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ANALYSIS OF THE PROSPECTIVE STRATEGY OF REDUCING THE NUMBERS OF FLOAT NETWORK IN CIRATA RESERVOIR (CASE STUDY OF CIPEUNDEUY DISTRICT, BANDUNG BARAT DISTRICT, WEST JAWA)

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KeyWords
KJA Cirata Reservoir West Bandung Regency, Stakeholders, MICMAC, Strategy for reducing the number of KJA, Prospective Analysis

ABSTRACT

This study aims to conduct a prospective analysis of strategies to reduce the amount of KJA in the Cirata Reservoir. The time and place of the study was conducted from September to January 2019 in Cipeundeuy District, West Bandung Regency. This research was designed using case study research methods, prospective analysis, and descriptive methods. The sampling method used is the method of interview, direct observation, and literature study. The data collection technique used was purposive sampling and random sampling. The type of data used is primary data generated from interviews with respondents and secondary data generated from the results of studies from the literature and statistical data from relevant agencies. The research data at the socialization and implementation stages were analyzed using the MICMAC software. The results are divided into quadrant 1 determinant variables, quadrant 2 connecting variables, quadrant 3 dependent variables, and quadrant 4 autonomous variables. The stakeholders that will be used as respondents are KJA cultivators, Law Enforcement (TNI), Cirata Reservoir Management Agency (BPWC), Fisheries and Marine Service Office of West Bandung Regency, West Bandung Regency Tourism and Culture Office, West Bandung Regency Environmental Office, District Technical Implementation Unit West Bandung, academics who are competent in the field of aquatic resource management, Community Care for Cirata Reservoir (MPWC) and community leaders. The results of the analysis show that the most influential stakeholders towards reducing the number of KJA are BPWC, TNI, and the Fisheries and Marine Service of West Bandung Regency. The strategy that can be done to reduce the number of KJA is a reduction based on the percentage of KJA ownership. Reducing the amount of KJA will take place optimally if it involves all active roles of influential stakeholders.

INTRODUCTION

West Java is famous for the use of its reservoir as a source of livelihood, one of which is the Cirata Reservoir. The Cirata Reservoir was built in the Citarum Watershed whose main function is as a power plant and one of its derivative functions is aquaculture using Floating Net Cages (KJA). Fishing activities for floating net karamba fish (KJA) in Cirata Reservoir increase from year to year (Table 1). In 2017 KJA recorded 77,195 plots (BPWC 2017), this had exceeded its supposed carrying capacity of 12,000 plots (West Java Governor Decree No. 41 of 2002). At present the number of KJA in the Cirata Reservoir is almost 98,000, the majority of KJA cultivators are not owned by the local community, but by outside investors (Husodo 2017)

Tabel 1. Total Increase KJA

No.	Year	Total KJA/Plot
1.	2001	30429
2.	2003	39690
3.	2007	51418
4.	2011	53031
5.	2017	77195

The increase in the number of KJA until 1997 could increase total fish production, but starting in 1998 the increase in the number of KJA was not in line with the increase in production. This is presumably because the quality of water in the Cirata Reservoir began to decline after 1997 to 2002, as well as the frequent occurrence of mass deaths of aquaculture fish due to pollution and being attacked by the herpes virus. Waste from KJA activities in Cirata Reservoir which accumulate in the bottom of reservoir waters has a negative impact on both the aquatic environment and the continuity of reservoir life and fisheries business activities(Prihadi et al., 2005). The abundance of organic waste from feed residues is thought to have caused the Cirata Reservoir to face a serious problem, including a high sedimentation process and deterioration of water quality, the occurrence of algal blooms, water hyacinth continued to grow on the surface of the water, damage to soil structure and change in soil moisture. agricultural land and reservoir operations were disrupted (Marhendi 2013). If this continues, it will cause disruption of hydropower, conservation values, aesthetics, and tourism sites in the Cirata Reservoir. Therefore, a special strategy is needed to reduce the number of floating net cages in the Cirata Reservoir.

