

ANALYSIS OF POTENTIAL DEVELOPMENT OF INLAND FISHERY IN THE DISTRICT OF EAST KOLAKA

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ABSTRACT

The existence of Fishery Potential resources in the county of East Kolaka is a comparative advantage that will be valuable if it is supported by analysis of potency about inland fishery development according to the area characteristics. The objectives of this research are to analyze the strategies and potencies of inland fishery in East Kolaka. The research location was focused on the center of inland fishery development in all districts areas. The method of data analyses were consist of qualitative, quantitative and spatial analyses. From the result of this research, it can be concluded that: (a) The district of Ladongi and Mowewe are considerably accepted as the center of fish breeding, (b) the center of fish maturation in the development of inland fishery is divided into five subclusters, (ponds, **rawa**, **bendungan/waduk**, river and **persawahan**, (c) the center of inland fish processing consists of two subclusters which are culinary and fishery product diversification.

Keywords: potency, development, inland fishery.

INTRODUCTION

The district of East Kolaka is a new district in Kolaka County. According to the data of Indonesian Statistics Center (BPS) in 2013, there are 1212 ton of inland fishery potency located in the district of East Kolaka with the income value production about 23.338.100.000,- rupiahs. The inland fishery potency are obtained from: pond fishery cultivation (1156 ton) with the value of productions 21.943.100.00,- rupiahs and general fishery aquaculture 57 ton with the value of productions 1.445.000,- rupiahs. Business diversity of ponds cultivation are located in 12 districts in East Kolaka, while general aquaculture business are located in the district of Ladongi dan Dangia.

One area of fisheries mainly developed today are farming (aquaculture). Aquaculture is an art or human creation to preserve, nurture and grow organisms in waters controlled manner, or the creation of science and technology in combining to manipulate the marine resources and fish resources for the purposes of public welfare (Cahyono, 2001).

This study is expected to venture inland fisheries can be developed simultaneously in each region, ranging from upstream, middle and downstream sectors. Simultaneous development will support the creation of agri-fishery system sustainable fishing. Thus, research on the development of inland fisheries would be beneficial to provide

direction and guidance for implementing inland fisheries development activities in East Kolaka.

The objective of this research is to analyze the potency and strategy of inland fisheries development in accordance with comparative advantage in the region of East Kolaka.

Framework

The research is based on the premise that East Kolaka District is one area that requires an accelerated development division to boost local economic growth. One potential resource areas for the region is the inland fisheries sector which has not been optimally managed in regional development.

Potential fisheries that exists today are characterized by a pattern of traditional and business so that the resulting production is still very low.

To increase the production of potential inland fisheries in East Kolaka, it is necessary to deeply understand the potency of inland fisheries resources in terms of the physical aspects of land suitability, water availability, social suitability and financial feasibility. Through studies on this aspects, will be analyze factors strengths and weaknesses factors faced in developing the potency of inland fisheries.

RESEARCH METHODS

Research Timeline and Location

This research was conducted from October to December 2015. The location of research was conducted on the entire territory of East Kolaka that has the potency of development of inland fisheries. The results of early

identification of potential area identified seven areas are 5 districts namely Dangia, Tinondo, Lalolae, Loea and Lambandia, based on the potential availability of freshwater resources to develop inland fisheries (Figure 1).

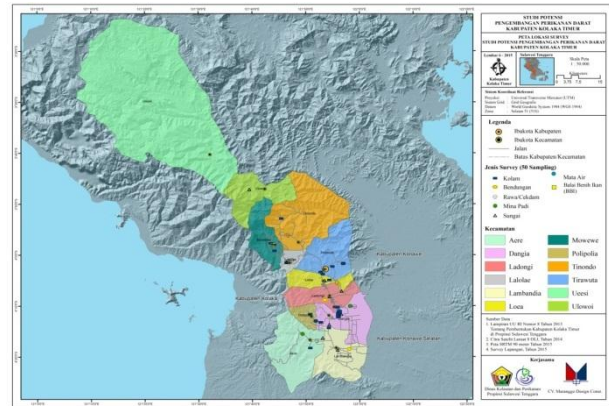


Figure 1. Location Plan Map of Potential Development Study of Inland Fisheries in The East Kolaka

Population and Sample Research

The study population was inland fishery businesses owner (marsh, pond, river, minapadi) and policy makers in the field of inland fisheries. Inland fisheries bussiness owner are fish farmers, Marine and Fisheries Agency and the Province of the East Kolaka. The sample of this study were selected purposively based on the source of water used in inland fisheries bussiness and interest in the development of inland fisheries. The number of samples in this study is 30 people, consisting of community bussiness inland fisheries as many as 25 people and five people from the Marine and Fisheries Agency and the Province of the East Kolaka.

