

## REGULATORY APPROACHES AND STRATEGIES FOR HOUSEHOLD WASTE POLLUTION MANAGEMENT IN THE EAST RIVER FLOOD CANAL OF SEMARANG CITY

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**Abstract:** This article explores regulations and strategies for managing the impact of household waste pollution in the East River Flood Canal of Semarang City. Water, crucial for human and environmental well-being, faces pollution challenges due to human activities. The study focuses on Semarang, where household waste pollution, often discarded along riverbanks, poses environmental threats. Primary data is collected through field interviews, complemented by secondary legal materials using socio-legal research methods. Regional Regulation No. 6 of 2012 addresses waste management in Semarang, aiming to empower residents in waste utilization and economic value creation. Law Number 32 of 2009 emphasizes collaborative efforts to address environmental challenges. Identified impacts of waste pollution include air and water pollution, contributing to flooding. A SWOT analysis suggests strategies such as enhancing stakeholder support, advocating the vision and mission for integrated waste management, establishing communication forums, leveraging ward roles in community counselling, and enhancing resource capacity

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to shift public perceptions and behaviours in waste management. This research aims to contribute to sustainable waste management practices and environmental preservation.

*Artikel ini mengeksplorasi regulasi dan strategi pengelolaan dampak pencemaran limbah rumah tangga di Banjir Kanal Sungai Timur Kota Semarang. Air, yang sangat penting bagi kesejahteraan manusia dan lingkungan, menghadapi tantangan polusi akibat aktivitas manusia. Studi ini berfokus di Semarang, dimana pencemaran limbah rumah tangga, yang sering dibuang di sepanjang tepi sungai, menimbulkan ancaman terhadap lingkungan. Data primer dikumpulkan melalui wawancara lapangan yang dilengkapi dengan bahan hukum sekunder dengan menggunakan metode penelitian sosio-legal. Peraturan Daerah Nomor 6 Tahun 2012 mengatur tentang pengelolaan sampah di Kota Semarang yang bertujuan untuk memberdayakan warga dalam pemanfaatan sampah dan penciptaan nilai ekonomi. Undang-Undang Nomor 32 Tahun 2009 menekankan upaya kolaboratif untuk mengatasi tantangan lingkungan hidup. Dampak pencemaran limbah yang teridentifikasi meliputi pencemaran udara dan air, yang berkontribusi terhadap banjir. Analisis SWOT menyarankan strategi seperti meningkatkan dukungan pemangku kepentingan, mendukung visi dan misi pengelolaan sampah terpadu, membentuk forum komunikasi, memanfaatkan peran lingkungan dalam konseling masyarakat, dan meningkatkan kapasitas sumber daya untuk mengubah persepsi dan perilaku masyarakat dalam pengelolaan sampah. Penelitian ini bertujuan untuk berkontribusi pada praktik pengelolaan sampah berkelanjutan dan pelestarian lingkungan.*

**Keywords:** Regulation; Strategies; Pollution; Countermeasures.

## INTRODUCTION

Water plays an important role in the life of humans and other living things. Water is used by humans for drinking, cooking, washing, and bathing. Besides that, water is also needed to irrigate rice fields, fields, industries, and many more. Water pollution is the entry or inclusion of living things, substances, energy and or other components into the water by human activities, so that the quality of the water drops to a certain level which causes the water to not function according to its designation. Definition of Water Pollution according to Government Regulation Number 82 of 2001 concerning Management of Water Quality and Control of Water Pollution in Article 1 point 11. Disturbed water quality is characterized by changes in smell, taste, and color.

In accordance with what is stated in the 1945 Constitution Article 33 paragraph 3 which reads: Earth, water and the natural resources contained therein are controlled by the state and used for the greatest prosperity of the people. That in this case, we as intelligent human beings should take care of all the natural wealth that we have and use it according to our needs and preserve it for future generations.

