

Mapping investment opportunities in the fisheries sector and minapolitan area in Pulang Pisau Regency, Central Kalimantan, Indonesia

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Abstract. The study aimed to map the investment opportunities in the fisheries sector and the development of a designated *minapolitan* area (a regional-based marine and fisheries economic development). Specifically, this study aimed to (1) identify potential investment in the fisheries sector, including locations and potential area of coastal pond development, area of inland ponds and associated fishery households, area of cages and associated fishery households, (2) identify the development of a *minapolitan* area, which includes its primary commodities, and record the fish production data of Pulang Pisau Regency, (3) formulate investment opportunities and constraints in the fisheries sector. Descriptive qualitative analysis was utilized as the analytical method through an objective data processing obtained from government agencies related to potential regional maps that had been previously explored, verified, selected, and formulated into regional investment potential. The identified investment opportunities include (1) the provision of fish processing plants, (2) the provision of cold storage facilities, (3) the provision of sediment tanks and (4) the cultivation of snakehead fish (*Channa striata*). This article offers an action plan to develop investment opportunities and attract the interest of investors to commit their investments in Pulang Pisau Regency, Central Kalimantan.

Key Words: investment constraints, investment opportunities, investment potential, minapolitan area.

Introduction. The purpose of economic development is to realize a just and prosperous society. To realize such objective, priorities are placed on economic growth since economic development potentially encourages progress in other fields. To actualize economic potential, one of the most essential measures is through investment due to its importance in boosting several aspects, including employment growth, income and human resources quality, which will eventually improve community welfare (Darma 2019).

The success of regional development can promote stability, equity, growth, and economic development of an area. It is therefore necessary to increase investment commitment, be it from government or private entities, in the financial sector as well as other sectors. Provisions regarding the ease of investment from the government and the private sector have been regulated in the Law of the Republic of Indonesia Number 25 of 2007 concerning Investment, Article 18 Investment Facilities. Local governments have been noted to initiate a number of investments in public facilities and infrastructures, which are areas that generally attract less attention from private sectors (Fajrah et al 2021).

Utilization and development of economic potential are necessary for the Regency of Pulang Pisau according to Regulation of the Head of the investment Coordinating board of Indonesia Number 9 of 2017. As such, several measures were carried out, including the creation of the potential investment map and the identification of potential fishery resources area in Pulang Pisau. With the potential investment map of the fisheries sector and information on potential resources, detailed, reliable, and accurate information on

the real potential of Pulang Pisau Regency can be presented to economic actors and investors (Sumule et al 2020; Fattah et al 2021).

Pulang Pisau Regency, as an investment destination, has attracted domestic and foreign investors. The presence of large-scale to medium-sized industries, as a form of foreign investment or domestic investment, has a multiplier effect in the economic growth and the absorption of labor. Investment growth in Pulang Pisau Regency had provided a broad impact, including regional economic growth, job provision, and increased microeconomic growth (Fattah et al 2021).

The preparation of investment potential map and identification of potential fishery resources in Pulang Pisau Regency aimed to identify and present investment potential and regional resources information in terms of business fields, labor, commodities and locations with promising prospects to be managed and further developed by investors. The initiative will also serve as a basis for investment policy making in Pulang Pisau Regency. The amount of investment and regional income in Pulang Pisau Regency is expected to continue to increase with such measure. However, the increase in investment must be accompanied by aspects of natural sustainability, and preservation in fisheries investment must be considered. The fishery potential in Pulau Pisang Regency is presented in Table 1.

Table 1

Fishery potential in Pulang Pisau Regency in 2017

<i>District</i>	<i>Amount of aquaculture production (ton)</i>	<i>Amount of capture fishery production (ton)</i>	<i>Public waters (ton)</i>	<i>Marine fisheries (ton)</i>	<i>Pond (ton)</i>
Pulang Pisau Regency	4,372.67	19,121.32	3,084.74	16,036.58	1,531.95
Kahayan Kuala	1,763.40	10,760.93	432.15	10,328.78	1,531.95
Sebangau Kuala	-	6,525.85	818.05	5,707.80	-
Pandih Batu	201.54	156.36	156.36	-	-
Maliku	277.75	118.36	118.36	-	-
Kahayan Hilir	680.43	479.50	479.50	-	-
Jabiren Raya	714.49	629.60	629.60	-	-
Kahayan Tengah	683.04	365.24	365.24	-	-
Banama Tingang	52.02	85.48	85.48	-	-

Source: Pulang Pisau Regency Investment & One Stop Integrated Service (DPMPSTSP) 2021.