Types and Sources of Data

Types of data collected are primary data and secondary data. The collection of secondary data obtained from the data / information sourced from departments / agencies in East Kolaka and Southeast Sulawesi provincial level, specifically the

Department of Marine and Fisheries. Primary data were collected by means of observing the field conditions and potential activities affecting the development of the cultivation of freshwater fishery, and interviewing methods using questionnaires to the Local Government (SKPD), and information socioeconomic level business operators of inland aquaculture land (entrepreneurs, investors and the public).

Data Analysis Method

Methods of data analysis used in this study are:

1. Biophysical Feasibility Analysis, Technical, Economic, and Social.

In the development of inland fisheries in East Kolaka. Application of this analysis model adapted to the issues that will be assessed, including:

Feasibility Analysis of Biophysical: related to soil analysis, analysis of the availability of water resources, water quality analysis, etc.

Social analysis : deals with the attitudes and perceptions, level of public acceptance and businesses against this type of aquaculture business prospective development.

Economical analysis : related to the feasibility analysis of the economic and financial aspects, the equation used, including:

$$\text{Equation Analysis Revenue} = \text{Revenue} - \text{Cost}$$

Feasibility Analysis: R/C ratio and or B/C ratio

$$\text{RC} = \text{Total Revenue} / \text{Total Cost}$$

In which: If the value of R/C ratio is less than 1 (R/C ratio <1) the development of the inland fishery can be defined as uneconomical and, if it is greater than 1 (R/C ratio > 1), the project can be defined as economical, and if it is the same as 1 (R/C ratio = 1), the inland fishery as no loss and no profit) (Umar, 2005).

2. Analysis of Location Quotient (LQ)

The analysis model was used to map the potential of inland fisheries whether it is a basic sector in the East Kolaka. The equation used as follows (Budiharsono, 2001):

$$\text{LQ} = (\text{Si}/\text{Ni}) / (\text{S}/\text{N}) = (\text{Si}/\text{S})/(\text{Ni}/\text{N})$$

Where:

Si: The number of inland aquaculture commodities (i) in the territory of East Kolaka (i)

S: The total number of fishery commodities in the region of East Kolaka (i)

Ni: Number of commodities Inland Aquaculture (i) in the province of Southeast Sulawesi

N: Total number of fishery commodities in Southeast Sulawesi province.

Commodity indicators for LQ values are:

- LQ value commodities inland aquaculture (i) > 1, the commodity is defined as an inland fisheries comodites in the East Kolaka region and vice versa.
- LQ value commodities inland aquaculture (i) <or = 1, the commodity inland fisheries (i)

cannot be defined as the commodity in the region of East Kolaka (i).

1. Analysis of facilities and infrastructure needs of each program and activities on the development priority of inland fisheries.

This analysis aims to identify the needs of facilities and infrastructure at the level of on-farm and off-farm, such as: building pools / ponds, KJA, drainage channels or irrigation, fish breeding facilities, cold storage, feed, pharmaceuticals pest controllers and diseases, etc.

2. Analysis of commodity marketing of inland fisheries

This analysis aims to map the pattern or marketing channels, marketing margin and the share of sales of commodity products cultivated by inland fishery. The equation used in this analysis are as follows:

- Analysis of marketing margin (Rhodes, 1983):

$$M = \frac{\sum_{i=1}^m \sum_{j=1}^n C_{ij}}{\sum_{j=1}^n \pi_j} \quad [1]$$

Information :

M = margin marketing

I_j = marketing costs to carry out the function of marketing the i-th by marketing agencies to j.

π_j = gains derived by marketing agencies all j

m = number of types of marketing costs

n = number of marketing agencies

- Analysis Fisherman Share (Kottler, 1992):

$$FS = P_p / P_k \times 100\%$$

Information :

FS = Fisherman Share calculated in percent

P_p = price received fish farmers

P_k = price paid by the final consumer

3. Method of SWOT analysis (strengths, weaknesses, opportunities, threats)

SWOT analysis is a method used to evaluate the strength, weaknesses, opportunities and threats in the Study of inland Aquaculture Development in East Kolaka intended to apply to build and develop the business potential of inland aquaculture. The four factors form the acronym SWOT (strengths, weaknesses, opportunities, and threats). This process involves determining the specific goals of a project and identifying the internal and external factors that support or constraint the purpose of the activities. (Rangkuti, 2010).

4. Analysis of GIS

This analysis method is used to map the results of the study obtained in this study using Arc-View software. The maps results will include: distribution map of potential of locations inland aquaculture development, map of the physical condition of inland Fisheries, aquaculture development a priority cluster map aquacultural in each district region, and other thematic maps in accordance with the purpose of implementation of this study.

