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Research Article

Study of Water Pollution Control Law in Sikendil and Selilin Rivers, Semarang Regency

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Abstract

Global environmental monitoring shows that conditions in developing countries are becoming increasingly alarming. Water pollution is a frequent problem. Rivers are synonymous with irrigation sources, domestic water supply, industrial needs, etc., posing serious hygienic and ecological problems. However, the current existence of water is undermined by environmental disasters, land use, geopolitical conflicts, pollutants, and population growth. This paper aims to determine pollution control efforts in dealing with river pollution problems legally and provide recommendations for River Management Strategies based on the opinions of experts in the field of water resources as an alternative to pollution control. The method used is descriptive qualitative to describe river pollution control efforts and river management strategies. This research focused on the problems of Sikendil River and Selilin River in Klepu Village, Pringapus Subdistrict, Semarang Regency. The results show that water pollution control by stakeholders requires good coordination and facilitation from relevant agencies, starting from improving the social, technological, regulatory, and institutional foundations as well as the ecological foundations of the industry and surrounding communities so that river pollution problems can be resolved. The most dominant and most important aspect is social institutions with a value of 0.427, and the most dominant alternative is community participation with a value of 0.546, so that the aspect of social institutions with alternative community participation can be the most prioritized strategy to be applied in river pollution cases.

Keywoards: Environmental Law; River Control Strategy; Water Pollution

INTRODUCTION

Water is one of the main needs of living things. Water availability and clean water management and sanitation are the indispensable goals of SDGs number 6 to create universal safe, and affordable drinking water access for all people by 2030. One of the goals is to improve water quality by reducing pollution and eliminating waste disposal. Furthermore, Minimize the disposal of hazardous chemicals and materials, halving the proportion of untreated wastewater, and substantially increase safe recycling and reuse globally [1]. Water covers 70% of our planet, and it is easy to think that water will always be abundant. However, the freshwater material we drink, bathe, irrigate our agricultural fields is very rare. Only 3% of the world's water is freshwater, and two-thirds of it is stored in frozen glaciers or is not available for us to use [2].

Rivers are one of the most important water bodies as a water resource for human use and ecosystems and health sustainability. Rivers are synonymous with irrigation sources, household water supplies, industrial needs, and others, so they tend to cause serious hygienic and ecological problems [3]. Pollution is caused by the increasing number of people, resulting in high public consumption changes every year. The area of land will be increasingly under pressure. Human activities from the agricultural sector, household, and industrial activities will cause waste, which will have an impact on water pollution which reduces water quality [4].

However, the presence of water is currently affected by the threat of environmental disasters, land use, geopolitical conflicts, contaminants, and population growth [5]. Besides, industrial growth, urbanization, and degradation by being used as waste disposal sites, forest pruning, and water availability depletion play a role in damaging aquatic ecosystems [6], [7]. In Indonesia, there are 82% of 550 rivers scattered throughout Indonesia damaged due to pollution. River pollution is caused by domestic waste such as household and industrial waste [8]. River water flow produces pollutants faster than stagnant water [9].

The Sikendil River and Selilin River are rivers located in Klepu Village, Pringapus District, Semarang Regency. Based on the field conditions, the Sikendil and Selilin rivers are industrial, agricultural, and residential. These activities have greatly affected water quality, especially industries that have repeatedly polluted, with several companies around the river that have polluted, namely PT. Java Eng Specialties (producer of liquid eggs) and PT. Mangkok Mas (producer of sauce). The results of contamination, which were proven through laboratory tests in May 2019, showed chemical parameters with high COD waste of 87.24 mg / L, Nitrate of 35.8 mg / L, Nitrite of 15 mg / L, Manganese 0.2 mg / L, Sulfate 13 mg / L, and Ammonia 0.01 mg / L in the Sikendil River. These parameters have exceeded the quality standards stipulated in Government Regulation No. 82 of 20001 concerning water quality management and pollution control (Environmental Office of Semarang Regency). Previous research has shown the results of water quality with the polluted category in water classes 1, 2 and 3 with points 9.50, 9.41, and 9, 35. In water class 4 it is categorized as moderate polluted with points 1.66. This means that the river is good for water class 4 designation for irrigating plants [10].

