a result of a winding river channel.
RTRWK	:	Regional Spatial Land.
PPK	:	Regional Service Center
PKLp	:	Local Promotion Center
DAS	:	Watershed
IPAL	:	Wastewater Treatment Plant
RB	:	River Basin
GWB	:	Groundwater Basin
RTBL	:	Building and Environmental Planning
WUP	:	Mining Business Area
WPR	:	People's Mining Area
WPN	:	State Reserve Area
HoB	:	Heart of Borne
PPL	:	Environmental Service Center
JKP	:	Primary Collector Network
SPAL	:	Wastewater Management System
TPA	:	Waste Processing Site
TPS	:	Temporary Shelter
PLTU	:	Steam Power Plant
PLTD	:	Diesel Power Plant
SUTT	:	High-voltage air ducts
LPPB	:	Sustainable Food Agriculture Land
KPA	:	Nature Conservation Area
KSA	:	Nature Reserve Area
PKW	:	Regional Activity Center
TKPRD	:	Regional Spatial Planning Coordination Team
RDTR	:	Detailed Spatial Plan
PUPRPKP	:	Department of Public Works and Public Housing and Residential Area Housing
DPMDes	:	Village Community Empowerment Service
DLH	:	Environmental services
Inland Fisheries	:	Activities / business of catching and cultivating fish and other aquatic biota in fresh water
TRGD	:	Regional Peat Restoration Team
BRG	:	Peatland Restoration Agency
LSM	:	NGO
UKM	:	Small and medium enterprises
KPHL	:	Protection Forest Stakeholders Unit

Deforestasi	:	Clearance, clearcutting or clearing is the removal of a forest or stand of trees from land which is then converted to a non-forest use
RDTR	:	Detailed Spatial Plan
AMDAL	:	Environmental Impact Analysis
BKSDA	:	Natural Resources Conservation Center
BWS 2	:	Kalimantan River Basin Agency 2
Pahewan	:	Forest area that was saved by the Dayaks
Kaleka	:	The location of community orchards which are spread Out and are usually useful in the future for germplasm
FAO	:	Food Agriculture Organization
YTT	:	Tahanjuang Tanjung Foundation
YPD	:	Petak Danum Foundation
Bosf-Mawas	:	Borneo Orangutan Survival Foundation-Mawas
TABE	:	Tahasak Belum Foundation
FMP	:	Fisheries Management Plan
TPI	:	Fisheries landings site
KTM	:	Independent Integrated Zone
KAPET DAS Kahayan	:	Integrated Economic Development Zone
DO	:	Dissolved Oxygen
TDS	:	Total dissolved solids
Temperature	:	Magnitude that indicates the degree of heat or cold of an object
Water brightness	:	A measure of the clarity of a waters
Responden	:	Those persons who have been invited to participate in a particular study and have actually taken part in the study.
Questionnaire	:	Information gathering techniques that enable analysts to learn the attitudes and behavior and character of several people
Beje	:	Natural / artificial ponds that function as fish traps
Map	:	A picture of the surface of the earth that is displayed on a plane with a certain scale
Reservart	:	A large natural or artificial lake used as a source of water supply.
HCV	:	High Conservation value
PAD	:	Original Local Government Revenue
Facilitator	:	Someone who helps a group of people understand and achieve goals
Implementor	:	Program / activity implementers
Coordinator	:	Coordinating person; who coordinates
Accelerator	:	Means that can increase speed
Domain	:	Region; the realm
Indicator	:	Something that can provide clues or information

BUMDes	:	Village-Owned Enterprises
FMU	:	Forest Stakeholders Unit
Fishery	:	Fisheries are all activities related to the management and utilization of fish resources and the environment in a sustainable manner, from pre-production, production, processing to marketing carried out in a fisheries business system.
Marine Fishery	:	Marine fisheries consist of capture fisheries and aquaculture. Based on the area of marine fisheries are divided into coastal fisheries (coastal) or "offshore" and deep sea fisheries
Land Fishery	:	Is a business of maintenance and fishing in land waters. Inland fisheries consist of capture fisheries and aquaculture. Inland fisheries include areas of rivers, lakes and swamps
Catch fisheries	:	Activities to obtain fish in waters that are not cultivated by any means or means, including activities that use ships to load, transport, store, cool, handle, process and / or preserve them.
Aquaculture	:	farming of fish, crustaceans, molluscs, aquatic plants, algae, and other organisms. Aquaculture involves cultivating freshwater and saltwater populations under controlled conditions,
Fisheries Management	:	All efforts including an integrated process ininformation gathering, analysis,planning, consultation, decision making, allocation of fish resources, and implementation and law enforcement of law and regulation in the field of fisheries, which are carried out by the government or other authorities directed toward achieving sustainable productivity of the waters of the waters and agreed goals.
EAFM	:	Ecosystem Approach To Fisheries Management
EAA	:	Ecosystem Approach To Aquaculture
Antropogenik	:	The source of pollution is not natural due to human intervention

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CHAPTER I
INTRODUCTION

1.1 Background

South Barito Regency is one of the regions in Central Kalimantan with a population density in 2015 reaching 117.34 inhabitants / km2. Population density in 6 districts is quite diverse with the highest population density located in the Subdistrict of South Hamlet with a density of 48.07 inhabitants / km2 and the lowest in Gunung Bintang Awai District of 10.99 inhabitants / Km2.

Fisheries Management Is an obligation as mandated by Law No. 31/2004 which is reaffirmed on the improvement of the law, namely Law No. 45/2009. In the context of the adoption of the law, fisheries management is defined as all efforts, especially integrated processes in information gathering, analysis, planning, consultation, decision making, allocation of fish resources and implementation and law enforcement of the laws and regulations in the field of fisheries, which are carried out by the government or other authorities that are directed to achieve sustainable productivity of waters in waters whose objectives have been agreed upon.

Naturally, fisheries management cannot be separated from three dimensions that are inseparable from each other, namely: 1) dimensions of fisheries resources and their ecosystems, 2) dimensions of utilization of fisheries resources for the socio-economic interests of the community and 3) dimensions of fisheries policies. EAPM is a concept of how to balance socio-economic objectives in fisheries management (fishermen welfare, fair use of fish resources) while taking into account the calm knowledge, information and uncertainty of biotic, abiotic and human interaction components in aquatic ecosystems through an integrated, comprehensive management and sustainable.

Some principles that must be considered in the implementation of the ecosystem approach in fisheries management (EAFM) include: 1) fisheries that must be managed at a boundary that has an impact that can be tolerated by ecosystems, 2) Biological interactions between fish resources and their ecosystems must be maintained, 3) Management tools should be compatible for all fish resource distribution, 4) Prudential principles in fisheries decision making process 5) Fisheries governance that includes the interests of ecological systems and human systems.

This document aims to incorporate the mainstreaming of terrestrial biodiversity into resource development and management policies, with demonstrations of conservation and sustainable use of terrestrial biodiversity in critical habitats in four locations in Kalimantan, Java and Sumatra, and effective monitoring and assessment. This is expected to increase the protection of freshwater ecosystems of high conservation value and

biodiversity in Indonesia. This in turn will help improve the supply of ecosystem goods and services and improve food security for local communities who depend on inland fisheries for their livelihoods.

District level land management and development plans are generally available, but consideration of aquatic ecosystems and terrestrial fisheries is very limited. Therefore, this project will support the development and / or improvement of land management plans, specifically Spatial Planning at the Regency or Regency level (RTRW) for the incorporation of biodiversity issues for inland (critical) aquatic ecosystems in selected pilot sites on peat lands, river basins and wetlands.

In this connection, it is necessary to prepare an Academic Paper on Land Fisheries Management Based on Rehabilitation and Conservation of Clown knife fish (Arwana) and Beje Fisheries that is adjusted to the developing problems.

1.2 Objectives and Benefit

The purpose and benefits of the preparation of this Academic Paper is to provide input to the South Barito District Spatial Plan (RTRWK) on terrestrial fisheries ecosystems and the management of aquaculture biodiversity of Clown knife fish (arowana) fish species and beje fisheries. In addition, the general objectives that are aligned are achieving one of the Sustainable Development Goals (SDGs), namely: (12). Ensuring sustainable consumption and production patterns and (14). Conserve and sustainability utilize marine, ocean and maritime resources for sustainable development.

1.3 Methodology

This study uses a normative juridical approach that is complemented by an empirical juridical approach, a historical approach, a comparative approach. The method of juridical-normative approach means that in this study the emphasis is on the science of law and focuses on the collection of secondary data which are primary, secondary and tertiary legal materials.

a. The normative juridical approach is carried out by reviewing the applicable legal methods, specifically the provisions of Law No. 16 of 1964 concerning Fishery Product Sharing, Law No. 31 of 2004 concerning Fisheries, Decree of the Minister of Maritime Affairs and Fisheries Number KEP.45 / MEN / 2011 concerning Estimation of Potential Fish Resources in the Territory of the Republic of Indonesia Fisheries Management; Regulation of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Regulation Number 29 / Minister / 2012 concerning Guidelines for the Preparation of Fisheries Management Plans in the Field of Fishing; Decree of the Minister of Maritime Affairs and Fisheries of the

Republic of Indonesia Number 54 / Ministerial Decree-KP / 2014 Regarding the Plan of Fisheries Management of the Republic of Indonesia State Fisheries Management 718; Regulation of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 29 / Ministerial Regulation-KP / 2016
Regarding Guidelines for the Preparation of Fisheries Management Plans in the Field of Fishing for Land Waters; Regulation of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 29 / Permen-Kp / 2018 Regarding Integrated Monitoring and Evaluation of the Implementation of Marine and Fisheries Development Programs / Activities as well as national laws and regulations relating to fisheries management. This normative juridical approach focuses on researching library data, or referred to as secondary data through the principles of law and legal comparison. The approach through research on legal principles is research on legal norms which are the benchmarks for appropriate behavior. While the empirical juridical approach is used to describe the symptoms studied and their relationships with each other.

b. Historical approach, used to conduct a historical assessment of the methods and developments of applicable law as a basis for regulating fishery products sharing systems.

c. Comparative approach, used to conduct comparative studies between the provisions of customary law and national law governing fishery production sharing systems.

d. Data Collection Techniques, the author collects data in two ways, as follows:
   - Library Research
     The Research was conducted to obtain secondary data from various legal study materials that are binding on the problem to be examined. The legal materials include Law No. 16 of 1964 concerning Fishery Product Sharing and Law No. 31 of 2004 concerning Fisheries; (ii) secondary legal materials, in the form of books, research results, dissertations, theses and papers related to the fishery production sharing system; and (iii) tertiary legal material in the form of journals, magazines, articles, newspapers and dictionaries.
   - Field Research
     Field research is conducted to support secondary data which is conducted by collecting, researching and selecting data through interviews or discussions by presenting various fisheries stakeholders.

e. Data Analysis Method,
   Data in the form of legal material that has been collected and then processed with qualitative analysis which is then presented in the form of descriptive analysis

CHAPTER II
GENERAL DESCRIPTION OF WATERS AND LAND FISHERIES IN SOUTH BARITO REGENCY

2.1. Land Fisheries Status

Demand for food has increased following an increase in the human population. As a result, more natural resources have been exploited to their limits, which in turn has led to the degradation of these resources. Land resources have long been exploited since the beginning of humanity followed by exploitation of marine resources and freshwater. Up to a certain extent, land resources have been exploited intensively more than aquatic resources. One of the aquatic resources located in the interior called inland freshwater has contributed to the inland fisheries sector of developing and developed countries weighing different interests (Welcomme, 2001).

On one hand, inland fisheries resources have a role to provide cheap sources of animal protein, especially for people who live in several regions in developing countries (So-Jung et al. 2014). It is widely recognized that fish is a source of superior protein and other important nutrients such as fatty acids and minerals than other terrestrial food sources (Roos et al. (2007a, b); Kawarazuka & B'en'e, (2011); Beveridge et al. 2013). In addition it provides vitamins, minerals, fatty acids and other micronutrients that are essential for a healthy diet. This important fact has become a major driver of inland fisheries to take part as one of the important elements of food security in developing regions. This has been supported by the fact that fish consumption has grown for more than a decade in the region of developing developing countries such as Asia and Africa. Welcomme et al., (2010) illustrate the importance of fish produced from inland water for 60 million people in the Lower Mekong Valley which can reach 2 million tons per year which is equivalent to 1 200,000 buffalo or 16-17 million pigs. Furthermore Welcomme et al. (2010) also highlighted the importance of inland fisheries as a source of income which is not only

important for families directly involved with this activity, but also for all communities living close to inland waters even for only a short period of time each year . Other South Asian countries such as Laos have reportedly consumed 29 kg of fish per person per year while Cambodia consumes 37 kg per person per year (Hortle 2007).

Unlike developing countries, inland water fisheries in most developed countries are less functioning as food providers, instead exploited mainly by recreational fisheries (Welcomme 2001). Because the main source of protein has been able to be fulfilled through the production of terrestrial animals such as beef, poultry, dairy products, inland fisheries it has been shifted to recreational fishing and fish conservation (Arlinghaus et al. 2002). These activities release fish after their capture to maintain the viability of fish populations in targeted water bodies. However recreational fishing and conservation goals have come up with some success because significant impacts from fishing pressure are still ongoing (Cooke and Cowx 2006). Number of Fish Marketing in South Barito

Table 1. Number of Fish Marketing in South Barito

District	Collector			Wholesalers			Retail		
	2014	2015	2016		2014	2015	2016		2014
South Barito	11	11	11	-	-	-	1392	1392	1392

Table 2. Number of Fishery Product Processing and Marketing Units

District/City/Province	Number of Fishery Product Processing and Marketing Units											
	Fishery Product Processing Unit				Fishery Product Processing Unit				Amount			
	2013	2014	2015	2016	2013	2014	2015	2016	2013	2014	2015	2016
South Barito	248	233	232	232	1509	1403	1403	1403	1757	1636	1635	1635

2.1.1. Lake

Lake waters are areas that are inundated by water bodies throughout the year and are formed naturally, lake formation occurs due to the movement of the earth's crust. Lakes that are in areas with high rainfall will always experience flooding in the rainy season, where water will inundate the banks of the lake which are very broad and change into a swamp (floodplain).

Lake based on its shape can be classified as follows: lake is circular (circular), semi circular (sub circular), elliptical or oval (elliptical), semi rectangular (sub rectangular), dentritic (dentritic), horseshoe (lunate), triangle (lunate) triangular), and irregular (irregular). The lake is limited, closed, and strongly influenced by the local climate of the surrounding land.

Figure 01. One of Lake Oxbow (Lake Palui and Lake Limur) Along the Great Rivers[1]

Hydrologically, the source or water supply of oxbow lakes and other flooding is generally from the main river. Indeed there are some lakes whose source of water comes from the ground. So that the lakes are ecologically influenced by the level of connectivity or openness with the river. The size of the distribution of these lakes also greatly affects the ecosystem.

The depth of the lakes varies between 3-14 m. Lake water level fluctuations in the dry and rainy seasons can reach 6 m. The ecology of lakes in Central Kalimantan, including the Barito river, is influenced by several factors such as hydrological linkages with rivers, their size and distribution. Judging from the hydrological process, there are three types of lake ecosystems in this area. The first type of lake is a lake that is completely isolated from the

[1] Sumber Data: https://earth.google.com

river. The second type is a lake whose downstream part is permanently connected to the river and the third type lake is a lake whose downstream part is permanently connected while its upstream part is only connected when the river level rises.

There are some common characteristics of oxbow lakes in Central Kalimantan that distinguish them from the large tectonic lakes that are commonly found in other regions in Indonesia such as Lake Toba in Sumatra, Lake Lamongan in Java and Lake Bratan in Bali. The first characteristic is the high water level fluctuations between the rainy season and the dry season which can reach 6 m. Due to the connectivity of these oxbow lakes with large rivers, the high and low water levels are generally very influenced by fluctuations in river water discharge. The brownish black water color is also one of the main characteristics of most of the lakes in Central Kalimantan. This is caused by seepage of water from peatlands which cover almost 5 million hectares in this area.

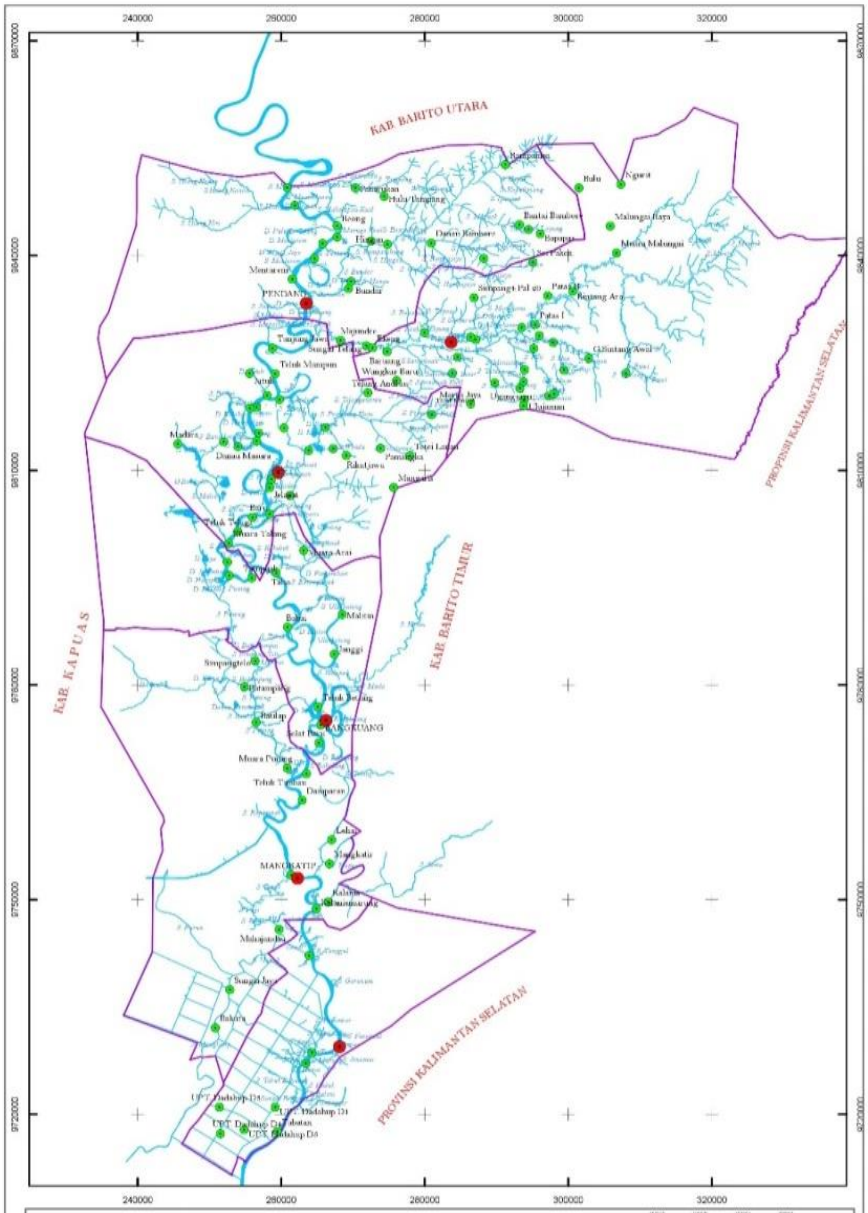

Figure 02. River That Serves As A Link Between The Lakes.[2]

This black water lake in the South Barito Regency area there are many lakes with various widths and depths. Some of them are located in the west of the Barito River consisting of lakes: Sabur, Pendang Besar, Pendang Kecil, Maduit, Jutuh, Kalahien, Hampalam, Masura, Palui, Madara, Bambaler, Talikui, Raya, Trambesi, Buntal and Simpang Telo . East of the Barito River there are lakes: Lalek, Bambure, Bundar, Wendo, Sanggu, Malawen, Sababilah, Pamait, Ganting, Malitin, Sadar, Kurik, Surapanji, Limut, Lampur and Bahalang.

Generally, the lakes in the South Barito district are in the form of lakes. In the following description a series of lakes are either separated / united by marshes, separated by headlands or connected by river systems. These systems are:

a. Circular System. This system consists of Bambure lake and bundar lake. This system is related to the Barito River through the Bambanem River;
b. Pendang system. This system consists of Pendang Kecil lake, Pendang Besar lake and Sabur lake;
c. Malawen system. This system consists of Wendo lake, Sanggu lake, Malawen lake, Sabibilah lake, Pamait lake, Limut lake. In this system there is the Wendo River which connects Lake Wendo with Sanggu lake. Sabibilah lake that connects Sanggu lake with Sabibilah lake. Pamait River connecting Sabibilah lake with Lake Pamait. Pamait Swamp unites Sabibilah lake with Pamait lake. The Raut River that connects the Pamait River with Ganting lake. Batang Lunuk River that connects Ganting lake with Limut lake and finally with the Barito River through the Bahaur River;
d. Sadar System. This system consists of Kurik lake, Bangka lake and Surapanji lake;

[2]Laporan Status Lingkungan Hidup Kab. Barsel 2017

e. Lampur System. This system consists of Lampur Lake and Bahalang Lake;
f. Kalahien System. This system consists of Hampalan lake, Kalahien lake, Masura lake, Madara lake, Bambalem lake, Ramilik lake and Talikui lake; and
g. Raya System. This system consists of Raya lake, Raya lake, Tarambesi lake, Buntal lake and Simpang Telo lake.

2.1.2. Swamp

Water is a type of swamp if the water is shallow with a gentle edge and full of aquatic plants. According to Nirarita et al. (1996) swamp is a broadly meaningful term that refers to all areas that are flooded either seasonally or permanently and overgrown with vegetation. Specifically swamps in Central Kalimantan according to MacKinnon et al. (2000) are divided into three depending on the terrestrial ecosystems that surround them, namely: 1. Peat swamp waters, 2. Alluvial swamp waters and swamp waters without forests or myre and their values have decreased significantly from 2005-2011. The decline in fish production and the value of fisheries from fishing in swamps is thought to be increasingly reduced swamp ecosystems, which are thought to be caused by silting and reclamation processes as human activities. However, fish catches and their value collectively show an increase.

Figure 03. swamp in Malawen lake, South Barito District
(Tabe 2019)

2.1.3. River

Central Kalimantan is flowed by large rivers whose upper parts consist of rapids or small tributaries. The swift flow of water correlates with steep slope causing strong friction with the rocks that continue to occur. Strong currents cause only a few aquatic plants to live in this region. Specifically, for fish, to live in this condition, they adapt by having body parts that are able to stick to the rocks so they are not carried away by swift water.

The rivers in Central Kalimantan, including the Barito river in the middle tend to be meandering ("meander") and murky turbid all the time, with turbidity increasing during the rainy season. This turbidity was exacerbated by gold mining activities carried out by the community along the river. Adapting to conditions with high turbidity, large fish in the ecosystem have a tentacle to touch food and adjust their direction of movement in water. As you get closer to the estuary, river bends decrease, but river ecosystems tend to become more complicated due to the influence of sea water. Due to differences in specific gravity between salt water and fresh water, salinity stratification occurs in the river mouth column. Fish that tend to like freshwater will usually be found in the upper layers, while fish that prefer sea water will dominate the water at the bottom of the river (Kottelat et al, 1993).

The river that crosses areas in Central Kalimantan Province, including the Barito river is very important for the lives of the inhabitants of Central Kalimantan. The river in this area for a long time, until now still serves as a means of transportation, residential areas (lanting houses) and also as an economic means through inland fisheries businesses both capture fisheries and cage cultivation. For decades the function of the river has not had a significant impact on aquatic ecosystems. However, along with the increase in economic activities on land followed by an increase in population, the burden of the river increases to accommodate the remnants of waste generated from these activities.