Pollution that occurs around the watershed is commonplace and is commonplace in relation to the large number of settlements and industries in the vicinity, especially regarding pollution of household waste that is simply thrown away on the banks of the river. The strategy carried out by the relevant agencies as an effort to tackle household waste pollution on the banks of the river in Semarang is considered optimal, especially with the prolonged rainy season causing flooding in the vicinity, but still the

surrounding community lacks respect and concern for the surrounding environment, especially the area along the river which is used as a dumping ground for their household waste. According to Law Number 32 of 2009 Concerning the Protection and Management of the Environment in Article 1 point 14 it gives the meaning of Environmental Pollution is the entry or inclusion of living things, substances, energy, and/or other components into the environment by human activities so that it exceeds established environmental quality standards.

Given the importance of water for human life, the Government issued Government Regulation no. 82 of 2001 concerning Management of Water Quality and Control of Water Pollution, Government Regulation No. 82 of 2001 concerning Management of Water Quality and Control of Water Pollution, "State Gazette of the Republic of Indonesia of 2001 Number 153. to ensure the quality of water for the needs of the Indonesian people. The purpose of water quality management is to guarantee the desired water quality in accordance with its designation, while the purpose of water control is to ensure that the water quality is in accordance with the water quality standards. or there must be and/or contaminants whose existence is tolerated in the water, see Article 1 point 9 of Government Regulation No. 82 of 2001. Through efforts to prevent and control water pollution and restore water quality.

The East Flood Canal River crosses the eastern part of Semarang, which is densely populated and industrialized. These waters are a place for waste disposal resulting from industrial and domestic activities. In this area, many settlements are located on the banks of the river, thus allowing

environmental pollution in the vicinity, either in the form of household waste or household waste. The Regional Regulation of the City of Semarang Number 6 of 2012 concerning Waste Management provides an understanding of Household Waste as stated in Article 1 point 10 is waste originating from daily activities in the household which does not include excrement and specific waste. The East Flood Canal River itself has begun to experience siltation and narrowing, the river flow in the East Flood Canal is even narrower than the river flow in the West Flood Canal.

The East Flood Canal River is the estuary area of the East Flood Canal River system, Tambak Lorok (Kali Banger) and Kali Grace. The East Flood Canal River crosses the eastern city of Semarang which is densely populated and industrialized. The East Flood Canal River has a length of 14.25 km with an average discharge of 295.33 liters/second. In this case the aims and objectives of the research on the banks of the East Flood Canal River are due to the many industrial and household activities around this watershed.

A range of strategies have been proposed for managing household waste pollution in the East River Flood Canal of Semarang City. Community-based waste management, including the use of waste banks, has been identified as an effective approach (Pramono 2020; Ramadan et al. 2019). The implementation of environmentally sound waste management systems, such as the 3R concept (Reduce, Reuse, Recycle), has also been emphasized (Da Costa and Bowo Suharto 2018; Nida 2022). However, challenges such as population factors and inadequate human resources have been identified as barriers to these efforts. The development of riverfront

areas, such as the Eco-Riverwalk Village concept, has been suggested to improve the ecology and aesthetic value of the area (Subianto et al. 2019). Lastly, the need for individual, semi-communal, or communal wastewater treatment installations to minimize water pollution has been highlighted (Firmansyah et al. 2021).

Then, if you compare it with the following study, permeable pavement can reduce pollution load with an average % decrease in TSS by 2.01%, COD by 4.48%, BOD 5% and Nitrate by 0.96 % (Sarminingsih et al. 2021). The concentration levels of elements were observed in both water and bottom sediments of SWF canal up to its site of confluence at Kultigong (Chatterjee, Chattopadhyay, and Mukhopadhyay 2010). The pathway coefficients that have positive and significant influence on sustainability are institution, environmental, technology selection, financial/economy, and social-culture (Setiawati et al. 2013). Land use change, complexity of spatial use, and community behavior have a negative impact on the environmental quality of the watershed (Syafri et al. 2020).

Previous researchers have indeed carried out articles on this topic. However, no previous research is the same as what the author proposes. Therefore, this article deserves to be discussed in more depth in the next section. The study focuses on Semarang, where household waste pollution, often discarded along riverbanks, poses environmental threats. Primary data is collected through field interviews, complemented by secondary legal materials using socio-legal research methods (Soemitro 1995; Soerjono 1986).