An effective and effective strategy is needed to deal with pollution in certain areas. Law enforcement must also be applied, especially against companies or industries that significantly

contribute to environmental damage [11]. The Pollutants' Payment Principle must be fully adopted in line with stricter laws and regulations with the effective management of sustainable rivers [12].
Legal actions against environmental pollution and destruction perpetrators consist of administrative aspects, civil aspects, and criminal aspects. In Article 76 paragraph (2) of Law Number 32 of 2009 concerning Environmental Protection and Management, it is explained that administrative sanctions consist of written warnings, government coercion, suspension of environmental permits, revocation of environmental permits [13]. Support through policy making for changes in environmental management and protection through statutory policies in order to create responsive and rational court decisions for the people is urgently needed [14]. Whatever the government's strategy, if there is no support from the community and the quality of the community and human resources, then the appropriate management is not possible [15].

Integrating stakeholders' views on environmental and management policies are increasingly in demand because of the many benefits of stakeholder participation. Information on water quality that is measured scientifically through its pollutant parameters needs to be complemented by the views of stakeholders so that it can become a valuable source of data [16]. River pollution control is handled by knowing the quality of river water in terms of the physical, chemical, and biological parameters of the pollutants. It requires understanding and integration through community and stakeholder support because policies must agree with the affected local communities. Agreement through public perception can guide policy management. However, scientific measurement of water quality should not be replaced by stakeholder perceptions because aspects of ecological integrity may not be important for the public segment but are important in water management [17]. Policymakers need to consider stakeholders' perceptions of river quality. Urgent steps are needed on water resources, environmental protection agencies, water bodies, and community sanitation to investigate the types of vegetation present, whether they are ecologically beneficial or harmful to humans and other organisms. Increasing stakeholder knowledge can help prevent polluting behavior that creates negative perceptions regarding river water quality [17].

METHODS

The method used is descriptive qualitative related to the problem of legal water pollution and pollution control strategies according to experts in the field of water resources using a questionnaire and collecting primary and secondary data from laws and regulations, articles and related agencies. Data collection techniques using the AHP method. AHP analysis is an alternative study to obtain the design of an environmental restoration model. This method divides problems based on hierarchy in form of alternatives with a comparison of which alternative is better in a management [18]. The use of AHP in determining policy direction policy, can solve a problem in an organized framework, so that it can be expressed to make effective decisions [19]. Stakeholders (DLH, DPU of Semarang Regency, and Pusdataru Agency) are the ones conducting the assessment [20]. This analysis is assisted by expert choice 11 software which will sort based on the priority scale of criteria and alternatives which results if the consistency ratio is <0.1 then the results are consistent and can be implemented as a policy.

Hierarchy of River Water Pollution Control Strategy Determination based on aspects of planning management, social institutions, and ecology.

RESULT AND DISCUSSIONS

This research is different from other research in that the investigation involves stakeholders who are experts in their fields and describe in detail and clearly the control efforts are undertaken. Not only that, this study provides recommendations for river control strategies according to experts in the field of related water resources, namely the environmental service, public works service, and one-stop integrated investment service in the Semarang district.

Public Complaints

There is anxiety experienced by the surrounding community regarding allegations of river pollution, which was followed by a public complaint to the Semarang Regency Environmental Service, which was found by PT Mangkok Mas and PT Java Egg Specialties causing a color change in the location of the Sikendil river due to leaks in pipelines, coal, soy sauce channels leaking and leaking diesel fuel. This is because the company has been running for a long time and lacks maintenance and poor environmental management, which is the business owner's commitment. The complaint process is under the Minister of Environment and Forestry Regulation No. P.22 / MenLHK / setjen / set.1 / 3/2017 concerning Procedures for Management of Complaints on Alleged Pollution and/or Environmental Destruction and/or Forest Destruction.

Legal basis for industrial river pollution

The industry has violated the stipulated provisions so that the basis for freezing the Liquid Waste Disposal Permit (IPLC) is frozen based on Semarang Regency Regulation Number 5 of 2016 concerning Wastewater Disposal Permits and Wastewater Utilization Permits, Central Java Provincial Regulation Number 5 of 2012 concerning Wastewater Quality Standards, Government Regulation Number 82 the Year 2001 regarding Water Quality Management and Water Pollution Control Article 31 (a) Preserving water quality in water sources as referred to in Article 4 paragraph (3) and Article 31 (b) Controlling water pollution in water sources as referred to in Article 4 paragraph (4), Law Number 32 the Year 2009 regarding Environmental Protection and Management, Semarang Regent Decree Number 130/0440/2017 concerning Delegation of the Authority of the Semarang Regent to DPMPTSP to issue and sign non-permit permits. The signing of a collaboration related to billboard management and a letter from the Regent of DLH Semarang regarding the revocation of the recommendation for liquid waste disposal from the two companies.