Watershed Ecosystem (DAS) is a part of the forest (land) and water (river) ecosystem which influence each other, starting from the upstream to the downstream in a watershed system. Ecosystem approach in development is expected to prevent side effects (side effects) which in turn is a burden that must be borne by the community. The river which is an integral part in a watershed system is one of the natural resources that are flowing (flowing resources), so that the use of water in the upstream will eliminate opportunities in the downstream (opportunity value), so if pollution occurs in the upstream will cause costs social in the downstream (externality effect) and vice versa if carried out conservation in the upstream will provide benefits in the downstream in a watershed system (DAS).

The central part of the Barito River Basin is affected by the flood waters in the form of swamp forest and swampy swamp forest. The waters that are abundant in swamp forests

are usually of high fish production. From observations in the field and information from local fishermen, fisheries production in the waters of the central Barito River Basin is indeed high. The waters of the swamp forest in the flooded swamp area are characterized by quite high water fluctuations, during the dry season the water is dry and when the rainy season is flooded. Above circumstances are usually the cause of fertile fertility and rich in natural food, such as aquatic insects, peripitons and baby fish.

Figure 04: Barito River in Mangkatip Regency (Tabe 2017)

2.2. Threats to inland fisheries

Sources of Threats to Land Fisheries in South Barito Regency come from various economic development sectors such as mining, plantations, agriculture, deforestation, and settlements.

1. Mining
   Types of activities include: mobilization of heavy equipment vehicles, land clearing, construction of buildings / factories and infrastructure, management (crushing / crushring), transportation to the port, pumping of sediment and the use of mercury / cyanide.
2. Plantation

Types of activities include: land clearing and preparation, construction of canals for transportation facilities, mobilization of plantation equipment, land management, negative impacts related to fertilization activities, herbicide use, management of crude palm oil (CPO) on crude palm oil PBS and transportation.

3. Agriculture
   Types of activities include: Land Preparation, Canal / Irrigation Development, Agricultural Equipment Mobilization, Land Management, Fertilization using chemical fertilizers and herbicides.
4. Deforestasi/Logging
   Types of activities include: deforestation that results in changes in land cover, increased surface water runoff, soil surface erosion, damage to vegetation by the river (riparian ecosisystem).
5. Settlement
   The types of activities include: domestic waste (kitchen, MCK), in residential areas that are located alongside a river which greatly impacts the damage to vegetation on the riverbank (reparian ecosisystem). The impact of some of the above sectors affects the chemical and physical changes in the waters.

Table 03. Impacts of mining, plantation, agriculture, deforestation and human settlement activities in South Barito Districts

Source of Impact	Sedimentation / Superficiality	Pollution/ Eutrophication	Habitat change	Changes in fish migration patterns	Loss of fish food availability	The extinction of fish that is on the IUCN list
Mining	√	√	√	√	√	√
Farming	√	√	√	√	√	√

Agriculture		√	√			√
Deforestation	√	√	√	√	√	√
Human settlement	√	√				√

2.3. Important Role Inland Fisheries

The term inland fisheries is used to define efforts to capture aquatic organisms from wild stocks of inland waters including fish (Allan et al. 2005; Welcomme et al. 2010). Therefore, terrestrial aquaculture is excluded from this term although this activity to some extent uses similar freshwater habitats. Terrestrial aquaculture has been seen as a competitor for inland capture fisheries (So-Jung et al. 2014). However, when the threat of climate change is taken into account, the impact on terrestrial fisheries also needs to be considered.

Even terrestrial freshwater habitats such as lakes, rivers and swamps are often stocked with juvenile fish resulting from hatcheries which ultimately form fisheries based fisheries and become part of the food web in the system. Therefore aquaculture-based fisheries can have opportunities to improve primary habitat productivity and can be considered as part of land fisheries mitigation and rehabilitation management measures.

The impact of climate change on inland fisheries in terms of food security may differ significantly according to different regions. For Asia and Africa, the role of inland fisheries in securing food access in terms of food security is very important compared to other regions such as the North and South. Therefore, the impact of climate change may be more severe in the previous area compared to its impact on the last area where recreational fisheries take a major place in inland fisheries rather than for food production. Terrestrial fisheries habitat consists of several natural freshwater ecosystems such as lakes, rivers, swamps, floodplain areas and man-made freshwater ecosystems such as reservoirs, dams and paddy fields (Coates 2002). Until now, the degradation of terrestrial freshwater habitat has occurred due to anthropogenic activities such as mining, agriculture, forestry, oil palm plantations, water abstraction. This activity depends on the nature of the activities that have threatened freshwater habitats through water pollution, increased sedimentation or siltation and turbidity, changes in water flow that adversely affect fish populations and their habitats. Finally, the impact may be multiplied because it has been combined with the impacts caused by climate change.

Land capture fisheries also suffer from false perceptions that assess land capture fisheries are not as important as sea capture fisheries. Unlike marine fisheries which are considered as an important way to generate foreign exchange, inland fisheries are seen more as a way to maintain the livelihoods of the poor and also for food security (Coates 2002). Because the role of inland fisheries has been ignored by many parties, it is not

surprising that the degradation of freshwater habitats due to anthropogenic activities has been abandoned without any efforts that have been tried to protect and rehabilitate them.

This is exacerbated by the fact that inland fisheries production statistics have been collected inaccurately due to the lack of methods used to collect statistical data (Coates 2002; Bartley et al. 2015). The lack of accurate data can clearly mislead plans and decisions need to be developed and made for appropriate management of inland fisheries to address problems including the impact of climate change on inland fisheries.

2.3.1. Food Safety and Security

Garcia and Rosenberg (2010) define two important roles of inland capture fisheries contributing to food security such as 1) directly as an important source of nutrition and 2) indirectly as a source of income to buy food.

The term food security was introduced by the Word Food Summit in 1996 which recognized the need for everyone at all times to have access to sufficient, safe and nutritious food to maintain a healthy and active life (World Health Organization 2014). Food security has been developed based on three important pillars such as the availability, access and use of food.

The term food availability refers to food production and stock levels and net trade. While access to food refers to several issues such as income, expenses, markets and prices that affect food security goals. Food use on the other hand refers to adequate energy and nutrient intake by individuals is the result of good care and feeding practices, food preparation, dietary diversity and food distribution in the household. Combined with good biological utilization of food consumed, this determines the nutritional status of individuals.

Referring to the definition of food security, there is no doubt that inland fisheries can be expected as a vital element of the poor in developing countries to meet global food security goals in certain poor regions such as Asia and Africa (Belton and Thils ted 2014). It is true that when fish are caught from fresh water it has been reported to be a rich source of nutrients, such as protein and calcium which is very important for human health (Belton and Thilsted 2014).

The role of inland fisheries is very important to provide cheap access to animal protein. For example, in Cambodia, fish are harvested mainly from the Mekong river which is 65-75% of the total protein in food (Guttman 1999). In Bangladesh, fish account for 60% of animal protein intake, and inland fisheries account for around 42% of total fish catch. In

rural rural areas, around 80% of households catch fish each year, either for own consumption or for sale (Williams 1999).

Fish is important to provide nutrition especially for people who live in developing countries because it is very popular and easily accessible in terms of its availability from nature and the price is also cheap compared to other animal protein sources such as beef. Because fish contain high-quality animal protein and essential fatty acids, especially long-chain polyunsaturated fatty acids (LCPUFA) and micronutrients, which are far greater than terrestrial animal-source foods (Beveridge et al., 2013), their role is to contribute to resistance the food of the poor becomes important.

In many communities, terrestrial fish are the main source of animal protein and a vital component in ensuring food and nutrition security at the local and regional level, especially in developing countries. Although per capita fish consumption from various regions is uneven and tends to grow stagnant and even decline in sub-Saharan Africa but in some countries in East Asia it increased from 35.4 kg in 2010, Southeast Asia to 33.4 kg, and North Africa to 12.2 kg (FAO, 2014). In Laos, inland fish contribute 29 kg per person per year (48% animal protein) and in Cambodia 37 kg per person per year (79% animal protein) (Hortle 2007).

Although fish can be produced from farmed fish, several studies comparing the nutritional content between wild fish and farmed fish find that wild fish are superior to fish that are cultivated. The reason for this claim is related to water quality, feed or suspected misuse of veterinary medicines which can affect the quality and nutritional value of fish (FAO 2014). Then replacing wild fish from the same fish species as fish that is being cultivated can cause the problem of nutrient degradation of people in the region.

2.3.2. Economic Value and Source of Revenue

The production of fish catches is related to the level of exploitation of fishery resources which is influenced by the number of fishermen and the amount of effort (effort), along with the type of fishing gear used. Thus fishing livelihoods can affect fish diversity. Side livelihoods are also likely to affect fish diversity. In addition to fishing, livelihoods are also generally owned by the community in mainland waters. This is caused by variations in the potential of fish resources are seasonal, and natural resources around them can still be alternative sources of livelihood.

In general, the livelihoods of fishing communities depend on the natural resources available in the public waters around their residence. Side livelihoods can cause damage to ecosystems, if exploitation of natural resources in public waters inappropriately used. If there are fewer alternative livelihoods, the community will tend to intensify the

contribution of fisheries as a source of income. Conversely, if there are alternative livelihoods that are more profitable, exploitation pressure fish resources will decrease.

Social and cultural factors of the community can affect fish diversity. The community utilizes fish resources in mainland waters through fishing activities. Socio-cultural factors of the community will affect people's behavior in utilizing fish and other natural resources. Social and cultural factors that influence the way people use fish resources include: social values and local wisdom, community perceptions of the environment, and norms that govern the use of fish resources. Most mainland aquatic fishing communities are part-time fishermen who have other livelihoods besides fishing. The total income of fishing households comes from the fishing and non-fishing sectors. The contribution of the non-fishing sector to total income depends on the livelihood opportunities available in the community's home environment. While the contribution of the fishing sector is influenced by the number of fish catches. The level of income of the mainland water fishermen community which is an indicator of the level of welfare is influenced by the percentage balance of the contribution of livelihoods to fishing with livelihoods rather than fishing. Fishermen are an important component in the dynamic system of fisheries, because fishermen are the main actors in fishing. Fishermen in the swampy swamp are characterized by the traditional attachment of fishermen to their environment. Fisheries business is carried out on a small scale. In general, fishermen in mainland waters obtain income from other businesses as well as from agriculture or plantations.

Table 4. Number of Aquaculture Households in South Barito

Year	South Barito District
	Types of cultivation: Ponds and floating
2017	1981
2016	1966
2015	1960
2014	1955

2.4. Economic value of inland Fishery

The economic value of fish produced from the terrestrial fisheries ecosystem is related to its contribution to the income of the fishing community and also its contribution to the regional income known as the GRDP. The economic value of fish production is highly dependent on the catches of fishermen from various terrestrial fisheries habitats such as rivers, lakes and swamps.

Fish production, in a variety of fish habitats, except for swamp waters, the production and value of capture fisheries frorm river and lake waters in the South Barito District tends to increase from year to year. A different trend occurs in swamp waters where fish

production and value have declined significantly from 2005 to 2011. The decline in fish production and the value of fisheries from fishing in swamps is thought to decrease the swamp ecosystem, which is thought to be caused by silting and reclamation processes as human activities. However, fish catches and their value collectively show an increase.

Table 05. Production and value of capture fisheries production from river, lake waters and swamps of South Barito Regency

No.	Year	River		Lake		Swamp	
		Volume (ton)	Value (IDR)	Volume (ton)	Value (IDR)	Volume (ton)	Value (IDR)
1.	2005	2.564,6	29.734.600	2.227,7	25.426.300	947,2	12.504.040
2.	2006	2.509,0	29.796.600	2.181,5	24.820.200	941,1	9.979.100
3.	2007	2.555,1	31.919.500	2.217,4	24.820.200	957,2	9.979.100
4.	2008	4.203,5	51.121.750	2.279.0	34.389.250	217,9	2.385.000
5.	2009	4.149,5	41.527.000	2.034,1	25.747.250	122,4	1.417.625
6.	2010	4.251,1	44.080.750	2.253,6	28.179.000	154,6	1.822.250
7.	2011	4.049,8	45.510.000	2.565,8	31.756.275	149,1	1.791.250

Source: Book of Statistics of Capture Fisheries in Central Kalimantan Province 2005 - 2011

In South Barito District, the inland fishery business has made a very positive contribution to the welfare of the fishing community and also to the district's economic growth. For the welfare of the fishing community, based on the results of research conducted by Sweking et al (2019) on the capture fisheries business conducted by fishermen in Lake Barito Mati, shows that the business economically provides significant benefits. The average profit per month is IDR 5,171,794, far exceeding the regional minimum wage (UMR) of South Barito Regency in 2017 of IDR 2,546,000 per month.

In terms of economic growth in the South Barito Regency, the contribution of the fisheries sector, especially inland fisheries, to the GRDP is very significant when compared to other sectors. The results of the GRDP analysis of the contribution of the fisheries sector in South Barito using the tilapia Location Quotient (LQ) (Table 02) shows a value of 2.65 exceeding the LQ value for other sectors such as waste, waste and recycling (1.63), animal husbandry (1.62), procurement water, mining and quarrying (1.47). LQ value> 1 indicates that the sector is a base and leading sector, specialized, export-oriented, and serves the domestic and foreign markets.

Table 06. Results of Analysis with Location Quotient (LQ) Contribution of the Fisheries Sector At the South Barito GRDP in 2017

Category	Description	Regency GDRB	Province GDRB	Information	Category	Description
(1)	(2)	2017	2017			

A	**Agriculture, Forestry, and Fishery**	**705,985**	18457,5	18457500	0,86	Non Basic
	1. Agricultute, Farming, Hunting and agriculture services.	453,214	15909,6	15909600	0,64	Non Basic
	a. Crops	32,602	1604,1	1604100	0,46	Non Basic
	b. Annual Horticulture plants	1,658		0		
	c. Seasonal Plantation	0		0		
	d. Annual and Other Horticultural Plants	8,134	417,9	417900	0,44	Non Basic
	e. Annual Plantation	314,154	12287,5	12287500	0,58	Non Basic
	f. Farming	86,462	1203,6	1203600	1,62	**Base Sector**
	g. Agriculture and Hunting Services	10,204	396,5	396500	0,58	Non Basic
	2. Forestry and Logging	56,889	880,7	880700	1,46	**Base Sector**
	3. Fishery	**195,882**	1667,2	1667200	2,65	**Base Sector**
B	**Mining and Logging**	**966,603**	14799,9	14799900	1,47	Non Basic
C	**Processing industry**	**238,289**	13971,9	13971900	0,38	Non Basic
D	**Electricity and Gas Procurement**	**1,941**	72,3	72300	0,61	**Base Sector**
E	**Water Supply, Waste, Waste and Recycling Management**	**4,951**	68,5	68500	1,63	**Base Sector**
F	**Contruction**	**245,384**	7853,8	7853800	0,70	**Base Sector**
G	**Wholesale and retail trade:Car and Motorcycle Repair**	**312,823**	10123,3	10123300	1,79	**Base Sector**
H	**Transportation and warehousing**	**450,194**	5668,9	5668900	1,11	**Base Sector**
I	**Provision of Accommodation and Food and Drink**	**74,601**	1510,4	1510400	1,23	**Base Sector**
J	**Information and Communication**	**57,570**	1059,6	1059600	1,33	**Base Sector**
K	**Financial Services and Insurance**	**171,546**	2910,6	2910600	1,05	**Base Sector**
L	**Real Estate**	**80,393**	1726,6	1726600	0,44	Non Basic
M,N	**Company Services**	**637**	32,4	32400	1,04	**Base Sector**
O	**Administrasi Pemerintahan, Pertahanan dan Jaminan**	**237,318**	5164,1	5164100	1,46	**Base Sector**
P	**Education Services**	**245,673**	3786,7	3786700	1,54	**Base Sector**
Q	**Health Services and Social Activities**	**103,638**	1516,8	1516800	1,97	**Base Sector**
R, S, T, U	**Other services**	**73,609**	841,7	841700		**Base Sector**
GROSS REGIONAL DOMESTIC PRODUCT BRUTO		3,971,155	89565,1	89565100		
REGIONAL DOMESTIC PRODUCTS WITHOUT OIL AND GAS		3,971,155		0		

Source: *Calculated from GRDP South Barito Regency 2017 data (BPS 2018)*

CHAPTER III
REVIEW OF SPATIAL REGION OF SOUTH BARITO REGENCY

3.1. Spatial Status of South Barito Regency

Based on the South Barito Regency Regulation, Number 4 of 2014, regarding the South Barito Regency Spatial Plan for 2014-2034, the objectives, policies and strategies of the South Barito Regency Spatial Planning have been determined.

The purpose of spatial planning in South Barito Regency based on the regional regulation is to create a region that is developed and independent and highly competitive by utilizing natural resources optimally, based on environmentally friendly and sustainable agro-industries. Furthermore, the spatial planning policy consists of: equal distribution of regency economic areas, increasing investment opportunities, increasing agro-industrial production, strengthening conservation areas for environmental preservation and enhancing the function of the area for national defense and security. To implement the economic equalization policy, the South Barito Regency uses strategies to develop transportation facilities and infrastructure systems, connect rural and urban areas, build district crossing piers, build railroad networks as transportation nodes, develop sub-district functions as production node of plantation products, processed products forestry, animal husbandry and fisheries.

To increase investment opportunities strategies need to be developed and manage forest resources of high economic value, increase cooperation with communities to manage productive community forests, provide assurance of legal certainty for investment, utilize forest resources together with the community for environmental sustainability, and make efforts to foster to the forest community, in this case the Dayak indigenous community to develop and develop plantations and forest processing

The planned structure of the South Barito Regency includes PKW located in Buntok, South Dusun sub district, PKLp located in Bangkuang, Karau Kuala sub district and in Tabak Kanilan, Gunung Bintang Awai sub district, PPK located in Mangkatip, Downstream Dusun sub district, in Rantau Kujang, Jenamas sub district, and in Pendang sub district of

North Dusun , PPL is located in Kalahien sub district of South Dusun, in Patas Gunung Bintang Awai sub district, and in Tarusan North Dusun sub district.

The South Barito Regency Spatial Plan includes the protected area and cultivation area plan. The protected area consists of protected forest area which stretches in the of Downstream Dusun sub districts, Karau Kuala, South Dusun and Gunung Bintang Awai covering an area of 67,566.60 hectares. Areas that provide protection to subordinates are water catchment areas scattered in the of Dusun Utara sub districts, Gunung Bintang Awai, South Dusun, Karau Kuala, and Downstream Dusun with an area of 2,789.30 hectares. Areas that provide protection to subordinate areas as referred to in Article 19 letter b, namely water catchment areas scattered in the sub districts of North Dusun, Gunung Bintang Awai, South Dusun, Karau Kuala and Downstream Dusun with an area of approximately 2,789.30 (two thousand seven hundred eight thirty nine point thirty) hectares.

Local protection areas include river border and lake / reservoir border areas. River border area with an area of approximately 2,904.53 (Two thousand nine hundred and four point fifty-three) hectares is located along the Barito River The border area of the lake or reservoir is directed to the entire area around the lake / reservoir with an area of 1,593.67 (one thousand five hundred ninety three point sixty seven) hectares spread throughout the South Barito Regency, including Bambaler lake, Madara lake, Mangguruh lake,Buntal lake, Buritkumpai lake, Karanen lake, Raya lake, Bundar lake, Mangkarai lake, Ganting lake, Palui lake, Malawen lake, Jutuh lake, Sadar lake, Hampalam lake,Sabur lake, Lambuhang lake, Jaman lake, Lelek lake, Muaradanau lake, Pamarahan lake, Bahalang lake, Surapanji lake, Rakutan lake, Kalahien lake, Mutar lake, Sanggu lake, Limut Lake, Sababilah lake, Masura lake, Baleleng lake, Jayo lake, Mentarem lake, Pulut lake, and Telang lake, the width is balanced with the physical condition of the lake/reservoir between 50-100 (fifty - one hundred) meters from the highest tide point towards the land.

Natural reserve or conservation area, 74,816.80 (seventy-four thousand eight hundred sixteen point eighty) hectares in the form of Orang Utan Habitat in Madara, Batilap, and Muara Puning. Black water ecosystem, is a swamp forest area with very peat thick, or often referred to as the peat dome, so the waters around it (rivers and lakes) are black, with an area of 13,719.02 (thirteen thousand seven hundred nineteen point zero two) hectares.

Water area, is the area of the Barito river along with its river branches that occupy space and are spread throughout the South Barito district, with an area of 12,124.36 (twelve thousand one hundred twenty-four point thirty-six) hectares. Cultivation areas include production forest designation areas, community forest designation areas, agricultural designation areas, fisheries allotment areas, mining allotment areas, residential allotment areas, industrial allotment areas, tourism allotment areas, other use areas, holding zone areas.

The area of designation of production forest includes limited production forest (HPT) located in Gunung Bintang Awai sub district, North Dusun, and South Dusun with an area of approximately 60,592.01 (sixty thousand five hundred ninety two, point zero one) hectares, production forest permanent (HP) which is spread throughout the Northern Dusun, Gunung Bintang Awai sub district, southern Dusun sub district and Karau Kuala sub district with an area of approximately 79,968.06 (seventy nine thousand nine hundred sixty eight point zero six) hectares, production forest which can be converted (HPK) spread in the Southern Dusun, Karau Kuala sub district, Downstream Dusun sub district and Jenamas sub district with an area of approximately 27,541.74 (twenty seven thousand five hundred forty-one point seventy four) hectares.

Area of designation of community forest/rights forest. The area of designation of community forest is the land that has been utilized and owned by the community, as evidenced by the title of land title. Private forest or private forest is located in Gunung Bintang Awai sub district with an area of approximately 288.02 (two hundred eighty eight point zero two) hectares, and in South Dusun District with an area of approximately 280.12 (two hundred eighty point twelve) hectares. Agricultural allotment areas include food crop allotment areas, community estate allotment areas, large estate allotment areas, and livestock allotment areas. one hundred and five point thirty eight) hectares. The allotment area of agriculture includes the allotment of food crops, the allotment of community plantations, the allotment of large estates, and the allotment of livestock. Food allotment area is spread throughout the district of South Barito district, with an area of approximately 7,105.38 (seven thousand one hundred five point thirty eight) hectares

The area of designation of people's plantations as in the form of rubber plantations, rattan gardens, fruit gardens (cempedak, durian, banana), and vegetable gardens, is spread in North Dusun sub district, Gunung Bintang Awai sub district, South Dusun sub district, Karau Kuala sub district, Downstream Dusun Sub-District and Jenamas sub-district with an area of 7,481.65 (seven thousand four hundred eighty-one point sixty-five) hectares. A large estate allotment area of 64,808.12 (sixty-four thousand eight hundred eight point twelve) hectares, an allotment area for livestock, covering an area of approximately 10,151.18 (ten thousand one hundred fifty one point eighteen) hectares located in Jenamas sub district and Downstream Dusun sub district.

Fishery allotment areas include allotment fishery allotment areas and aquaculture allotment areas. The allotment area of fisheries as found in rivers and lakes that exist in all districts with an area of 745.62 (seven hundred forty-five point sixty-two) hectares. Mining allotment area including mineral and coal mining is located in Gunung Bintang Awai sub district with an area of approximately 93,400.43 (ninety-three thousand four hundred point forty-three) hectares.