RESULTS AND DISCUSSION

Analysis of Potential and Constraints of Inland Aquaculture Development

(a) Availability of Land and Water Quality

In general, the potential of inland fisheries in Kolaka East based on the source of water is divided into three parts, namely ponds, rivers, and swamps, which are spread over 12 districts (Table 1).

Table 1. The existing and potency of inland Fishery Cultivation Area in several districts in 2015

No	Districts	Pond (ha)	River (ha)	Swamps (ha)	Dams (ha)	Rice Field (ha)
1	Tirawuta	25,16		0,69		737,75
2	Loea	32,2	0,22		0,47	1,18
3	Ladongi	12,3	0,60	1,11	24,2	2.059,9
4	Dangia	19	0,13	645,12		1.140,1
5	Polopolia	9,9	0,18			600
6	Lambandia	12,4	0,07	1,41	0,44	1.248,7
7	Aere	10,8	0,59	4,56		611,3
8	Lakolae	12,5	1,48	13,07		710
9	Mowewe	10,7	0,14			1.047
10	Uluwioi	12,0	18,25	4,12		568,0
11	Ueesi	11,0	11,26			1.302,0
12	Tinondo	21,0		3.684,45	0,91	496
	Total	188,96	32,92	4.354,53	26,02	11.700,25

Source: Production of 2015

Remarks: * = Existing, ** = Potential Land

According to the table above, the total land area of fisheries for the existing pool (188.96 ha), bog-pool (4.354,53ha), rivers (32.92 ha). As for the dam (26.02 ha) which should be developed for inland fisheries covering an area of 1.95 ha. For paddy fields with potential 11700.25 ha which can be developed cultivation techniques (minapadi) covering an area of 8981.75 ha. Potential eligible land area developed for inland fisheries, is also supported by the resource of potential water resources are available throughout the year and the results of quality of water analysis. Utilization of land for inland fisheries have not previously managed (ponds, dams and rivers) to the

highest part of efforts to increase the marginal value of land use (Anonymous, 1991).

Based on the results of water quality measurement and analysis of laboratory tests showed that the water quality at the location are potential to be developed as the inland fisheries known to be suitable and feasible for the fishery (Figure 1). Water quality is very important for the growth of the fish, but it is also influenced by heredity, sex, age, and external factors, including the aquatic environment, feed, diseases and parasites as well as by the space (Brown, 1957). Meanwhile, according to Chu (1943), one of the important elements in the quality of waters for fishing is PO₄-P where the minimum limit required is from 0.018 to 0.090 mg l, while for optimum growth is 0.09 to 1.80 mg /l. According to Liaw (1969) levels of phosphate in the fertile waters ug.at/l ranged from 1.62 to 3.23, equivalent to 0.051 to 0.1 mg / l. In addition to the above parameters, the water temperature is less important as stated by Jangkaru (1956), the optimal water temperature fish is between 25° C to 27° C. Temperature affects fish growth and appetite. Process of digestion is done by the fish runs very slowly at low temperatures, on the contrary faster in warmer waters (Rounsefell and Everhart, 1953) .According Pescod (1973) waters are ideal for aquaculture activities is 6,8s/d 8 , 5 and waters with pH <6 lead to inhabited growth of microscopic organisms.

The results of the measurement of dissolved oxygen (DO) ranged from 3.90 to 7.71 mg/L. According Swingle (1963) states that the content of oxygen in a body of water with minimum of 2 mg /L, could support to aquatic organisms.

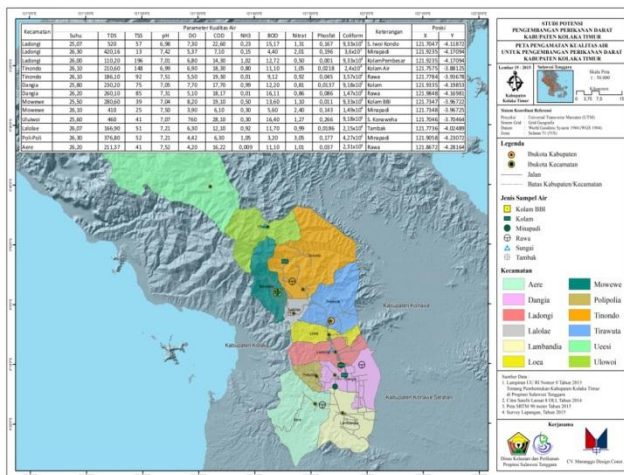


Figure 2. Distribution Map of waters Quality in the East Kolaka

(b) Status of Land Ownership

Generally, the results of the identification of the potential of fisheries indicated that the majority of ownership is still on a small scale to moderate (0.5 to 2 ha). Based on data collection in the study site, it can be stated that the status of land ownership spread across East Kolaka are dominantly in private ownership.