The purpose of this research is to determine the influential stakeholders in the effort to reduce the number of KJA in the Cirata Reservoir and to determine the strategy to reduce the amount of KJA in the Cirata Reservoir so that it can be realized. The benefit of this research is that for researchers, this research can provide insight and knowledge about strategies that can be used to reduce the amount of KJA in the Cirata Reservoir. For the government, this research can be used as input for information on strategies that can be done to reduce the amount of KJA in the Cirata Reservoir. For other parties, this research can be used as reference material or information for further research regarding prospective analysis.

METHODS

Research Parameters

Respondents who are a measure of qualitative research, according to Sugiyono (2012), are referred to as social situations consisting of three elements (places, actors and activities) that interact in synergy. The respondents must be assessed as being able to answer the questionnaire questions that have been prepared and there is a match between the respondent's background and the topic of the problem being examined, then the validity of this research will be determined. The respondents consisted of key respondents (experts) and ordinary respondents. Some of the respondents used as parameters in this research are as follows:

Akademisi	:	Pihak Akademisi
BPWC	:	Badan Pengelola Waduk Cirata
DPKBB	:	Dinas Perikanan dan Kelautan Kabupaten Bandung Barat
DLH	:	Dinas Lingkungan Hidup Kabupaten Bandung Barat
DPK	:	Dinas Pariwisata dan Kebudayaan Kabupaten Bandung Barat
PKJA	:	Pembudidaya KJA
TNI	:	Penegak Hukum
MPC	:	Masyarakat Peduli Cirata
UPTKBB	:	Unit Pelaksana Teknis Pembenihan Ikan Kabupaten Bandung Barat
TM	:	Tokoh Masyarakat

Method of collecting data

The method that will be used in this research is through the survey method. The sampling technique used was purposive sampling and random sampling. The data analyzed are primary and secondary data. Primary data is obtained from the results of interviews with respondents and secondary data generated from the literature and statistical data of the relevant agencies. The study was conducted in September-November 2018 in Cipeundeuy District, West Bandung Regency.

Retrieval of KJA cultivator respondents' data is done by Random Sampling, sampling provides the same opportunity or opportunity to be taken to each element of the population (Nasution 2003). The number of respondents taken using the formula Isaac and Michael (1981) with a confidence level of 95%.

$$S = \frac{N\lambda^2 \,.\, (P.Q)}{(d^2(N-1))+(\lambda^2(P.Q))}$$

Information :
S = Number of Samples
N = Total Population
λ = Desired level of confidence (95%)
d = Accuracy level
P = Q = 0.5

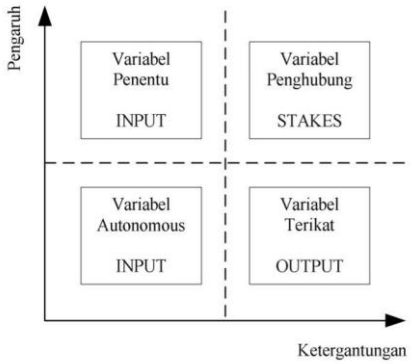
$$S = \frac{1493\ (3{,}841^2)(0{,}25)}{(0{,}05(1493-1))+(3{,}841^2(0{,}25))}$$

S = 70 Person
Based on the above calculations, it can be found that there are 70 KJA cultivators in Cipeundeuy Sub-District. The total number of respondents to be interviewed are 81 person.

