

## Identification of Hazardous and Toxic Waste Characterization in the Mining Activities of PT Semen Padang

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### ABSTRACT

Dams have a very large ability to develop fish culture, then from that the development of fish culture grows rapidly. This rapid progress greatly resulted in a reduction in water quality, good for the life and progress of fish and their food-living creatures. This dam is also used for capturing fisheries, floating net cage aquaculture (KJA), transportation, and tourism. This research is literary research from several posts that study articles on the status of the sustainability of dams and the sustainability of KJA aquaculture in multidimensional sustainability (environmental, economic, and social sciences). Based on the results of policy research on the sustainability of environmental, social, and economic science and fish farming in dam waters, the sustainability of dams as well as the sustainability of KJA cultivation are very supportive of one another. Prolonged management of the dam will help the sustainability of KJA cultivation.

*KeyWords: Dams, Policy, Environmental Science, Sustainability, Social, Economics.*



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### INTRODUCTION

In the region of the Arabian peninsula, 5 thousand years ago, a blazing volcanic crater that was no longer active was used as a dam by the peasants to store their water. The arid climate and scarcity of water in India gave rise to innovations in the management of the water-energy base approaching the construction of the dam in Girnar in 3000 BC (Wani, 2021). A dam (English: reservoir) is a created lake, or enlarged natural pond, or a dam over a river intended to store water (Baxter, 1977).

Dams are usually formed in river gorges (Wu et al., 2004). Ligon et al (1995) add, Dams are built using the method of constructing an embankment, digging the ground, or practicing conventional architectural methods such as building walls or pouring stones. The term reservoir can only be used to refer to ground-based storage such as groundwater sources, oil sources, or water sources. Dams are large ponds where stale water is stored for various purposes. Dams can be built naturally and can also be made by people. The artificial dam is formed by the method of making an embankment which is then flowed with water until the initial dam is full.

The function of the dam in principle means to hold water when the discharge is large to be used for the duration of the small discharge (Jeong et al., 2007). Bergkamp et al (2000) add, like any other public construction, the reservoir problem concerns surgical planning and treatment perspectives. Lakes or ponds or reservoirs or dams or ponds are one of the bases of brackish water that supports the lives of all human beings and the socio-economic activities of people. The availability of water resources is very important to support the

economic development of the area. A limited water energy base in an area is linked to limited development activities and in conclusion limited economic activity as a result of which the abundance of residents is not easy to achieve.

Lake or dam water can be used for a variety of uses, including basic drinking water for irrigation, electricity generators, flushing, fisheries, and others. The pond ecosystem has a significant role in maintaining the quality and quantity of brackish water availability. The lake is also very liable to changes in weather conditions. Alterations in temperature and rainfall, for example, can specifically affect water evaporation, the size of the upper portion of the water holding capacity, water balancing, and the biological production capacity of lake waters. Several things are needed in dam programming, namely: Basic information, Basic information is data obtained by carrying out experiments on the field, measurement, sampling, and laboratory analysis. Inferior Information, Inferior Information means data- information obtained from institutions. after getting the information – data, then the next day issue a decision that is appropriate or not like the position to be dammed.

The characteristics of a dam which are the main parts of the dam are biological load capacity (live storage), dead storage capacity, maximum water face size (TMA), minimum TMA, and top of spillway according to discharge planning (Gleick, 1992). Starting from the physical characteristics of the dam, the relationship between elevation and reservoir capacity is obtained, which is also called the dam capacity curve.

## METHOD

The method used in this research is the method of literature review with a descriptive analysis approach and uses the concept of systematic review, namely searching the bibliography by reading various newspapers related to the point of research. Nazir-Ali (1998) in his book entitled *Methods of Research* argues that what is meant by bibliography research is a method of gathering information by carrying out research studies on books, literature, notes, and reports that have something to do with the problem being solved. After that, for Nazir-Ali (1998) bibliography research is a meaningful stage where after a researcher has decided on a research point, the next stage is to make observations related to the philosophy of the research point. In search of philosophy, researchers want to collect data at best from the related bibliography. Bibliography sources can be obtained from novels, newspapers, magazines, research results (dissertations and essays), as well as other suitable sources (internet, newspapers, and others).