(c) Commodity of the Inland Fisheries

Types of inland aquaculture commodity are Nila, Mas, Gurame, Mujair (frangipani), Tawes (Kandia) and catfish. The method used is still very limited by means of the use of augmentations, monthly fish production can not be known because of the utilization of inland fisheries have mostly not meet the needs of the market and consumer needs. Feed used in fish rearing process is the pellets and bran. The constraints in fulfilling the needs of fish feed is the availability of feed.

(d) Conditions of the Availability and Requirements of Inland Fisheries Supporting Facilities

The conditions of supply and the needs of the supporting facility in the development of inland fisheries in The

District of East Kolaka is still very limited which means of support in the development of fisheries (Swimming, Swamp, Dams) used to be very simple as the absence door water control, dike built using soil deposited as a barrier dike, although the availability is abundant.

This shows that the area of inland fisheries managed by the community is still very modest, supported by limited access and information, although BBI that have been built (Ladongi, Mowewe) is quite adequate but the quantity and the quality is still very limited in fulfilling the needs of fish farmers. Facilities and infrastructure needs are very important as Djajadiredja and Cholik (1981), suggested that one of the main problems of the problems found in the field of fisheries are the inadequate income of the fishermen / fish farmers as a result of lack of education and the entrepreneurial skills as well as inadequately fishing facilities.

Inland Aquaculture Development Constraints. Generally, the development of freshwater aquaculture business can be divided into 3 categories of business, namely fish hatchery operations, fish rearing business and business processing fishery products. Every effort is related to the production and marketing of products. Analysis of the potential and constraints of development of each segment is analyzed using SWOT method, presented in the form of the grouping of internal factors (strengths / strength and weakness / weaknesses) and external factors (opportunities / opportunities and threats / threats).

(A) Fish Hatchery

Based on the value of internal factors and external values as coordinate points, it was found that the meeting point is in

quadrant I (strengths-weaknesses value = 0.567) and (Opportunities-Threats value = 0.702). It is a situation that is favorable for the development of hatchery fish in Kolaka East. so that it can be described as SWOT analysis diagram (Figure 2).

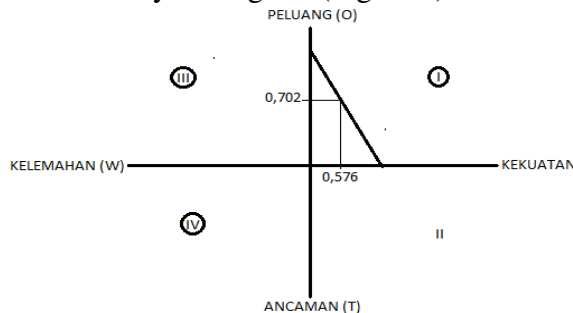


Figure 3. Diagram Fish Hatchery in East Kolaka

The hatchery business have the opportunities and strengths that can take advantage of existing opportunities. Thus, the strategy adopted in this condition is to optimize the existing power to simultaneously take advantage of opportunities available in developing inland fish hatcheries.

(B) Fish Cultivation

Based on the value of internal factors and external values as coordinate points, it was found that the meeting point is in quadrant I (strengths-weaknesses value = 0.567) and (Opportunities-Threats value = 0.702). It is a situation that is favorable for the development of fish rearing in Kolaka East, so it can be described as SWOT analysis diagram (Figure 4).

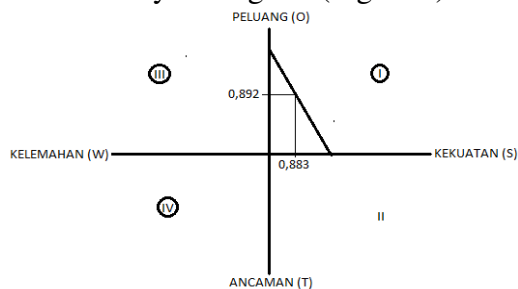


Figure 4. Cultivation of Fish in Kolaka East

Based on the diagram, then the fish cultivation business in Kolaka East has the opportunity and the power that can take advantage of existing opportunities. Thus, the strategy adopted in this condition is to optimize the existing power to simultaneously take advantage of opportunities available in developing cultivation because it is supported by hatchery fish (breem).

(C) Processing of Fishery

Based on the value of internal factors and external values as coordinate points, it was found that the meeting point is in quadrant III (Strengths-Weaknesses value = -0.500) and (Opportunities-Threats value = 0.690). It is a win-win situation but just to overcome the disadvantages for the development of the fishery-based processing of inland fish in East Kolaka, so it can be described in the SWOT analysis diagram (Figure 5).