Data analysis method

Analysis of the data used in this research is using the MICMAC application, qualitative description analysis, and prospective analysis. According to Hardjomidjojo (2002), prospective analysis is used to predict possibilities that will occur in the future. The prospective stages of analysis in this research are as follows (Hardjomidjojo 2002):

a. Determine the purpose of the system under review
   The purpose of the system under review needs to be specific and understood by all experts who will be asked for their opinions. This is done so that the experts understand the scope of the study and the similarity of views on the system under study. The purpose of the system under review is the reduction strategy of the Cirata Dam KJA.
b. Identify influential factors
   Factors that influence the achievement of these objectives are usually the needs of the system stakeholders studied. Based on the objectives to be achieved, experts are asked to identify these objective factors.
c. Assessment of direct influence between factors
   All factors identified will be assessed as a direct influence between factors, with guideline ratings as follows 0 = no role, 1 = small role, 2 = moderate role, 3 = very important role. The results of the combined matrix of expert opinions are processed by the MICMAC application. The calculation results are visualized in the influence diagram and dependency between factors in Picture 1.



Picture 1. Influence and Dependency Curve

c. Preparation of conditions that may occur (state) on the factor
   Based on the dominant factors obtained in stage 3, conditions that may occur in the future are prepared. Each factor may have more than one situation, provided that conditions must have a very large chance to occur (not khaya-lan) in a future time. Circumstances are not the level or size of a factor, but are descriptions of the situation from a factor.
d. Build and choose a scenario.
   Scenarios must contain all factors, but for each factor only contains one condition and does not include the partner a mutually incompatible situation.
e. Scenario analysis and strategy formulation
   Strategy preparation is based on achieving the desired scenario or avoiding scenarios that have a negative impact on the system.

RESULT AND DISCUSSION

General Location of Research Location

Based on the extensive data of the West Bandung Regency, which is 1,305.77 km², it is located between 60º 41 '- 70º 19' LS (South Latitude) and 107º 22 '- 108º 05' BT (East Longitude) with an area of 1,305.77 square kilometers or around 130,577.40 hectares. Kabu-patent West Bandung has 16 sub-districts, and 165 villages. The borders of West Bandung Regency in the west are bordered by Cianjur Regency, displaying to the north bordering Purwakarta and Subang Regencies, then on the east bordering Bandung Regency, Bandung City, and Cimahi City, on the south bordering South Badung Regency and Regency of Cianjur. In 2012 the population of West Bandung Regency reached 1,572,806 people, the male population numbered 802,607 while women 770,199 people with a sex ratio reaching 1.04. The average population density per square kilometer reaches 1,250 people (BPS 2013).

The West Bandung region is included in zone I in the distribution of fish breeding locations in KJA. Cipeundeuy District is a subdistrict affected by irrigation in the Cirata Reservoir. Cipeundeuy sub-district consists of 12 villages, 170 neighborhood units (RW), 520 neighborhood units (RT), and 24,669 family heads (KK). The twelve villages are Margaluyu Village, Nanggeleng Village, Sirnaraja Village, Jatimekar Village, Bojongmekar Village, Nyenang Village, Cipeundeuy Village, Margalaksana Village, Sukahaji Village, Ciharashas Village, Sirnagalih Village, and Ciroyom Village (Bandung Regency Information Communication and Statistics Office West 2017). Cipeun-deuy sub-district has a total of 31,527 KJA in the Cirata Reservoir with a total number of 1,214 local owners and 279 newcomers, making the total number of KJA owners in Cipeundeuy Subdistrict 1,493 people. Villages inundated with Cirata Reservoir are in 4 villages, namely Margalaksana Village, Nyenang Village, Nanggeleng Village, and Margaluyu Village (BPWC 2018).