Administrative sanctions that have not been fulfilled in 2018 even though the Company received recommendations for environmental documents No.660.1 / ukl-upl / 1035/2016 dated May 9, 2016, among which were ordered to increase the capacity of WWTP due to increased production on May 9, 2016. However, only 2 years, there were complaints from residents at the Klepu location regarding the Sikendil river condition, which resulted in Coercive Administrative

Sanctions No.660.1 / 300 of 2018 PT Mangkok Mas and no. 660.1 / 2380/2018 to PT. Java Eggs Specialties. The two companies are currently undergoing Government Coercive Administrative Sanctions in August 2018 to carry out WWTP repairs, such as making a clarifier tub in the WWTP installation as a location for sludge deposition and making a drying bed to dry the sludge and placing a spare blower if there is damage to the WWTP pump and making storage places while B3 waste.

Stakeholders' Efforts In Pollution Problems

The Action Of The Semarang Regency Environmental Service (DLH)

Based on Office Records Number 660.1 / 1864/2019 concerning Pollution Reports that Occurred in the Sikendil River, Klepu Village, Pringapus District, the Semarang Regency Environmental Service Office carried out:

1. Conducted a field review on Sunday, May 05, 2019, and found that the Sikendil river water (coordinates 07 ° 10'52.6 ″ South Latitude and 110 ° 26'52.5 ″ East Longitude) had returned to normal.
2. Identifying the parties polluting the river, dumping liquid waste into the Sikendil River, namely PT. Mangkok Mas and PT. JESS.
3. Checking the two companies' locations on Monday 6, May 2019, showed that PT Mangkok Mas found that the PT. Mangkok Mas broke down, so there was a spillage of orange water in the drainage channel while at PT. Java Eggs Specialties (JESS) is currently conducting production trials for ketchup and red chili sauce, and the company leadership has not been excluded from the trial. The quality standard in IPLC does not include the production of tomato sauce and chili sauce.
4. Conduct a sample test that comes out of the outlet of the company PT. Mangkok Mas and the second river dumped waste. The analysis showed that the parameters of COD, Ammonia, Chlorine, and Total Coliform exceeded the wastewater quality standards according to the Regional Regulation of the Province of Central Java Number 5 of 2012.License suspension by DPMTSP One-Stop Integrated and Investment Agency in Semarang district

Facilitation and Clarification

Complaints in Minutes of Facilitation and Clarification of Complaints on Environmental Problems Number: 660.1 / 1825/2019. Wednesday Fifteenth, May Two Thousand Nineteen at 9:00 a.m. to 12:00 a.m. WIB at the Semarang Regency Environmental Service Meeting Room, a meeting was attended by Semarang District DLH, DPMTSP, Satpol PP, Klepu Village Head, and residents to facilitate complaint handling environmental problems from the activities of PT. Mangkok Mas and PT. Java Eggs Specialities (JESS) which resulted in the following points of agreement:

1. PT. Mangkok Mas and PT. Jess to improve management and monitoring of the performance of the Wastewater Treatment Plant (WWTP).
2. PT. Mangkok Mas and PT. Jess to undertake activities to clean up rivers and spread fish seeds.

3. PT. Mangkok Mas and PT. Jess reapply for a new IPLC and submit the old Liquid Waste Processing Permit (IPLC) to the Semarang Regency One-Stop Investment and Integrated Services Office.
4. PT. Mangkok Mas and PT. Jess to attach the wastewater test report apart to the Environmental Agency and Klepu Village (Pringapus) and provide access to Klepu residents to report incidents of wastewater pollution.
5. PT. Mangkok Mas and PT. Jess to improve its environmental management division to increase its efforts to monitor environmental management and increase recruitment of personnel from affected areas.
6. If the company fails to implement the statements in numbers 1 to 5 above, the said company is willing to accept legal action in the context of enforcing the Semarang Regency Regional Regulations and the applicable laws and regulations.

