



STRATEGY FOR DEVELOPMENT OF AQUACULTURE IN BOGOR REGENCY

Farah Khairunnisa¹, Asep Agus Handaka S.², Ayi Yustiati², Atikah Nurhayati²

1Student in Faculty of Fisheries and Marine Science, Fisheries Department, Universitas Padjadjaran. Email: Farahkrhn@gmail.com

*2Lecturer in Department of Fisheries, Faculty of Fisheries and Marine Science, Universitas Padjadjaran
Jalan Raya Bandung – Sumedang, KM 21, Jatinangor, Sumedang Regency 40600, West Java, Indonesia.*

KeyWords

Bogor Regency, aquaculture, development efforts, government policies.

ABSTRACT

Bogor Regency is one of the regencies located in West Java that has great potential in the field of fisheries, especially the aquaculture sector. The local government of Bogor Regency has implemented several policies as an effort to improve the welfare of cultivators but in reality there are still problems from the government and cultivator groups, including many groups of cultivators who have not been able to implement these policies, causing various problems including the level of welfare among cultivators, lack of infrastructure support, and other possible problems. The purpose of this study is to find out what government policies have been implemented by the Bogor Regency government, analyze problems and formulate appropriate policy recommendations for the development of aquaculture in Bogor Regency. The method used in this research is the case study method. Analysis of the data used in this study using a Soft System Methodology approach based on an unstructured problem approach using existing conditions which include technical and production aspects, institutional aspects, and human resources aspects. The research was conducted in January 2020 – March 2022 in Bogor Regency. Respondents in this study consisted of 6 people, namely 3 fish cultivators and 3 people from Bogor Regency government agencies.

1. Introduction

Bogor Regency is the mainstay of the fisheries sector in West Java. The fisheries sector is noted to have made a major contribution to aquaculture in Indonesia and the welfare of the people in the region. Bogor Regency with its climate (suitability of land and water, temperature range, rainfall, etc.) has shown a fairly high suitability for use as land for the cultivation of various species of fish, both consumption fish and ornamental fish. In March 2014 the Bogor Regency Government inaugurated the Minapolis Center in Ciseeng District. Bogor Regency has carried out various efforts to improve the fisheries sector, both in terms of increasing production and employment by providing support in the form of establishing a Minapolitan area in Bogor Regency, physical and non-physical assistance, in the form of assistance to fisheries business actors, especially existing fisheries business actors. in the Minapolitan area, either in the form of Independent Direct Assistance (BLM) to the community (Mina rural business development program) or in the form of fishery infrastructure and facilities such as prospective brood fish, feed and other cultivation tools.

The concept of fishery development is basically a fishery development oriented in the field of cultivation. The ultimate goal is to increase the production and quality of fishery products, to increase welfare equally and fairly for cultivators, and to develop the minapolitan area as a center of economic growth in an area. However, it cannot be denied that not all fisheries development programs implemented by the government bring results as expected.

The success of a policy is proven if one of the programs actually follows the rules contained in the policy. The policies that need

to be developed need to be prepared based on the flow of the fishery development planning process in the field of aquaculture, namely knowing the environmental situation in the context of developing aquaculture, for example, knowing the opportunities and problems that will be faced in fisheries development so that policies are made. The local government of Bogor Regency has implemented several policies as an effort to improve the welfare of cultivators but in reality there are still problems from the government and cultivator groups, Among them are many groups of cultivators who have not been able to implement these policies, causing various problems including the level of welfare among cultivators, lack of infrastructure support, and possible other problems in implementing policies for the development of aquaculture. Therefore, this study was carried out with the aim of describing the profile of local government policy strategies in an effort to improve aquaculture in Bogor Regency and analyzing the policies that have been implemented so that they can be recommended in the field of aquaculture.

2. Method

This research was conducted in Bogor Regency. This research was conducted from January 2020 to March 2022. The collection of data and other information related to this research activity was carried out by observation and interviews with employees of the Department of Fisheries and Livestock of Bogor Regency and fish cultivators.