MIMAC Analysis Results

Dissemination of Floating Net Cage Reduction

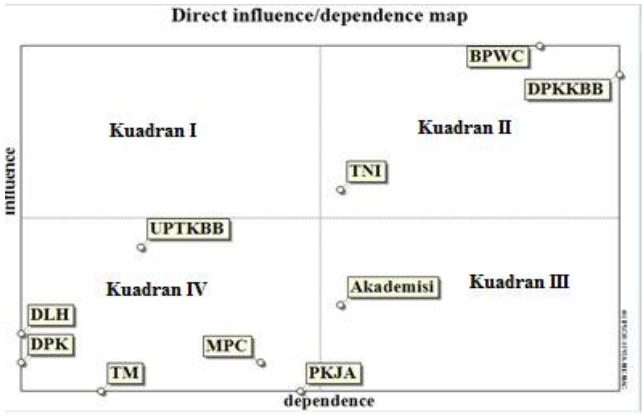
The results of the analysis show that the Fisheries and Marine Service of West Bandung Regency, Cirata Reservoir Management Agency, and Law Enforcement are in quadrant II (variable stakes). Academics are in quadrant III (dependent variable). West Bandung Regency Fish Hatchery Technical Unit, West Bandung Regency Environmental Office, West Bandung District Tourism and Culture Office, KJA Cultivator, Cirata Care Society, and Community Leaders are in quadrant IV (au-tonomus) (Picture 2).

Variables that are in quadrant II are key variables that can influence the reduction of KJA socialization. The entire KJA control process is based on the Decree of the Governor of West Java No. 523.34 / Kep.917-DKP / 2017 concerning the KJA Control and Arrangement Task Force in the Cirata Reservoir has formed a Task Force chaired by the West Java Provincial Office of Marine and Fisheries, BPWC as deputy chairman, and III / Siliwangi Military Regional Command as the head of the security sector. Thus BPWC, Fisheries and Marine Service of West Bandung Regency, and TNI have the duty and authority to carry out socialization of KJA reduction to all relevant stakeholders.

According to presidential regulation number 15 of 2018 concerning the acceleration of control of pollution and damage to the Citarum watershed, the president directly appointed the TNI or more precisely the Commander of the Regional Command for Military Planning III / Siliwangi as the deputy commander. In carrying out the task of the task force the deputy commander jointly coordinates and synergizes in accordance with their respective operational areas while still adhering to the policies set by the director.

Based on the results of the interview, the academics belong to the third quadrant because during the socialization the Academics were not directly involved, the main task of the academics was to conduct research on the condition of the Cirata Reservoir and then provide reports and inputs to the BPWC and DKPP then the BPWC and DKPP would do action. There is no variable in quadrant I because stakeholders cannot carry out the socialization process without assistance from other stakeholders.

Autonomous variables are variables that have weak driving force and dependence. The variables included in this category will be eliminated from the existing measurement variables, because they do not have a significant effect on the measurement process, or in other words the stakeholders do not play a significant role in the socialization of KJA reduction and their dependence on other systems. The highest to lowest influence in KJA reduction socialization is BPWC, Fisheries and Marine Services of West Bandung Regency, TNI, Academics, West Bandung UPT, Environmental Office of West Bandung Regency, West Bandung Regency Tourism Office, MPC, Community Leaders, and Cultivation



Picture 2. The Result of The Analysis of The Role of Stakeholders In Socialization

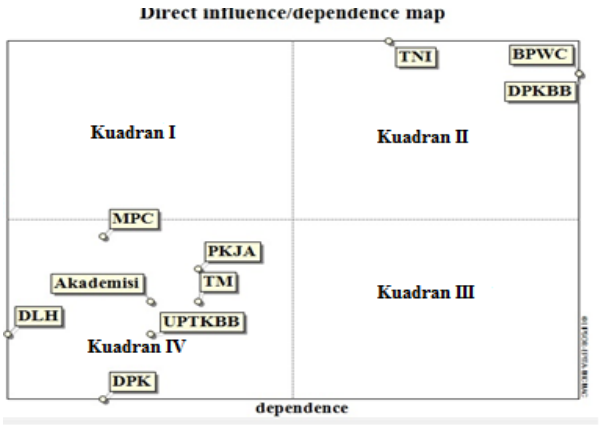
Implementation of Reduction in the Amount of Floating Net Cages

The results of the analysis show that BPWC, TNI, and the Fisheries and Marine Service of West Bandung Regency, Community Figures, and Cirata Care Communities are in quadrant II (variable stakes). Fish Breeding Technical Implementation Unit of West Bandung Regency, West Bandung Regency Environmental Office, West Bandung Regency Tourism and Culture Office, Academics, KJA Cultivators, are in quadrant IV (autonomous) (Picture3). The reduction in KJA in the Cirata Reservoir began in July 2018 which is the initial stage of the implementation of this KJA container and will be carried out in several stages of implementation until 2022.