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Material and Method. A qualitative descriptive analysis was carried out through real data processing obtained from Pulang Pisau's government agencies related to the regional investment potential map. The period of study ranged from September 2021 to February 2022. Upon analysis, the data were subsequently explored, verified, selected and formulated into regional investment potentials. Data analysis steps included: 1) communicative secondary data; 2) communicative secondary data analysis; 3) review of secondary documents; 4) focus group discussion (FGD) with primary data of group efforts for improvement; 5) survey and mapping. All obtained information was formulated and organized into accurate and up-to-date regional investment potential data.

Results and Discussion

A general overview of Pulang Pisau Regency. Central Kalimantan Province has great natural potential in the plantation, mining, and fisheries sectors. Pulang Pisau Regency covers an area of 8,997 km² or 899,700 ha, which represents 5.85% of the area of Central Kalimantan Province (153,564 km²). Pulang Pisau Regency is divided into 8 districts and 99 villages, where each village generally covers a very large area. The land use of Pulang Pisau Regency refers to the Spatial Plan based on Law of the Republic of Indonesia Number 5 of 2002 covering an area of 8,997 km². Pulang Pisau Regency area for fish cultivation covers 3,902 km² with waters and rivers covering an area of 492 km². Topographic conditions of the southern area of Pulang Pisau Regency consists of coasts and swamps with an altitude of 0-5 m above sea level with an elevation of 0°-8° which are affected by tides and have a fairly large flood intensity. Pulang Pisau Regency waters include lakes and swamps, which are crossed by major river paths, namely the Kahayan River and the Sebangau River.

The fisheries sector investment potential. Investment potential with proper development will create investment opportunities. The drainage basin of Pulang Pisau Regency includes rivers and tributaries with a length of 825.5 km, and has the potential for aquaculture, capture and conservation areas (closed season) as well as agro-tourism business. The coastal areas in Kahayan Kuala District and Sebangau Kuala District with a length of up to +153.6 km also present marine fisheries potential with the largest marine fisheries production in Kahayan Kuala District.

With the fisheries potential, it is expected to trigger the emergence and development of downstream industries for local residents, such as the salted fish industry and other food industries with marine fisheries raw materials. This potentially serves as a multiplier effect that is able to absorb labor and provide added value to the economy of Pulang Pisau Regency and included in The General Plan of the Penanaman Modal Kabupaten Pulang Pisau 2017-2025 (2022).

The marine and fisheries potential of Pulang Pisau Regency, which has public waters and seas rich in diverse fishery products, has not been optimally managed and can still be further developed, especially with programs to increase fish farming. Pulang Pisau Regency has potential land for marine and fisheries development with 98,304 ha of sea, 59,689 ha of rivers, 15,183 ha of lakes and 307,980 ha of tidal swamps and coastal areas with a coastal length of 153.6 km, all of which offer potential for fishing areas and aquaculture (Figure 1). In land areas that are predominantly vacant, there is great potential for the development of fish farming in cages and inland ponds (BPS – Statistics of Pulang Pisau Regency 2021).

Of the 1,950 ha of coastal ponds that have been built (Table 2), 600 ha were built by the local government through the regional budget during 2006 fiscal year, completed with 20 km of channels while the rest were left to independent fish farmers to manage themselves.

Table 2
Locations and potential area for coastal pond development

<i>Location (village)</i>	<i>Wide potential pond (ha)</i>	<i>Already awakened (ha)</i>	<i>Already developed</i>
Kiapak village	1,000	1,950.00	Bandeng
Papuyu III village	11,000		
Cemantan village	17,000		
Sei Bakau Village	9,000		
Sei Hambawang village	5,000		
Total	43,000	1,950.00	