## DISCUSSION

### **Regulations Related to Waste Management in Semarang City**

Waste management in Semarang City is regulated in Regional Regulation No. 6 of 2012 concerning Waste Management. Article 1 point 9 states that waste is the residue of daily human activities and/or natural processes in solid form. Whereas in Article 1 point 10 it is explained about the definition of household waste is waste that comes from daily activities in the household which does not include excrement and specific waste. While the definition of Waste Management is regulated in Article 1 point 15 is a systematic, comprehensive, and continuous activity which includes the reduction and handling of waste.

In the city of Semarang, solid waste is a very serious problem as one of the negative impacts of the rapid development. This can be seen from the increasing waste from year to year. Waste production in the city of Semarang continues to increase every year in line with the increase in population. This is proof that waste production is directly proportional to population growth each year, so it requires optimal handling. Based on Semarang City Regional Regulation No. 6 of 2012, waste management should consist of reducing and handling waste. Waste reduction includes limiting waste generation, recycling, and recycling of waste. While waste handling includes container and sorting, collection, transportation, processing, and final processing, however, the current waste management is only in the form of waste management starting from the container to the final processing without waste segregation at the source (Syukriya 2014).

Given these problems, it is necessary to have a systematic waste management development plan in the district area. According to Law No.

18 of 2008, waste management is a systematic, comprehensive, and continuous activity which includes waste reduction and handling. The success of management does not only depend on technical aspects alone, but also includes non-technical aspects, namely institutional sub-systems, laws/regulations, financing, and community participation. The components of the operational engineering sub-system are sweeping, container, collection, transfer, transportation, and processing. The components for the financing sub-system are investment costs, operating and maintenance costs, work/management unit costs, and retribution costs.

In Article 2 of Regional Regulation Number 6 of 2012 concerning Waste Management it is explained regarding the Scope of waste including the waste regulated in this Regional Regulation consists of household waste, household-type waste and specific waste; household waste as referred to in paragraph (1) letter a originates from daily household activities, excluding feces and specific waste; household-type waste as referred to in paragraph (1) letter b originates from commercial areas, industrial areas, special areas, social facilities, public facilities, and/or other facilities; specific waste as referred to in paragraph (1) letter c includes waste containing hazardous and toxic materials, waste containing hazardous and toxic material waste, waste arising from the disaster, waste resulting from the demolition of buildings, waste that cannot be processed technologically; and/or waste that does not arise periodically, and further provisions regarding specific types of waste other than the provisions referred to in paragraph (4), are regulated by Mayor Regulation in accordance with statutory regulations.



Duties and Authorities of Regional Governments related to Regional Regulation Number 6 of 2012 concerning Waste Management are regulated in 5-7 of them: “The Regional Government is tasked with ensuring the implementation of good and environmentally sound waste management in accordance with the objectives referred to in this Regional Regulation” (Article 5), “The duties of the Regional Government as referred to in Article 5 consist of: Developing and increasing public awareness in waste management; Carry out research and development of waste reduction and handling technologies; Facilitating, developing and implementing efforts to reduce, handle and utilize waste; Carry out waste management and facilitate waste management facilities and infrastructure; Facilitating and developing the benefits generated from waste management; Facilitate the application of local specific technologies that develop in the local community to reduce and handle waste; and Coordinate between SKPD, the community and the business world so that there is integration in waste management” (Article 6), “In carrying out waste management, the Regional Government has authority: establish policies and strategies in waste management based on provincial and national policies; carry out waste management in accordance with the norms, standardization, procedures and criteria set by the Government; to guide and supervise the performance of waste management carried out by other parties; determine the location of TPS, TPST, and/or TPA waste; carry out regular monitoring and evaluation every six months during the useful life of the TPA with a sanitary landfill disposal system and 20 years after the TPA is closed; and prepare and organize an emergency response system for waste management in accordance with their authority.

Determination of the location of TPST and TPA waste as referred to in paragraph (1) letter d, is part of the Spatial Plan for the City of Semarang. Determination of the location for placement and/or processing of specific waste shall be further regulated by Mayor Regulation in accordance with statutory regulations. Further provisions regarding the guidelines for preparing an emergency response system as referred to in paragraph (1) letter f, are regulated by a Mayor Regulation in accordance with statutory regulations” (Article 7).

