EDUCO
Environment Education and Conservation
EDUCO 1(2): 51–57
ISSN 3062-8210

Institute for Advanced Science, Social and Sustainable Future
MORALITY BEFORE KNOWLEDGE

Perceptions of community on efforts to address waste and odor issues in Kali Sentiong: An evaluation of the waring fabric installation and water hyacinth planting initiatives

Berliana Nur Kholila[1], Divo Ario[1], Putri Alvernia[1]*
[1] *School of Environmental Sciences, Universitas Indonesia,; Central Jakarta City, 10430, Indonesia.*
*Correspondence: berliana.nur@ui.ac.id

Received Date: May 30, 2024 Revised Date: June 26, 2024 Accepted Date: August 31, 2024

ABSTRACT

Background: Kali Sentiong, commonly known as Kali Item, is a river in Jakarta plagued by unresolved issues of waste and unpleasant odors. The Head of the Environmental Control and Regulation Division of the DKI Jakarta Environmental Agency reported that the Biological Oxygen Demand (BOD) of Kali Item exceeds the standard threshold, measuring 16.43 ppm. This research aims to assess community perceptions regarding the management of Kali Item following the installation of the netting and the proposed planting of Water Hyacinth. **Method:** A qualitative approach with triangulation methods was employed for data collection, including interviews with selected respondents from the surrounding area and observations. Interview results revealed that some informants considered the netting effective in mitigating odors, while others believed both the netting and the Water Hyacinth would not effectively address the odor issues in Kali Item. **Findings:** Additionally, research findings indicate that the Fecal Coliform levels are 30,000 times above the permissible limits. The Jakarta Provincial Government has undertaken various initiatives to address these problems under the leadership of Fauzi Bowo, Jokowi, Basuki, and currently Anies. In preparation for the 2018 Asian Games, which attracted international guests, the government focused on Kali Item due to its proximity—less than one kilometer—to the Athletes' Village, causing noticeable odors. The government installed a protective netting at a cost of IDR 560,000,000.00, but the netting deteriorated within a year due to damage caused by illegal waste dumping. This led to the removal of the netting and the introduction of a plan to plant Water Hyacinth (Eceng Gondok) in the river. However, the government's efforts to resolve the issues of Kali Item have not yet succeeded, largely due to the persistent problematic behavior of the community. This is suspected to be due to differing perceptions of the government's initiatives.

KEYWORDS: Kali Item; biological oxygen demand (BOD); water hyacinth (eceng gondok).

1. Introduction

Kali Sentiong, also known as Kali Item, is a river located in North Jakarta, serving as an urban drainage channel for wastewater from the residential areas on both sides. According to a 1914 Batavia map, Kali Item was named Kali Soenter, with its current name deriving from its historical black color. The issues with Kali Item have not emerged recently; records from 1976 indicate that the river was covered by over 500 meters of garbage. By the 1980s, the river was heavily polluted with trash, and public latrines were situated around Kali Item. The lack of proper waste bins led residents to dispose of their garbage directly into the river. In 1982, Kali Item began emitting a foul odor due to slow water flow caused by the thick

Cite This Article:
Kholila, B. N., Ario, D., & Alverina, P. (2024). Perceptions of community on efforts to address waste and odor issues in Kali Sentiong: An evaluation of the waring fabric installation and water hyacinth planting initiatives. *Environment Education and Conservation*, *1*(2), 51-57. https://doi.org/10.61511/educo.v1i2.2024.1235

mixture of waste in the river. Industrial waste also contributed to the pollution, with direct disposal into the river being a primary cause. Waste from a soybean processing factory made it difficult to clean Kali Item.

Efforts to clean Kali Item have been ongoing for years. Under FB's leadership, the riverbanks were raised, and this effort continued with Joko Widodo and Djarot Saiful Hidayat, who enhanced the Public Facilities and Infrastructure Management (commonly known as the "orange troops") to clean Kali Item daily. Leading up to the 2018 Asian Games, the Jakarta Provincial Government intensified its cleaning efforts. A month before the event, the Governor ordered the installation of 689 meters of netting (waring) to cover Kali Item, combined with the installation of aerators and nanobubble technology to reduce the odor from the polluted river. The use of netting as an odor-control measure sparked controversy, particularly among Jakarta residents, who viewed it as a temporary and ineffective solution, especially given the project's cost of over 500 million rupiah (Subkhan, 2018). The netting material was synthetic, made from materials such as nylon (polyamide), tetoron (polyester), vinilon, creamona (polyvinyl-alcohol), pylen (polypropylene), hizex (polyethylene), saran, and kurehalon (polyvinyl chloride) (Nainggolan, 2012).