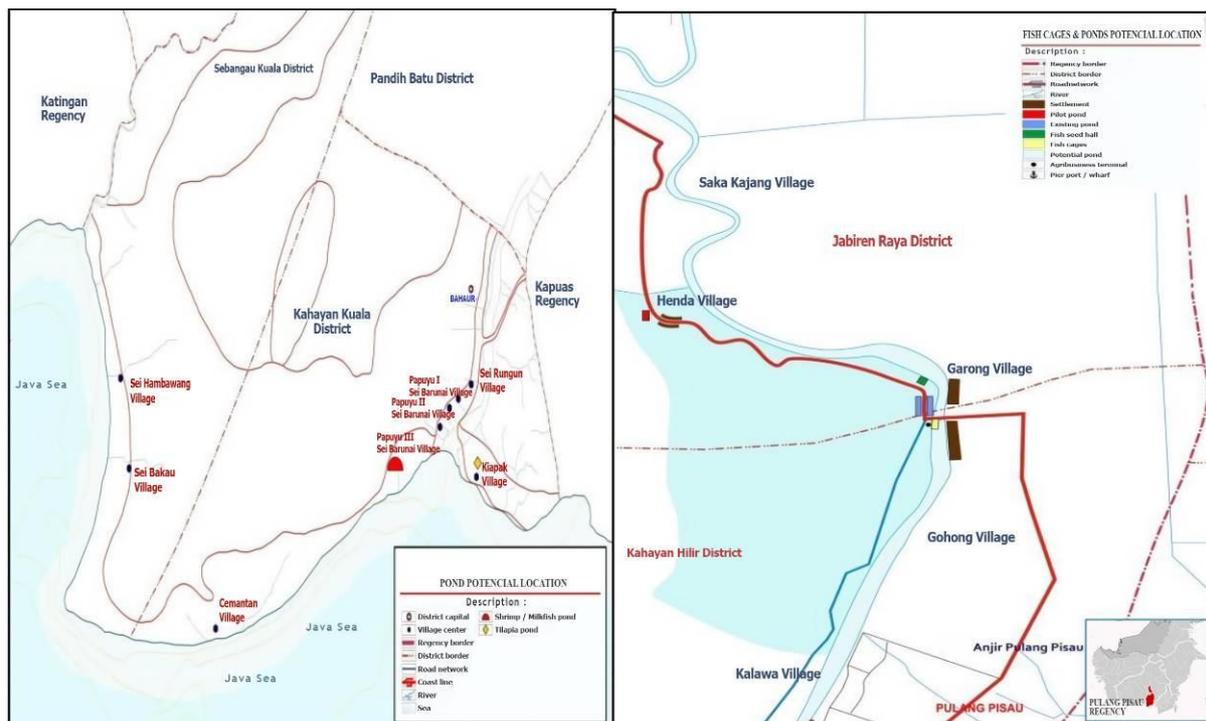


Figure 1. Map of the potential coastal ponds, inland ponds and cages. (Source: Pulang Pisau Regency Investment & One Stop Integrated Service (DPMPTSP) 2021).

In the management of the coastal ponds, fish farmers are recommended to adhere to the traditional pond management so as not to cause environmental damage. The data on area of brackish water aquaculture facilities and infrastructure in Pulang Pisau Regency are presented in Table 3, Table 4 and Table 5 (Source: Pulang Pisau Regency Investment & One Stop Integrated Service (DPMPTSP) 2021).

Table 3
Coastal pond area and number of fishery households from 2015 to 2019

Year	Coastal pond area (ha)	No. of fishery households (unit)	Production (unit)
2015	1,950	240	1,276.95
2016	1,950	240	1,531.95
2017	1,950	240	1,531.95
2018	1,950	240	1,533.38
2019	1,950	240	1,534.00

Table 4
Inland pond area and number of fishery households from 2015 to 2019

Year	Inland pond area (ha)	No. of fishery households (unit)	Production (unit)
2015	29.68	2206	1,563.09
2016	29.68	2206	1,728.49
2017	29.95	2230	1,728.49
2018	30.37	2249	1,929.10
2019	31.09	2289	2,304.12

Table 5

Cage area and number of fishery households from 2015 to 2019

Year	Cage area (ha)	No. of fishery households (unit)	Production (unit)
2015	0.55	604	1,103.48
2016	0.56	614	1,112.29
2017	0.57	614	1,112.23
2018	0.57	614	911.86
2019	0.57	614	546.03

The development of designated minapolitan area. Pulang Pisau Regency is one of the *minapolitan* areas, which include 5 regencies/cities in Central Kalimantan Province, based on the decree of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia No. 32/MEN/2010 dated May 14, 2010. As a result, Pulang Pisau Regency has specifically established an Aquaculture Production Center that will support the Minister's vision and mission to promote Indonesia as the largest fish producer in the world.