When related to the Implementation Theory by Marilee S. Grindle related to the Legal Basis used in waste management in Semarang City, Implementation Theory according to Merilee S. Grindle, “Implementation Amid Scarcity and Apathy: Political Power and Policy Design” (Cleave 1980:8-12), in states that the success of Public Policy Implementation is influenced by two major variables, namely First, the content of policy in the form of regulations related to Semarang City Waste Management which is regulated in Regional Regulation Number 6 of 2012, where it is explained in detail Regarding Waste Management, especially in the City of Semarang, the content of policy in this regional regulation is indeed more complete and detailed than the previous regional regulations. Regional Regulation No. 6 of 2012 is broken down into several sections, namely Chapter I General Provisions, Chapter II Scope, Chapter III Principles and Objectives, Chapter IV Duties and Authorities, Chapter V Rights and Obligations, Chapter VI Licensing, Chapter VII Implementation of Waste Management, Chapter VIII Compensation, Chapter IX Cooperation and Partnership, Chapter X Community Role, Chapter XI Waste Service Retribution, Chapter XII

Supervision and Development, Chapter XIII Prohibitions and Sanctions, Chapter XIV Administrative Sanctions, Chapter XV Incentives and Disincentives, Chapter XVI Dispute Resolution, Chapter XVII Provisions for Investigation , Chapter XVIII Criminal Provisions, Chapter XIX Transitional Provisions, Chapter XX Closing Provisions.

Second, the implementation environment (content of implementation) of the implementation of Regional Regulation No. 6 of 2012 concerning Waste Management in the framework of reducing and handling waste in Semarang City is seen from 2 indicators, namely waste management, and waste utilization. Waste Management, including waste management in Semarang City is divided into 2 stages, namely planning, and implementing. Planning, the waste reduction and handling plan contains the following matters: waste reduction, provision of infrastructure, patterns of developing cooperation and community participation in waste management, and provision of financing. In implementing waste reduction and handling in this plan, the government has carried out efforts to reduce waste that goes to TPA and waste handling in Semarang City, by providing and procuring infrastructure facilities every year, partner collaboration and involving community participation in waste management and in terms of payment. retribution.

Waste Utilization, including the collaboration between the City Government and the private sector in the form of establishing a compost processing factory at the TPA is a form of cooperation in the field of waste utilization. By processing organic waste into organic fertilizer/compost, it can reduce the volume of waste that goes to the TPA every day.

### **The effect of household waste on the nearby environment**

The impact of the development of globalization is that many housing estates have emerged which are getting denser and encouraging people to start building in riverside areas due to limited land, but in its development, it has had an impact on the environment. The impact is environmental pollution caused by waste and residual waste from the household process. In the city of Semarang pollution is due to household waste and waste, one of which occurs in the East Flood Canal River. This river, which is in an urban area, is polluted due to household waste and garbage. This can be seen from the amount of garbage that has accumulated on the banks of the river and the water is cloudy and smells fishy. In Law no. 32 of 2009 concerning the Protection and Management of the Environment in Article 1 point 14 which formulates Environmental Pollution is the entry or inclusion of living things, substances, energy, and/or other components into the environment by human activities so that they exceed the environmental quality standards that have been set.

Impact theory put forward by Rossi & Freeman, connected with the problem regarding the environmental impact on household waste pollution on the East Flood Canal Riverbanks by using the method of comparing problems/situations/conditions with what happened before policy intervention, it can be explained some of the impacts of waste pollution as follows.

Some of the impacts that occur with the existence of waste pollution include air pollution, water pollution, and cause of flooding. Air pollution is decomposing waste (organic and solid) generally releases gases such as

methane (CH<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>) as well as other compounds. Globally, these gases are one of the causes of decreasing environmental (air) quality because they have a greenhouse effect (green house effect) which causes an increase in temperature and causes acid rain. Meanwhile locally, these compounds, in addition to smelling bad/rotten, can also interfere with human health. Garbage that is disposed of in Final Disposal Sites is still at risk; because if the Final Disposal Site is closed or covered up, especially with buildings, it will result in methane gas not being able to escape into the air. Methane gas that is trapped, over time will be more and more so that it has the potential to cause an explosion. Something like this has happened at a TPA (Final Disposal Site) in Bandung, causing deaths.