2.1 Research Method

The research method used in this research is descriptive method with a case study basis. Descriptive method can be interpreted as research that is carried out continuously or continuously so that comprehensive knowledge is obtained about problems, phenomena, and social forces that are obtained if phenomena relations are studied over a long period. Descriptive method is a method used to describe or analyze a research result but is not used to make broader conclusions (Sugiyono 2005).

The research method used in this research is a case study. Case studies are methods that are applied to understand individuals more deeply by being practiced in an integrative and comprehensive manner. Data and information were collected from respondents through questionnaires. Questionnaires are a number of questions or written statements about factual data or opinions related to the respondent, which are considered facts or truths that are known and need to be answered by the respondent (Sutoyo 2009).

2.2 Sources and Types of Data

There are two types of data sources used in this research, namely primary data and secondary data. Primary data was taken directly from the field by direct interview technique with the respondents, namely the Head of Service and Head of Fisheries Production at the Fisheries and Livestock Service Office of Bogor Regency and the cultivating community using a questionnaire. Secondary data came from the Department of Animal Husbandry and Fisheries of Bogor Regency, Bappedalitbang of Bogor Regency, the Central Bureau of Statistics of Bogor Regency, and the Department of Marine and Fisheries of West Java Province. The type of data used is qualitative data. Qualitative data are methods for exploring and understanding the meaning that a number of individuals or groups of people ascribe to social or humanitarian problems (Creswell 2010).

2.3 Data Collection Method

Data collection is done by taking samples. The sampling technique used is using purposive sampling method to the cultivators and also the government. The sample is taken according to the desired criteria, meaning that the sampling technique is not based on random, regional or strata, but based on considerations that focus on certain goals or techniques to determine research samples with certain considerations aimed at making the data obtained later can be more accurate. representative (Sugiyono 2015). While the questionnaires were given to government officials, namely to the authorities concerned with the development of aquaculture at the Department of Animal Husbandry and Fisheries, Bogor Regency.

2.4 Data Analysis

The data analysis used in this research is descriptive qualitative data analysis. Qualitative descriptive data analysis is an analysis that describes an overview of the policy strategy of the local government of Bogor Regency and analyzes policies that can be recommended in the development of aquaculture in Bogor Regency from the point of view of the local government policy authorities and the point of view of the farming community.

Data analysis in this research uses Soft System Methodology. Checkland & Scholes (1990) asserted that Soft System Methodology (SSM) is a continuous process but the stages in SSM are not rigid so that they can be adapted to the situation in which they are implemented. Brocklesby (1995), states that usually in its use it is not fixed that the process must be sequential forward, but the movement of each stage in SSM can go forward or backward to each stage. Maqsood et al (2001) stated that research can be

started at any stage with literacy and tracing as important components. The seven stages according to Checkland & Scholes (1990) are:

- (1) Examine unstructured problems.
- (2) Express the problem situation.
- (3) Build a problem definition related to the problem situation.
- (4) Build a conceptual model.
- (5) Compare conceptual models with problem situations.
- (6) Establish appropriate and desirable changes.
- (7) Take corrective action on problems.

3. Results and Discussion

Soft system methodology (SSM) is a systemic research process that uses systems models (Checkland 1993). Martin et al. (2008) stated that, SSM was developed to deal with management problems that arise from human activity systems, such as conflict. Furthermore, it is stated that SSM is a problem-solving framework specifically designed for situations where the nature of the problem is difficult to define. The essence of SSM is to build a system model through in-depth understanding and meaning of problem situations according to the phenomena encountered (Williams 2005). The SSM analysis will provide several forms of policy recommendations regarding the development of fishery product processing in Bandung Regency, West Java. SSM will provide some form of local government; efforts to improve policies towards the development of processing so that the field of processing fishery products can develop properly. The SSM analysis carried out in the development of capture fisheries consists of several stages.

3.1 Identifying Unstructured Problems

Information about unstructured problems on an object can be obtained from secondary data collection. The information that has been obtained will produce a number of problems in the form of issues, conflict relations, and other related problems, so that the source of these problems can be known and understood. Unstructured problems were obtained through interviews and documentary studies obtained from respondents. Existing government policies are sometimes not in line with their implementation in the field. Based on information obtained from fisheries cultivators and staff from the Department of Fisheries and Livestock of Bogor Regency, there is a factual discrepancy between existing policies and activities in the field.