Action One-Stop Integrated and Investment Agency (DPMPTSP)

One-Stop Integrated and Investment Agency (DPMPTSP) suspended PT JESS's environmental permit based on the follow-up recommendation of revoking the WWTP recommendation from DLH in mid-December 2019. Based on Article 31 of Regional Regulation No. 5 of 2016, the IPLC permit is suspended by temporarily suspending business/activities, moving business facilities, closing sewerage, dismantling, confiscating goods/production tools that cause violations, temporarily stopping the business, taking actions aimed at stopping the violation and taking remedial measures. DPMPTSP calls on PT JESS to repair WWTP under Regional Regulation No. 5 of 2016 by independently closing the sewerage and building a clarifier tub (a tool/place to purify cloudy raw water) to increase the capacity of managing liquid waste and reporting to DLH no later than January 14, 2020, and is required to take care of new permits. Meanwhile, PT JESS can use vacuum cleaner services for its liquid waste disposal.

Supervision

This supervision is carried out to obtain information supporting decision-making in granting or extending permits and examining compliance in implementing administrative sanctions (Handbook of Supervision & Law Enforcement in Water Pollution, 2017). Supervision is carried out comprehensively, including permits and study documents or analysis on which the licenses are issued. The results of supervision carried out by the Semarang Regency Environmental Agency are carried out by Incidental Supervision, which is carried out at any time if there are allegations of environmental pollution and damage. This incidental supervision is carried out in the event of a public complaint regarding the alleged environmental pollution, which has an important or disturbing impact on the community or the existence of a disaster referred to in the legislation related to disaster management an impact on the environment. Incidental supervision is carried out directly at the location of the business and/or activity. Supervision is carried out on administrative sanctions with the imposition of sanctions that can be carried out cumulatively internally by applying sanctions that are carried out by combining several types of administrative

sanctions on one violation (Yusuf (2014). In this case, government coercion sanctions combined with permit suspension sanctions)

Evaluation

Evaluation is carried out to avoid administrative sanctions given whether it is by the effect according to the purpose of the impact, in the case of river pollution due to industry, PT. Mangkok Mas and PT. Java Egg Specialties have received administrative permits due to residents' complaints at the Klepu location regarding the condition of the Sikendil river. The administrative sanctions given in 2018 have not yet been fulfilled until 2019. The industry is carrying out these sanctions by improving WWTP performance, but it takes a long time to relieve. However, administrative sanctions have not yet been completed; factory waste emerged from the two companies in May 2019, followed by public complaints. It turns out that the company is still dumping waste into the river due to carelessness and tools that are not suitable for their use. So far, administrative sanctions have not had a deterrent effect on the company.

The environmental agency enforced the WWTP recommendation's revocation to the Semarang Regency One-Stop Investment Service (DPMTSP) to suspend the WWTP permit in mid-December 2019.

During the revocation of the IPAL for the two PTs, various parties such as the government, industry, and residents made efforts to control the Sikendil and Selilin rivers in Semarang Regency manipulating in the following table

Table 1. Analysis of efforts to control water pollution in the Sikendil and Selilin rivers, Semarang district

No	Aspects of river water pollution control	Indicator
1	Role of Government	1. There is a liquid waste disposal agreement which is regulated in the Semarang Regency Regulation Number 5 of 2016 concerning Wastewater Disposal Permits and Wastewater Utilization Permits, Central Java Provincial Regulation Number 5 of 2012 concerning Wastewater Quality Standards 2. Conducting industrial supervision efforts 3. The existence of an online complaint forum that makes it easier for the community in case of river pollution 4. There is good coordination between various stakeholders (DLH Semarang Regency, Industry, DPMPTSP, Village Head) 5. Sufficient information and data in dealing with industrial pollution problems 6. The granting of industrial permits is under the RTRW, but the industry sometimes fails to maintain the WWTP and drainage channels to enter water bodies that exceed quality standards.

		7. Resolution of river pollution that occurs can be properly resolved by mutual agreement according to suggestions for river improvement, repair of WWTP, and issuance of new IPLC permits by attaching the WWTP outlet results for the last 3 months. 8. In the absence of periodic water quality monitoring activities in river water bodies, Sikendil and Selilin river classes' designation has not been determined.
2	Industry Role	1. Both industries have improved the river by forming MAPELING (Community Caring for the Environment) and donating funds and workers from the industry to clean up the river and stockfish seeds in the river. 2. The industry has made improvements to WWTP and issued new IPLC licenses by attaching the WWTP outlet results for the last 3 months to DPMTSP. 3. Industry parties that are closed enough to other unrelated parties to be questioned regarding the control 4. The industry is expected to be consistent in the following years in terms of waste produced to comply with quality standards before being disposed of into river water bodies. It is better if we apply zero waste by reusing it.
3	Role of society	1. The community is part of MAPELING (Community Care for the Environment) and can help monitor the river's condition. 2. Some people do not know about the river pollution that has occurred due to a lack of socialization or lack of community awareness regarding river pollution.