Water pollution is the process of washing solid waste by water, especially by rainwater, is a source of water pollution, both surface water and ground water. As a result, various sources of water used for daily needs (wells) in residential areas have been contaminated which has resulted in a decrease in the level of human/population health. Water pollution is not only the result of the process of washing solid waste, but the biggest pollutant comes from liquid waste which still contains chemicals from various types of factories and other types of industries. Polluted water is not only surface water, but also ground water; so, it is very disturbing and dangerous for humans.

Causes of flooding are physical waste (solid waste), both fresh and rotting, which is carried into gutters/gutches, and rivers will block the flow of water and shallow the river. Simplification causes the capacity of the river to decrease, so that the water becomes stagnant and overflows causing

flooding. Floods will certainly result in physical losses and threaten human life (drifted/flooded). But what is most troubling is the aftermath of the flood which always brings disease.

### **Mitigation strategies for household garbage pollution**

The Deep Ecology Theory demands a new ethic that is not centered on humans but is centered on all living things with efforts to overcome environmental problems. Included in this case, as someone who has a noble personality, it is appropriate that he should have an awareness of the environment around him, especially those who live around riverbanks. They are demanded more to be able to maintain the balance of the environment around the river. Because rivers are also part of an important ecosystem for many human lives. For example, by reducing waste from sources (households), the private sector and small industries. Or by moving the recycling of household waste to make it more economical and useful for the community itself.

When associated with Participation Theory, it can be explained about what participation is. Participation in the Big Indonesian Dictionary is defined as the act of taking part, participating, or participating. According to Juliantara, participation is defined as the involvement of every citizen who has the right to make decisions, either directly or through intermediary legitimacy institutions that represent their interests, community participation is freedom and speaking and participating constructively. In this case the community also needs to participate in their environment, especially participating in supporting programs that have been launched by the Government to maintain and maintain a clean environment. For

example, doing community service between villages to clean up trash around the river.

Related to Role Theory, Linton (Cahyono 2008) an anthropologist, has developed Role Theory by describing social interaction in terms of actors who play according to what is determined by culture. In accordance with this theory, role expectations are a shared understanding that guides individuals to behave in everyday life. The role of the community in this case is to maintain environmental stability which is more adequate and conditioned to create a clean and healthy environment, both spiritually and physically healthy. The community plays a role in becoming a pioneer in living a healthy, clean, and beautiful life in society and increasing waste banks in urban villages to manage waste so that it is more useful.

Strategic environmental analysis is used as a basis for determining the strategy in overcoming the environmental impact of household waste pollution on the riverbanks flooding the east canal in the city of Semarang. which aims to identify what are the strengths, weaknesses, opportunities, and threats that exist. The following analysis is based on research results.

## **CONCLUSION**

The study concludes as follows waste management in Semarang City is governed by Regional Regulation Number 6 of 2012. This regulation aims to empower the community, particularly Semarang residents, to utilize and manage waste effectively for economic value. Law Number 32 of 2009 emphasizes the need for consistent environmental management efforts supported by stakeholders and the community to combat environmental degradation and threats to human and animal life. The current waste

management practices are inadequate, leading to negative impacts on public health and the environment. Therefore, comprehensive waste management, including legal frameworks like regional regulations, is crucial. Waste pollution has various adverse effects, such as air pollution due to unpleasant odors from improperly disposed household waste, water pollution rendering river water unusable and causing diseases, and increased flooding risks during prolonged rainy seasons, potentially causing embankment collapse along the East Semarang Canal. SWOT analysis suggests several waste management strategies: increasing stakeholder support with the mayor's backing, enhancing advocacy to raise awareness and community support, establishing a communication forum with the Mayor and Legislature's assistance, leveraging the kelurahan's role through counseling, coordinating production outcomes, and enhancing resource capacity to reshape public perceptions, attitudes, and behaviors in waste management. [W]

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