Settlement designation areas consist of allotment areas for urban settlements and rural settlement designation areas. The area of designation of urban settlements is in Buntok with an area of approximately 3,831.46 (three thousand eight hundred thirty one point forty six) hectares. The area of designation of rural settlements is spread in each district with an area of approximately 24,655.45 (twenty four thousand six hundred fifty five point forty five) hectares.The development of urban settlements is directed at the villages of Sababilah, Mangaris,and Sanggu, South Dusun sub district, with an area of approximately 1,500.20 (one thousand five hundred point twenty) hectares.

Industrial allotment area of 2,120.35 (two thousand one hundred twenty point thirty-five) hectares consists of large industrial allotment areas, medium industrial allotment areas and allotment areas of home industries. The large industrial allotment area consists of the rubber industrial area in the South Dusun sub district, the Crop Palm Oil (CPO) industrial area in the North Dusun sub district, the coal mixing industry area along the Barito river, the North Dusun, the South Dusun, Karau Kuala, and the Downstream Dusun. The industrial allotment area is currently composed of rattan industrial zones in the Sub-districts of Downstream Dusun, North Dusun, and South Dusun, the timber industry area in Gunung Bintang Awai sub district and the industrial area of construction materials and roads in the sub-district of South Dusun. The home industry designation area consists of rattan and purun woven industrial zones in Karau Kuala sub-district, Jenamas, Downstream Dusun and South Dusun, food diversification industrial areas in the sub districts of South Dusun and Gunung Bintang Awai.

The allotment of tourism area is 50.80 (fifty point eighty) hectares, consisting of natural tourism, cultural tourism, and artificial tourism. The allotment of nature tourism includes Goa and / or Liang Exploration tours in Bintang Ara Village and Bipak Kali Village and Senango Waterfall Tourism in Bintang Ara Village. The allotment of cultural tourism allotment is the tourist site of Mount Bawo in Bintang Ara Village. Areas for tourism are culinary tourism at Pamait village.

Other areas of use are 54,428.25 (fifty four thousand four hundred twenty eight point twenty five) hectares, located in North Dusun sub district, Gunung Bintang Awai sub district, South Dusun sub district, Karau Kuala sub district, Downstream Dusun sub district and Jenamas sub district.

Areas not yet Designated for Changes in Designation and Spatial (Holding Zone), are forest areas that are proposed to change their designation and function or are not proposed to become forest areas by the Governor to the Minister of Forestry in the revision of regional regulations on provincial spatial plans that have not yet been approved changes in the designation and function of their forest areas by the Minister of Forestry, including community forest allotment areas based on laws and regulations in the forestry sector as limited production forest areas, hereinafter referred to as forest areas / community forest designation areas, community forest allotment areas based on laws and regulations in the forestry sector is still a permanent production forest area, hereinafter referred to as a forest area / area designated for community forest, the area designated for community forest which is based on laws and regulations in the forestry sector still as a production forest area that can be converted.

Forest area / designation area of community forest (private forest) is located in a part of North Dusun sub district, Gunung Bintang Awai sub district and South Dusun sub district covering an area of 4,161.19 (four thousand one hundred sixty-one point nineteen) hectares, forest area / forest allotment area the people (private forest) are located in parts of North Dusun sub district, Gunung Bintang Awai sub district, and South Dusun sub district covering 5,414.97 (five thousand four hundred fourteen point ninety-seven) hectares, forest area / designated area for community forest (private forest) is located in part of the Gunung Bintang Awai sub district area, and South Dusun sub district covers an area of 1,157.43 (one thousand one hundred fifty-seven point forty-three) hectares, the forest area / agricultural allotment area (food crops) is in a portion of the sub district of South Dusun and the sub district Karau Kuala covering an area of 115.92 (one hundred and fifteen point ninety two) hectares,
forest / agricultural allotment area (food crop) is located in a part of North Dusun sub district, Gunung Bintang Awai sub district, South Dusun sub district and Jenamas sub district covering 125.82 (one hundred twenty-five point eighty two) hectares, forest area / designation area agriculture is located in parts of the North Dusun sub district, Gunung Bintang Awai sub district, South Dusun sub district, Karau Kuala sub district, Downstream Dusun sub district, and Jenamas sub district covering 4,317.15 (four thousand three hundred seventeen point fifteen) hectares,
forest area / agricultural allotment area (community plantation) is located in a part of the sub-district of South Dusun with an area of 86.96 (eighty six point ninety six) hectares, forest area / agricultural allotment area (smallholder estate) is located in part of the Karau Kuala sub district area of 1,638.85 (one thousand six hundred thirty eight point eighty five) hectares, forest areas / agricultural allotment areas (smallholder plantations) are located in a part of the South Dusun sub district of covering an area of 2,349.29 (two thousand three hundred forty nine point twenty nine) hectare, forest area / designation area for community plantations are located in parts of the North Dusun sub district, Gunung Bintang Awai sub-district, South Dusun sub-district, Karau Kuala sub-district,

Downstream Dusun sub district, and Jenamas sub district covering 28,079.26 (twenty eight thousand seventy nine point twenty six) hectares.

Furthermore, the forest agricultural allotment area (smallholder estate) is located in a portion of the North Dusun sub district, Gunung Bintang Awai sub district, South Dusun sub district, Karau Kuala sub district, and Jenamas sub district covering 16,110.27 (sixteen thousand one hundred ten point twenty seven) hectare, forest area / esignation area of livestock is in part of the Downstream Dusun sub district and Jenamas sub district covering an area of 528.98 (five hundred twenty eight point ninety eight) hectares, forest area / allotment area is in part of Downstream Dusun sub district and Jenamas sub district covering an area of 601.79 (six hundred and one point seventy nine) hectares, forest area / designation area is located in a portion of the sub district of South Dusun and Downstream Dusun sub district, covering an area of 354.57 (three hundred fifty four point fifty seven) hectares , Forest area / settlement designation area is located in a part of South Dusun sub district, Karau Kuala sub district, and Downstream Dusun sub district, covering an area of 650.11 (six hundred and fifty point eleven) hectares, the forest area / designation area is located in a portion of the North Dusun sub district, Gunung Bintang Awai sub district and South Dusun sub district covering 14,778.92 (fourteen thousand seven hundred seventy-eight point ninety-two) hectares, forest area / designation area is located in a portion of the North Dusun sub-district, Gunung Bintang Awai sub district, South Dusun sub district, Karau Kuala sub district, and Downstream Dusun sub district covering 6,279.39 (six thousand two hundred seventy nine point thirty nine) hectares, forest area / tourism allotment area is located in a part of Gunung Bintang Awai sub district area of 604.51 (six hundred four point fifty one) hectares, forest area / tourism allotment area is located in a part of the region Gunung Bintang Awai sub district covering an area of 25.64 (twenty five point sixty four) hectares, forest area / designation area per earth ahan is located in a part of the sub-district of South Dusun with an area of 87.24 (eighty-seven point twenty four) hectares, forest area / other allotment of use area is in a part of the sub district of South Dusun with an area of 78.51 (seventy eight point fifty-one) hectare.

The plan to develop the strategic area of South Barito Regency is at the level of the National Strategic Area, Provincial Strategic Area, and Regency Strategic Area. The development of national strategic areas are those stipulated in the National Spatial Planning namely the Integrated Management Areas of the Kapuas Kahayan and Barito Watersheds, or abbreviated as KAPET DAS KAKAB. The development of provincial strategic areas is stipulated in the Central Kalimantan RTRWP covering strategic areas in terms of economic interests, namely minapolitan areas in the South Dusun sub district, and peat development areas (PLG), strategic areas viewed from the point of socio-cultural importance namely the Bawo Site Area in Bintang Ara Village, the strategic area is seen in terms of the importance of utilizing natural resources and / or high technology and the strategic area is viewed in terms of the importance of environmental carrying capacity,

namely the black water ecosystem conservation area (KEAH) located in Batilap Village, Batampang, Simpang Telo.

The development of the strategic area of South Barito Regency covers strategic areas from the point of economic interests, strategic areas from the point of socio-cultural interests and nature reserves, and strategic areas from the point of interests of the functions and carrying capacity of the environment. The development of the district's strategic area is seen from the perspective of economic interests including the agropolitan area, in Pararapak, South Dusun sub district, Pendang in North Dusun sub district, and Tabak Kanilan in Gunung Bintang Awai sub district, rattan production development areas in Buntok (South Dusun sub district) and Mangkatip (Downstream Dusun sub district), Buntok urban area, Bangkuang urban area, Tabak Kanilan urban area, Pendang urban area, Mangkatip urban area, Rantau Kujang urban area, Patas urban area, Sababilah urban area and Kalahien urban area.

The development of the strategic area of the South Barito district in terms of socio-cultural interests and nature reserves is the area of swamp buffalo grazing in Tampulang, Rangga Ilung, and Kelanis; and the strategic area of the South Barito district from the standpoint of environmental carrying capacity, namely the endemic flora and orchid gardens in Malawen.

The direction of spatial use in the South Barito Regency based on the regional regulation contains the directions for the realization of the spatial structure plan, the direction for the realization of the spatial pattern plan, the direction for the spatial plan for the strategic area of the regency. Directions for the use of spatial structure plans include System center plans; and Regional infrastructure system plan. Embodiment of the planned system of activity centers consisting of urban systems; and rural system.

The directions for the realization of the spatial plan for the South Barito Regency include the realization of the protected area; and the realization of cultivation areas. The embodiment of protected areas consists of embodiment of protected forest areas, embodiments of areas that provide protection to subordinates, embodiments of protected areas, embodiments of nature reserves, nature conservation, and cultural preservation, embodiments of areas prone to natural disasters; and the realization of other protected areas. The embodiment of protected forest areas includes reforestation on critical lands through collaboration with various forest care institutions, cross government agencies and local communities, management of protected forests, strengthening management of areas and strengthening of protected blocks in 33 protected forest areas to support conservation areas thereon, enforcement law for illegal logging by handling (preventive, persuasive, and repressive) in a sustainable manner, forest area rehabilitation activities; and installation of boundary markers.

The embodiment of the area that provides protection to subordinates consists of: reforestation in water catchment areas, installation of boundary markings in water catchment areas, and planting of perennials that have high water absorption capacity.

The embodiment of local protected areas includes the making of boundary markers of watersheds, rivers and lakes, counseling the community so as not to penetrate into the border area; planting hard plants that function as protection; control of buildings that threaten environmental sustainability around the river border; maintain the watershed border to protect watersheds from activities that interfere with the sustainability of watershed functions; arrangement of watershed border areas; arrangement of river border areas; and arrangement of lake / reservoir border areas.

The embodiment of the nature reserve area, nature preservation, and cultural preservation as consisting of establishing boundaries for nature reserves, nature preservation, and cultural preservation; promoting cooperation in restoring the function and role of nature reserves, preservation of nature, and cultural preservation; implementation of rehabilitation programs for nature reserves, nature conservation and cultural preservation; the implementation of programs to preserve and preserve nature reserves and cultural reserves; multi-approach and multi-actors rehabilitation programs and cross-regions; and monitoring and evaluation.

The realization of natural disaster-prone areas consists of socialization of potential flood and landslide hazards in the Regency, conducting post rehearsals and field rehearsals against flood and landslide hazards; strengthening institutions and mechanisms for handling floods and landslides in South Barito Regency; and strengthening and enhancing cooperation and participation of non-governmental organizations in handling floods and landslides.

The realization of other protected areas consists of the preparation and / or strengthening of the area development program, the implementation of the area development program, and the implementation and supervision of the area development program. The embodiment of the cultivation area includes the embodiment of the allotment of the production forest, the embodiment of the allotment of the people's forest, the embodiment of the allotment of the agricultural area, the embodiment of the allotment of the fishery allotment, the embodiment of the allotment of the mining allotment, the embodiment of the allotment of settlements, the embodiment of the industrial estate, the embodiment of the allotment of agricultural areas; and the embodiment of other designation areas.

The embodiment of the production forest allotment area includes mapping the boundaries of the production forest allotment area, identifying the types of allotment of the production forest, the program of recovery and development of the production

forest; and carrying out the management and development of production forests. The realization of the area of designation of community forests includes: the socialization of the use and control of spatial planning, mapping of boundaries of the area of designation of community forests, inventory of types of designation of community forests; and managing and fostering community forests. The embodiment of the allotment of agricultural areas includes mapping of leading agricultural areas as the leading sector for regional economic development, the making of the agropolitan area masterplan, the making of the minapolitan area masterplan, the development of the agropolitan center; and construction of facilities and infrastructure to support the development of agricultural areas, mapping boundaries of plantation areas, development of potential plantation areas, development of estate crops, marketing of estate products, and enhancement and development of human resources.

The embodiment of the fishery area includes the establishment of boundaries of the fishery area, the embodiment of the aquaculture area, the creation of the minapolitan area master plan, the improvement and development of the aquaculture area, the improvement and management of the aquaculture area, equipping the integrated fishery area with supporting facilities, promoting the integrated fisheries area through various media, and carrying out various promotional activities; and establish an integrated fisheries information center and regional fisheries promotion management information system.

The embodiment of the mining allotment area includes improving management and development, as well as guiding and supervising the mining and energy sectors; inventory of mineral resources, guidance and supervision in the fields of mining and minerals and underground water that have the potential to be exploited on an economic scale; promotion to attract investment in the development of mining and energy.

The embodiment of residential designation areas includes the mapping of existing settlement zones and areas ready to build; developing urban settlements in protected areas and relocating; provision of new residential areas.

The realization of industrial allotment areas includes mapping of existing industrial zones and their development zones; construction of the completeness and scope of supporting infrastructure services for the needs of the industrial estate in the future; reserve of new industrial areas; provision of housing for industrial employees.
The embodiment of the tourism allotment area includes the mapping of the existing tourism area and its area, the construction of facilities and infrastructure as well as supporting and supporting utilities, the reserve of tourism development land and its supporting sectors, the procurement of information centers and tourism promotion.

The embodiment of other designation areas includes the determination of the area of fire training, the development of the State defense and security area, the construction of state defense and security facilities, the construction of other supporting facilities. Direction for the realization of the strategic spatial plan for the South Barito district include the development and improvement of the agropolitan area; development and improvement of urban areas; development and improvement of the rattan industrial area; the development and enhancement of the tourism sites of bawo sites; development and improvement of swamp buffalo grazing areas; development and management of endemic areas and orchid parks;

Directions for the realization of the development and improvement of the agropolitan area include the establishment and mapping of the agropolitan area; construction of transportation infrastructure facilities to support and support the development of agropolitan areas; construction of infrastructure for developing agricultural products; d. developing marketing results of agricultural activities; and the development and improvement of human resources.

The directions for the realization of the development and improvement of urban areas include the construction of land transportation system facilities and infrastructure, the construction and improvement of road and bridge networks; construction and improvement of terminals B and C; construction of trade facilities and infrastructure and services; construction of social facilities (universities, high schools / vocational schools, educational institutions & tutoring, type B hospitals, community health centers); development of social utilities (increasing the supply of clean water, providing electricity, development; and developing and increasing human resources.

The directions for the realization of the development and improvement of rattan industrial areas include the determination of the boundaries of rattan production development areas; the development of labor-intensive and export-oriented rattan industrial areas; development and improvement of infrastructure facilities supporting industrial activities; construction of facilities and infrastructure to support the development of rattan production; and community preparation.

The directions for the embodiment of the management of the Bawo site's cultural heritage area include the mapping of the boundaries of the cultural preservation area; development and enhancement of the area of historic sites; mapping and maintaining cultural heritage areas in the form of bawo sites; construction of other supporting facilities and infrastructure; and socialization and community preparation. The directions for the embodiment of the management of swamp buffalo grazing areas include the boundary mapping of swamp buffalo herding areas; maintenance of swamp buffalo grazing areas; swamp buffalo grazing area development; provision of supporting facilities

and infrastructure; breeding of superior buffalo species; and socialization and community preparation.

Directions for the realization of endemic area management include mapping of boundaries of nature reserves, nature preservation; development of orangutan habitat areas; development and enhancement and preservation of endemic flora areas; development of endemic areas and orchid parks; maintenance of nature reserves in the form of habitat for orangutans; and socialization and community preparation.

3.2. Legal status of Spatial Planning for South Barito Regency

With the enactment of South Barito District Regulation number 4 of 2014 concerning the South Barito Regency Spatial Planning 2014-2034 as of June 9, 2014, the land use area of the South Barito Regency in general has a strong and binding legal basis.

In general, land use in South Barito Regency is divided into two major parts, namely protected areas and cultivation areas. Cultivation area consists of production forest allotment area, community forest allotment area, agricultural allotment area, fishery allotment area, mining allotment area, residential allotment area, industrial allotment area, tourism allotment area, other use allotment area and holding zone.

Interaction and dynamics between the division of the two large land uses, which triggered the emergence of environmental problems, which could endanger the inhabitants of each of the two large lands. Excessive pressure from the area of cultivation will disturb the balance in the protected area, which in the end will return to the area of cultivation and especially humans who live in the area of cultivation.

All kinds of regulations at various levels and sectors are actually intended to maintain a balance in the interaction and dynamics between the two regions. However, in reality these regulations appear to be too slow in anticipating the excesses that arise from these interactions and dynamics. Thus, they often cause stuttering for law enforcers and local law enforcers (Civil Service Police Unit) in implementing these regulations. Another problem is the weak enforcement of these regulations because there is not yet a strong awareness among stakeholders about the importance of anticipating the excesses that arise from the interaction and dynamics between the two regions. This lack of awareness could be due to differences in interests between each stakeholder and sectoral ego.

So what often happens is that rules targeting the problems that arise as a result of interactions and dynamics have been made, but enforcement of these regulations through the arousal of public awareness and stakeholders and the provision of penalties and sanctions for deterrent effects, often difficult to implement.

This is the case with the South Barito district regulation regarding this Regional Spatial Plan, even though it has been determined and has a binding nature, but the enforcement of the regulation in order to maintain a balance between protected areas and cultivation areas in the South Barito district, remains to be tested. Some problems that arise such as forest and land fires in the South Barito regency area after the enactment of the regulation, and the difficulty of dragging the perpetrators of forest fires, environmental destruction into the realm of the court can be an indicator that the regulation is still not effective in anticipating the excesses that arise from the implementation of the Plan Spatial Planning for South Barito Regency.

3.3. Regency Spatial Position in Development Implementation

Regency Spatial Planning is a system of spatial planning processes, spatial use and spatial use control. Where the implementation of spatial planning is an activity that includes the arrangement, guidance, implementation and supervision of spatial planning. Of the four points, it is clear that spatial planning activities are also related to development planning. As also stated in Law Number 26 of 2007 concerning Spatial Planning.

The district spatial planning document and development planning are both intended to predict future activities. In addition, spatial planning as a result of spatial planning activities is part of the development planning process that influences one another. As mentioned earlier, spatial use is a series of implementation programs and their financing during the planning period. Where according to Oetomo (1998) that spatial use activities include in the form of counseling and correcting plans, compilation of programs, preparation of implementation regulations and incentives and disincentives, the preparation and proposals of projects and the implementation of programs and projects. The South Barito district spatial plan must be operational so that it can become a regional strategy and policy to achieve the stated development goals and objectives. In addition, the spatial plan must function as an instrument of coordination for programs / projects that will be implemented in areas originating from various funding sources, as a manifestation of the use of spatial plans in the South Barito district.

Spatial planning is a plan for spatial use that is prepared to maintain the harmony of development between sectors in the framework of developing development programs in the long term (Nurmandi, 1999). Therefore, the spatial plan can be used as a reference in the preparation of development program plans, which are medium and short term plans. In the spatial plan can also be used as a reference for the government in making decisions, controlling, supervising and regulating the growth of a development in certain areas.

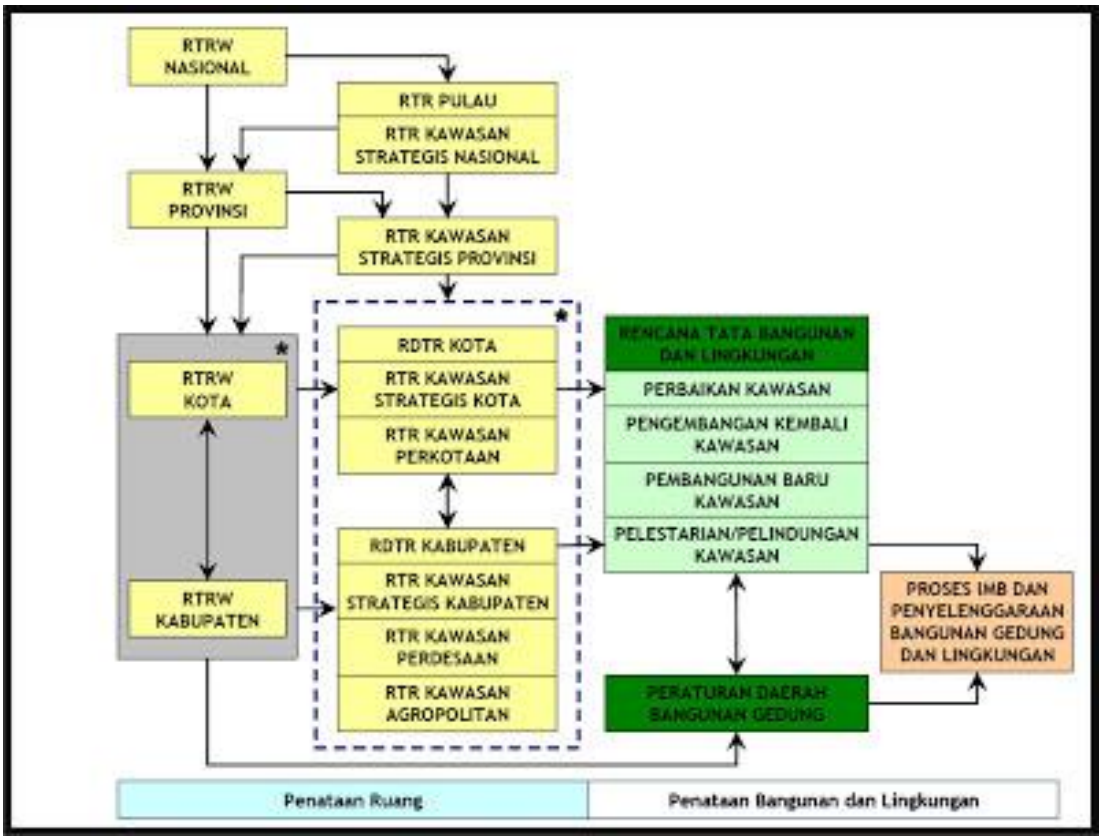

Figure 05. Spatial Plan Chart

In addition, the role of spatial planning in development planning can be seen from the spatial product namely the Building and Environmental Planning (RTBL) which is a guide to the design of an environment or area intended to control spatial use, the arrangement of buildings and the environment, and contain the main material Building and environmental program provisions, general plans and design guidelines, investment plans, plan control provisions, and implementation control guidelines

Environmental / regional development. besides that the RTBL function is as follows:

1. The basis for granting a building permit and building utilization more clearly and decisively.
2. Control the location, size of buildings and not buildings and not buildings.
3. Preparation of building designs and not buildings.
4. Arrangement of private elements to be integrated with the city area through "urban design gudenlines". Guaranteed legal certainty in the implementation of development, including certainty to obtain services, harmonious and harmonious conditions in carrying out its activities.

Besides that, the Barsel District Spatial Plan is a reference in the preparation of other inter-sectoral planning documents, and guidance in preparing Short, Medium and Long-term Development Plans that are reduced to regional programs.