Literary Research is a method for solving cases by tracing sources of records that have been made before (da Sousa Correa & Owens, 2009). In other words, the term Literature Research is also very often heard with the title of library research. In research that will be carried out, of course, a researcher must have great knowledge related to the subject to be monitored. If not, then it can be determined in a large submission that the research will fail. Supervised sources also cannot be arbitrary. Because not all research results can be used as a reference. Some that are commonly and properly used are books made by trusted short stories (preferably made by academics), accredited objective journals, and student research results in various forms such as theses, dissertations, essays.

The theories underlying the problem and the aspects to be monitored can be found by conducting bibliography research. Not only that, a researcher can get data about similar studies or those related to his research. As well as research that has been tried beforehand. By carrying out bibliography research, researchers can use all the data and thoughts relevant to their research. This bibliography research is a researcher reviewing several

posts with the keywords policy, dams, dam water environmental science, environmental, social, and economic sustainability, and posts obtained from dailies for 2016–2022. For more details can be seen in Table 1 below.

Table 1. Data extraction

Journal Title	Population and Sample	Research result
Policies for Ecological, Social, Economic Sustainability and Floating Net Cage Cultivation	Respondents selected as many as 44 respondents, consisting of KJA cultivators, fishermen arrest, member of the Cirata Caring Community (MPC), Pokmaswas (community group supervisor), Aspindac (association of fish traders Cirata Lake), and the fisheries service	<p>The position of the sustainability status of the dam in the environmental science format is in the indicator number 34.70 or in other words the sustainability status of the Cirata Dam is in a less sustainable status. The stress figure obtained stems from the position of the dam's sustainability status in an economic format in an environmental science format which is 14.68 percent. Such a sensitive situation indicates that a reaction or environmental science policy is needed, especially in the case of water contamination by KJA feces. Water contamination that occurs in the Cirata dam is one of the symptoms of a decrease in the quality of the dam, both as an important function and as an ordinary water use.</p> <p>The position of the sustainability status of the dam in economic terms is in the indicator number 55.80 or in other words the sustainability status of the Cirata dam in economic terms is in a fairly prolonged status.</p> <p>The position of the dam's sustainability status in social terms is in the indicator number 52.14 or in other words the sustainability status of the Cirata dam in social terms is in a fairly prolonged status.</p>
Effect of Heavy Metal Contamination on Sediments towards the Benthic Macroinvertebrate Community: Case Studies in Reservoirs	Retrieval of organisms macroinvertebrate benthic performed on depth of 5 m because in some stations for example Nanjung and Cimerang have depth only 5 meters, so there is a similarity depth of the benthic community macroinvertebrates are expected to be compared with other stations. Number of examples at each observation station is 5 times taken and done composite.	<p>The increase in heavy metal Cd pollution occurred from the origin (St. Gram Doll) to the outlet of the Saguling Dam (St. Rajamandala) which is categorized as relatively large. Cd metal pollution in St. 2 Nanjung (0.26 milligrams or kilograms) and St. 8 The Cipatik threshold (0.23 milligrams or kilograms) indicates a very large metal contamination among all observation stations. After St. Nanjung is starting to show extreme shrinkage and is on track to increase again until St. 8 Cipatik Threshold (0.23 milligrams or kilograms). Cd metal pollution after St. TheCipatik threshold indicates that there is a trend of decreasing back to St. 12 Intake structure (0.11 milligrams or kilograms).</p> <p>Seven areas of the factory area that are passed by S. Citarum have the potential to bring heavy metal contamination into the Saguling Dam including the areas: Majalaya, Barisan, Rancaekkek, Dayeuhkolot, Ujung Berung, Cimahi, and Padalarang (Rachmatyah 2003). Another anthropogenic activity that has the potential to increase Pb metal in the area is originating from non-point sources from motorized transportation fumes. Pb metal is commonly added to gasoline to increase the octane number in motorized transportation engines.</p>
Aquatic ecological aspects for the application of capture fisheries based on cultivation in reservoirs	Measurement of several parameters of aquatic ecology and fisheries biology is carried out directly in the field (in-situ). Water samples were taken at depths ranging from 0, 2, 4, 8 to depths bottom of the waters for the purpose of representation in the waters column using a Kemmerer Water Sampler with a volume of 4.2 liters.	<p>Most of the water quality observed is still within the range of quality standards required for fishing activities (Basic Quality Category 3) in Rule Regulation No. 22 of 2021 regarding Implementation of Protection and Management of Living Areas, although the STORET indicator.</p> <p>The water temperature, DO content and pH on the plains are relatively higher and begin to decrease from 2 meters in strength. The opposite situation occurs in the turbidity benchmark where turbidity tends to increase to the bottom of the water. This happens because the underwater consists of mud and dissolved and/or suspended organic or inorganic materials which tend to increase turbidity. The mud</p>