TNI became the main executor in the implementation of the reduction in KJA in the Cirata Reservoir because the TNI was considered as a stakeholder who had decisiveness in acting and was difficult to resist by those who did not agree with the reduction in KJA. There is a Task Force for the reduction of KJA formed by the government as the operating target team, the target team of this operation is 6 related agencies that collaborate with the BPWC including POL PP, Fisheries and Marine Services, BPWC, TNI, POLRI, and local communities.

The Office of Fisheries and Maritime Affairs of West Bandung Regency in implementing the reduction in KJA has the duty to record, supervise, and determine the KJA targets that must be dismantled. The role of stakeholders in quadrant IV in the implementation of KJA reduction has not been partially seen or its role has been carried out in reducing KJA in the Cirata Reservoir. Like the academics, these stakeholders have a role in conducting research on the condition of the Cirata Reservoir and then giving reports and inputs to the BPWC and DKPP, then the BPWC and DKPP will take action, but in the implementation of the reduction the academics do not act as the target team . Other stakeholders have a role as technical assistants in the field such as reducing organic and non-organic waste in the Cirata Reservoir or needed to move local residents in reducing KJA. Besides that, it will also provide input or education to the community around the reservoir to preserve reservoirs (Ramadhan 2018).

The highest to lowest influence in the implementation of KJA reduction is TNI, BPWC, Fisheries and Marine Services of West Bandung Regency, MPC, KJA Cultivators, Academics, Community Leaders, West Bandung UPT, Environmental Office of West Bandung Regency, and Tourism and Culture Office West Bandung Regency.



Picture 3. The Result of The Analysis of The Role of Stakeholders In Implementation

Post KJA Reduction

In the post-implementation phase, the reduction in KJA in the Cirata Reservoir has not been implemented because the KJA reduction program has not been completed until 2022 so that researchers have not been able to identify stakeholders in the post-implementation reduction of the number of KJA. The results of interviews with the BPWC state that there are business or professional transfer programs after the implementation of the KJA reduction process is carried out which is expected to keep fisheries producers from being disturbed. The business transfer program is located in 3 Regency points, namely in West Bandung Regency, located in Margaluyu Village, Cianjur Regency, located in Kartajaya Village, and Purwakarta Regency located in Pasirjambu Village. These 3 locations will be used as places for piloting other villages in the form of biofloc ponds.

The stakeholders who will collaborate in this business transfer program are BPWC, PT Shinta's fish feed company, and BBPBAT Sukabumi (Center for Development of Freshwater Cultivation). In addition, there are several other business transfers in the fisheries sector that are still planned by the BPWC, District and Provincial Fisheries and Marine Services including catfish cultivation in soil ponds, CBF (Culture Based Fisheries), fish hatchery and fish farming, fish processing (smoked catfish) , shredded catfish, smoked catfish, fish jerky, etc.), and ornamental fish cultivation. There are also business transfers in the non-fisheries sector including entrepreneurship training, duck and duck farming, and quail cultivation. The budget for the transfer of this business amounts to 21 billion each year sourced from the Regional Budget (Regional Budget) and Fisheries and Marine Services of each Regency (BPWC 2018).