Source: *Analysed from the primary source.*

Completion

After these efforts, PT mangkok mas and PT Java Egg Specialties obtained new WWTP permits by reporting the implementation of the requirements and obligations every 6 (six) months based on Article 53 paragraph (2) of Government Regulation Number 27 of 2012 concerning Environmental Permits.

1. **PT Jess**

   Clarifying through an official report on environmental problems with number 660.1 / 1825/2019 point 3, PT Jess re-submits a new IPLC and submits the old IPLC to the Semarang Regency One-Stop Investment Service and attaches a wastewater disposal permit, a recommendation for disposal of wastewater to the source water, analysis results for the past 3 months and minutes of facilitation and clarification of complaints on environmental issues as a consideration.

On February 13, 2020, based on the letter of the Head of the Semarang Regency One-Stop Investment and Integrated Service Office no.510.4 / 314 PT JESS has made efforts to build a new wastewater treatment plant (WWTP), the results of the inspection by DLH have met the quality standards according to the Regional Regulation Central Java no.5 of 2012 concerning Wastewater Quality Standards. So that the revocation of the WWTP permit suspension for PT. JESS can be accepted provided that the company maintains the quality of wastewater under quality standards, the position of the fall of wastewater entering the water body (outfall) must be observed, water sampling is carried out with outfall.

2. PT Mangkok Mas

On March 9, 2020, based on the letter of the Head of the Semarang Regency One-Stop Investment and Integrated Service Office no.510.4 / 469 PT PT Mangkok Mas has made efforts to build a new Wastewater Treatment Plant (WWTP). (Received PT. Mangkok Mas letter no.004 / MM / VIII / 2019 concerning Application for WWTP Direction 26 August 2019 and sent WWTP referral letter to PT. Mangkok Mas after receiving WWTP referral application 27 August 2019

The examinations were taken in December 2019, January 2020, and February 2020 have met the quality standards under Central Java Regional Regulation No. 5 of 2012 concerning Wastewater Quality Standards. Based on the results of monitoring of the wastewater quality test for WWTP at coordinates (07 ° 11'06.5 "LS-110 ° 26'31.11" East Longitude), the periods of July, December 2019, and January 2020 have met the environmental quality standards set. In connection with this, the letter of DLH Semarang Regency no.660.1 / RPLC / 2017 dated 27 March 2017 concerning Recommendations for Disposal of Wastewater to Water Sources for PT. Mangkok Mas Dusun Ngempon RT.05 RW.03 Ngempon Village, Bergas District, Semarang Regency is valid.

Control Efforts from the Ministry of Environment and Forestry (KLHK)

Based on the technical guidelines for river water quality restoration (method of improving river water quality) from the Ministry of Environment and Forestry (KLHK), the following efforts are made:

Table 2. Control Efforts from the Ministry of Environment and Forestry (KLHK)

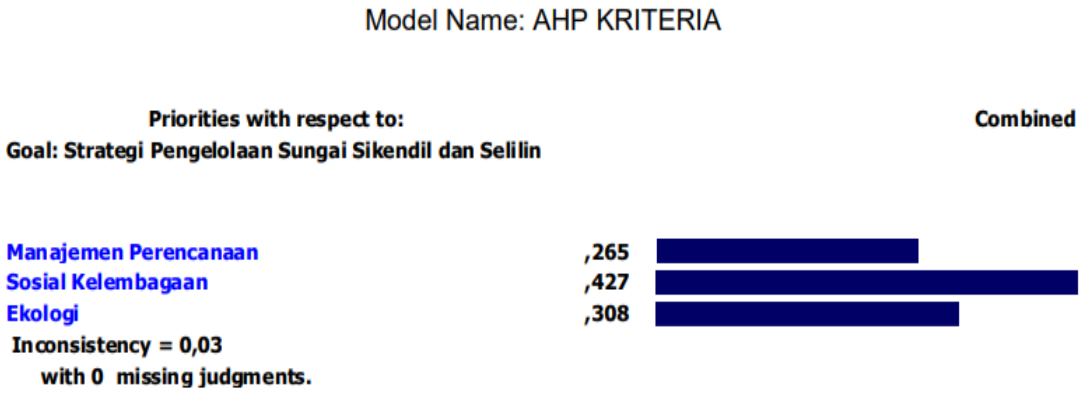
No	Control Efforts	Information
1	Social Base	River pollution control is carried out by using a social approach to the community. Involve the community in monitoring and maintaining river conditions, together to clean up the river
2	Technology Base	Technological approach with the addition of new WWTPs and carrier body improvements in each company
3	The regulatory and institutional basis	Support and facilitation from related agencies that are responsive in dealing with river pollution that occurs