Table 1. Government Programs

Government Programs	Reality	Program Description
Aquaculture development program	Not yet fully implemented	Development of superior fish seeds
		Guidance and development of consumption fish farming
		Fishery data management
		Organizing minapolitan working groups
		Distribution of fish seeds in public waters
		Implementation of UPT BBI activities
		Improving the infrastructure of the minapolitan area
Fostering and developing ornamental fish farming		

Based on information obtained from respondents in the agency through questionnaires, the main problems in aquaculture development activities in Bogor Regency consist of several aspects. The description of the problem can be seen in the following table.

Table 2. Description of Unstructured Problems by Institution

Problem	Problem Description
Technical or Production Aspect	Decreased water quality
	Uncertain weather so that cultivation activities are not optimal
	Changes in land use due to the development of infrastructure and housing

projects

Reduced market share due to reduced people's purchasing power

Increased production costs

Human Resources Aspect Local government policies regarding fisheries development in Bogor Regency are less known and understood by cultivators

Based on information obtained from respondents who are a group of fish farmers in Bogor Regency, the main problems in aquaculture development activities in Bogor Regency consist of several aspects. The description of the problem can be seen in the following table.

Table 3. Description of Unstructured Problems According to Fisheries Cultivators

Problem	Problem Description
Technical and Production Aspect	Local government policy programs are felt to be not evenly distributed by all cultivators
	Lack of socialization and information
	Lack of nursery assistance
Human Resources Aspect	Cultivator groups still do not understand the existing government policies

Based on an unstructured problem approach, it describes the existing conditions. The existing conditions cover several aspects, including technical and production aspects, institutional aspects, and human resources aspects.

3.2 Problem Situation

Elemental analysis using the rich picture method is the method used to state the problem situation in the development of aquaculture. This is done to make it easier to capture the structure of the problem, the processes involved, as well as the relationship between the structure and processes that occur in aquaculture development policies in Bogor Regency. This stage is carried out to analyze the problems that occur in local government policies in the development of aquaculture carried out by the local government of Bogor Regency.

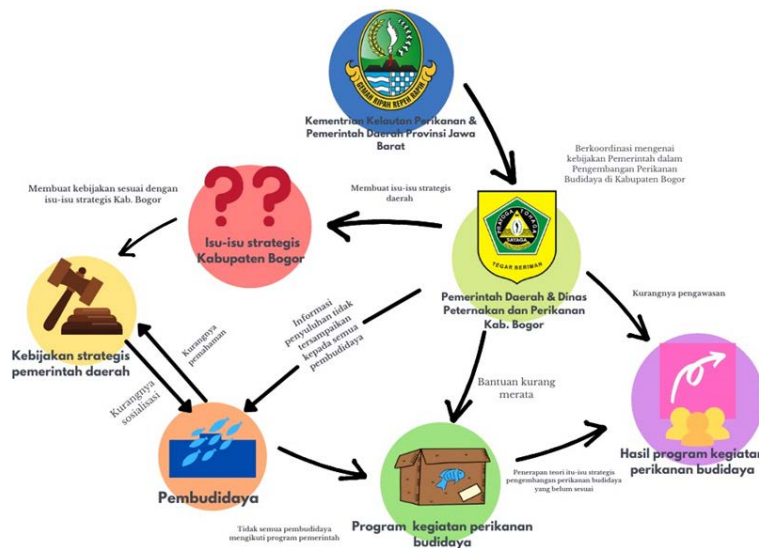


Figure 1. Aquaculture Development Method

3.3 Defining the Relevant System

The stage of defining the system in aquaculture development activities is carried out using the root definition. Identifying the situation and the parties involved using CATWOE is a way to identify the system. Elements of the root definition analysis stated by CATWOE on the development of aquaculture carried out by the Bogor Regency government are listed in the table below.