The fish production areas in Pulang Pisau Regency include: (1) main areas, namely Kahayan Hilir District and Jabiren Raya District (Gohong Village and Garung Village), (2) first buffer areas, namely Central Kahayan District, Banama Tingang District, Maliku District and Pandih Batu District, and (3) second buffer areas, namely Kahayan Kuala District and Sebangau Kuala District. Table 6 shows the improvement in fish production in Pulang Pisau Regency from 2015 to 2019. These conditions challenge local governments to return and relying on aquaculture activities. At the same time, the conservation and rehabilitation of the marine environment and public waters, their capacity, and coverage continue to be improved. The current policies implemented by the Ministry of Maritime Affairs and Fisheries and the Pulang Pisau Regency Government indicate investment growth. Particularly in the processing and marketing of fishery products, it is likely to increase significantly in the future. This is in line with new Ministry of Maritime Affairs and Fisheries policies, such as (1) a business licensing moratorium policy and (2) plans for allocating fishing quotas to regions. This policy is predicted to encourage investment relocation from industrial areas that are already dense and the carrying capacity of their natural resources reduced to areas that are still productive and have abundant natural resources (Hikmah & Purnomo 2012).

The area division was intended to streamline the implementation prioritization of the Production Improvement Program in accordance with the carrying capacity of the available facilities and infrastructure. It will also make it easier for government agencies' education instructors to carry out education for fish farmers (Surya et al 2021). To ensure production increase, selection of aquaculture fish products to be cultivated was determined by the Director General of Aquaculture and each region was assigned to cultivate certain fish products in accordance with the characteristics of their respective regions. Pulang Pisau Regency was assigned to cultivate shark catfishes (Pangasiidae) and *Oreochromis niloticus* as the main focus, with milkfish (*Chanos chanos*), shrimp (Caridea), catfish (Siluriformes), climbing perch (*Anabas testudineus*), and carp (*Cyprinus carpio*) as the secondary focus. One of the supporting infrastructures managed by Pulang Pisau Regency includes Fish Seed Hall located in Gohong Village, Kahayan Hilir District.

Table 6

Fish production data of Pulang Pisau Regency from 2015 to 2019

Year	Cage (unit)	Inland pond (unit)	Coastal pond (unit)	Total production (unit)
2015	839.75	1,103.29	1,027.61	2,970.65
2016	1,103.48	1,563.09	1,276.95	3,943.52
2017	1,112.23	1,728.49	1,531.95	4,372.67
2018	911.86	1,929.10	1,533.38	4,374.34
2019	546.03	2,304.12	1,534.00	4,384.15

Concerning the process of economic decentralization, it is necessary to prepare and implement an aquaculture development strategy that is able to mobilize fish farming communities throughout the region, to ensure the realization of the potential of existing land resources into economic activities supported by efforts to develop initiatives and entrepreneurial spirits and increase business capabilities among fish farming communities. Fisheries economic activities in rural areas are generally slow to develop due to the lack of infrastructure and facilities, the lack of seed availability, which still depends on import from outside the region, as well as marketing, capital and technology (Sam'un 2020).

Improvement of infrastructure and facilities to support aquaculture followed by the development of human resources will be able to accelerate the increase in aquaculture production in brackish and public waters (Hikmah & Purnomo 2012; Suprianto et al 2021). It is hoped that private investment in aquaculture development will play a greater role without abandoning local fish farmers and the preservation of aquatic resources. The development of the marine and fisheries sector, especially the aquaculture sub-sector, is expected to encourage the community's economic sector, especially aquaculture farmers and other coastal communities, which in turn increases the income and welfare of the community itself.

Investment opportunities and constraints. From the identification of the investment potential of the fisheries sector and the development of a designated *minapolitan* area, the investment opportunities in Pulang Pisau Regency include: (1) the provision of fish processing plants to increase the added value of capture products; (2) the provision of cold storage in fish processing groups in each district to ensure that the quality of fish is maintained; (3) the provision of sediment basins for downstream waterways flowing to rivers to ensure that the water is filtered and clean for fish and shrimp cultivation; (4) the development of snakehead fish (*Channa striata*) farming, considering the presence of promising current breeders. The obstacles in the fisheries development include the high sedimentation rate due to the presence of the large Kahayan River that carries mud sediment to the estuary, causing low salinity, whereas shrimps can only live normally at a salinity of 15 -20 ppm. The influence of pyrite content in soil (peat) also causes the water to be acidic and toxic, hence difficult to be developed for cultivation without large costs (Augusta & Pernando 2019). This not only causes siltation but also causes water quality to inevitably decline. The role of secondary irrigation for each land is therefore extremely critical and one of the solutions is to create and place a deposit tank before the water enters a river to ensure that the water is filtered and clean for fish and shrimp cultivation (Yusuf 2019).