It is clear that the South Barito district spatial plan plays an important role in development planning in the area, because it is indeed an inseparable unit. Spatial planning is not only used in the mechanism of permit issuance, but also as a basis for preparing medium and short term development planning documents and preparing local budgets. What needs to be emphasized here is that every activity, both physical and non-physical, will definitely need space for the activity to take place. In addition, as stated by Foley (1967) that spatial planning is not only a spatial conception (spatial), but there is also a non-spatial (a-spatial) insight because activities involving spatial are inseparable from the a-spatial conditions that occur.

The preparation and proposal of programs and projects that are in accordance with the spatial plan aims to realize integration between the development program and the existing spatial plans so that spatial plans are not only seen as procedural aspects in the implementation of regional development but also as activities that can support the achievement of targets development. Therefore, spatial planning is one of the strategic policies in an area.

3.4. Analysis of Spatial Problems That Are Associated with Land Fisheries

Although the South Barito Regency Spatial Plan for 2014-2034 has been made and has been stipulated as a South Barito regional regulation with Regulation No. 4 of 2014, it is a general Spatial Planning document which is still general in nature by including all aspects. Therefore, other specific plan documents are still needed with reference to the Regional Spatial Plan to describe them.

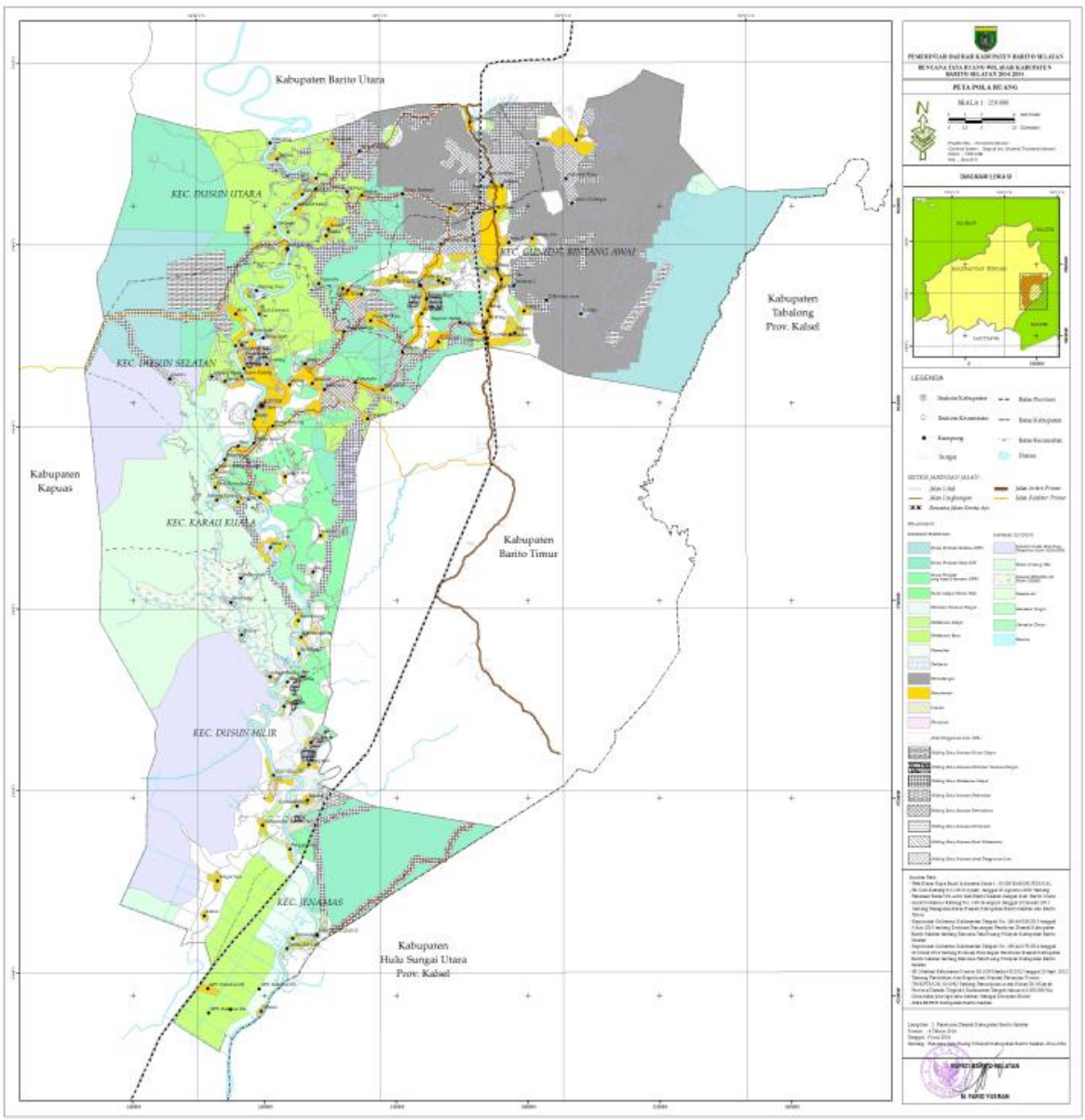
Kabupaten Barito Utara
KEC. DUSUN UTARA
KEC. GUNUNG BINTANG AWAI
Kabupaten Tabalong Prov. Kalsel
KEC. DUSUN SELATAN
Kabupaten Kapuas
KEC. KARAU KUALA
Kabupaten Barito Timur
KEC. DUSUN HILIR
KEC. JENAMAS
Kabupaten Hulu Sungai Utara Prov. Kalsel
PEMERINTAH DAERAH KABUPATEN BARITO SELATAN
RENCANA TATA RUANG WILAYAH KABUPATEN BARITO SELATAN 2014-2034
PETA POLA RUANG
LEGENDA

Figure 06. Map of Spatial Planning for South Barito Regency

The main issue in this study is whether the South Barito Regency Spatial Plan has accommodated the sustainability of inland fisheries and anticipated the excesses of the development of cultivation areas and conservation of protected areas against the existence of inland fisheries, which are generally located in lakes and rivers. rivers throughout the South Barito region. From at the South Barito Regency Spatial Plan 2014-2034, it is clearly seen the fisheries development plan in the area of aquaculture and maintenance of inland fisheries ecosystems through conservation of protected areas.

Based on the Spatial Planning document it is planned that the embodiment of the protected area consists of the embodiment of the forest area protection, the embodiment of the area that provides protection to his subordinates, the embodiment of the local protection area, the embodiment of the nature reserve area, nature preservation, and cultural preservation, the embodiment of the area prone to natural disasters; and the realization of other protected areas. The embodiment of protected forest areas includes reforestation on critical lands.Then in the South Barito Regional Spatial Plan it is planned to be in a protected area, namely the realization of a protected area that provides protection to its subordinates, consisting of reforestation in water catchment areas, installation of boundary markings in water catchment areas, and planting hard plants that have high water absorption.

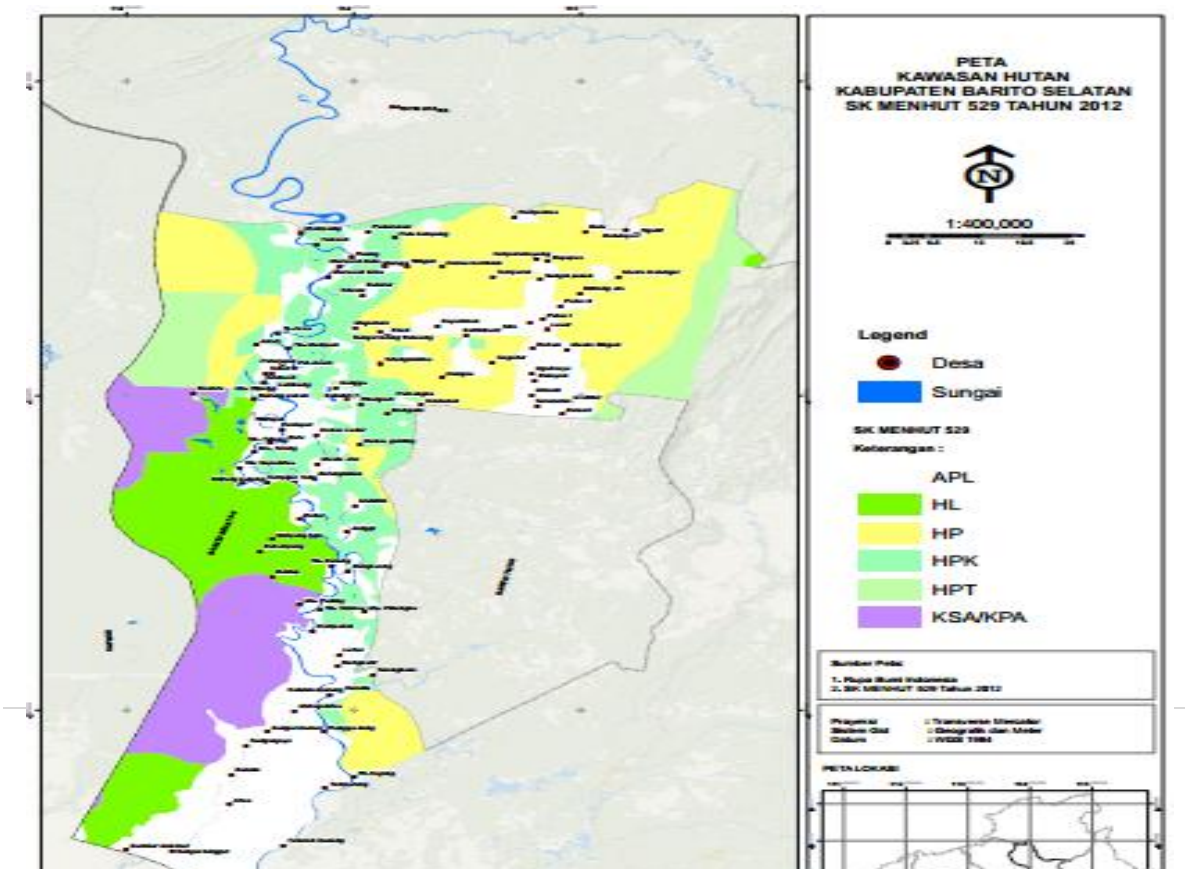

Figure 07. Map of South Barito Regency Forest Area
Minister of Forestry Decree 529 of 2012

All plans to maintain this protected area are realized through the making of boundary markers in watersheds, rivers and lakes, counseling the community so as not to penetrate into the border area; planting hard plants that function as protection; control of buildings that threaten environmental sustainability around the river border; maintain the watershed border to protect watersheds from activities that interfere with the sustainability of watershed functions; arrangement of watershed border areas; arrangement of river border areas; and arrangement of lake / reservoir border areas.

Furthermore, based on the Regional Spatial Plan, in the protected area a natural reserve, conservation of nature, and cultural preservation area will be realized as consisting of strengthening the boundaries of natural reserve, preservation, and cultural preservation; promoting cooperation in restoring the function and role of nature reserves, preservation of nature, and cultural preservation; implementation of rehabilitation programs for nature reserves, nature conservation and cultural preservation; the implementation of programs to preserve and preserve nature reserves and cultural reserves; multi-approach and multi-actors rehabilitation programs and cross-regions; and monitoring and evaluation.

From all the plans that have been made in the Regional Spatial Planning document, there is a strong desire from the South Barito government to maintain protected areas throughout its territory, where the maintenance of protected areas will in turn support its cultivation area. Furthermore, the development of cultivation areas based on the Spatial Planning document includes the development of production forest designation areas, the

embodiment of community forest designation areas, the embodiment of agricultural designation areas, the embodiment of fishery designation areas, the embodiment of mining designation areas, the embodiment of designation areas of settlements, the embodiment of community forest designations, the embodiment of agricultural designation zones, tourism; and the embodiment of other designation areas.

More specifically in the planning of the embodiment of the fishery area consisting of efforts to determine the boundaries of the fisheries area, create a fisheries cultivation area, create a master plan for the minapolitan area, increase and develop fishery cultivation areas, increase and manage fisheries cultivation areas, complete integrated fisheries areas with facilities supporting, promoting integrated fishing areas through various media, and carrying out various promotional activities; and establish an integrated fisheries information center and regional fisheries promotion management information system.

From the analysis of the fisheries area embodiment development plan in the Regional Spatial Planning document, it can be stated that the plan still does not approach the fisheries problem integrally. This can be seen strikingly, through the absence of a link between the fisheries area development plan for example with a development plan mining areas, plantation areas, residential areas, and facilities and infrastructure development plans when each of these areas and the development of facilities and infrastructure can create a large impact on the existence of fisheries throughout the South Barito region.

The easiest example is seen in lakes located in PWK Buntok, Downstream Dusun sub district. Along with the development of residential areas in the urban area of Buntok, causing the surrounding lakes to be affected by waste disposal, which directly affects the nutrient balance in the lake, causing siltation due to the growth of certain plant species whose roots and stems are able to withstand sludge sludge. over time the lakes have narrowed and need special treatment to restore the carrying capacity again.

Furthermore, the Spatial Plan does not yet accommodate the problem of loss of local wisdom in inland fisheries, namely the use of beje as a fish trap and where fish breed. Beje-Beje largely disappeared due to the opening of large canals as part of the Million-hectare Peatland Opening Project aimed at building rice granaries outside of Java. These large channels changed the hydrology of water on a large scale, which eventually drained Beje.

As part of the revitalization of inland fisheries throughout the South Barito regency, the local wisdom should be raised through the beje revitalization program. This plan must be integrated with plans in protected areas and plans to develop facilities and infrastructure. This is still not visible in the Plan Spatial Planning for South Barito Regency in 2014-2019.

The development of certain fish species that can become the flagship of inland fisheries in the South Barito district, can be a strategy in the development of fisheries areas in the Regional Spatial Plan. If this particular species, which is endemic to the fisheries area in the South Barito regency, has a high sale value, and is marketed in local, regional, national, and even international markets, then inland fisheries will become jobs for the people who live around the lake and river. From here the supply of inland fishery products can be boosted to meet domestic and international market demand. The Spatial Plan does not yet mention plans to develop certain endemic species that can become icons of inland fisheries in the area South Barito district. Therefore, through the study of this academic paper, the development of certain endemic species that have high selling points is Dragon fish *(Scelerofagus Formosus*)

CHAPTER IV
LAND FISHERIES MANAGEMENT BASED ON EAFM

4.1. EAFM's Position in Regional Spatial Planning

4.1.1. EAFM

Some principles that must be considered in the implementation of the ecosystem approach in fisheries management (EAF) include: (1) fisheries must be managed at the boundary that provides impacts that can be tolerated by the ecosystem; (2) ecological interactions between fish resources and their ecosystems must be maintained; (3) management tools should be compatible for all fish resource distribution; (4) the precautionary principle in

the fisheries management decision-making process; (5) fisheries governance includes the interests of the ecological system and the human system (FAO, 2003).

Based on the EAFM definitions and principles above, the implementation of EAFM in South Barito Regency requires structural and functional adaptation at all levels of fisheries management, both at the central and regional levels. This is at least related to a change in mindset (for example) that fisheries authorities no longer only carry out fisheries administrative functions, but more than that carry out fisheries management functions (Adrianto et al, 2008).

In this case, a comprehensive understanding of the effects of other human activities on the terrestrial fisheries sector is very important. This understanding will only be gained through the efforts of the socialization of these effects through the dissemination of data obtained from the development of indicators established in the EAFM.

Development of Indicators for EAFM Implementation Indicators are simply defined as a tool or a way to measure, indicate, or refer to things with more or less than the desired size. According to Hart Environmental Data (1998) in Adrianto (2007), indicators are set for several important objectives namely measuring progress, explaining the sustainability of a system, providing learning to stakeholders, being able to motivate, focusing on action and being able to show the interrelation between indicators (showing linkages).

Furthermore, in the context of fisheries management, an indicator is said to be a good indicator if it fulfills several elements such as (1) utilizing ecosystem carrying capacity; (2) relevant to the goals of co-management; (3) able to be understood by all stakeholders; (4) can be used in a monitoring and evaluation framework; (5) long-term view and (5) Figure of linkages in fisheries co-management systems (Hart, 1998). Meanwhile, according to Pomeroy and Rivera-Guieb (2006), a good indicator is an indicator that meets the following criteria:

1. Can be measured: able to be recorded and analyzed quantitatively or qualitatively
2. Appropriate: defined equally by all stakeholders
3. Consistent: does not change from time to time and
4. Sensitive: changes proportionally in response to actual changes

In some cases, the selection of indicators is related to the objectives to be achieved from monitoring and evaluation. When one indicator has been determined, the next process is the selection of methods to measure the indicator. Some important conditions that must be considered are that the method should (1) be accurate and reliable, meaning that the level of error that results from data collection can be minimized; (2) cost effective, meaning the extent to which this method will produce good indicator measurements with low costs; (3) eligibility, which means whether there are elements of society that can carry out the method of measuring indicators; and (4) accuracy, meaning the extent to which the method chosen is appropriate to the context of fisheries planning and management.

The implementation of EAFM requires an indicator set that can be used as a monitoring and evaluation tool to the extent to which fisheries management has applied the principles of ecosystem-based management (Degnbol 2004; Garcia and Cochrane, 2005; Gaichas, 2008). In developing indicators for ecosystem-based management (EBM), one approach that is often used is the DPSIR (Drivers-Pressures-State-Impact-Response) approach as offered by Turner (2000) for the context of coastal management or simpler in the context of only Pressures-State-Impact by Jennings (2005), Adrianto (2007) in the context of fisheries management. In this case, indicators are built on the basis of the DPSIR or PSI cycle so that the mitigation of policy mitigation in response to indicator behavior can be done appropriately.

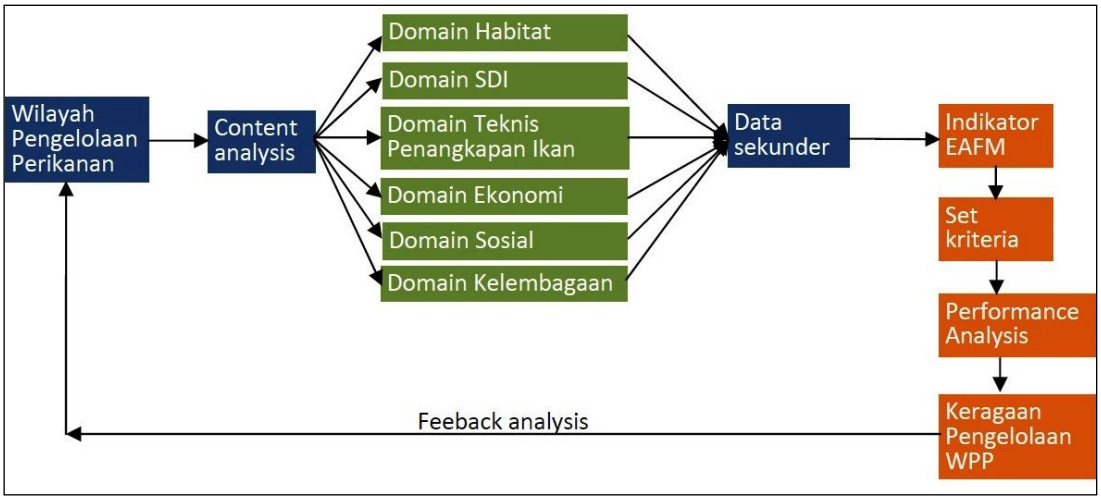

Figure 8. DPSI Cycle Chart (Drivers-Pressures-State-Impact-Response)

4.1.2. Why South Barito Regency Needs EAFM

Inland fisheries in South Barito Regency are very important resources whose contribution is to the supply of food sources (animal protein) needed for the growth of intelligent generations and to prevent generations that are stunted from physical and intellectual growth (stunting). In addition, its contribution to the economic growth of South Barito Regency is reflected through the South Barito Regency GRDP.

Although the contribution of inland fisheries is very important for food security and sovereignty as well as its contribution to supporting economic growth in South Barito Regency, in planning and management it tends to remain partial and carried out in a "business as usual" (BAU) manner. From the results of a survey conducted, the recording of catches carried out is almost never done in a structured manner. It has become a reality that inland fisheries production statistics have been collected inaccurately due to the lack of methods used to collect statistical data (Coates 2002; Bartley et al. 2015). The results of the recording of catches are only done by officers at the fish landing area (TPI) which is a collection of fish catchers from various Barsel regions by the collecting traders. So that the

data obtained related to fish production based on the number of tails and weight, type of fish caught, fishing gear used and catchment area cannot be clearly described. This problem actually does not only occur in South Barito Regency, but is a typical problem that occurs throughout Indonesia and even other Asian countries.

Awareness of the general problems in the management of inland fisheries in South Barito Regency is not not understood by the parties. This is evident from the results of discussions with related SOPD, which raised several strategic issues, constraints and major problems in the area of water resources and fisheries which are categorized into several aspects, such as: aspects of the region, economy, ecosystems, and policies that can be seen in the TABLE 7 below. However, this general awareness is still not enough, because it is unable to answer the problem contextually without valid and accurate technical data as a basis for solving the problem of inland fisheries management.

Table 7. Strategic Issues, Obstacles and Main Problems in the Fisheries Area South Barito Regency

ASPECT	STRATEGIC ISSUE	PROBLEMS	OBSTACLES
AREA	Fisheries Inventory and Management	Not yet maximized fisheries inventory and fisheries governance	Not yet strong fisheries institutions / institutions that work at the site level
		Beje fishing locations are still found in protected forest areas and are claimed as ownership rights.	The community does not yet understand the function of protected areas.
	Management Rights and Right to Use of Fisheries Areas by the Community	Protection, management and fisheries areas are not yet maximized	The zonation of zones in fisheries areas other than minapolitan has not been arranged in RTRWK.
		The Fisheries Sector has not yet become a priority scale.	The concentration of the revised preparation of the RTRWK is more focused on the energy sector.
SOCIAL		The illegal fishing process is still found in the field (fishing with stun)	The low awareness of people in catching fish in an easy and fast way
		Optimal utilization of potential aquatic resources	Lack of assistance from relevant agencies.
		The community still depends a lot on the results of capture fisheries.	The fisheries product management process is not yet maximized.

ASPECT	STRATEGIC ISSUE	PROBLEMS	OBSTACLES
		Intensity and Distribution of Forest and Land Fires	Still found the use of fishing methods by burning (ngeruhui)
EKONOMI	The level of community income is low	BUMDes and Fisheries UKM activities have not yet developed	The direction of development in the village is mostly used for infrastructure needs.
		Marketing of capture fisheries products still depends on middlemen.	Limited market information and access to distant markets in the community.
POLICY	Coordination, Integration, Synchronization and Synergy of Development Plan	The Stakeholder Work Plan for Water Resources Management has not yet been integrated	Sectoral ego in planning.

Technical data related to inland fisheries management is inaccurate and valid can mislead the plans and decisions that need to be developed and made for appropriate inland fisheries management in overcoming various problems including the impact of climate change on inland fisheries. Efforts to involve stakeholders are also rarely done as a result of ignorance of the technical impact of each stakeholder on inland fisheries. Including, ignorance of the role of fisheries resources and their position in regional development which often results in the inland fisheries sector is ignored and does not enter into important discussions when synchronized into one policy in the South Barito Regency Regency Spatial Planning (RTRWK) frame. This is also caused by the weak coordination and synergy of development plans caused by the still strong egosectoral in planning. Because the role of inland fisheries has been ignored by many parties, it is not surprising that the degradation of freshwater habitats due to anthropogenic activities has been abandoned without any efforts that have been tried to protect and rehabilitate them.

Socially, it is not uncommon for conflicts in the management of inland fisheries to be carried out illegally, both by people from South Barito and outsiders. Problems that occur in the field of inland fisheries, because they are multideminesional and involve various parties, cannot be seen only from one side only and this requires a management device that is able to accommodate all interests into one frame where interactions between interests can occur harmoniously and can be monitored and evaluated based on data, space and time.