Compilation of Development Scenarios

The scenario for developing KJA reduction in Cirata Reservoir is based on key factors that influence the socilization process and the implementation of KJA reduction. Based on these key factors, it is then described about various states that might occur in the future. According to Hardjomidjojo (2002), this is intended to predict the possibility that can occur in these factors, whether it will develop in a direction that is better than now, fixed, or will get worse than the present situation.
Based on the conditions that have been made, a scenario can be drawn up about the possibilities that will occur for the reduction in the number of KJA in the Cirata Reservoir in the future. Scenario 1 is an optimistic scenario, therefore it needs to be encouraged so that the entire plan can be implemented. Scenario 2 is a pessimistic scenario, so policy makers should try to avoid this possibility.

An optimistic scenario (scenario 1) is the creation of a free clean Cirata Reservoir from KJA and other wastes that cause pollution in the waters around the Cirata Reservoir, this situation can be carried out if key stakeholders work together and play an active role with each other then help by stakeholders in quadrants 3 and 4 in socialization and the implementation of a reduction in the number of KJA. Pessimistic scenario (scenario 2) namely if there is a lack of public understanding of the KJA control program, this can be caused when the KJA reduction process for KJA cultivators or village government invited in the socialization does not return to KJA farmers, so there are errors in understanding or information that produces a response that is opposite to the intent and purpose.

Operational Recommendations

The operational recommendations for reducing KJA in the Cirata Reservoir are prepared based on scenarios and possibilities that exist in the stages of socialization and implementation. Recommendations focus on influential stakeholders at each stage. Recommendations are prepared by combining the best possibilities that can be implemented by stakeholders, the results of data analysis, expert opinion and literature studies.

Stakeholders who play a role in the process of socialization are BPWC, TNI, Fisheries and Marine Services of West Bandung Regency, and Academics. The operational recommendations for the socialization phase can be seen in table 2. The socialization process needs to be followed by all stakeholders that influence the reduction in the number of KJA so that the intentions and objectives to be conveyed can be conveyed well to all KJA business actors.

Tabel 2. Recommended operational stages of socialization

No	Form Of Implementation	Executor
1.	Gathering all stakeholder representatives in a forum	BPWC, TNI
2.	Making posters and leaflets in the form of social media or print media about reducing the number of KJA and installing them in certain places	BPWC, DPKBB
3.	Submission of the plan to mitigate the impact of the reduction in KJA	DPKBB
4.	Strengthening reasons for reducing KJA supported by statistics	Pihak Akademisi

At the implementation stage, the stakeholders who play a role are BPWC, TNI, Environmental Office of West Bandung Regency, MPC, and Community Leaders. The operational recommendations for the implementation phase can be seen in table 3. The KJA enforcement will be carried out by stakeholders who have been formed by the BPWC team. The team included the operational target team consisting of TNI, BPWC, DPKK, MPC, and Community Leaders. The team carried out the task of collecting data on all KJA cultivators in each district and then determining the number of KJA to be regulated according to the number of order presentations.

Table 3. Recommended operational implementation phase

No	Form Of Implementing	Executor
1.	Record the number of KJA Owners and determine the number of plots that must be controlled	TNI, BPWC, DPKBB, MPC, Tokoh Masyarakat
2.	Undoing the KJA material and bringing the KJA material to the post that has been determined	TNI, MPC, Tokoh Masyarakat
3.	Keeping KJA material on land until the KJA material owners comes	TNI, MPC, Tokoh Masyarakat
4.	Establishment of a KJA material collection post on reduced land KJA	TNI, MPC, Tokoh Masyarakat

In the post-implementation stage, the role stakeholders are BPWC, TNI, Fisheries and Marine Service of West Bandung Regency, Tourism and Culture Office of West Bandung Regency, Academics, MPC, Community Leaders and BBPBAT Sukabumi. Operational recommendations for the post-implementation stage can be seen in table 4. Reduction of labor due to KJA rationalization will cause unemployment in the villages around the reservoir (Suryana 2013).