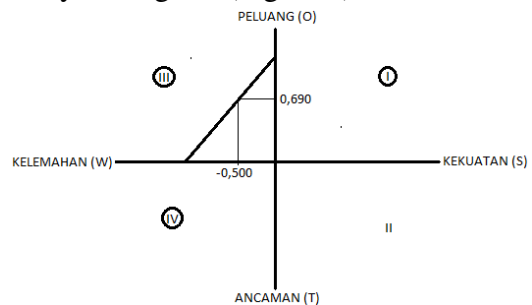


Figure 5. Diagram of Raw Fish

Processing in Kolaka East

Based on the diagram, then the fish processing enterprises have a high chance that can be prioritized for the development of fish processing. The strategy to this condition is to optimize the strength to overcome problems as well to take advantage of the opportunities available to develop the processing of fishery products made from inland fishery.

Prospects and Feasibility of Inland Aquaculture

In general, the prospects and feasibility of the development of inland fisheries in East Kolaka covers technical aspects (water quality), economic aspects, and socio-cultural aspects.

(A) Technical Aspects

Technically the development prospects of fish farming land in East Kolaka based water quality parameters as follows (Table 2 and Table 5).

Table 2. Results of Measurement on Water Quality Parameters (Pool) in East Kolaka, 2015

No	District	Village	Water Quality Parameters					NITRATE	POSPAT
			Temp.	pH	DO	NH3	DO		
1	Ladongi	Wela-la	26,30	7,42	5,37	0,15	2,01	0,196	
2	Tinondo	Mulia	25,80	7,05	7,70	0,99	0,81	0,0137	
3	Mowewe	Kel. Inebnggi	25,50	7,04	8,20	0,50	1,10	0,011	
4	Tinondo	Tulus	26,10	6,99	6,90	0,80	1,05	0,0218	
5	Lalola	Wesalo	26,07	7,21	6,30	0,92	0,99	0,0186	

Table 3. Results of Measurement Parameter Water Quality public (Rawa) in East Kolaka, 2015

No	District	Village	Water Quality Parameters					NITRATE	POSPAT
			Temp.	pH	DO	NH3	DO		
1	Tinondo	Tawa-Tawaro	26,10	7,51	5,50	0,01	0,92	0,045	
2	Dangia	Wende	26,20	7,31	5,10	0,01	0,86	0,086	
3	Aere	Aere	26,20	7,52	4,20	0,009	1,01	0,037	

Table 4. Results of Measurement of Water Quality Parameters common (Mina Padi) in East Kolaka, 2015

No	District	Village	Water Quality Parameters					NITRATE	POSPAT
			Temp.	pH	DO	NH3	DO		
1	Ladongi	Rara	26,00	7,01	6,80	1,02	0,50	0,001	
2	Mowewe	Inebnggi	26,10	7,50	3,90	0,30	2,40	0,143	
3	Poli Polia	Tokai	26,30	7,21	4,42	1,05	3,05	0,177	

Table 5. Results of Measurement of Water Quality Parameters (River) in East Kolaka, 2015

No	District	Village	Water Quality Parameters					NITRATE	POSPAT
			Temp.	pH	DO	NH3	DO		
1	Ladongi	Gunung Jawa	25,07	6,98	7,30	0,23	1,31	0,167	
2	Ulu	Amolu-lu	25,60	7,07	7,60	0,30	1,27	0,266	

(b) Economic Aspects

The results of the analysis of the economic aspects associated with aquaculture land in East Kolaka as follows:

- **Analysis Location Quotien (LQ):** Location farming of activities that have the greatest LQ value and greater than 1 ($i > 1$) obtained in the location of the Swamp with the value of LQ (61.62), followed by the LQ value of pond fishery (6.28), dam with LQ of (2.95), as well as *minapadi* with LQ value of (2.70), whereas, the value of LQ which is smaller than 1 ($i < 1$) was found on farms in the river with a value of LQ (0.96). Based on data from the location of aquaculture activities in Kolaka East it is known that in the swamps area, ponds, dams and *minapadi* (intercropping) is still categorized as the river-based location. On the other hand, classification of non-river-based locations due to the location of cultivation in the river is still relatively new Kolaka District East.