Table 4. CATWOE Analysis on Aquaculture Development Strategy in Bogor Regency

Element	Information
C (Customer)	Fish Cultivator
A (Actor)	Bogor Regency Fisheries and Livestock Service, Bogor Regency Regional Government, West Java Provincial Government, Ministry of Marine Affairs and Fisheries, Fisheries Extension, Fish Cultivators
T (Transformation)	<p>> Procurement of facilities and infrastructure in cultivation activities</p> <p>> Providing assistance by increasing the scale of assistance and assistance more evenly according to the number of cultivators, such as seedling assistance or capital for cultivation activities.</p> <p>> Conducting socialization on local government policies regarding the development of aquaculture, training and counseling are more often carried out routinely and intensely and thoroughly so that they can be conveyed to all fish cultivators</p> <p>>The process of making Fisheries Business Permits (SIUP) or Fisheries Business Registration Certificates (TDUP) for small-scale cultivators is easier</p> <p>>Improve the quality of human resources in the field of aquaculture so that the development of aquaculture in Bogor Regency can be carried out optimally</p>
W (World View)	The Bogor Regency Government and fish cultivators must both understand the policies in the development of aquaculture and cooperate in the implementation of aquaculture development.
O (Owner)	Regional Government of Bogor Regency, Department of Fisheries and Livestock of Bogor Regency, Ministry of Marine Affairs and Fisheries, Regional Government of West Java Province, Fisheries Extension
E (Environment)	Fish farming land, water quality, and weather that can affect fish farming activities

3.4 Presenting a conceptual model of the system according to the definition

The conceptual model is used to build a model of the pattern of human thinking in accordance with the foot definition that uses at least one activity that can be used as an example and drawn by applying system thinking. The conceptual model that is in accordance with the problems in the unstructured aquaculture development policy activities in Bogor Regency is that it can use SSM (Soft System Methodology) analysis. Unstructured problems consist of problems in technical and production aspects, institutional aspects, and human resources aspects.

In order to be able to present the conceptual model that is built, that is by describing the activities that must exist to carry out the tasks stated in the root definition. The stages of making a conceptual model include:

1. *Root definitions* formulated based on its constituent elements in the form of a CATWOE table.
2. In the activity of formulating a conceptual model, the root definition is used as a reference to obtain recommendations for improvement.
3. Technical and production aspects, institutional aspects, and human resources aspects in unstructured problems are used to determine the root definition.
4. Conceptual models are made to obtain solutions to existing problems.

Problem management and identification of relevant factors can be assisted by conceptual models. Conceptual models can make it easier to map problems. Conceptual models can be a true representation of the phenomenon being studied. The problem can be simplified by reducing the number of properties that must be included with the help of a conceptual model, making it easier to focus on the essentials.

Root definitions implemented to complete water quality improvements, opening new areas devoted to agriculture, more fish breeding assistance, additional budget for capital for cultivators and aquaculture groups, easier legal administration for cultivators, socialization of local government policies in the development of aquaculture in Indonesia. Bogor Regency is carried out intensely so that cultivators know and understand better, and competent human resources in the field of aquaculture are increased so that government programs can be realized properly. This is done in order to increase the production of fish farming and to improve the welfare of small-scale fish cultivators.

3.5 Comparing the Conceptual Model with the Real World

The conceptual model that has been made compared to the real world will show:

- a. The systematic difference between the real world and the model world,
- b. Problems to be stated further to related parties (stakeholders),
- c. The plan of action to change the situation, the design of the changes that must be made to the model.

The results of comparing the conceptual model with the real world in local government policies in the development of aquaculture from the technical and production aspects, institutional aspects, and human resource aspects in Bogor Regency are shown in the table below.

Table 5. Comparison of Conceptual Models with the Real World in Aquaculture Development in Bogor Regency