Thus, fisheries resource management efforts are able to comprehensively look at the factors that affect the sustainability of inland water resources including fish stocks which include aspects of fish resources, habitat, water quality, fishing efforts including fishing methods, threats to resources fish, socio-economic fisheries including fisheries management institutions. One of the tools that can be developed for fisheries management is EAFM. Referring to the six domains used in the marine fisheries EAFM indicators that are harmonized for inland fisheries management are considered important and are used in

identifying the performance of inland water management, including the Resource domain. Fish, Habitat, Fishing Technology, Social, Economic and Institutional.

Table 8. Discussion and Results of the South Barito Regency FGD.

FISHERIES DIMENSIONS	HASIL DISKUSI
Dimensions of fisheries resources and their ecosystems.	1. Habitat Arwana under 1995, after 1995 the population of Arwana fish decreased. The location of the Arwana habitat at that time was in the South Dusun (Sadar lake, Madara lake) North Dusun (Bundar Lake), Gunung Bintang Awai (Ayuh River, Uwa River), Karau Kuala sub district (Malitin lake, Buntal lake, Trambasi, Puning River and Bahalang lake) and along the Barito River. 2. At present all regions are experiencing critical conditions due to: 1) fishing methods using prohibited fishing gear, 2) forest encroachment and illegal logging, 3) waste of plantation and mining companies, 3) forest and land fires. 3. Regrowing local wisdom, Strengthening customary institutions, beje is included in local wisdom, which is handed down to catch fish, another function of beje is a reservoir of water during the dry season, natural fish farming. The problem that often arises in Beje fisheries is the use conflict in Beje fisheries.
Dimensions of the use of fishery resources for the socio-economic interests of the community	1. Fisheries are very important, because the Fisheries sector is one of the leading sectors. 2. Processing of fishery products, salted fish, fish balls / fish balls, shredded fish, fish nuggets, fish sausages, crackers, amplang, wadi, pakasem. 3. Generally, fish culture practices in South Barito Regency are Cages and Floating Nets. 4. Capture fisheries (environmentally friendly / legalized: beje, net, salambau (in certain sizes), tabing, tampirai / bubu, pangilar, spear, longline, flood, fishing line, lunta / net, net, kabam, bagagap, mangaruhi / manggalau , Illegal fishing methods: electrized fish, poison with chemicals (Tiodan, Decis) and traditional (tuba), salambau / paranet (small size). 5. Fish market chains: For sale locally / villages (around harvested fish areas), for sale in districts, for sale between districts in 1 province and for sale between provinces.
Dimension of fisheries policy with other users	1. There is no policy from the South Barito District Government in land fisheries. 2. Going forward, government policy is directed at the size regulation of fishing gear. 3. Rules for supervision of area protection in draft form have not yet become a regulation. 4. Going forward there needs to be stakeholder compliance with the policy to protect the waters. 5. Regulations or policies issued for the protection of

	territorial waters are appropriate and in line with the local wisdom of the community

Referring to the six domains as indicators of EAFM-based fisheries management, some of the problems identified in inland fisheries management in South Barito Regency are as follows: Some of the problems that can be analyzed both from the results of the field survey and the results of FGD with various stakeholders are as follows:

4.1.3. Fish Resources

Fish resources include fish species, the number and size of fish caught in various ways and methods of fishing (see sub chapter 5.2.3.1)

1. The number of individuals and the weight of fish caught decreases.
2. The size of the fish caught is getting smaller.
3. Some fish species are no longer present in the catch and are categorized as "endangered" species by the IUCN.
4. Restocking efforts without understanding the structure of the fish community in the target waters as well as the target fish to be restored.
5. Not carrying out efforts to monitor impacts (negative and positive) of fish restocking.

4.1.4. Habitat

Fish habitat is a place where fish live and carry out their life activities (their life cycle) either looking for food, growing and reproducing (reproduction) and dying. Fish habitats in South Barito Regency are rivers, swamps and lakes (Oxbow lake). Some of the problems of this habitat are as follows:

1. Changes in the flow of river waters (slowing and moving) caused by surface runoff from erosion.
2. Changes in water turbidity due to erosion and the release of dissolved particles due to erosion (tree felling) and groundwater (gold mining).
3. Sedimentation of fish bottom habitat by sedimentation.
4. The silting of rivers, lakes and swamps.
5. Disconnected oxbow funds from the main river flow.
6. The disappearance of rivers and lakes.
7. Damage to beje function as a means ("trap tool") for fish

4.1.5. Fishing Technology

Simple fishing technology can be interpreted as a way of fishing and the tools used to catch fish, including the frequency (effort) of fishing carried out. Some problems from inland water fishing technology are as follows:

1. The use of non-selective type of fishing gear (the size of the net is too small), and the time and place of capture (when the fish migrate).

2. The use of electricity and chemicals (potassium and cyanide).
3. No quota has been set for the use of fishing gear.

4.1.6. Economy

The Economic Domain which is the key indicator is 1). Fisheries household income (RTP) 2). Savings ratio and 3). Asset ownership). Some problems from the economic domain are:

1. Ownership of arrest assets is still not inventoried in order to access loans from financial institutions.
2. Fish are sold in the form of life and there has been no attempt to do modern processing.
3. The price of fish is determined by fish collectors, prices tend to be cheap.
4. Inability to manage income (saving) from fishing.

4.1.7. Social

The social domain is an important domain because the aim is how fisheries can guarantee the social welfare of fishing communities such as the lack of conflict, high public participation and so on. Some problems from the social domain are:

1. The involvement of stakeholder participation in fisheries management is still unclear.
2. Conflicts of interest which include resource conflicts, policy conflicts, fishing gear conflicts and conflicts between sectors.
3. Utilization of local knowledge for fisheries management, including customary law instruments and traditional fishing tools that are environmentally friendly.

4.1.8. Institutional

The institutional domain is needed to assess the success of fisheries management with an ecosystem approach. Some problems from the institutional domain are as follows:

1. Completeness of rules in managing inland fisheries resources
2. Compliance with the "rule of game" in management
3. Decision making mechanism (SOP)
4. Inland Fishery Management Plan (RPP)
5. Synergy between institutions in supporting management of inland fisheries

CHAPTER V
LAND FISHERIES MANAGEMENT STRATEGY BASED ON EAFM AND REGIONAL SPATIAL PLANNING

5.1 Public Test Results and Field Verification

5.1.1 Stakeholder Mapping Public Test

a. Sources and Impacts For Management of Inland Fisheries Management.

Table 9. Sectors that have an impact on inland fisheries.

Source of Impact	Sedimentasi/ Pendangkalan	Pollution/ Eutrophication	Change in Habitat	Change in fish migration patterns	Loss of fish food availability	Loss of fish food availability	The extinction of fish that is on the IUCN list
Mining	√	√	√	√	√	√	√
Plantation	√	√	√	√	√	√	√
Agriculture		√	√				√
Deforestation	√	√	√	√	√	√	√
Settlements							√

Table 10. Stakeholder involvement

NO	Source of impact	Impact						Stakeholders
		1	2	3	4	5	6	
1	Mining	x	x	x	x	x	x	Regent, Environment Agency, Licensing Service, Mining Company, Agency for Regional Development, Village Community, South Barito District Police, Environmental Observer NGO, Fisheries Service, and BKSDA
2	Plantation	x	x	x	x	x	x	Regent, Environment Agency, Licensing Service, Agency for Regional Development, Village Community
3	Agriculture	x	x	x			x	Regent, Environment Agency, Licensing Service, Agency for Regional Development, Village Community,
4	Deforestation/Logging	X	x	x	x	x	x	KPHL, BKSDA, Kapuas District Police, Village Community,, TRGD, Kelembagaan Adat, Environmental Observer NGO
5	Settlements						x	PUPR dan PKP, Environment Agency, Village Community, Fisheries Service,

Explanation of impacts: 1. Sedimentation / siltation, 2. Pollution / eutrophication, 3. Changes in habitat, 4. Changes in fish migration patterns, 5. Loss of availability of fish food and 6. Extinction of fish that are included in the IUCN list

5.1.2 Verification Results of Fisheries Conditions

General description of the condition of inland fisheries and water quality (water) in South Barito District is carried out by carrying out water quality measurements and interviews. Interviews through filling in questionnaires were carried out on the community in the target village. Whereas water quality is carried out by directly measuring several physical and chemical parameters of water quality directly in rivers and lakes by using standard water quality measurement tools. For the South Barito district as a sampling location, Sadar lake was selected in Danau Sadar village, Malawen Lake in Sanggu Village, Madara Lake and Madara river in Madara village. Measurement of water quality was carried out in August 2019 during the dry season.

Water Quality Measurement Results

Dissolved Oxygen (DO)

The results of dissolved oxygen (DO) measurements at several sampling points showed an average DO content which ranged from 2.57 to 6.59 mg / L. The highest DO concentration (6.59 mg / L) was obtained in the Madara River located in the Madara Village area, followed by DO content in Sadar lake (3.94 mg / L) located in the Danau Sadar Village, Madara Lake (3, 07 mg / L) located in Madara lake and Malawen lake (2.57 mg / L) located in Sanggu Village.

Table 11. Water Quality Measurement Results at Four Land Water Locations (Sadar Lake, Malawen Lake, Madara Lake dan Madara river) Kabupaten South Barito.

No	Parameter	Sadar Lake (Danau Sadar Village)				Malawen Lake (Sanggu Lake)				Danau Madara Lake (Madara Village)				Madara River (Madara Village)			
		downstream	The middle	Upstream	Average	downstream	The middle	Upstream	Average	downstream	The middle	Upstream	Average	downstream	The middle	Upstream	Average
1.	Dissolved Oxygen	4,26	3,14	4,42	3,94	3,02	2,07	2,63	2,57	2,22	3	3,98	3,07	6,17	6,92	6,67	6,59
2.	Total Dissolved Solid	0,13	0,13	0,13	0,13	0.09	0,06	0,06	0,06	0,05	0,05	0,05	0,05	0,1	0,11	0,1	0,10
3.	Temperature (^{0}C)	37	34	36	35,67	37	37	37	37,00	35	33	31	33,00	31	27	31	29,67
4.	Acidity	7,6	7,2	7,4	7,40	5,4	5,4	5,3	5,37	5,3	5,2	5,2	5,23	4,8	4,8	4,6	4,73
5.	Brightness of water (cm)	71,5	71,5	71,5	71,50	75,5	74	64	71,17	57,5	31	23	37,17	55,5	29	32	38,83
6.	Water dept (m)	4,7	5	6,3	5,33	2	2	1,9	1,97	1	0,47	0,36	0,61	0,89	0,47	0,58	0,65

Information : sampling in August 2019

Referring to the water quality criteria according to Lee et al., (1978) in Table 12, the waters of the Madara River fall into the uncontaminated category, while the rest of Sadar lake, Madara lake and Malawen lake fall into the medium polluted category. The DO content in a waters is influenced by bacterial activity which breaks down the organic material that is in a water. This bacterial activity requires oxygen, so that it results in a decrease in the oxygen content in the water. Thus the more organic matter described, the higher the oxygen demand and the lower DO in the waters. Thus, the status of DO in a waters can figure the condition of a waters whether it is being polluted by organic matter. The source of organic material from pollutants in a waters usually comes from fertilizers, pesticides, household domestic waste, and industrial waste which are residues from human activities that exist around these waters such as mining, agriculture, plantations, residential housing.

Another factor that influences the dynamics of DO content in a waters is the level of

turbidity of the waters. Water turbidity is related to the rate of photosynthesis carried out by aquatic plants both macro (water plants) and micro (phytoplankton) in producing oxygen. The higher the turbidity of a water, the lower the rate of photosynthesis which results in a lower DO content in the water. Based on the results of visual observations made at all locations measuring DO content, the level of turbidity of the waters is relatively low with a high level of brightness (see brightness measurement data). This indicates that the low activity of human activities around the location of the measurement of water quality. The low level of turbidity of the water provides optimum sunlight penetration for the speed of photosynthesis, which in turn contributes to the increased DO content in the waters.

Low turbidity also affects the level of fish productivity. Low turbidity benefits fish that rely on visualization to get fish food. DO content is also influenced by water temperature, where the more the water temperature increases, the DO content decreases in water. In the measurement of DO content in Lake Malawen get the lowest value of 2.57 mg / L with the highest water temperature (37^{o}C).

According to Huet (1970) and Effendi (2003) the minimum DO content is 2 mg / L enough to support the life of organisms if the waters are not polluted with toxic materials. Ideally the dissolved oxygen content should not be less than 1.7 mg / L for 8 hours with at least a saturation level of 70%. Meanwhile, according to Yustina (2002), DO content that is good for fish life is more than 4 ppm. Thus, all measurement locations contain DO that are ideal for the life of aquatic organisms including fish.

Table 12. Water Quality Criteria based on Dissolved Oxygen Levels

Oksigen terlarut (mg/l)	Criteria
>6.5	Not polluted
4.5-6.4	lightly polluted
2-4.4	moderately polluted
< 2	heavily polluted

Source : Lee et. al.(1978)

Total Dissolved Solid (TDS)

TDS is the Amount of Dissolved Solids in water. Dissolved substances or solid particles found in water can be in the form of sodium (salt), calcium, magnesium, potassium, carbonate, nitrate, bicarbonate, chloride and sulfate. The ideal TDS content for fish in lakes and rivers is based on PP No. 82/2001 TDS grade I water quality standard is 1000 mg / L .

From the results of TDS analysis on water samples at the TDS measurement location, the average TDS values ranged from 0.05 to 0.13 mg / L. The highest TDS value (0.13 mg / L) was obtained in the Sadar lake Danau Sadar village, followed by the average value of TDS

(0.10 mg / L) in the Madara River Madara village, the TDS value (0.06 mg / L) in Malawen lake in Sanggu village and the average TDS value (0.05 mg / L) in Madara lake that passes through Madara village. Referring to the water quality criteria based on, the TDS content is still far below the TDS content required in Government Regulation No. 82/2001

Water Quality Criteria Based on PP No.82 / 2001

Parameter	Unit	Class		
		I	II	III
Fisika				
Temperature	^{0}C	Deviasi 3	Deviasi 3	Deviasi 3
TSS	mg/L	50	50	400
Kecerahan	Meter	-	-	-
TDS	mg/L	1000	1000	1000
Konduktifitas	µmhos/cm	-	-	-
Kimia				
DO	mg/L	6	4	3
pH	-	6-9	6-9	6-9
BOD	mg/L	2	3	6
COD	mg/L	10	25	50
Nitrat (NO3-N	mg/L	10	10	20
Fosfat(PO4-P)	mg/L	0.2	0.2	1
Biologi				
Total Coliform	Jml/100 ml	1000	5000	10000

Temperature

The average temperature from the measurement results in the field at the specified location ranged from 29.6 to 37.0 ^{o}C. The highest temperature (37.0 ^{o}C) was obtained at Malawen lake in Sanggu village, followed by water temperature (35.67^{o}C) obtained at Sadar Lake in Danau Sadar village, water temperature (33.0 ^{o}C) at Madara lake in Madara village and water temperature (29.6 ^{o}C) on the Madara River in the Madara Village. When compared with the water quality standard according to Minister of Environment Decree Number 51 where the ideal water temperature is between 28-32 ^{o}C, except water temperature (29.6 ^{o}C) in the Madara river, the water temperature from the measurement results in all survey locations exceeds the temperature the ideal. Increased water temperatures will negatively affect aquatic organisms that live along the river, including fish that will migrate to other areas where the temperature is still ideal.

pH (Acidity)

The degree of acidity or pH is an index of hydrogen ion levels (H+) which characterizes the acid and base balance of pH is one of the important things in determining the water

quality of a waters. pH generally increases due to waters that have been polluted by human activity itself. That's because there is a lot of waste, or organic and inorganic materials that pollute the waters. This increase in waste which is followed by the decomposition process by spoilage bacteria will cause a decrease in DO content and conversely increase CO2 content in the waters which will ultimately decrease the pH value of the waters or increase the acidity level of the waters.

From the measurement results, the pH of water at the measurement location ranged from 4.73-7.40. The lowest pH (4.73) is found in the Madara river Madara village followed by a pH value (5.23) in Madara lake, Madara village, a pH value (5.37) in Malawen lake in Sanggu village, and a pH value (7.40) on Sadar lake, Danau Sadar village. PH values in all measurement locations show values that are within the range of quality standards (6-9) Ministerial Decree no. 28 of 2009. Thus the pH values in all measurement locations can be categorized under ideal conditions. According to Odum (1971), waters with a pH between 6-9 are high fertility waters and are classified as productive because they have a pH range that can encourage the process of dismantling organic matter in the waters into minerals that can be assimilated by phytoplankton.

Brightness of water (cm)

Water brightness is very tight with turbidity that can inhibit the entry of light into the waters. High turbidity can reduce the brightness of the waters. From the measurement results obtained the highest average brightness (71.50 cm) in Sadar lake, Danau Sadar village, followed by the average value of brightness (71.17 cm) in Malawen lake , Sanggu village, the average value of average brightness (38.83 cm) in the Madara river Madara village and an average brightness value (37.17 cm) in the Madara lake Madara village. The low value of water brightness observations in rivers and Madara lake shows the high levels of organic material entering the two waters originating from community activities in Madara Village. According to Effendi (2003) high turbidity can cause disruption of osmoregulation systems, respiration and visibility of aquatic organisms, and can inhibit the penetration of light into water which reduces the rate of photosynthesis by aquatic plants which contribute to the increase in dissolved oxygen content in the waters.

Water depth

The results of depth measurements at water locations show depth values ranging from 0.61-5.33 m. The highest water depth (5.33 m) is found in the waters of Sadar lake , followed by the depth of Malawen lake (1.97 m), the depth of the Madara River waters (0.65 m) and the lowest depth found in the waters of Madara lake (0, 61 m). The depth of the waters associated with photosynthesis is the same as the process of respiration called depth compensation. The depth of compensation usually occurs when the light in the water column is only 1% of the total intensity of the light that has penetrated the surface of the water. The depth of compensation is strongly influenced by cloudiness and the presence of clouds so that they fluctuate daily and seasonally (Effendi, 2003). As the

depth increases, the process of photosynthesis will decrease effectively, so there will be a decrease in the level of dissolved oxygen to a depth called Compensation Depth, which is the depth where the oxygen produced through photosynthesis is proportional to the oxygen needed for respiration. The depth of the lakes varies between 3 - 14 m.

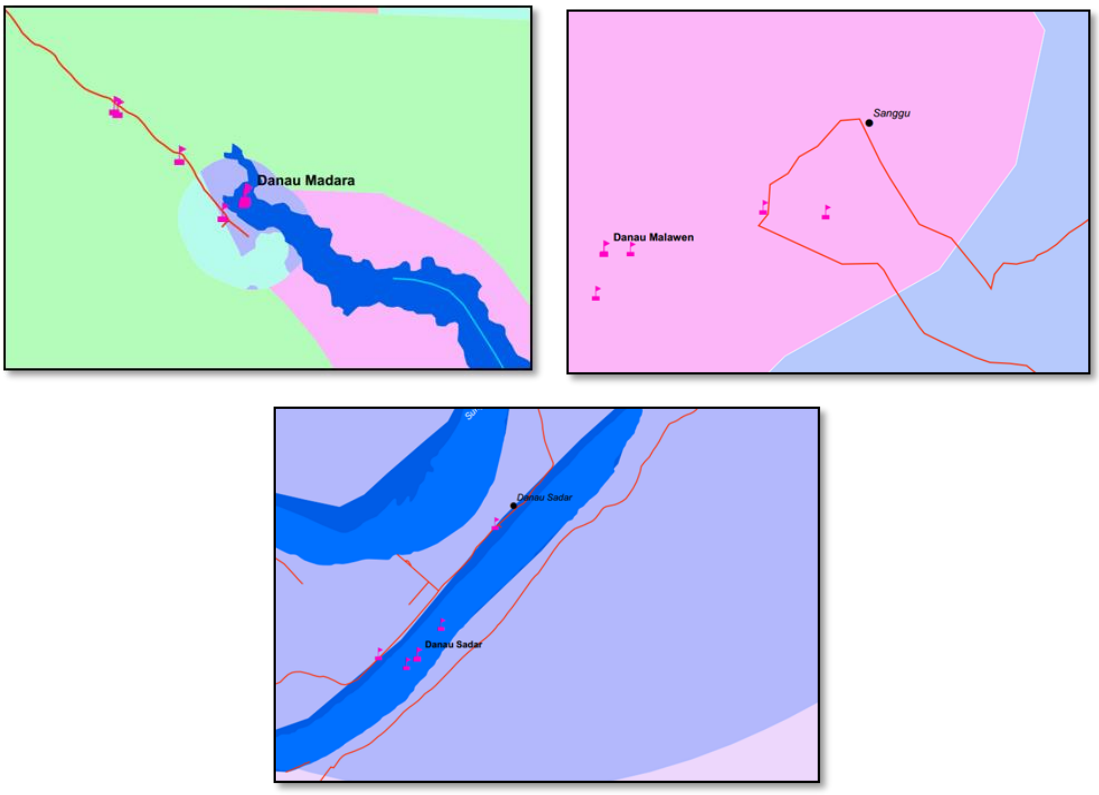

Figure 9. Point of Water Sampling Area Identification of High Conservation Value

The condition of Inland Fisheries in South Barito Regency

The results of the data obtained when conducting interviews with 10 respondents who work as fishermen or the general public in the villages of Sanggu and Madara villages, South Dusun sub-district to represent the conditions of capture fisheries in South Barito. The conclusion of the interview with the fishermen community is as follows:

Sanggu Village

1. 10 Respondents experienced in fishing between 5-49 years, on average fishing using boats *(jukung),* motorized boats (ces) and kelotok and there is 1 respondent who uses a motorcycle with the type of fishing gear used is relatively the same namely: gillnets, banjur, pangilar, nets, tampirai, lukah *(buwu)* fishing rods, spornet nets and spears.

2. All respondents do not have Beje because they live in high land and not in tidal areas, besides catching in conscious lakes and malawen fishermen also look for fish in gold mining, the types of fishing gear used are fishing rods and gillnets, types of cork fish, catfish, Kakapar, karandang, lais, tahuman and biawan.
3. Generally respondents look for fish during low tide at the beginning of the dry season and deep water, low tide is characterized by increasing temperatures and fish gather in an area while the tide is more turbid at the start of the rainy season, the frequency of fishing from every day until 1-4 times a week.
4. Fish catches are obtained from Malawen lake, Sanggu lake, in swamps, river Pematang Kayu, swamps in Betung (outside the village) in the area of Ampah, Luwau / swamps around the village of Sanggu, Wendu River, and the location of rice fields.
5. The types of fish caught in lakes / rivers are Tapah, Manjuhan, Karandang Kalui, Kalabau / Kalawau, Toman, Cork, Small Shrimp, Patung, Flotsam, Biawan, Papuyu, Baung, Sepat Siam, Small Sepat, Catfish, Peyang and lais.
6. There was once Arwana (Tangkalasa) in Sanggu lake with information from 1 respondent who had caught Arwana/Tangkalasa fish weighing 3 kg and was not traded (self consumption), while 9 other respondents had never caught / found Arwana.
7. The type of fish that is caught the most is the type of snapper.
8. In general, most respondents (8 respondents) stated that there was a change in the size of the fish changed smaller when viewed 5 years back experienced significant changes and decreased fish population, fish catch decreased from 5 years ago while 2 respondents felt no which changes the size of the fish. This change occurred because of the large number of large trees that used to have been cut down now and the increase in population in many villages are fishing and also residents from other villages are fishing in the village of Sanggu and there have been fishing activities that have been banned, one of which uses electric batteries shocking activities fish, salambau and putas and pesticides decis 2 years ago.
9. The average fish potential area is adjacent to its location in the agricultural area, especially lowland rice farming. and in some fisheries areas there are former traditional gold mining holes.
10. Agricultural activities are considered by respondents as activities that do not endanger the fisheries ecosystem.
11. Most of the fish caught for sale and self-consumption. Sales are generally carried out around the village or sold to buyers from the City of Buntok.
12. The price of fish sold as follows: Tapah 30-35 rb/kg, manjuhan 30-35 rb/kg, karandang 25-30 rb/kg, kalui 30 rb/kg, kalabau/kalawau30 rb/kg, toman 30 rb/kg, gabus 30 rb/kg, udang kecil 50-60rb/kg, patung 20-25 rb/kg, kapar 25-30 rb/kg, biawan 25 rb/kg , papuyu 35 rb/kg (not for sale), baung 30-35 rb/kg.
13. All respondents know the types of illegal fishing gear such as: using poison (tuba) and the use of stun equipment and there is never supervision from the authorities, the role of the village apparatus is limited to giving a warning. Most respondents

reprimanded people who do fishing activities that violate rules such as electrocuting fish, using salambau and others.