- **Supporting Infrastructures In Inland Aquaculture**

Based on the observation of the conditions, the fish cultivating ponds were run but most water resources are limited in the dry season, while the condition of the swamps are dry during the season (empty). To optimally take advantage of the pool which is contained in East Kolaka so it will need the development of aquaculture in the pond as well as the training of fish farming in ponds while the swamp AOPA required detailed studies of the potential quagmire AOPA for fisheries development,

master plan management pond swamp in Swamp Aopa the Regional District. East Kolaka, marsh pond construction, development of fish farming pond system swamps, fish restocking in Rawa Aopa, training of fish farming in ponds swamps and institutional establishment and management of fish marketing network.

Supporting infrastructure of other inland fishing activities is a means of processing results in the form of restaurants located on Rate-rate and Lalolae. However, restaurant has not specifically provide inland fish marketing infrastructure while production factors such as marketing, production and processed freshwater fish contained in the common markets in East Kolaka, but is still limited so that it requires additional marketing infrastructure.

- **Feasibility Analysis (R/C Ratio)**

Based on the analysis of the financial feasibility of aquaculture in the East Kolaka known as R/C ratio of each type of aquaculture. The order of the value of R/C ratio of each type of cultivation from the highest to the lowest occupied by the cultivation of carp, tilapia, catfish, carp and tilapia fish in freshwater ponds. While the cultivation of fish by *minapadi* system has a value of R/C ratio in the highest number in the cultivation of carp, *Nila* and *Mujair*. This type of culture which occupies the maximum R/C ratio is 1.47.

The highest ratio of R/C following the inland pond is the cultivation of carp in *minapadi* with a value of R/C of 1.46, inland pond culture has a high R/C ratio due to the cultivation of inland fishery as

a type of farming that has long been cultivated by people in East Kolaka and derived from generation to generation with a very simple cultivation system without using sluice and clearing land for cultivation. Therefore it does not require any costs incurred by farmers for the cultivation types.

(C) Aspects of Inland Fisheries Products Marketing Business

- **Inland Fish Demand**

Based on the projected total consumption amounted to 17,889,825 kg of fish / year, the highest fish consumption in South Konawe was calculated to 4,447,015 kg / year and the lowest in North Konawe amounted to 856 155. Meanwhile, the total demand for fish consumptions were amounted to 17 890 tonnes / year, which demand the highest fish consumption in Konawe South and lowest in the North Konawe, it is of course supported by the population of the requests and needs of the fish.

- **Inland Fish Supply**

Based on the potential development of inland aquaculture in East Kolaka which is dominantly focused on the waters of the marsh pond, it is supported by the potential of land resources and geographical conditions to the study area. Meanwhile, in view of the potency of land resources in the development of aquaculture in a district scale, it is obtained that districts that have the potency for the development are in the districts Dangia and Lambandia (pond, river and swamp), whereas for the development of inland aquaculture (*minapadi*) are more dominant in the districts of Ladongi and Tirawuta, it is supported by the

potency of rice cultivation which are largely widespread in 144.19 ha and 516.43 ha.

Projected production is based on the potential of inland fisheries development locations in Kolaka more dominant East is in the district Tinondo (393.94 tons / year), Tirawuta (268.27 tons / year), Dangia (237.5 tons / year), Ladongi (107,02 tons / year), Lambandia (78.76 tons / year), Mowewe (40.93 tons / year), and the lowest was Uluiwoi districts (1.83 tonnes / year). This is certainly potential in the development of inland fisheries but must be followed by adequate infrastructure and appropriate technology for land resources is more dominant marsh pond.

- **Analyzing the Competition and Market Opportunities**

The level of competition in the inland fish farmers in East Kolaka is relatively low, so the market opportunity is still open for new farmers. Based on the information from the Department of Agriculture, Fisheries and Livestock of East Kolaka, there is a daily increasing demand for inland fish for household needs in East Kolaka. The request can not be fulfilled due to several constraints: the meat of the inland fish are less suitable to be processed into refined products, supporting facilities such as transportation and there are people who do not prefer inland fish particularly the types of local catfish, and licensing issues.

Marketing channels which lasted for paddy goldfish have small marketing channels and divided into three marketing channels. ie from farmers to directly sell to middlemen /

gatherers and farmers market directly and consumed by the family. Of middlemen in general goods flowed into nearby markets.

Based on the analysis of marketing margins results, channel I (farmers □ Consumer □ Traders Gatherer) results in Rp. 15,000 to fisherman share of 57% so that it can be said that the marketing channel that is created is efficient because part of the price received by farmers was > 50%. Channel of marketing margin II (farmers □ Consumer) was obtained at least as many as Rp 25,000 to fisherman share of 100% so it can be said that the marketing channel that is created is very efficient because part of the price received by farmers was > 50%.

(D) Social Aspects

The public perception of aquaculture is quite high, but the role of the community is still very low. Therefore, it has not seen any effect on the farming community participation that they've done so far then through cultivation expected role of the community that can be improved.