No.	Real World Models	Conceptual Model
1	Several parameters such as BOD, H ₂ S, free chlorine, and COD in the main rivers in Bogor Regency (Ciliwung River, Cikeas River, Cipaeh River, Cileungsi River, Cijere River, Ciluar River, Kali Angke River, Kali Baru River, Cikaniki River, Cipamingkis River, and Cibeet River) the value has exceeded the quality standard, meaning that the burden of domestic and industrial waste is quite high for river water pollution.	The water quality parameters for aquaculture activities are in accordance with the national water quality standards, for example, the appropriate BOD parameters are 3-6 mg/L, COD is 25-40 mg/L, DO is 3-4 mg/L, H ₂ S is 0.002 mg/L, and free chlorine is 0.03 mg/L (PP No. 22 of 2021 Class III).
2	Land for fish farming is reduced due to changes in land use for project or housing development.	Based on the Bogor Regency RPJPD 2005-2025, it states "Fisheries are developed in areas/areas that technically, socially, and economically have the potential for fishery activities, calm water ponds, swift water, hatcheries, ornamental fish ponds/aquariums, and fish cultivation in public waters." Land parameters for freshwater fish farming, namely topography, soil type, land use of an area and water conditions (Susanto 2002).
3	Capital assistance and fish seeds are not evenly distributed because the budget for coal is not proportional to the number of cultivators/cultivator groups	Assistance programs for fish cultivating farmer groups, one of which is the procurement of brood fish and fish hatchery technical assistance.
4	Many cultivators do not know about local government policies in the development of aquaculture so that government programs cannot run optimally	Fish cultivators have an important role in supporting and implementing programs regarding local government policies in the development of aquaculture in Bogor Regency
5	Lack of competent human resources in the field of aquaculture in Bogor Regency	Carry out guidance for the community in the form of counseling or education regarding freshwater fish farming production facilities, which has the aim of improving the quality of human resources to be able to manage fish cultivation properly.

3.6 Systematic Change

This improvement is an effort to fix problems in the development of aquaculture in Bogor Regency. Research using SSM is expected to provide positive changes to society and provide benefits for the long term.

After comparing the conceptual model with the real world, there are several results to obtain the expected systematic change, namely:

- 1) Maintain water quality or fish farming environment in accordance with water quality parameters for freshwater fish farming.
- 2) Spatial planning in the development of aquaculture.
- 3) Dissemination of local government policies in the development of aquaculture in Bogor Regency.
- 4) Carry out guidance for the community in the form of counseling or education regarding freshwater fish farming production facilities.

3.6 Actions to Improve Problem Situation

Improvement efforts that can be made are:

- 1) Monitoring and measurement of water quality parameters used as the main water source for aquaculture activities in Bogor Regency needs to be carried out regularly and periodically to maintain quantity, continuity, and quality; and minimize domestic and industrial activities that can significantly reduce the value of water quality.
- 2) Spatial planning in the development of aquaculture, in particular allocating land for fish cultivation in regional fisheries management areas by taking into account the appropriate land parameters for aquaculture activities, such as topography of soil type, land use of an area and water conditions.
- 3) Socialization and counseling activities regarding local government policies in the development of aquaculture in Bogor Regency, as well as introducing intensive cultivation methods with better technology to increase the production value and quality of aquaculture to the cultivating community are carried out intensively and persuasively and the contribution of the cultivating community in the policy-making process needs to be improved.
- 4) Carry out guidance for the community in the form of counseling or education regarding good and correct freshwater

fish farming techniques, and in this modern era the government can also provide interesting and easily accessible information via gadgets or the internet (such as websites or applications) about aquaculture, which aims to improve the quality of human resources to be able to manage aquaculture properly.

Improvement of facilities and facilities is one of the most important factors in influencing the course of aquaculture, in line with the policy recommendations given by Nursyahbani et al (2020), the aquaculture development policy program in Pangandaran Regency requires strategic recommendations, namely procurement of advice and infrastructure, assessment of distribution supervision fairness and determination of the object of assistance in accordance with recommendations from community leaders, extension workers, NGOs and community groups, as well as handing over the formation of human resource recruitment in the marine and fisheries sector from the regional government to the central government and the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia.