14. In the village there are no village regulations (perdes) or customary regulations that prohibit fishing activities that are in violation of the rules.
15. Respondents have never documented their catches during fishing activities or from related agencies.

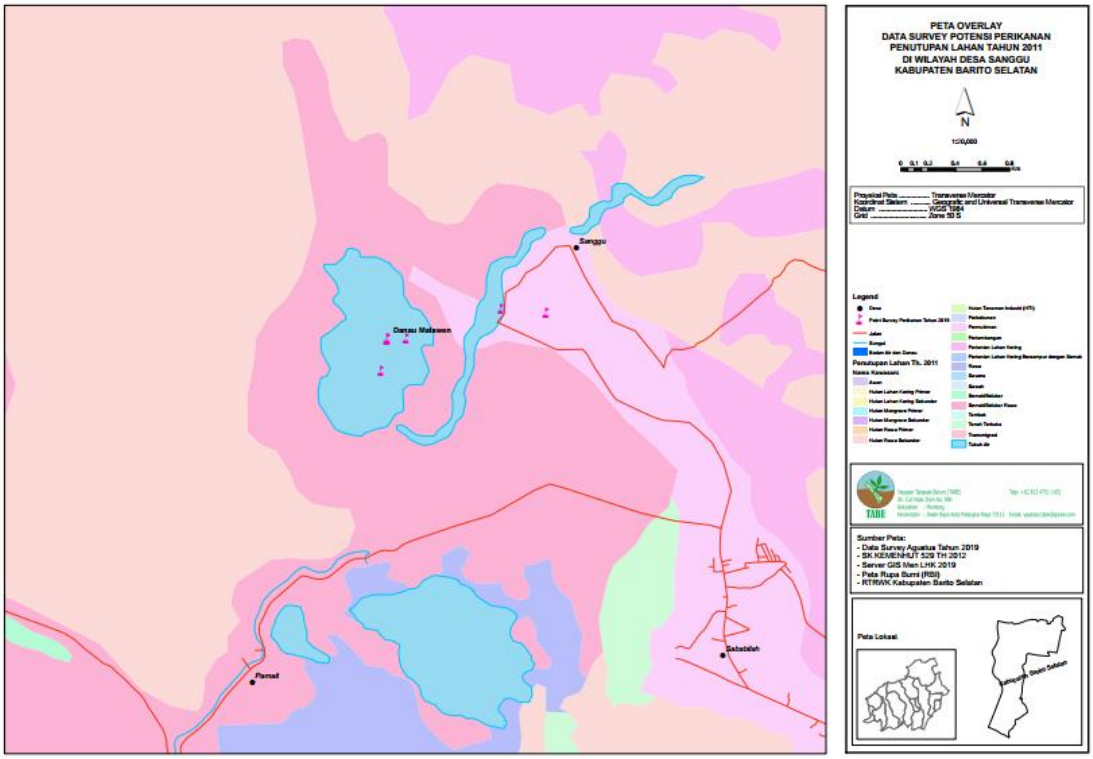

Figure 10. Map of Sanggu Village

Madara Village

1. From 10 respondents experience in fishing ranging from 2 - 49 years, fishing using motorized boats (ces) and boats with paddling (jukung), the types of fishing gear used are relatively the same, namely: gillnet, banjur, tabing, bubu, salambau, pangilar, nets / lunta, pangilar, tampirai, fishing rods and four-edged spears (sarapang).
2. All respondents did not have beje, because the area was in the highlands and sandy land and not tidal areas.

   None of the respondents own beje, because the area is on a plateau and sandy soil and not a tidal area.

3. Generally, respondents look for fish during low and deep water, starting to dry out and starting big tides (rainy season). Fish coming out of tributaries are called nanau / hagas. Fishing activities are carried out there are those who fish every day up to 3-4 times a week when many fish are caught.
4. Fish catches are obtained from Lake Madara, Luwau River, Papuan River and Madara River. The type of fish that is caught the most is the type of Kakapar.
5. The size of the fish when viewed 5 years back has experienced significant changes that have changed is the decline in fish catches. This is due to stun, community waste into the lake, and the use of Salambau fishing gear.
6. The community's livelihood to meet their household needs by tapping rubber and fishermen's work is no longer their main occupation.
7. The salambau installation activity carried out by the hamlet bamaler Baru village community who installed salambau at the end of Lake Madara was considered by the community as a factor in the reduction of live fish and flourishing in Lake Madara because the salamabau was installed throughout the year both during the dry and rainy seasons (deep water) so when there is a barito water overflow to the lake and the river in Madara fish salambau nets so as to reduce the yield of capture fisheries in the village. More people look for fish for consumption needs only because fish are difficult to obtain.
8. Fish that are caught for self-consumption to meet the protein needs of families, neighbors and if excess is sold around the village with the following prices: karandang 20-30 rb/kg, toman , kakapar 20 rb/kg, biawan 20-25 rb/kg , patung 20-25 rb/kg, mihau 20 rb/kg, baung 25 rb/kg, kihung 20 rb/kg, saluang 5rb/1 takar (4 ons), puhing 10-15 rb/kg, bilis 2500/1 takar, Kapar 20 rb/kg, Lele 20rb/kg, peyang 25 rb/kg, lais 30rb/kg, Tapah 25 rb/kg, gabus 20rb/kg dan miau 20rb/kg. Kadang juga masyarakat membuat ikan kering.
9. Only 1 respondent ever caught Dragon fish / Tangkalasa fish in the estuary of Lake Madara in 1990 weighing 1/2 kg and not traded (own consumption), the rest of the respondents never caught / found Dragon fish.
10. All respondents know the types of illegal fishing gear such as: using stun and the use of stun and salambau equipment, lack of supervision from the authorities, the role of village officials is limited to giving no warning. In general, the public is aware of the prohibition on using fishing gear that is prohibited through appeals from the Village government and the police.
11. In 2015 there were massive fish deaths in lakes and in the river there were massive deaths after the 2015 fires. These deaths were thought to be due to poisons from burning ash of woods flowing into rivers and lakes.

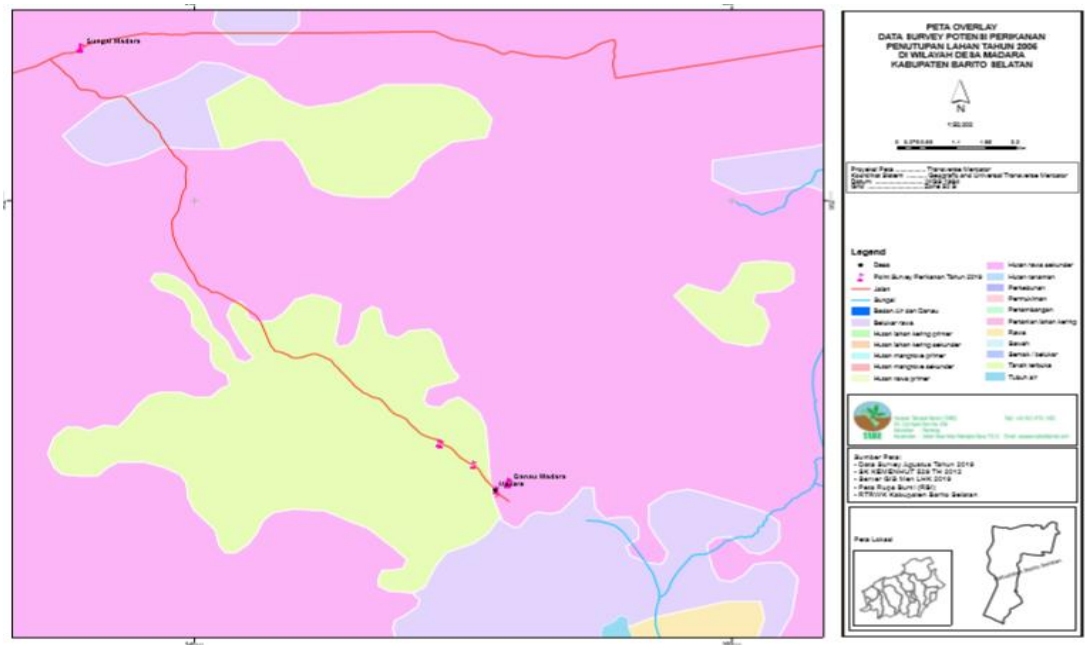

Figure 11. Map of Madara Village

Recommendation

From the results of water sampling and questionnaire from 3 villages in South Barito District, it can be concluded:

1. Sadar lake in the village of Danau Sadar, South Dusun sub district based on the results of the water sample data is not recommended to be used as a location of high conservation value and the location of arowana fish reservoir because the lake ecosystem is experiencing pollution both physically and chemically its water because it is based on information from residents and pemdes water waste from a rubber factory from a neighboring village (Asam Baru village) which is not far from the lake flows into Sadar lake and most of the lake side of Sadar lake is used as a settlement for the residents of Danau Sadar village. The location of Sadar lake has also been made by the Regional Government of South Barito as the location of the paddle race, although the paddle port is currently not maintained.
2. Malawen lake in the village of Sanggu in the sub district of South Dusun sub district in general the surrounding natural conditions are still supportive as places that have

high conservation value because the lake is quite far from settlements. The location is overgrown with water plants such as daffodils and above the lake there are still forests that support the location of the lake even though it does not have large trees but the trees are still tight and beautiful. From the community there is already an awareness of not using destructive fishing gear such as the use of stun equipment about 2 years ago and the location of Malawen is often a place for releasing fish through / carp from the Fisheries service.

3. Madara lake in the village of Madara in the sub district of South Dusun is seen visually when the data collection is less representative as an area that has a high conservation value as the area of the fish restocking reservoir development because the natural conditions that exist during the dry season the lake is very receding and there is shocking activity and installation of salambau not far from the lake by residents of a neighboring village (Desa Asam Baru) which allows this condition to be unfavorable if developed due to many field constraints. While the Madara river in terms of physical and chemical parameters, some support it to be used as an area for the development of fish restoking, but the physical condition of the river is small and very low during the dry season which makes it difficult to develop fish in the river.
4. Fisheries management plan (RPP) Required for all villages that have EAFM based inland water resources.

5.2 Fisheries Management Ecosystem Approach

5.2.1. Institutional Challenges of Implementation at the South Barito District Level

From the results of the analysis, field review and discussion, it was found that there were several potential threats to the problem in the onshore fishery sector, namely: mining, plantation, agriculture, deforestation / logging, climate change and human settlements and several other sectors. Inland Fisheries Problems South Barito can be described in the Table below:

Table 13. Problems in the inland fisheries sector.

No	Sector/Bidang	Description
1.	Mining	1. Mobilization of vehicles, heavy equipment, 2. Land clearing, 3. Disposal of waste that does not consider environmental aspects, 4. Construction of facilities and infrastructure, 5. Transportation to the Port, 6. Pumping of sediments, 7. The use of mercury or cynide
2.	Plantation	1. Land clearing preparation 2. Making canals in the peatland ecosystem, 3. Mobilization of equipment, 4. Land management, 5. Fertilization,

		6. Use of herbicides, 7. Transportation.
3.	Agriculture	1. Land preparation, 2. Burning land clearing which impacts on forest and peat swamp fires, 3. Mobilization of equipment, 4. Fertilization, and 5. Use of herbicides.
4.	Deforestation	1. Land cover change, 2. Ground Surface Erosion, 3. damage to vegetation on the riverbank (reparian ecosystem).
5.	Population Settlement	1. Domestic / Household Waste (Toilet, kitchen, plastic),dan 2. Damage to vegetation on the riverbank (reparian ecosystem).
6.	Policies	There is still no policy from the Government of South Barito Regency towards the protection of aquatic ecosystems and inland fisheries.
7.	Aquaculture	1. Limited availability and distribution of superior parent and seedlings, 2. Readiness in dealing with pests and diseases, 3. Provision of good pool and water facilities, 4. Issues of feed raw materials and stability price, 5. High price of feed, 6. Low productivity of aquaculture, 7. Aquaculture business actors are small / traditional scale, 8. Limitation of capital aspects, 9. Attacks of fish pests and diseases, 10. Pollution affecting the environmental quality of aquaculture, 11. The spread of pests and fish diseases is dangerous due to trade transportation.
8.	Catch fisheries	1. Integration of upstream and downstream production systems Not yet optimal. 2. Fish Landing Base (PPI) and Fish Auction Place (TPI). 3. The quality of human resources and institutions is still low. 4. Technology mastery and accessibility to infrastructure and information are inadequate. 5. Limited business capital support. 6. The potential for natural disasters and the impact of climate change on ecosystem damage, abrasion, sedimentation, pollution and land.
9.	District Spatial planning	1. Fisheries development zones that are in accordance with regional spatial planning, have not been arranged so that there are no specific and integrated integrated areas for the development of Fisheries Areas on a Regulatory basis. 2. The development of areas that have the potential for specific commodities is not optimal so that the level of production and productivity of a region is still low. 3. There needs to be special treatment in the development of an area to be developed into an ideal fishing area, caused by

		factors that are not optimal and marginal land conditions for example peatlands, critical inland waters.
10.	Division of Authority	The limitations of regional government authority are related to the extent of water management.

(stakeholder mapping report)

5.2.2 EAFM Competency Needs in Regency

In implementing EAFM in land fisheries in South Barito Regency, certainly all parties concerned need to take the role and responsibility to work together to achieve expectations in protecting, developing a grounded EAFM concept so that in the end the land fisheries that have been experiencing neglected conditions are part of the potential fisheries can be a source of livelihood for the community and contributors of the South Barito Original Local Government Revenue, especially those around the edge of the South Barito river and surrounding areas to develop capture fisheries that refer to protected areas so that inland fisheries can be saved from the conditions of existing threats and sustainable natural resources with the support of the Regional Government, especially the South Barito Food, Maritime and Fisheries Service. Previously identified stakeholders with interests in South Barito. The list of stakeholders is presented in the table below

Table 14. List of Stakeholder.

No	Name of Stakeholders	Description
1	Head of Regency	In the context of regional autonomy in Indonesia, it is a term for district head.
2	BAPPEDA (Development Planning Agency at Sub-National Level)	Service that carries out the functions of supporting Government Affairs in Planning and Research and Development
3	TKPRD	Spatial Planning team based on Regent Decree No 188.45 / 19/2019 on the Establishment of the South Barito Regional Spatial Coordination Team in 2019.
4	DKPPP	Agency that organizes Government Affairs in Food, and Agriculture which includes food crops and horticulture, Plantation, animal farm and Agribusiness and in fisheries.
5	BKSDA Kalimantan Tengah	The Natural Resources Conservation Center, often abbreviated as Balai KSDA or BKSDA, is a technical implementation unit under the Directorate General of Forest Protection and Nature Conservation of the Ministry of Forestry Republic of Indonesia.
6	Kalimantan River Region 2 (BWS Kalimantan 2)	As one of the River Basin Centers in the Directorate General of Water Resources, the Ministry of Public Works and Public Housing is responsible for describing the vision and mission of the Directorate General of Natural Resources.
7	TRGD Provinsi Kalimantan tengah	The Regional Peat Restoration Team formed by BRG which runs the process of restoration of peatlands in the Province and District.
8	Sub regional Police of South Barito District	Indonesian National Police located in sub regional in South Barito.

9	Dinas PUPR	Agency that organizes government affairs in the field of public works and spatial planning.
10	KPHL Gerbang Barito	KPH whose area of work is all or mostly consists of protected forest areas.
11	Oil Palm Plantation	Obligations in environmental safeguards
12	Mining	Companies that have activities in the search, mining (excavation), processing, utilization and sale of coal extraction.
13	Environmental Agency (DLH)	Service that organizes government affairs in the environmental field.
14	Trade, Industry and SME services (Dinas Perdagangan Koperasi dan UKM)	Agency that organizes Government Affairs Trade, the field of Small and Medium Enterprises Cooperatives and the Industry sector
15	Office of social service, and community empowerment and village administration	Office that organizes Government Affairs in Community and Village Empowerment.
16	NGO environmentalists	Organizations established by individuals or groups of people who voluntarily give more attention to the environment.
17	Fishermen	People or groups who work daily catch fish in rivers, swamps or lakes.
18	Villagers	A group of people who live in villages, interact together and have similarities in their livelihoods
19	Village Government	Responsible for empowering and fostering the community Village against prohibiting the practice of illegal fishing.
20	Customary Institution	Parties / organizations responsible for preserving adat Dayak tribal customs, which are regulated in Perda No. 16 of 2018 Dayak Customary Institution in Central Kalimantan).
21	Collector Traders	Groups or individuals who collect business activities fishery products and sell these results to industrial or market enterprises.

Based on stakeholder identification and mapping then identify the roles of stakeholders that have been carried out, the roles of stakeholders include: 1) Policy creator, 2) Coordinator, 3) Facilitator, 4) Implementer, 5) Accelerator, presented in table 1 below:

Table 15.. Results of the Identification and Role of Stakeholders in realizing ecosystem-based terrestrial fisheries management

Stakeholder Primer	Role	Activity related to role	Assessment Analysis
Villagers	Implementer	1. Carry out prevention activities in their respective regions. 2. Report to law enforcement officials if there are allegations of violations or criminal acts in the fisheries sector. 3. Arrest (if caught in the act) and hand over the offender (including the evidence) to law enforcement officials. 4. Disseminate information to the public about functions, disturbances / threats, and sustainability of marine resources.	In order to involve the community's role in overseeing fish resources in accordance with the mandate of Article 67 Law Number 33 of 2004 concerning Fisheries as amended by Law Number 45 of 2009, the Directorate General of Marine Resources and Fisheries Management (Ditjen PSDKP) has developed a Community-Based Monitoring System (SISWASMAS) through the formation of a Community Monitoring Group (POKWASMAS).

		5. Play a role in operational prevention when carrying out activities as fishermen 6. Play a role in preparing preventive operational plans. 7. Role in the preparation of preventive operational plans.	South Barito District for Community Supervisory Groups totaling 20 Groups (Strategic Planning of the South Barito District Fisheries Service in 2018)
Fish Catcher Group	Implementer	1. Identify potential fisheries areas. 2. Subjects in ecosystem-based fishing activities. 3. Determination of zoning-zoning fisheries in the village.	Fishermen must be the subject of management, manage their own fish resources. The global and national concept of sustainable fisheries management can only work and achieve its goals if working with fishermen. But non-free fishermen are unlimited, because in the management there is still a compromise, namely a middle road that can be taken where fishermen can hold themselves back, and fish resources can recover, including in avoiding catching using electric, tubes and poisons.
Village Government	Policy Creator	1. Making Village Regulations (Perdes) for protection of water areas. 2. Budget allocation from Village Funds / ADD.	Village Regulation (Perdes) is a product of the village government and the Village Consultative Body which is used as a reference for implementation village government as long as it does not conflict with the interests of the people and the rules of the law on it. The existence of village regulations in the protection of aquatic ecosystem areas is very important to regulate the times / fishing areas by the community.
Kelembagaan Adat	Policy Creator	1. Membuat peraturan adat tentang perlindungan kawasan. 2. Melestarikan dan menghidupkan kembali kearifan lokal. 3. Menegakan hukum adat bagi oknum-oknum yang melanggar .	Based on Regional Regulation No. 16 of 2008, which was revised through Regional Regulation No. 1 of 2010 concerning Amendments to Central Kalimantan Regional Regulation No. 16 of 2008 concerning Institutional Dayak Customs. It can be concluded that one of the roles of customary institutions is to preserve the indigenous culture of the Dayak tribe.. The participation of indigenous peoples in the protection of the region is currently in the form of pukung pahewan, tajahan and kaleka, the wisdom of this local community that will be encouraged in the community.