		<p>element has a specific gravity that is much greater than water, so it certainly settles and there may be basic currents that can stir up the underwater structure.</p> <p>The reservoir meets eutrophic standards based on P-PO4 and chlorophyll-a standards. The nitrate benchmark also proves the status of a productive dam even though it has a longer (mesotrophic) character.</p> <p>The potential for fish creation in the Penjalin Dam is based on the chlorophyll-a standard which ranges from 147.8 to 682.1 kilograms or ha or year with an average of 336.6 kilograms or ha or year. Trying to spread fish can reduce the ability to form eutrophication due to the status of productive waters.</p> <p>It is known that GIFT manila and betutu fish are carnivorous or piscivorous because 80 percent of their food is in the form of fish, whereas tilapia and beunteur are herbivorous or planktonic because 80 percent of their food is in the form of phytoplankton.</p> <p>The development of CBF is one of the efforts to use water bodies in dam or pond waters by means of stocking fish originating from nursery institutions. Not only does it aim to increase the production of capture fisheries, CBF also functions to improve the fish energy base because it can improve the quality of water areas and fish stocks in dams or ponds (Kartamihardja, 2015). The CBF program must meet several requirements so that its implementation can be successful (Aisyah et al., 2019). For Agostinho et navy (AL).(2010), one of the important aspects of the CBF requirements is the view of aquatic environmental science which encompasses dam or pond ecosystems. Objective observations related to the environmental science view of dam waters which will be the object of CBF application need to be carried out, apart from the view of the availability of nursery institutions, social economy and institutions near the dam. This view of aquatic environmental science includes abiotic aspects such as quality and carrying capacity of waters and biotic aspects such as fish communities, food networks and their interactions.</p>
<p>Evaluation of the role of fish species in the utilization of feed resources and space in the reservoir</p>	<p>Six representative observation points the Citarum Channel, Cilalawi Channel, and main inundation areas, and these observation stations include: 1) Sodong, 2) Bojong-Jamaras, 3) Kerenceng, 4) DA1v1, 5) floating net pocket, and (6) Ubrug</p>	<p>Feeding habits, depth, and interactions with fish species show that the position of the food energy base in these waters is quite complete. On the other hand, based on an analysis of the use of space horizontally, it proves that the dekameter area or important puddles are less able to be used optimally. This means that stocking the type of fish in the chart containing empty ecological depths is not needed, but stocking the fish needed in the chart increases the efficiency and ability to utilize the available energy base, especially space. Therefore, in an effort to increase the efficiency and ability to utilize existing energy sources, especially in important willow areas, it is necessary to spread fish species with Pelajis characteristics and plankton predators.</p>
<p>Management Strategy for Catfish (Pangasianodon hypophthalmus) in the reservoir</p>	<p>Spreading catfish (Pangasianodon hypophthalmus) in Gajah Mungkur Reservoir</p>	<p>In early 2012 there was a violation of fish detention in fishery shelters in a grand way to this day. This situation has resulted in the creation of catfish capture fisheries in the Gajah Mungkur Dam which are becoming increasingly sharp. Some of the efforts that need to be done to improve catfish resources in the Gajah Mungkur Dam include restoring the function of fishery shelters in the KJA zone belonging to PT. Aquafarm, maximizing management based on local virtues assisted by legal views, as well as implementing catfish stocking in Fishery Refugees.</p>