According to Ambasari et al (2013), the strategy carried out for the development of aquaculture areas in East Lampung Regency is to attract the participation of stakeholders consisting of fish cultivators, fisheries entrepreneurs, scientists, extension workers, security forces and bureaucrats in order to protect, maintain and manage the aquaculture environment. ; build supporting facilities consisting of physical and institutional facilities (financial institutions, insurance, NGOs, marketing, associations and legislation) that support the development of aquaculture areas; build access to distribution, marketing, availability of fishery production facilities and anticipation of environmental damage; carry out clear and firm law enforcement for stakeholder members who violate the rules that have been determined and mutually agreed upon; and provide incentives for stakeholders who want to carry out the regulations that have been determined and mutually agreed upon (seed subsidies, feed subsidies, compensation and so on). There are several strategies that need to be considered in the development of aquaculture based on Blue Economics (BE) so that its implementation can develop well, such as the development of Human Resources (HR) who are directly or indirectly involved in aquaculture activities, analysis of the feasibility of commodities that can be used in the implementation aquaculture in an integrated manner based on BE/IMTA, a more detailed analysis of land feasibility for the development of aquaculture locations with integrity, the need for program socialization from the center to the regions so that it can be implemented properly,

Counseling is very much needed in the development of aquaculture in order to increase the insight of fish cultivators regarding good and correct fish cultivation techniques and can increase fishery production if cultivators use the right techniques when cultivating fish. Aquaculture growth in Central and Northern Uganda has shown slow results due to institutional and social factors concerning aligning the provision of extension services with the needs of fish farmers (Atukunda et al 2018). Whether commercially oriented or not, the approaches and instruments chosen to support aquaculture development must include good governance principles and take into account interactions with other sectors (FAO 2010).

Conclusion

Based on the results of the research on the Aquaculture Development Strategy in Bogor Regency that has been carried out, it can be concluded that the Bogor Regency local government's policy in the aquaculture development program is quite good, only efforts are needed to distribute program assistance to all cultivators and increase socialization, draft recommendations for local government policies in the development of aquaculture in Bogor Regency, is to improve facilities and infrastructure and regional spatial planning in allocating fish farming land in regional fisheries management areas in accordance with existing parameters by optimizing land, mentoring programs for fish cultivators and seed assistance or capital is carried out evenly, Socialization activities regarding local government policies to the cultivating community are more often carried out, and provide easily accessible information and conduct counseling on aquaculture to the cultivating community.

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References

- [1] Atukunda, G., AE State, J. Molnar, and P. Atekyereza. 2018. Aquaculture Development and Uganda's Agricultural Extension System: The Case of Fish Farmers in Central and Northern Regions. *J Fish Aqua Dev*: JFAD-137.
- [2] Ambasari, L., K. Gandasmita, dan U. Sudadi. 2013. Strategi Pengembangan Kawasan Perikanan Budidaya di Kabupaten Lampung Timur. *Globe Volume 15 No. 2*: 137-145.
- [3] Brocklesby, J. 1995. Using soft Systems Methodology to Identify Competence Requirements in HRM. *International Journal of Manpower*, vol. 16. no. 5/6.
- [4] Checkland, P. dan J. Scholes. 1990. *Soft Systems Methodology in Action*. New York: John Wiley & Sons.
- [5] Creswell, J. W. 2010. *Research design: pendekatan kualitatif, kuantitatif, dan mixed*. Yogyakarta: PT. Pustaka Pelajar.

- [6] Effendi, H., Kristianiarso, A.A. dan Adiwilaga, E.M. 2013. Karakteristik Kualitas Air Sungai Cihideung, Kabupaten Bogor, Jawa Barat. Jurnal Eco-lab. Vol. 7 No. 2.
- [7] Nursyahbani, A., A. A. H. Suryana, Y. Dhahiyat, dan A. Rizal. 2020. Government Policy Strategy In The Development Of Aquaculture In Pangan-daran Regency, West Java Province. Global Scientific Journals. Volume 8, Issue 1.
- [8] Radiarta, N., Subagja, J., Saputra, A., dan Erlania. 2015. Pengembangan Budidaya Ikan Lele di Kawasan Minapolitan Kabupaten Bogor, Jawa Barat: Aspek Kesesuaian Lahan, Implementasi Produksi, dan Strategi Pengembangan. Jurnal Riset Akuakultur. Vol. 7, No.2.
- [9] Sugiyono. 2015. Metode Penelitian (Kuantitatif, Kualitatif dan R&D). Bandung: Alfabeta.
- [10] Sutoyo, A. 2009. Pemahaman Individu, Observasi, Checklist, Interview, Kuesioner dan Sosiometri. Yogyakarta: Pustaka Pelajar.

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