Aquaculture expected to generate production is increasing so that in addition to providing for the daily fish protein can also preserve the biodiversity of freshwater fish. Particularly in Kolaka Eastern societies have always participated in the inland fish cultivation. However, the participation that had been there only related to the utilization activity-oriented economy without intensive care.

Cluster Priority of Inland Fisheries Development in East Kolaka

The results of the analysis of the potential and constraints in the development of inland fisheries in East Kolaka are identified as 5 types of cluster development, namely:

(A) Cluster of Fish Hatchery

Cluster analysis of the fish hatchery is planned in two units, namely cluster Fish Seed Center (BBI) and the People Seedling Enterprises (UPR). Based on the analysis, development planning Fish Seed (BBI) the District Ladongi (3 ha) and the District Mowewe (2 ha) which serves as the center of the fish hatchery. Fish hatchery center serves an area that serves the entire process of seeding and distribution of fingerlings from sub growth (village) up to the enlargement areas scattered in the area of inland fisheries. Based on the results of data analysis development plan Unit Hatchery Rakyat (UPR) in Kolaka East are in Sub Ladongi (2 ha), District Lambandia (2 ha), District Loea (2 ha), District Tinondo (1 ha) and the District Mowewe (1 Ha). Determination districts as the center of the fish hatchery is based on the criteria of the potential development of seed marketing, site suitability RTRW, quantity and continuity of water resources, water quality, labor, accessibility, and other supporting facilities.

(B) Cluster of fish Cultivation

Based on the analysis of the potential and constraints of the development of inland fisheries in East Kolaka, identified cluster plan landing fish rearing fish in ponds, swamps, dams, rivers and minapadi. One factor to consider in the development of aquaculture in a way clusterpembesaran threshold stocking fish is fish and their

environmental limiting factors. As noted Hickling (1971), within certain limits high stocking density will increase total production but reduces the weight and large size of individual fish produced in a maintenance. It may happen because of the food and the environment can be a limiting factor.

The results of data analysis cluster in the fish cultivation ponds in East Kolaka District includes the District Tirawuta (10.06 ha) and the District Dangia (7.6 ha) as a center for the cultivation of fish cultivation ponds. While districts who support the enlargement of fish in pond waters spread over 8 districts-districts Loea (12.88 ha), Ladongi (4.92 ha), Poly-Polia (3.96 ha), Lambandia (4.96 ha) , Aere (4.32 ha), Mowewe (4.32 ha), Ueesi (4.28 ha), and the District Tinondo (8.4 ha).

Cluster of fish cultivation in the District of Dangia (190 ha) and Tinondo (63 ha) becomes the center of swamp fish cultivation. Meanwhile, the district in which a fish cultivated in swamp waters pond spread across two districts of Ladongi with (10 ha area) and the District of Lambandia (30 ha).

Cluster fish cultivation in the area of the dam / reservoir are found in the district of Ladongi (20 ha), Lambandia (0.08 ha), and Tinondo (0.18). Cluster of cultivation in the river is located on the District of Ueesi (1.82 ha) and Uluiwoi (1.12 ha) as a fish rearing facility in the area of the river.

Cluster of fish cultivation in such a paddy fields (*minapadi*) are located in the District of Ladongi (144 ha) and Mowewe (73.29 ha) as a center for fish rearing in paddy fields (*minapadi*). While the district that serves as a supporting locations are Tinondo (34.72 ha), Tirawuta (516.42 ha), Dangia (79.80 ha),

Loea (82.60 ha), Polipolia (42 ha), Lambandia (87.41 ha), Aere (42.79 ha), and Lalolae (49.72 ha).

(C) Cluster of Fishing/Harvesting

The fishing/harvesting is done on all public waters, rivers, swamps, dams and irrigation channels with a variety of fishing gear. The highest intensity of fishing activity is in bog waters of Dangia, Ladongi, Tinondo and Lalolae. Swamps in the East Kolaka part of the flow of water from the swamp of National Wildlife Aopa Watumohai (TN RAW) includes the District of Tirawuta, Loea, Ladongi, Dangia, Lambandia and Aere.

The fishing activity was also done in almost all streams and irrigation potential to the fishing area by using bubu. Some fishing rods and many types of utility that are commonly used in public waters such as swamps, rivers, dams and other puddle are: traps, hook and line, gill nets, and throwing nets.

The types of fish commonly caught in public waters Koaka East is Cork (*Chana striata*), catfish (*Clarias batrachus*), carp (*Helostoma temminckii*), eel (*Monopterus albus*), Mujair (*Tilapia mossambica*), Tawes (*Barbodes gonionotus*), Sepat (*Trichogaster trichopterus*) Mas fish (*Cyprinus carpio*), eel (*Anguilla sp.*) and others.