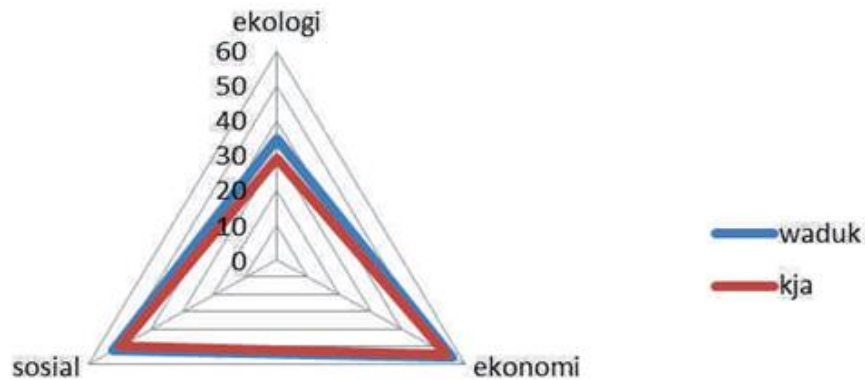


Figure 1. Sustainability search chart for environmental, economic and social science formats of dams and KJA in reservoir waters (In Indonesia)

Daily searches use web searches on Google Scholar with the keywords wisdom, dams, dam water environmental science, sustainability of environmental, social, and economic sciences. Determination of posts also determines the year limit around posts obtained from 2016-2022 dailies. The daily form used is PDF, speaks Indonesian and English, and is a free daily. Research diaries that match the criteria sought are then combined and analyzed and then made as information extraction. The research results of all the daily collected after that were collected to respond to the mission of the research.

## RESULTS

In making this research the author made a limit of only 5 days to be reviewed. Daily that does not meet the limit will be grouped as an exclusion benchmark such as a research review. The days found to match the search limit and then filter to 6 days. From the search results on the Google Scholar website, 5 days were selected to be reviewed which can be seen in chart 1. Policy-related research papers for environmental, social, and economic sustainability and fish farming in dam waters can be found in the research daily Hidayat et al (2016 ) reports on the position of the dam's sustainability status in the environmental science format in indicator number 34.70 or other words the status of the sustainability of the Cirata Dam is in a less sustainable status.

The stress figure obtained stems from the position of the dam's sustainability status in an economic format in an environmental science format which is 14.68 percent. Such a sensitive situation indicates that a reaction or environmental science policy is needed, especially in the case of water contamination by KJA feces. Water contamination that occurs in the Cirata dam is one of the symptoms of a decrease in the quality of the dam, both as an important function and as an ordinary water use. The position of the sustainability status of the dam in economic terms is in indicator number 55.80 or other words the sustainability status of the Cirata dam in economic terms is in a fairly prolonged status. The position of the dam's sustainability status in the social format is in indicator number 52. The research of Sudarso et al (2018); Dewata & Putra (2021) also proved that the increase in heavy metal Cd pollution occurred from the original section (St. Gram. Dolls) to the outlet of the Saguling Dam (St. Rajamandala) which is categorized as relatively large. Cd metal pollution in St. 2 Nanjung (0.26 milligrams or kilograms) and St. 8 The Cipatik threshold (0.23 milligrams or kilograms) indicates very large metal contamination among all observation stations. After St. Nanjung is starting to show