	Facilitator	Conduct socialization in the community related to customary law and local wisdom of the community.	With the passage of time customary law and local wisdom in the community began to fade, therefore it needed continuous socialization.
Stakeholder Primer	**Role**	**Activity related to role**	**Assessment Analysis**
The head of Regency	Policy creator	1. Issue policies related to land fisheries management based on ecosystems. 2. Control / control the issuance of industrial licensing areas by taking into account regional aspects.	One of the Regents' authorities is to issue policies on the utilization of strategic natural resources and high technology, conservation and national standardization. (Law No. 22 of 1999 concerning Regional Government). In realizing ecosystem-based fisheries, a regional policy is needed in the protection of fisheries areas in the form of regent regulations / regent decree / regional regulations.
BAPPEDA (Development Planning Agency Sub District)	Coordinator	1. Preparation of Coordination material preparation of technical policies; 2. Coordinating the preparation of regional development planning documents (RPJPD, RPJMD and RKPD) 3. Conduct regional analysis and assessment 4. Integrating and harmonizing development programs in the regions; 5. Evaluate development planning policiesregions, and implementation of regional development plans, as well as results regional development plan;	Based on Regent's Regulation No. 62 In 2016, Bappeda plays an important role in the preparation of the RTRWK because in accordance with the duties of the Bappeda, it conducts analysis and study of the area and evaluates development planning policies and coordinates the preparation of the RPJMD as outlined in the planned activities in the SKPD. Bappeda will certainly coordinate with SKPDs related to the planning of each SKPD specifically the Fisheries Service activities which will be facilitated by TABE to recommend Ecosystem Based Land Fisheries.
TKPRD	Coordinator	1. Coordinate Spatial Planning. 2. Coordinating the Utilization of Space. 3. Planning the use of land that is stretched in the area district; 4. Evaluate and adjust the location plan for land use activitiesbased on changes in the RTRW and the development of realizationdevelopment; 5. Prepare regional investment maps and identify potential resourcesarea; 6. Prepare materials for the preparation of technical guidelines for the administration of agriculture, plantations, animal husbandry,	Based on Regent's Regulation No. 39 of 2016 concerning the main tasks and functions of the Regional Secretariat included in the South Barito District TKPRD have an important role in the preparation of the RTRWK. The statement from the TKPRD representative delivered by the Assistant II of the Economy and Development Section of the South Barito District Secretariat during the Stakeholder Mapping Workshop in South Barito on March 26, 2019 provided space for the TABE to facilitate the results of academic drafting activities as input for the Local

		marine and fisheries, forestry, ESDM (mineral resource energy), environment and food;	Government to include inland fisheries management in the RTRWK although now the South Barito RTRWK has been approved by the Governor but it has still not been approved. The TKPRD team consists of the Regional Secretariat, Bapedda and the PUPR and PKP Office
Fisheries Service	Accelerator	1. Provide Formulating and proposing academic documents together with TABE for the delineation of the HCV area of inland fisheries. 2. Formulation and determination of policies in the inland fisheries sector. 3. Formulation, implementation of policies, evaluation and administration in the field of empowering small fishermen, empowering small fish cultivators and managing fisheries resources;	Based on Regent's Regulation No. 58 of 2019 concerning the Auth of South Barito District Fisheries Service. The Fisheries Service has the task of helping the Regent carry out his affairs government which is the regional authority and assistance task in the field of maritime affairs and fisheries The role of the Fisheries Service becomes very important as a leading sector in the preparation of academic documents to be submitted to TKPRD, BAPPEDA and PKP PUPR Office so that they can be discussed together to be included in the RTRWK. The role of the Department of Agriculture includes determining the next step, namely the submission of an ecosystem-based inland fishery protection policy to the head of regent
Stakeholder Primer	**Role**	**Activity related to role**	**Assessment Analysis**
BKSDA central Kalimantan	Facilitator	1. Carry out conservation of protection of Dragon fish in public waters. 2. Tagging the location of the distribution of Dragon fish if outside the KSA / KPA area	Activities related to the role of Dragon fish protection were obtained Referring to PP No 7 of 1999 in the attachment sheet section V Pisces (fish) number 220 it is written that *Scleropages formasus* in Bahasa Indonesia Peyang malaya, Tangkalasa included in protected fish
Balai Wilayah Kalimantan Sungai 2	Facilitator	1. Conserve Water Resources in a sustainable manner 2. Utilizing Water Resources fairly and meeting quality and quantity requirements for various community needs. 3. Control the power of water damage 4. Empower and enhance the role of the community and government in the management of water	The role of the Kalimantan Regional Office 2 is for the maintenance of swamp areas, river maintenance, and the determination of watershed conservation locations.

		resources 5. 5. Increasing the openness and availability of data and information in the management of water resources.	
TRGD Prov Central Kalimantan Province	Accelerator	1. Restoration of critical peatlands 2. Protection of peatlands from the danger of forest and land fire. 3. Recovery of hydrology through canal blocking activities.	The provision of assistance tasks is contained in the Minister of Environment and Forestry Regulation No.61 / MENLHK / SETJEN / KUM.1 / 11/2017 concerning Assignment of Part of Government Affairs in the Environmental Field and Forestry for the 2018 Peatland Restoration Activities. TRGD was formed to carry out activities: wetting peatlands, planting and revitalizing the Socio Economic Community. Restoration of degraded peatlands with the aim of returning the function of peatland to the function of the future will have a positive impact on the sustainability of terrestrial and beje fishery ecosystems.
DPMPTSP South Barito	Accelerator	1. Assist the Regent in carrying out the preparation and implementation of regional policies in the field of investment and one-stop integrated services 2. Providing licensing services for business people, investors / investors. 3. Place to file investment licenses for an area and region in coordination with the Regent	The Role of the One-Stop Integrated Investment and Licensing Office in Fisheries to ensure that the proposed investor / investor permit file and business actors provide recommendations (permits) in accordance with the results of an environmental impact analysis (AMDAL) that does not rule out the protection of inland fisheries areas (swamps, lakes and river) which has high conservation value so that the existing zones can be protected and sustainable.
South Barito Police Resort	Facilitator	1. Implement law enforcement related to illegal fishing. 2. Carry out law enforcement related to environmental damage due to PBS / Mining company activities. 3. Public outreach about awareness about the dangers of illegal fishing.	Referring to Law Number 45 of 2009 concerning Fisheries as referred to in Article 8, that every person is prohibited from fishing and / or cultivating fish using chemicals, biological materials, explosives, tools and / or methods, and / or structures that can harm and / know endanger the sustainability of fish resources and / or the environment in the territory of the Republic of Indonesia fisheries management.

PUPR PKP Agency	Facilitator	1. Formulating spatial planning policies. 2. Implementation of local government policies related to spatial planning. 3. Coordinating the provision of supporting infrastructure. 4. Monitoring, implementation and evaluation of the area 5. Carry out the drafting of the Strategic Plan, Work Plan,Budget Work Plans and Budget Work Plans for Changes in the Public Works Office, Spatial Planning, Housing and Settlement Areas in accordance with existing regulations and guidelinesso that the implementation of tasks runs smoothly and can accounted for;	PKP PUPR Service as part of TKPRD. At present the implementation in the preparation of the RTRWK is moved to the PUPR PKP service Kab. South Barito previously in Bappeda, PKP PUPR Office played an important role in the Compilation of Detailed Spatial Planning (RDTR), with the conditions in the strategic plan of the Fisheries Service not specifically mentioning Beje and Dragon fish fisheries activities, with the FAO program allowing these activities to be entered through the results a study from the TABE Foundation in the form of an academic paper document for potential fisheries areas will be drawn up with detailed spatial plans that will be protected.
KPHL South Barito	Facilitator	1. Has a strategic role in nature's efforts to conserve peat ecosystems in the Protection Forest 2. Implementation of conservation, rehabilitation and revitalization of protected forest areas	By carrying out conservation activities of protected forests (rehabilitation and revitalization of the area) in a sustainable manner so that inland fisheries that are an integral part of the existing peat ecosystem are maintained and can be utilized by the local community. The form of activities such as periodic inventory of management areas and forest management, forest utilization in certain areas, community empowerment, KPHL has 3 core zones, a revitalization zone and a rehabilitation zone
Oil Palm Plantation	Implementer	1. Controlling waste from plantation production to aquatic ecosystems. 2. Avoiding the opening of oil palm in peatlands by making canals that cause oxidation processes.	With the existence of PBS activities in the South Barito Regency area, the need for the Local Government to make policies that consider the impact of the plantation sector, especially oil palm plantations, because most of the areas in South Barito Regency are peat waste management and plantation land clearance by taking into account aspects of AMDAL and referring to the Republic of Indonesia's Minister of Environment Regulation No. 5 of 2014 concerning Wastewater Quality Standards.
Mining company	Implementer	1. Controlling and controlling	In particular, the determination of coal

		company waste. 2. Waste management based on waste quality standards. 3. Paying attention to zoning fisheries zones.	stockpiles and transportation routes takes into account fisheries zoning. CSR activities are encouraged to repair damaged ecosystems
Environmental services	Facilitator	1. Preservation of conservation areas, biodiversity and ecosystem functions especially watersheds, aquatic ecosystems. 2. Providing EIA recommendations for companies engaged in natural resource exploration by taking into account sustainable natural resource ecosystems.	DLH has an Environmental Protection and Oversight Plan (RPPLH) for a certain time which is a plan for protecting and managing efforts with the principle of sustainable development being important in managing ecosystem-based terrestrial fisheries, and having the tools to measure it, namely the Strategic Environmental Assessment (KLHS) is the basis of development sustainable this is in line with the onshore fisheries program to be developed.
Industry, trade and cooperative services agency	Facilitator	1. Connecting the Fisheries group with buyers / consumers and helping to find a market for the Fisheries group by diversifying processed fish so as to increase prices. 2. Assisting the Fisheries group in promoting the processed fish products at the regional, provincial and national development exhibitions 3. Fostering groups of Fishermen and Small and Medium Enterprises in the field of fisheries.	With the activities of coaching and mentoring the fish market chain of fisheries groups, it will increase the income of the people who work for fisheries.
Social and Community Empowerment agency	Facilitator	1. Assistance in strengthening village government institutions. 2. formulation of policies in the field of village structuring, implementation adm village government agencies, village financial and asset management, and village legal products 3. Policy formulation, policy implementation, evaluation and reporting in the field of Community and Village Empowerment 4. Arranging plans for the use of space and areas in rural areas;	The role of the Community and Village Empowerment Agency is very important for village progress, namely by strengthening village institutions so that the village government has the capacity to make legal products in the form of village regulations relating to ecosystem-based land fisheries, the Village Government can access support from the PMD Office in mapping village potentials especially in the field of fisheries so that the village itself can make potential protection policies that exist as part of

		5. Facilitating the preparation of village spatial planning; 6. Facilitate the thematic mapping needs for rural area development and village spatial planning; 7. Community Assistance in Empowering Village Economic Business Institutions (BUMDes)	conserving livelihood resources in the field of inland fisheries.
NGO environmental	Facilitator	1. Supervise, actively involved in providing input in the process based on insight and knowledge possessed. 2. Participate in socializing any future draft policy or planning.	The role of NGOs is more driven by the purpose of its formation, namely a non-governmental organization is an organization outside the government, outside of the bureaucracy, the aim can be to help the performance of the government and even instead monitor the running of the government so as not to cause abuse of authority.

5.2.3 Development of the South Barito District EAFM Fisheries Land Indicator

The development of EAFM indicators in the marine fisheries sector has been carried out with the support of ease of data obtained in a structured manner, and a catchment management system (WP) which is divided into zones based on many supporting factors from the number of stocks of commercial fish species to the fleet catch along with fishing gear and fishing capacity, as well as electronic based fishing data recording (e-logbook). All of them facilitate and support the implementation of EAFM in the marine capture fisheries sector based on six EAFM indicator domains. However, the six EAFM indicator domains which are measurement tools for EAFM evaluation and monitoring efforts as well as some aspects of the indicator sub-domain are still relevant to be applied to the planning and management of EAFM-based inland fisheries by making some adjustments or aligning sub-domain indicators to the problems permaslahan and data available on the inland fisheries sector in South Barito.

The effort to harmonize this is not an effort to force but with limited data owned by inland fisheries, improvements to management efforts can be done in the future by making improvements in terms of data collection on land fisheries and other related aspects. Thus it is expected that with the effort to develop this EAFM Indicator, Land Fisheries can become a reference for making work programs that are more directed to refer to the indicators that have been built. The South Berito District EAFM Indicator for Land Fisheries will be tested later, so that it will receive many inputs from various stakeholders involved in an effort to achieve its perfection.

Referring to the EAFM indicators that have been made in the Capture Fisheries sector, by aligning with the problems that occur in the Land Fisheries sector, the South Barito Regency EAFM Fisheries indicators are as can be seen in several TAF domain indicators for the land fisheries EAFM indicators below :

5.2.3.1 Fish Resource Domain

This fish resource domain has 5 (five) sub-domain indicators such as: 1) "Catch per Unit of Effort" (CpUE) or Catching Results Per Unit of Raw Business, 2) Trend of the size of fish caught, 3) Proportion of juvenile fish (yuwana) captured, 4) Composition of catch species, 5) "Range Collapse" of fish resources, 6) ETP species (Endangered, Threathened and Protected species). All indicators of this sub-domain of fish resources have already been applied to marine fisheries management, but they are also relevant to be applied to EAFM-based inland fisheries management because there are technical similarities to the problems that occur in these fish resource domains in both marine and inland fisheries management. Thus, the sub-domain indicator on the land fisheries resources of South Barito Regency is as can be seen in Table 16.

Table 16. Development of sub-domain indicators of inland fishery fish resources in South Barito Regency.

Indicator	Definition /Explanation	Monitoring/Collecting	criteria	Weight (%)	Ranking
1. Default CPU	Is the result of capture per unit of business of capture (tons / year)	Logbook, survey enumerator, observer of at least 3 years from the fisheries unit under study	1 = decreased sharply (average decreased> 25% per year) 2 = decreased slightly (average decreased <25% per year 3 = stable or increasing	40	1
2. Fish size trends	Total length, standard, and length of carapace (shrimp) / fin	Fish frequency sampling is regularly carried out at the dominant fisheries (species) studied, which in total have a volume of more than 50% of the catch 1	The average size trend of fish caught is getting smaller 2 = relatively fixed size trend 3 = The trend of size is getting bigger	20	2
3.Proportion of juvenile fish (young fish) caught	Percentage of fish caught before reaching adulthood	- Regular fish sampling program - Interview respondents	1 = Very much (> 60%)	15	3

	(based on fish maturity level)	with experience in fisheries related for at least 10 years	2 = Lots (30 - 60%) 3 = A little (<30%)		
4. Catch species composition	Target species that are utilized, non-target species that are utilized and not used -	The results of the fisherman logbook, observation - Poor fisheries interview data to respondents who have experience in related fisheries for at least 10 years	1 = Proportion of target is slightly lower (<15% of total volume) 2 = Proportion of targets equal to non-target (16-30% of total volume) 3 = More target proportion (> 31% of total volume)	10	4
5. "Range collapse" of fish resources	Fishing locations are increasingly far away	- Survey and monitoring, observation logbook - Poor fisheries interview data for respondents who have experience in related fisheries for at least 10 years	1 = Increasingly difficult, depending on target species 2 = Relatively fixed, depending on target species 3 = Easy to play, depending on target species 1 = Fishing ground becomes very far depending on the target species 2 = Fishing ground far depends on the target species 3 = Fishing ground is relatively fixed, depending on the target species	10	5
Spesies ETP	Populasi spesies ETP sesuai dengan krteria CITES	- Survey dan monitoring, logbook, observasi dalam satu tahun terakhir - Data poor fisheries interview kepada responden yang berpengalaman dalam perikanan terkait selama minimal 10 tahun	1= Terdapat individu ETP yang tertangkap tapi tidak dilepas 2= Tertangkap tapi dilepas 3= Tidak ada individu ETP yang tertangkap	5	6

5.2.3.2. Domain of Aquatic Habitat and Ecosystem

This domain has 6 (six) sub-domain indicators, namely: 1) Waters quality, 2) Status of river ecosystems 3) Status of swamp ecosystems, 4) Status of oxbow lakes 5) Special unique habitats, 6) Changes to water conditions and habitats

Fish habitats in inland waters are rivers, swamps and lakes. Rivers are flowing waters (lotic), while lakes (oxbows) and swamps due to their nature are open and connected to the main waters (rivers), hydrologically experiencing dynamics depending on water runoff which is affected by rainy and dry (dry) seasons. These three types of habitat are directly related to the quality of the waters (physical, chemical and biological). Water quality in this case is influenced by the condition of terrestrial ecosystems such as plants that live in water and human activities such as agriculture, mining, forestry, plantations.

Riparian areas are generally considered to be areas bordering rivers and lakes. The relationship of this area to adjacent waters is an intrinsic relationship of the structure and function of riparian areas. In ecologically healthy landscapes, water flows and their margins form an inseparable unit of flow corridors. The flow corridor includes not only active river channels, but also open sections and stagnant water areas near river basins, as well as flood plain surfaces above and beyond the banks of the channel. The river channel which has been cut off from its riparian area no longer holds and stores water and accumulates sediment, thus losing many of its ecological functions.

Ecologically healthy river corridors are more than sediments and water, river basins and floodplains, but include a collection of riparian plant communities and wild animals that depend on natural hydrological regimes that represent certain landscapes. Lacking human-induced changes, the riparian plant community supports a variety of functions including bank stabilization through root strength, sediment deposition in floodplains during periods of overbank flow, interstitial flow through sediments, and large timber supplies, which have a large influence on channel complexity and instream habitat features. Ecologically intact riparian areas maintain and recycle nutrients, modify the local microclimate and maintain a broad-based food web that helps support a diverse collection of fish and wildlife. Loss of floodplain connectivity caused by changes in river flow and flow regimes, removal of river shoulder vegetation has a large ecological impact that affects aesthetics, recreational opportunities, and other characteristics of this area that are valued in humans.

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Table 17. Development of indicators of sub-domain habitat and ecosystem of inland fisheries in South Barito Regency

Indicator	Definition/Explanation	Monitoring/Collecting	Criteria	Weight (%)	Ranking
1. Aquatic Quality (Rivers, lakes and swamps)	Clinically identified, audio and / or visual wastes (Example: B3-hazardous and toxic substances) using parameters and from Permen LH12010) concerning water pollution control	Secondary data, sampling and monitoring Sampling and monitoring are carried out 4 times a year (representing seasons and transitions)	1 = polluted 2 = medium polluted 3 = not polluted	25	1

	Water quality can be seen from the level of turbidity and total suspended solids.	Survey, monitoring and secondary data, using satellite imagery Monitoring with water quality checker (continuous), satellite imagery (time series data) and sediment traps (once a year), turbidity measurement in laboratory	1 = Exceeds the quality standard Minister of Environment Regulation 1 regarding pollution control 2 = Same as the quality standard Minister of Environment Regulation 1 regarding pollution control 3 = below the quality standard Minister of Environment Regulation 1 regarding pollution control		
	Eutrophication using chlorophyll a parameter	Surveys are conducted 4 times a year representing seasons and transitions	1 = chlorophyll concentration a <2 µg / l 2 = chlorophyll a concentration 2 - 5 µg / l 3 = chlorophyll concentration a> 5 µg / l		
2. Status of Riparian ecosystems	Cover and diversity of riparian species (diversity of tree and insect species)	Secondary data, survey and monitoring, satellite imagery Measurement of riparian tree / plant species	1 = low cover ≤ 30% 2 = medium cover ≥ 30 - <60% 3 = high cover> 60%	15	2
		Sampling and monitoring of fish food in the form of plants (fruit) and insects	1 = low diversity (H '<3.2 or H' <1), number of species <3 2 = moderate diversity (3.20 <H '<9.97 or 1 <H' <3) number of species 3 - 5. 3 = high diversity (H '> 9.97 or H'> 3) number of species> 5)		
3. Sedimentation rate	Loading material sedimentasi	Secondary data, survey and monitoring, satellite imagery Measurement of sedimentation rates and siltation of rivers, lakes and swamps	1= Sedimentation rate> 2 = sedimentation rate = 3 = Sedimentation rate <		3

Table 18. Development of sub-domain indicators of habitat and aquatic ecosystem inland fisheries in South Barito Regency

Indicator	Definition/explanation	Monitoring/Collecting	Criteria	Weight (%)	Ranking
1. Fishing methods that are destructive and illegal	Seen from the use of tools and methods of capture that damage and or do not comply with applicable regulations	- Reports on the results of fisheries inspectors, surveys - Poor fisheries data: reports from the police, interviews from fishermen / POKMASWAS	1 = frequency of violations> 10 cases per year 2 = frequency of violation of 5-10 cases per year 3 = frequency of violations, 5 cases per year	30	1
2. Modification of fishing gear and fishing aids	The use of fishing gear and assistive devices that have a negative impact on SDI	Observation, sampling the size of target fish / dominant fish, Lm size	1 = more than 50% size of target fish species <Lm 2 = 25 - 50% size target species <Lm 3 = <25% size target species <Lm 25 1	25	1
3. Fishing capacity and fishing effort (fishing capacity and effort)	The amount of fishing capacity divided by fishing activities -	Survey, logbook - poor fisheries data: interview to respondents who have experience in related fisheries for at least 10 years	1 = Capture capacity ratio <1 2 = Capture capacity ratio = 1 3 = Capture capacity ratio> 1	15	3
4. Catch selectivity	Catching activities are related to the extent, time and diversity of the catch	Statistics of capture fisheries, logbooks, surveys	1 = low (> 75%) 2 = moderate (50 - 75%) 3 = high (less than 50%) use of non-selective fishing gear	15	4

5.2.3.3. Economic Domain

Indicator	Definition/explanation	Monitoring/Collecting	Criteria	Weight (%)	Ranking
1. Ownership of assets	Changes in the value of the number of RTP business assets (fisheries business assets or RT assets obtained from fisheries businesses	Survey and data collection of average annual household income by taking into account the five-year season (source of data Susenas BPS)	1 = reduced asset value (more than 50%)	45	1
2. Household income (RTP)	Fisheries Households are fish processing fisherman households and fish traders whose main income is generated from fisheries	Survey of RTP income using a sampling approach in accordance with applicable scientific principles, where the income compared to the UMR is the individual income derived from the fishery activities studied	1 = Less than the average UMR 2 = Same as the average UMR 3 => from the average UMR	30	2
3. Saving ratio	Explain the ratio of savings to net income	Directions for survey frequency and data collection for RTP income are according to fishing season (primary data). Information on loan	1 = Less than the loan loan interest 2 = Same as loan interest 3 = More than	25	3

		interest can be obtained at BI during the survey	interest on loan loans		

5.2.3.4 Social Domain

Indicator	Definition/explanation	Monitoring/Collecting	Criteria	Weight (%)	Ranking
1. stakeholder participation	Stakeholder involvment	Registration of participation is carried out continuously in accordance with the phases of fisheries management. Evaluation of these records is carried out at each stage and cycle of management. The percentage of involvement is measured by the number of types of stakeholders not individual stakeholders	1 = < 50% 2 = 50 – 100% 3= 100%	40	1
2. Fisheries conflict	Resource conflicts, policy conflicts, fishing device conflicts, conflicts between sectors	Directions for conflict data collection are every semester (2 times a year) or according to the season (assuming different levels of competition	1 = more than 5 times / year 2 = 2-5 times / year 3 = less than 2 times / year	35	2
3. Utilization of local knowledge in fish resource management	Utilization of local knowledge related to fisheries management	Recording utilization of traditional technology is carried out continuously in accordance with the phases of fisheries management. Evaluation of these records is carried out every management cycle and carried out in a participatory manner	1 = Nothing 2 = Yes but not effective 3 = There and effective use	25	3

5.2.3.5 Institutional Domain

Indicator	Definition/Explanation	Monitoring/Collecting	Criteria	weight (%)	Ranking
1. Compliance with the principles of fisheries responsible for fisheries management that have been established both formally and informally	The level of compliance of all stakeholders in the fishing area to the rules of the game both formal and informal	Obedience monitoring: 1. Reports / records of formal violations from supervisors 2. Interviews / questionnaires (key person) for non-formal violations including adherence to their own rules and regulations thereof 3. Need additional information about the quality of the case with examples	1 = More than 5 times a violation of law occurred in fisheries management 2 = 2-4 times a violation of the law occurred 3 = less than 2 violations of the law Non-formal 1 = More than 5 infringement information 2 = More than 3	25	1

			infringement information 3 = No violation information		
2. The Complete rules in managing fishery	The extent to which completeness of regulations in fisheries management is available to regulate fish utilization practices in accordance with the EAFM domain, namely regulations related to the sustainability of fish resources, habitat and ecosystems, fishing techniques, socioeconomic and institutional	- Refers to National regulations. In this case the regency government should make derivative rules - Compare the current situation with the previous situation - Replication of local wisdom	1 = There are no regulations until the availability of fisheries management regulations covers 2 domes of EAMF 2 = Availability of fisheries management regulations to cover 3 - 5 EAMF domains 3 = The availability of complete fisheries management regulations 6 EAFM domains Elaboration for point 2: 1 = There is but the amount is reduced 2 = There is but the amount is fixed 3 = There and the number increases	26	2
	Whether or not there are rules and their effectiveness	The survey was conducted through interviews / questionnaires: 1) Availability of surveillance equipment 2) Form and intensity of prosecution (reprimand, punishment)	1 = There is no enforcement of rules / regulations 2 = There are enforcement of rules / regulations 3 = There are enforcement of the rules of the game / regulation and effective 1 = There are no tools and people 2 = There are tools and people but no action 3 = There are tools and people and there are actions 1 = There is no warning or punishment 2 = There is a reprimand or punishment 3 = There is a rebuke and punishment		
3. Decision making mechanism	Whether or not there is a decision making	The survey was conducted by document analysis between	1 = There is no decision making	18	3

	mechanism (SOP) in fisheries management	institutions and stakeholder analysis through interviews / questionnaires	mechanism 2 = There is a mechanism but it is not effective 3 = There is a mechanism and works effectively 1 = There was a decision but it was not carried out 2 = There is a decision not fully implemented 3 = There are differences and they are fully implemented		
4. Fisheries management plan	The presence or absence of RPP for the fisheries management area in question	The survey was conducted by interview / questionnaire 1. The existence or absence of RPP in the area 2. Implemented or not made lesson plans	1 = There is no RPP 2 = There is a lesson plan but it has not been fully implemented 3 = There is a lesson plan and it has been fully implemented	15	4
5. The level of policy and institutional synergy in fisheries management	The higher the level of synergy between institutions, the effectiveness of fisheries management will be better	The survey was conducted by document analysis between institutions and stakeholder analysis through interviews / questionnaires The survey was conducted by document analysis between institutions and stakeholder analysis through interviews / questionnaires	1 = Conflict between institutions (between institutions with different interests) 2 = Communication between institutions is not effective 3 = Synergy between institutions works well 1 = There are conflicting policies 2 = Policies do not support each other 3 = Mutual support policy	11	5
6. Stakeholder capacity	How big is the frequency of stakeholder capacity building in ecosystem-based fisheries management.	The survey was conducted by interview / questionnaire on 1. The presence or absence and the number of times 2. Material	= No increase 2 = Yes but not functioning (the expertise acquired is not in accordance with the job function) 3 = Available and functioning (expertise gained in accordance with the work function)	5	6

5.2.4 EAFM and Regional Spatial Planning South Barito Regency

The development of the South Barito Regency EAFM inland fisheries that has been made in the previous sub-section shows various domains and sub-domain indicators that can be monitored and evaluated quantitatively from the influence of various other activities, both directly and indirectly. In other words, efforts to integrate management of terrestrial fisheries resources with other activities can be done based on data collected referring to indicators that have been developed. The parties or stakeholders can directly monitor their activities that have the potential to have a negative impact on the management of land fisheries that intersect both directly and indirectly.