4	Ecological Basis	Spread fish seeds every 3 months once in the river, cleaning up disturbing plants around the river

Source: *Analysed from the primary source.*

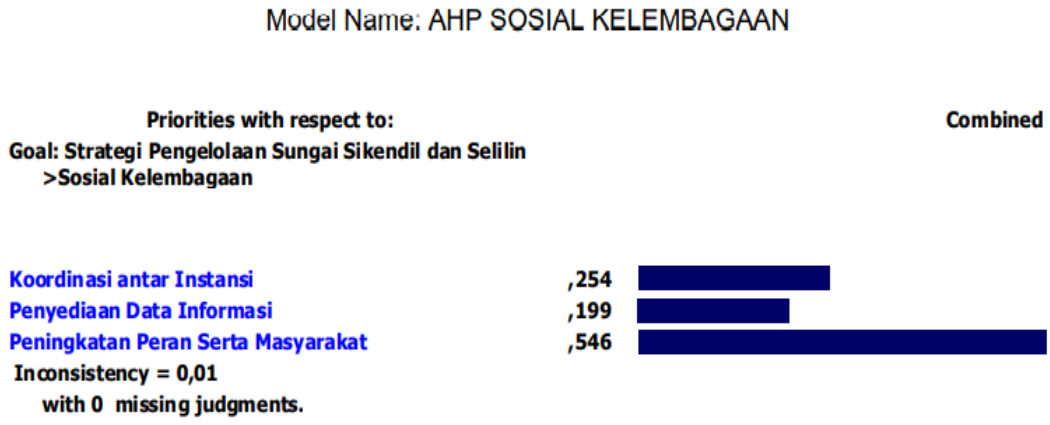
River Management Strategy

River based prioritization using the AHP method according to experts in the field of water resources. This study used 2 experts from the Semarang Regency Environmental Agency, 2 experts from the Semarang Regency Public Works Agency, 3 experts from BBWS Pemali Juwana Semarang, and 1 expert from the Semarang Pusdataru Office. The total number of experts who became respondents in this study was 8 experts. Calculating river management strategies using expert choice 11 software. Strategies used by comparing institutional aspects of planning, social aspects of institutions, and ecological aspects in the table below



Graph 1. Dominant Aspects of River Management Strategy using expert choice 11 software

It can be seen that in the three criteria above, namely aspects of planning management, social institutions, and ecology, the greatest value according to experts is in social institutions with a value of 0.427. Meanwhile, the aspects of social institutions can be seen in the table



Graph 2. Dominant Aspects of Social Institutions.

The most dominant according to experts is increased community participation with an inconsistency of 0.01 still below 1 so it is valid, with a value of 0.546.

In planning management, determining river class segmentation is a priority that must be prioritized for River Management Strategies.

CONCLUSION

River pollution control efforts are carried out in a very structured manner between stakeholders, namely the environment office, public works office, and one-stop integrated service in Semarang district. Implementation of river pollution control runs according to applicable policies and is a real implementation of river condition improvement. The role of related agencies is in accordance with applicable laws and policies. Consistency is needed from the company to maintain the quality of wastewater so that it meets the quality standards set in the IPAL permit before being discharged into the river.

It would be better to utilize the waste so that no waste needs to be discharged into the river. Coordination between related agencies is correct. Complaints received by the Semarang district environment office have followed up on complaints from the public based on Article 25 paragraph (2) of the Minister of Environment Regulation Number P22/Ministry of Environment/Set.1/3/2017 on Procedures for Handling Complaints of Alleged Pollution and/or Environmental Damage and/or Forest Destruction). In the dominant river management strategy according to each expert, the most dominant and most important aspect is social institutions with a value of 0.427, and the dominant alternative is community participation with an inconsistency of 0.01 which is still below 1 so it is valid, with a value of 0.546, so that the aspect of social institutions with alternative community participation can be used as the most priority strategy to be applied in legal river pollution cases.

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