extreme shrinkage and is on track to increase again until St. 8 Cipatik Threshold (0.23 milligrams or kilograms). Cd metal pollution after St. The Cipatik threshold indicates that there is a trend of decreasing back to St. 12 Intake structure (0.11 milligrams or kilograms). 7 areas of the factory area passed by S. The Citarum has the potential to cause heavy metal contamination to the Saguling Dam covering the following areas: Majalaya, Barisan, Rancaekek, Dayeuhkolot, Ujungberung, Cimahi, and Padalarang (Rachmatyah 2003). Another anthropogenic activity that has the potential to increase Pb metal in the area is originating from non-point sources from motorized transportation fumes. Pb metal is commonly added to gasoline to increase the octane number in motorized transportation engines.

A research daily conducted by Aida et al (2022), reported that most of the water quality under investigation was within the quality baseline range required for fishing activities (Basic Quality Category 3) in Rule No. 22/2021 regarding the Implementation of Protection and Management of Living Areas, although the STORET indicator. water temperature, DO content, and pH on the plains are relatively greater and begin to decrease from 2 meters in strength. The opposite situation occurs in the turbidity benchmark where turbidity tends to increase to the bottom of the water. This happens because the underwater consists of mud and dissolved and/or suspended organic or inorganic materials which tend to increase turbidity. The silt element has a specific gravity that is much greater than water, so it certainly settles and there may be basic currents that can stir up the lower layers of the water. The dam fulfills eutrophic standards based on P-PO<sub>4</sub> and chlorophyll-a standards. The nitrate benchmark also proves the status of a productive dam even though it has a longer (mesotrophic) character. The ability to produce fish in the Penjalin Dam is based on the chlorophyll-a standard which ranges from 147.8 to 682.1 kilograms or ha or year with an average of 336.6 kilograms or ha or year. Trying to spread fish can reduce the ability to form eutrophication due to the status of productive waters. It is known that GIFT manila fish and betutu are carnivorous or piscivorous because 80 percent of their food is in the form of fish, On the other hand, tilapia and blunter are herbivorous or planktivorous because 80 percent of their food is in the form of phytoplankton. The development of CBF is one of the efforts to use water bodies in a dam or pond waters using stocking fish originating from nursery institutions. Not only does it aim to increase the production of capture fisheries, but CBF also functions to improve the fish energy base because it can restore the quality of water areas and fish stocks in dams or ponds (Kartamihardja, 2015).

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A research daily conducted by Aida & Utomo (2017), reported that in early 2012 there were violations of fish detention in fishery shelters in a grand way to date. This situation has resulted in the creation of catfish capture fisheries in the Gajah Mungkur Dam which are becoming increasingly sharp. Some of the efforts that need to be done to improve catfish resources in the Gajah Mungkur Dam include restoring the function of fishery shelters in the KJA zone belonging to PT. Aquafarm, maximizing management based on local benevolence assisted by legal views, as well as carrying out stocking of catfish in Fishery Refugees.

## CONCLUSION

The sustainability of the dam or the sustainability of fish farming greatly influences one another. Prolonged management in dams will affect the sustainability of fish farming. Prolonged management in fish farming will support the sustainability of the dam as a whole, on the contrary, bad management of dams or fish farming will become an obstacle to the realization of sustainable management. The results of the analysis of indicators for the sustainability of dams and fish farming are presented in Chart 1, in addition to the analogy for the sustainability of dams and fish farming presented in Figure 1. We can conclude that from a sustainability perspective, we must pay close attention to the perspectives that have a very significant impact, namely environmental science view, economic views, and traditional social views. From the totality of the review posts, we can conclude, every time a policy is developed, whether it has a development character or not, we must analyze these 3 important views, namely the view of the area or its ecosystem (environmental science), the economic view and by no means surrender is social. local customs.

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