One of the issues discovered by the study is that fish products are still conventionally processed with low processing skills, hence necessitating investment in a fish processing plant in Pulang Pisau Regency. Several types of products that could be produced in the area include fish fillets, fish meatballs, fish nuggets, and fish crackers. The processing of those food items provides considerable added value to marine fish products. The presence of fish processing plants is hoped to create jobs and increase fish farmers' income. Accordingly, the expansion of coastal and inland aquaculture is one of the important development agendas for the government of Pulang Pisau Regency (Fattah et al 2021). One advantage of the area is the proximity to the source of raw materials, which encourages efficiency for fish processing activities in the form of reduced transportation costs and increased profits for fish farmers.

The second investment opportunity is the provision of cold storage facilities in fish processing groups in each district of Pulang Pisau Regency to ensure that the quality of fish is maintained. Cold storage facility is a specially designed storage space with certain temperature conditions used to store a variety of fisheries products with the aim of maintaining the freshness and quality of fish. The cold storage facilities will help fish processors by providing higher quality fish and therefore more competitive prices. The presence of cooling warehouses is also expected to increase the bargaining position for fishermen and improve fishermen's economy so that their catches can be quickly accommodated. The COVID-19 pandemic is feared to have an impact on the absorption of fishermen's catches and cause sluggishness in fish processing industry (Fajrah et al 2021).

In fiscal year 2021, Pulang Pisau Regency received assistance from the swamp area rehabilitation program for coastal ponds from the Ministry of Public Works and Public Housing, enabling the fish farming pond area in Pulang Pisau to reach 8,800 hectares. The rehabilitation of swamp areas for the ponds was to support the cultivation of ponds in Pulang Pisau Regency. Coastal aquaculture in Pulang Pisau district is spread across several villages, including Kiapak Village (2,000 hectares), Sei Pudak (4,000 hectares), Cemantan (1,000 hectares), and Sei Bakau (1,800 hectares). Considering the topography and geography of Pulang Pisau Regency, the investment opportunity lies in the manufacture of sediment tanks for downstream water routes to ensure that the water is filtered and clean for fish and shrimp cultivation.

The last investment opportunity is snakehead fish (*Channa striata*) farming due to the presence of promising current breeders and local fish farming development programs (Augusta & Pernando 2019). The production of snakehead fish (*Channa striata*) has been proven to bring advantages, added value and competitiveness in the global market and export market. The investment opportunity will further motivate local residents in cultivating fish sustainably and competing with other regions to increase fisheries production, especially local fish production, which potentially improve the regional economy and the welfare of the residents of Central Kalimantan Province.

Conclusions. By combining the identification of potential and harmonizing land use, air use, water use, and other natural resource use in a unified harmonious and dynamic environmental system and supported by the management of harmonious population development and managed through a regional approach by taking into account the natural and social environment, the investment potentials in Pulang Pisau Regency can be further developed. The regency covers an area of 8,997 km² or 899,700 ha or 5.85% of the area of Central Kalimantan Province (153,564 km²). The southern part of the regency consists of coasts and swamps with a height of 0-5 m above sea level with an elevation of 0°-8° and affected by tides with a fairly large flood intensity. Pulang Pisau Regency waters include lakes, swamps, and are crossed by major river paths, namely the Kahayan River and the Sebangau River. The potential investment opportunities that can be offered to investors in the region include: 1) the provision of fish processing plants to increase the added value of the catch; 2) the provision of cold storage facilities in fish processing groups in each district to maintain fish quality for further processing; 3) the provision of sediment basins for downstream water routes to ensure filtered and clean water for fish and shrimp cultivation; 4) the cultivation of snakehead fish (*Channa striata*) considering the presence of promising current breeders.

Conflict of interest. The authors declare that there is no conflict of interest.

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