The integration of management of inland fisheries resources into the RTRWK can be done by making zoning allocations for fishing, protection and rehabilitation of inland fishery resources both rivers, swamps and lakes by referring to the domain indicators of the Land Fisheries EAFM. In this case, the role of relevant agencies, especially the South Barito District Fisheries Service, is supported by various parties such as the Department of the Environment (DLH) and Bappeda to be very important. Likewise, the role of other stakeholders such as traditional institutions and village government institutions that play a role in producing customary law and village regulations in the context of land fisheries management.

5.3. High Conservation Value of Inland Fisheries Area in the South Barito District

5.3.1 *High Conservation Value* (HCV)

Since its development as an environmental management tool that is still in good condition and has been degraded by the "Forest Stewardship Council" (FSC) in 1990, HCV has been widely applied in various countries including Indonesia, especially for environmental management in forest areas, plantations and aquatic ecosystems. However, the use of HCVs for the management of aquatic ecosystem areas, especially those related to terrestrial fisheries ecosystems is still very limited. In HCV-based environmental management, an area to be managed is divided into six ecosystem functions with high value (the six high conservation value), namely: HCV1 (Species diversity, HCV2 (landscape-level ecosystems and mosaics), HCV3 (Eosystems and habits)), HCV4 (ecosystem services), HCV5 (community needs), and HCV6 (cultural values).

The inland fishery area which includes rivers, lakes and swamps with various ecosystem components, both the biotic and abiotic components, has six functions with a high value (the six high conservation value) defined in the HCV. The function of HCV in the terrestrial

fisheries ecosystem area which is related to the typology of each component of the ecosystem and key indicators is as a basis parameter to identify the function (TABLE 18). This key HCV indicator, because it is related to the management of terrestrial fisheries area, is very relevant to be associated with fisheries management based on the Environment Approach Fisheries Management (EAFM) which was initiated by FAO. The similarity of the environmental management system based on HCV and EAFM is very clearly seen from the slice of the six high value functions with the indicator domain specified in the EAFM.

The results of conducting the field survey through interviews with communities living around the terrestrial fisheries ecosystem area and the measurement of the biophysical and chemical components of the aquatic environment with various indicators in the South Barito District shows the potential of several terrestrial fisheries ecosystem areas that have all six HCV functions. Consolidation through public testing with various stakeholders has determined 1 (one) lake, namely Lake Malawen and as an area that has HCV values. Nine other lakes, namely Lake Lelek, Lake Palui, Lake Hampalam, Lake Mangguruh, Lake Mangkare, Lake Mangkatip Matei, Lake Bateken, Lake Karanen Kecil and Danau Raya, through the proposed public test with various stakeholders are believed to have the six HCV functions, however further identification and justification efforts must be made through conducting surveys and measurements with the indicators set out in the EAFM (see sub Chapter 4.1.1 EAFM).

These lakes have the potential to experience degradation due to the growing pressure from various anthropogenic activities in the future (see chapter 5.1.2) that if no action is taken to establish them as HCV areas, the six HCV functions in some lake areas will experience degradation and even disappear.

Table 19. Inland fishery ecosystem area with key indicators for the identification of six functions with high values.

HCV Function	Inland Water Areas	Inland Fisheries Ecosystem	Key Indicator
HCV 1 Species diversity	- Surface, middle and bottom waters bodies)	The discovery of various types of freshwater fish	- Total fish population - Community structure - Endangered species - Economically important fish
HCV 2 Landscape-level ecosystems and mosaics	- Water body - Riparian vegetation, the border area between land and water bodies - Aquatic plants that float	- Endangered species are rare and protected fish	- Cover of riparian - Types of riparian plants - Water depth, water color - Speed of water flow
HCV 3 Ecosystems and habitats	- Water bodies (surface habitat, middle and base waters)	- Habitat for a variety of freshwater fish, including ornamental fish, spawning and	- Characteristics of habitat: Soil bottom (muddy, sandy, rocky,

		eating migratory sites, fish nurseries	litter, etc.). Water color (brown, blackish brown, clear). Overgrown with aquatic plants (floating, semi-floating and sinking with roots at the bottom) - Physical quality (brightness, turbidity, TDS, TSS, temperature), chemical (pH, DO, BOD, COD, Na, Cl, K, P, N (NH3, NO2, NO3), Pb, Fe, Hg, As, CD, phenol, fat / oil, biology (abundance of plankton, benthos and fish)
HCV 4 Ecosystem services	- Bodies of water (surface habitat, middle and bottom waters)	- Source of drinking water - Fish cultivation - Water transportation	- Water quality - Water dimensions (length, width and depth)
HCV 5 Community needs	- Various types of fish, including shrimp, crabs, shellfish - Sources of domestic fulfillment (drinking water, bathing and washing)	- Food sources (protein) - Sources of income (economy)	- Nutrition status (stunting) and public health - Income per household / year - Environmental health status (type of house, MCK)
HCV 6 Cultural values	- Water Agency - Island in the middle of the waters - Riparian vegetation (trees), the border area between land and water bodies - Aquatic animals (crocodiles), certain types of fish that are considered "pali"	- Sacred area - Sacred animal	- Type and number of sacred sites (support animals, cemeteries, certain areas with tree attributes and yellow cloth etc.) - Indigenous communities that manage it

5.3.2 High Conservation Value Fisheries Areas (HCV) Malawen Lake South Dusun Sub District

Based on visual data collection of inland fisheries and interviews obtained in the following table:

Table 20. Land fishery Ecosystem (Lake Malawen, Sanggu Village, South Dusun District) with key indicators for the identification of six functions with high values.

Jenis Perairan	HCV 1: Species diversity	HCV 2: Landscape-Level Ecosystems and Mosaics	HCV 3 Ecosystems and Habitats	HCV 4 Ecosystem Services	HCV 5 Community Needs	HCV 6 Cultural Values
Malawen Lake, Sanggu Village, South Dusun District	Fish species that live in lakes include fish that migrate from the Barito river during floods Such as Tapah, manjuhan, karandang kalui, kalabau/kalawau, toman, gabus, udang kecil, patung, kapar, biawan, papuyu, baung sepat siam, sepat kecil, Catfish, peyang dan lais. Previously, there was a Arwana fish caught by fishermen in Malawen Lake around 2009 (10 years ago) and now it's no longer found.	It is a horseshoe lake (oxbowlake) which is cut off from the main river (Barito). The distance between the lake and the Barito river is ± 9 km. Dimensions of length (2 km), width (1 km) and depth (7-9 m). To reach the location of Malawen lake by using a boat / motorized boat (ces / alkon) with travel time (15-30 minutes). With the distance from the village of Sanggu to Malawen lake ± 1 km	Freshwater habitat that gets water flow from upstream from the pematang kayu river to the mouth of the Sanggu lake it flows into Malawen Lake then the water goes out to the Pamait river, followed by the Tabuk river and finally to the Barito river.	Sources of water for wild animals and fishing community locations fishing for business (livelihood) indirectly the Malawen location is a fishing tourism for people from the South Barito district and people outside the village even though from the village there is no charge to enter the Malawen lake. Before reaching Lake Malawen, it will pass through Sanggu Lake, Sanggu Lake is a lake that is used as a tourist attraction and has been determined by the local government of	Fish catches, as a source of food (protein) and a source of income for fishermen. The number of fishermen in Sanggu village is minimal because the economy is not dependent on fisheries because most of them work in government (PNS) and as company employees, currently the utilization of fish resources in Lake Malawen is carried out by some residents of neighboring villages, namely the Pamait village community. For people in Sanggu, in general, looking for fish to meet their protein needs only.	- Malawen lake is one of the lakes that is believed by the people of the village of Sanggu as a sacred lake (white crocodile) named Kumbang Bernaung and Intan - - For fishermen from the village of Pamait provide ritual offerings and put a yellow cloth in certain areas in Malawen Lake hoping that the results of the fish obtained more than the previous time. - - There is a belief in the community there if there is poison (with tubers, chemicals or other), the sunny weather becomes cloudy

				Kab. South Barito .		or it rains immediately even though it is the dry season.

5.4 Fisheries Management South Barito Regency Spatial Approach

5.4.1 Factors Inhibiting the Role of Stakeholders

1. Monitoring and implementation of policies at the village level is still not optimal.
2. Information and socialization related to the community such as: status of the area, types of protected fauna, and types of fishing gear recommended, are still lacking.
3. Financial resources have resulted in the lack of optimal traditional institutions in carrying out their roles and functions.
5. There are differences in authority and duties of each agency with their respective achievements, resulting in a lack of coordination and collaboration between stakeholders.
6. Budget and personnel are limited so that it becomes an obstacle to the function and role of stakeholders.
7. Policies on inland fisheries with an ecosystem approach have not received attention, while South Barito District has great fisheries potential.

5.4.2 Program and Land Fisheries ecosystem based Management and Stakeholder Engagement

Table 21. Program and Land Fisheries Ecosystem based Management and Stakeholder Engagement

No	Ancaman	Sektor Program	Objectives	Outcome	Stakeholder
1.	Sedimentation and siltation	1. Sediment Dredging. 2. Making a deflection (Deflector) in the Oxbow Lake Estuary. 3. Revegetation on degraded land. 4. Harvesting aquatic plants.	1. Deepen the flow of rivers and lakes. 2. Reducing the load of sediment loading. 3. Reducing the occurrence of erosion.	1. Reducing sediment and river flow / and becoming deep 2. Reduced sediment loading 3. Reduced level of land erosion	Department of Public Works and Public Housing, Department of Transportation, Department of Environment, Mining Companies, Plantation Companies

2.	Eutrophication / Enrichment of Nutrition in lakes and blooming aquatic plants	1. Reducing the entry (loading) of domestic waste from settlements into the river /Lake 2. Reducing the rapid growth of aquatic plants (blooming)	1. Reducing the entry of domestic waste into rivers / lakes 2. Maintenance (restocking) of water-eating fish 3. Harvesting aquatic plants	1. Reducing the volume of waste that goes into the river / lake 2. The growing population of aquatic plant-eating fish (herbivore) 3. Reduced density and expansion of aquatic plants	The Office of Community and Village Empowerment, the Office of food security and fisheries, the Office of Public Works and Public Housing, the Office of the Environment, Village Government, Village Communities.
3.	Changes in fish habitat.	1. Restoration of fish habitat (Physical) including beje	1. To plant (revegetate) plants on the banks of lakes, rivers or swamps. 2. Laying wooden log structures in swamps, rivers and lakes. 3. Normalizing the Beje hydrological system, including the Beje capacity or volume (Rehabilitation of Beje ecosystems)	1. The growth of plants on the banks of rivers or swamps. 2. Placing log structures in swamps, rivers and lakes (fish habitat). 3. Increased volume or beje capacity.	Fisheries Service, KPHL, BWS Kalimantan 2, Dinas PUPR, BAPPEDA, TRGD Prov Village Government, Customary Institution
4.	Changes in fish migration patterns.	1. Restoration of fish migration patterns	1. Making fishing regulations (regulations) (related to fish migration patterns) 2. Rehabilitation of physical barriers to	The issuance of a local regulation concerning fishing in freshwater waters	Regents, Fisheries, Traditional Institutions, and Environmental Watchers, Village Communities, Mining

			fish migration (road construction), culverts making 3. Improvement of fish migration habitat		Companies, Plantation Companies and Fishing Fishers.
5	Changes in fish migration patterns.	Restoration of the availability of natural fish food	Revegetation along river banks, lakes and swamps	He planted riverbanks, lakes and swamps	BAPPEDA, Dinas Perikanan, KPHL, TRGD dan BWS
6	The extinction of fish that is on the IUCN / CITES list	Restoration of target fish populations	1. Restocking fish habitat that has been restored 2. Appointment and manufacture of PERDA of water areas that are restocking as areas that are closed to fishing (fishery reserves) 3. Delineation of management areas (fishing, conservation areas, fish migration areas) into the RTRWK	1. Scattering of target fish in critical waters 2. The issuance of PERDA for water areas that are closed to fishing activities 3. The inclusion of management area and management of inland fisheries into the RTRWK	BAPPEDA, TKPRD, DKPPP, BKSDA, NGO, One-Stop Integrated Investment and Licensing Office, Barsel Police, Environmental Observer, Customary Institutions.

5.4.3 Public Test of EAFM-Based Land Fisheries Management Plan in South Barito Regency RTRW

Date/Month/Year	Purpose of Activity	Participants

Wednesday, January 29th 2020	FGD Acdemic paper of South Barito regency	1. Obrien (Facilitator FGD) 2. Uras Tantulo (Expert) 3. Indrawan (Expert) 4. Sonia (Tabe) 5. Muhammad Salim (DLH South Barito Regency)) 6. Wiklin A (BAPPEDA South Barito Regency) 7. Nenny M. (BAPPEDA South Barito Regency)) 8. Sahandrianto (DKPP South Barito Regency)) 9. Mustakim (DKPP South Barito Regency)) 10. M. Ridho Madshur (KPHP Downstream Barito)
Results of Public Consultation on Academic Paper Draft	**RTL**	
From the results of water quality retrieval in South Barito Regency in the Sadar lake,Malawen lake, Madara lake, and Madara Rivers that meet the requirements to become HCV areas is Malawen lake	n/a	
DKPPP proposes increasing the number of lakes that will become fish protection areas, including: Malawen lake, Hampalam lake, Lelek lake, Raya lake, Mangguruh lake, Karanen Kecil lake, Bateken lake, Mangkatip Matei lake, Palui lake and Mangkare lake. Reasons for choosing the lake above: Belida fish species (Notopteridae) are still widely found, there are still community regulations in the protection of fishing areas, the area is believed to be a sacred area, the lake's current function is the reservoir	GPS location of the lake region	DKPP
10 proposed lakes 5 of which are included in the Protected Forest Area include: Lake Hampalam,Raya lake, Mangguruh lake, Karanen Kecil lake and Bateken lake	DKPP and Forestry Discussion to find out the pattern of future collaboration Decree of the Minister of Maritime Affairs and Investment in Lake Management in the Forest Zone Past the Agrarian Reform Land (TORA) program.	Provincial Forestry Service, Fisheries and Maritime Services, DKPP South Barito Regency
DKPP will start adopting the EAFM indicator through the initial stages of data collection on the number of catches and species of fish in the Subdistrict of Downstream Dusun	FAO and DKPP In February 2020 will go to Mangkatip sub district	DKPP and FAO
Academic Manuscripts entered into the Regency Spatial Plan through supporting documents below (RDTR)	Identification of RDTR areas in South Barito Regency	TABE, DKPP, PUPR and BAPPEDA

Table 22. Public Test Results of the EAFM-Based Land Fishery Management Plan into the South Barito District Spatial Plan.

Figure 12. Location of Prospective Lake Reservaat in South Barito Regency

CHAPTER VI
INTEGRATION RECOMMENDATIONS ON SOUTH BARITO REGION PLAN

6.1 General Recommendations on South Barito District Fisheries Management and Management Policy

General recommendations are made based on an analysis of the linkage of spatial planning policies with the fisheries sector, spatial planning policy coherence, as well as gaps in the status of terrestrial fisheries management conditions using EAFM / EAA indicators with spatial planning policies as follows:

Table 23. General Recommendations on South Barito Spatial Planning and Fisheries Management Policies.

Policy Level	Recommendations	Stakeholder
National	Encouraging the Central Government to Integrate the Issue of EAFM-Based Land Fisheries Management into the National Strategic Policy (KSN) and RPJMN	BAPPENAS, KKP, ATR BPN, KLHK, Kementrian PUPR, FAO
Province	Encourage local (provincial) government to integrate EAFM-based land fisheries management into the Provincial Strategic Policy (KSP) and RPJMDP	Central Kalimantan Provincial Development Planning Agency, Central Kalimantan Maritime and Fisheries Service
	Encourage local (provincial) government to integrate management of EAFM-Based Land Fisheries into the Regional Action Plan of Central Kalimantan Province	Central Kalimantan Provincial Development Planning Agency, Central Kalimantan Maritime and Fisheries Service
	For locations located in protected forest areas according to the RTRWK, it will be recommended to: a. Collaborate with related agencies of BKSDA and KPH to utilize the protected forest area in the management of inland fisheries b. Carry out a proposed revision of the RTRW based on applicable regulations and laws (Minister ATR Regulation / Head of BPN No. 6 of 2017 Concerning Procedures for Review of Regional Spatial Planning)	Local government, South Barito Regency Fisheries Service, DPUPRPKP
	A terrestrial fisheries management plan based on Ecosystem Approach to Fisheries Management (EAFM) is needed.	DKPPP South Barito District

District		
	The inland fisheries management plan refers to the High Conservation Value Area (HCV) and the Ecosystem Approach to Fisheries Management (EAFM) indicator.	DKPPP South Barito District
	Encourage the local government in this case the fisheries service to propose a revised spatial plan for the South Barito district (RTRWK) which accommodates plans for management of terrestrial fisheries based on High Conservation Value Areas (HCV) and Ecosystem Approach to Fisheries Management (EAFM).	DKPPP South Barito District
	Determine inland water areas for restoking based on the order of importance such as: Lake Malawen, Lake Hampalam, Lake Raya, Lake Mangguruh, Lake Karanen Kecil and Lake Bateken as areas for carrying out dragon fish restocking	DKPPP South Barito Regency
	Specifically Lake Hampalam, Danau Raya, Lake Mangkare, Lake Karanen Kecil and Lake Bateken which are results based on public testing, need to be verified in accordance with EAFM indicators.	DKPP South Barito regency, KPH dan KPHL,
	Lake Malawen, Lake Lelek, Lake Mangakatip Matei, Lake Mangkarei and Lake Palui included in the protected forest area can be proposed as an area of inland fisheries management with a conservation partnership pattern taking into account point 5.	DKP, Bappeda, BKSDA, Forestry

6.2. Proposed Revision of the South Barito Regency Spatial Plan Based on EAFM

Additional Proposal for Mainstreaming of Sustainable Land Fisheries in South Barito Regency RTRW Revision No. 4 of 2014 concerning South Barito Regency Spatial Planning for 2014-2034

Table 24. Proposed Revision of the South Barito Regency Spatial Plan Based on EAFM

No.	RTRW chart	Regional Regulation No. 5 of 2019	Matrix Change the mainstreaming of sustainable Dragon Fish fisheries	Proposed Amendment to Regional Regulation No. 5 of 2019
1.	General requirements	Article 1 number 46 Fisheries are fisheries are all activities related to management and sustainable use of fish resources and the	Changes to the matrix in the form of additions to article 1 are added: Fisheries consist of land fisheries. Changes to the matrix in the	Amendment to article 1 number 62 to: "Fisheries are all activities related to the management and sustainable use of fish resources and the environment, from pre-production, production, processing to marketing

		environment, starting from preproduction, production, processing to marketing carried out in a fisheries business system;	form of adding numbers 47, 48, and 49 regarding: - Land fishing - Capture fisheries - Aquaculture This has an impact on article 30	carried out in a fisheries business system; including in it is inland fisheries.
			Changes to the matrix in the form of the addition of the number 47 namely: Capture fisheries are activities to obtain fish in waters that are not cultivated by any means or means, including activities that use ships to load, transport, store, cool, handle, process, and / or preserve them.	
			Changes to the matrix in the form of the addition of the number 48 namely: Inland Fisheries is a business of maintenance and fishing in land waters. Inland fisheries consist of capture fisheries and aquaculture. Inland fisheries include areas of rivers, lakes and swamps.	
			Changes to the matrix in the form of an additional number 49 that is: Aquaculture is an activity to seed, maintain, raise and / or breed fish and harvest the results in a controlled environment.	
2	Space Pattern	Article 30 (1) Fishery allotment area as referred to in Article 26 letter d, includes: a. capture fisheries designation area; and b. allotment area for aquaculture. (2) The allotment of fishery area as referred to in paragraph (1) is found in rivers and lakes throughout	Changes to the matrix in the form of adding numbers in article 30 to 6 points, originally 2 points. This change is to accommodate the fisheries management approach to ecosystems in the local regulation of the Barsel District RTRW	(1) Article 30 (1) The definition of fisheries area is inland fisheries and coastal fisheries (2) The fishing allotment area as referred to in paragraph 1 is found in rivers and lakes that exist in all districts with an area of 745.62 (seven hundred forty-five point sixty two) hectares. (3) What is meant by land fishery allotment area is:

		the sub-district with an area of 745.62 (seven hundred forty-five point sixty two) hectares.		Capture fishery allotment area and cultivation fishery allotment area (4) The allotment of inland fisheries has a fishery reserve (reservoir) which functions as a place for natural fish culture development. (5) the land allotment area in the form of a fishery reserve (reservoir) includes: Lake Malawen, Lake Hampalam, Lake Lelek, Lake Raya, Lake Mangguruh, Lake Karen Kecil, Lake Bateken, Lake Mangkatip Matei, Lake Palui and Lake Mankare. (6) The implementation of inland fisheries management in the form of a fishery reserve (reservoir) is carried out using the Fisheries Management Prinsif with an ecosystem approach (EAFM).

CHAPTER VII
CONCLUSION

From the results of the process of preparing the academic paper some of the things we obtained were as follows:

1. Inland Fisheries have an important role in food security and in improving the economy as a source of Local Revenue.
2. Inland fisheries as a sector whose planning has not yet received proportional attention in Regional development planning and RTRWK.
3. There is no fisheries management plan (RPP) for inland fisheries based on HCV and EAFM.
4. The role of stakeholders in fishery planning has not yet been involved in the planning of the development of inland fisheries.
5. Existing fisheries management systems do not refer to locations that are in accordance with High Conservation Value and are not based on EAFM.
6. There is no legality at the district level for the determination of inland fisheries management areas based on HCV and EAFM.
7. Not yet determined the area of inland fisheries as a place to carry out restocking.
8. This academic paper is basic data as a reference for local governments and related institutions in order to determine policies and programs, especially in the management of ecosystem-based terrestrial fisheries (EAFM).

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