This rationalization will also stop employment. Unemployment in rural areas will usually encourage an increase in the number of underprivileged people and will migrate to urban areas with poor quality education, therefore an increase in the potential for unemployment due to this rationalization must be anticipated. Anticipation of unemployment due to the reduction in the number of KJA can be done in several ways including increasing employment when an increase in the area of aquaculture using land pond media, transferring business outside the fisheries sector such as duck farming business which is certainly provided by the government, doing cooperation with investors to provide training for farmers affected by unemployment. After the economic aspect is resolved, stakeholders must also pay attention to the ecological aspects through the assistance of academics who conduct research, recommendations and reporting on the condition of the Cirata Dam after reducing KJA so that the waters of the reservoir remain monitored and their quality is maintained.

Table 4. Operational Recommendations Post-Implementation Phase

No	Form of Implementing	Executor
1.	Conduct a business transfer program in the form of a bio-flok land pool	BPWC, BBPBAT Sukabumi
2.	Periodic guidance and education for business actors	DPKBB
3.	Cooperation with investors in the framework of empowering communities affected by KJA's influence by conducting entrepreneurship	DPKBB
4.	Periodic supervision of the business practices of KJA	TNI, MPC, Tokoh Masyarakat, BPWC
5.	Development of Cirata Reservoir water tourism	DPK
6.	Conduct research and research recommendations after reducing the number of KJA	Pihak Akademisi

Strategy for Reducing KJA in Cirata Reservoir

So far the strategy for reducing the amount of KJA in the Cirata Reservoir carried out by the BPWC has been implemented. The reduction strategy is to control the KJA according to the presentation as follows:
- KJA 0-20 plot ownership = 0%
- KJA 20 ownership> plot <100 = 20%
- KJA 100 ownership> plot <200 = 25%
- KJA ownership> 200 plots = 30%

The KJA withdrawal presentation is determined based on the following information:
1. KJA is off / seriously damaged and no owner is immediately disciplined on the first occasion without notice
2. The non-active KJA is being damaged and there are no fishes and there are pemikik, given 3 days to prepare for the demolition
3. The target of active KJA operations is determined based on the presentation of KJA ownership, starting from the most KJA owners in each region
4. In 2019 until the next stage, active TO KJA is determined evenly annually with a target of 2022 zero KJA.

Another strategy that can be carried out by key stakeholders is by spreading fish seedlings in the Cirata Reservoir, meaning that KJA ransom will continue to be carried out until the predetermined target and convert to the owners in a mutually exclusive manner. The intended conversion is to make KJA farmers as joint cultivators in the Cirata Reservoir. The distribution of these fish seeds can be done during the implementation of KJA control, so that after the reduction in the number of KJA is completed in the next 5 years the fish seeds are large and ready to be harvested. The aquaculture in the Cirata Reservoir will later switch to capture fisheries by prioritizing environmentally friendly fishing methods by using fishing gear that suits their needs and environment.

Conclusion

The most influential stakeholders and dependency in the socialization of reducing the number of KJA are BPWC, Fisheries and Marine Services of West Bandung Regency, TNI, and Academics. The most influential and dependent Stakeholers in implementing the reduction in the number of KJA are the TNI, BPWC, and the Fisheries and Marine Service of West Bandung Regency.

The strategy that can be done to reduce the number of KJA is to control the KJA in accordance with the ownership presentation that has been determined and prioritized by the owner who has the most KJA, based on KJA conditions, KJA cultivators are given a time estimate of 3 days to prepare KJA to be dismantled if the KJA there is still fish, the KJA reduction will be carried out in stages until the target is 2022 zero KJA. The strategy that can be done in the future is to spread fish seeds in the Cirata Reservoir so that the Cirata Reservoir will later switch from aquaculture to capture fisheries that promotes environmentally friendly capture fisheries.

Business transfer planning for KJA cultivators that will be realized by the BPWC, namely fish farming using the bio-floc method. Located in 3 regencies, namely in West Bandung Regency, located in Margaluyu Village, Cianjur Regency, located in Kartajaya Village, and Purwakarta Regency, located in Pasirjambu Village.

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