(D) Cluster of Fish Processing

The results of the analysis of the potential and constraints of the development of inland fisheries in East Kolaka, are identified as inland fishery processing plant that is defined as a culinary and fishery products. From the results of data analysis, cluster of culinary is in the district of Tirawuta and Lalolae as central processing fishery products. As for the cluster of fishery

diversification products are located in the District and Sub-district Tirawuta Lalolae as central processing fishery products.

Determination of this district as a tourism center of culinary and processing product diversification are based on the developmnet criteria, strategic location, transportation lines (Kendari - Kolaka), means of support, quantity and continuity of raw materials, the central marketing, labor, accessibility, and other supporting facilities.

(e) Integrated Inland Fisheries Development Facilities

Based on the results of data analysis, cluster development of inland fisheries integrated in the District Kolaka Timur divided into three clusters, namely cluster seeding in the district Lambandia, Ladongi, Loea, Mowewe and Tinondo, to cluster magnification are scattered throughout the districts, while for cluster processing is located in the district Lambandia, Dangia, Ladongi, Tirawuta and Lalolae. Integrated inland fisheries development centers in Eastern Kolaka can be seen in Table 6 and Figure 6.

Table 6. Cluster Integrated Development of Inland Fisheries East Kolaka, 2015

No	Districts	Cluster of hatchery	Cluster of Cultivation	Cluster of Fish Processing
1	Lambandia	√	√	√
2	Aere		√	
3	Dangia		√	√
4	Polipolia		√	
5	Ladongi	√	√	√
6	Loea	√	√	
7	Tirawuta		√	√
8	Lalolae		√	√
9	Mowewe	√	√	
10	Tinondo	√	√	
11	Uluiwoi		√	
12	Ueesi		√	

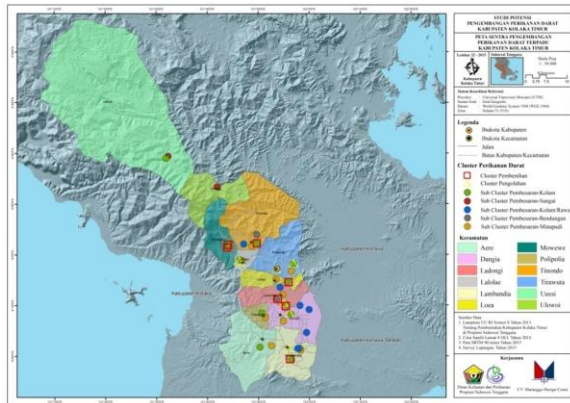


Figure 6. Cluster of Integrated Inland Fisheries Development facilities

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

1. Sub-district and sub-district Ladongi decent Mowewe developed as centers of hatchery fish, which is divided into two (2) subcluster (BBI and (UPR).
2. The center of fish cultivating facilities in the development of inland fisheries in East Kolaka District is divided into five (5) subcluster namely: fish cultivation centers in the pond (the District of Tirawuta and Dangia), fish cultivation centers in Swamp (districts of Tinondo and Dangia), fish cultivation centers in the dam / reservoir (district of Landongi), fish cultivation centers in the river (the District Uluiwoi), center for fish cultivation area under paddy (*minapadi*) in the District of Ladongi and Mowewe
3. The center of fishery products processing in Kolaka East is divided into two (2) subcluster namely: (a) Culinary with development centers in the District of Tirawuta and Lalolae, (b) the diversification of

fishery products with a development center in the District of Tirawuta, Lalolae, Dangia, Ladongi, and Lambandia.

Recommendation

- (1) Location for Fish Breeding Development priorities (BBI) should be directed to the District of Ladongi (3 hectares) and the District Mowewe (2 ha).
- (2) Development of main commodity for aquaculture activities should be prioritize to the types of *Nila*, *Mas*, and catfish.
- (3) Infrastructure new fisheries (catching, cultivation, processing and marketing) should be based on accurate data and information due to the potency that exists through SIDCOM (Survey, investigation, design, construction, operation and maintenance) in advance as well as the adequacy of the support of other sectors such as roads, water and electricity.
- (4) To support the accelerated development of inland aquaculture, it is necessary to follow up the preparation of Master Plan for Management of Wetlands in East Kolaka followed by the Eastern Regional Regulation on Management of Swamps area.
- (5) Location Inland Fishing Cluster are recommended in the regions outside the cultivation cluster of fish in the swamp and river ecosystems.
- (6) It is necessary to conduct some commercial fish species restocking in swamp waters primarily to improve the stock of fish in public waters in supporting fisheries and food security of the fisheries sector.

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