Over time, the installed netting degrades into microplastics, which pose environmental risks, particularly to the Kali Item ecosystem. The degradation of microplastics affects the water quality, with Biological Oxygen Demand (BOD) being a critical parameter. Higher BOD levels indicate poorer water quality, with values from 0 to 2 mg/L associated with high water quality, and values over 10 mg/L linked to low water quality (Water Quality Field Guide). Organisms along Kali Item are likely to ingest these microplastics, mistaking them for food. This ingestion has potential health implications for humans through the food chain. Although human health risks remain unclear, there are concerns that microplastics could accumulate toxic chemicals and potentially enter the bloodstream. As Rachel Hurley from the University of Manchester and her colleagues noted in a report published in Nature Geoscience, "Due to their pervasive and persistent nature, microplastics have become a global environmental concern and a potential risk to human populations." This issue should be considered in assessing the socio-economic consequences.

The netting installed along Kali Item has since been removed, and there is now discussion about introducing water hyacinth (*Eichhornia crassipes*) into the river. Water hyacinth is an aquatic plant widespread in tropical and subtropical regions, capable of thriving in highly polluted environments (Tan et al., 2007). It has been successfully used in wastewater treatment systems to improve water quality by absorbing organic and inorganic compounds (Liao & Chang, 2004). However, the proposal to plant water hyacinth has also generated debate among residents. Despite various efforts to address Kali Item's pollution, the river still emits an unpleasant odor and remains black in color.

The role of the community in addressing Kali Item's issues is often overlooked. One reason for the limited effectiveness of the netting was the continued disposal of waste into the river by local residents. Accumulated trash at certain netting points caused the netting to collapse and touch the water surface. An educational sociology approach is needed to foster environmental awareness and ensure that efforts to protect the environment are not solely the responsibility of the government but are also embraced by individuals. Attitudes toward the environment are defined as positive or negative feelings toward environmental issues or objects. Positive attitudes are likely to lead to more environmentally friendly behaviors (Gumelar, 2016).

Local government proposals for using water hyacinth should involve socialization and direct dialogue with residents around Kali Item before implementing the program. This is essential to understand the community's knowledge and perceptions of water hyacinth. Residents may have both positive and negative views on its introduction. Knowledge and perceptions are shaped by various sources, including tradition, customs, religion, sensory experiences, reason, and intuition (Mufid, 2009). Cultural values related to the environment influence individuals' attitudes toward environmental protection. Jakarta, as the capital city and a melting pot of diverse cultures, reflects how cultural attachments influence individual environmental values (Gumelar, 2016)

Social processes, based on individual experiences, can make interventions more effective, as individuals are trained to respond to their community context. The goal of this research is to understand community perceptions regarding the management of Kali Item after the installation of netting and the proposed planting of water hyacinth. This study is necessary to ensure that government efforts to clean Kali Item achieve maximum results through active community participation.

2. Methods

The study was conducted at Kali Sentiong in Kemayoran, Central Jakarta. A qualitative research approach was employed, utilizing a triangulation method. Data collection techniques included in-depth interviews with selected respondents from the surrounding area and observations. Respondents were chosen from local village officials around Kali Item, and residents living in the southern and northern areas of Kali Item for at least 20 years. Observations were used to cross-check and align the interview findings with the actual conditions on site. Secondary data was obtained from previous research studies and statistical data from the DKI Jakarta Administration.

3. Results and Discussion

3.1 Kali item conditions

The Biological Oxygen Demand (BOD) of Kali Item is 16.43 ppm, whereas the BOD threshold is 12 ppm. This indicates a 30% increase in BOD over the threshold. According to the Head of the Monitoring and Legal Development Division of the DKI Jakarta Environmental Agency, BOD measures the amount of oxygen required by microorganisms to decompose organic matter in water. BOD testing is crucial for determining pollution loads from wastewater and for designing biological treatment systems. Additionally, research shows that the Fecal Coliform count is 6.1×10^9 or 6,100,000,000 per 100 ml, compared to a threshold of 2,000. Lower levels of BOD and Fecal Coliform indicate better water quality. The high BOD level in Kali Item, exceeding the standard threshold by 30%, and the Fecal Coliform level being 30,000 times above the standard, play a significant role in assessing the pollution level in Kali Item. Elevated BOD values suggest the presence of organic pollutants.

3.2 Interview results

According to Mr. E, 47, who works as the secretary in Sunter Jaya, improvements to Kali Item began before the 2018 Asian Games. He mentioned that the odor from Kali Item is less bothersome to residents in the southern part because it is not strongly perceived there. The smell is more noticeable in the northern areas (athlete housing) due to the wind direction, which led to the installation of nets to mitigate the odor. Mr. E noted that since moving to Sunter in 1992, Kali Item has always been black and foul-smelling, especially during the dry season. The installation of nets has not significantly impacted the southern area residents' experience of the smell. However, these nets help to manage waste entering the river, keeping Kali Item cleaner. Mr. E observed that during his inspections of Kali Item, residents did not dispose of trash in the river, attributing this to the nets preventing waste carried by the wind from entering Kali Item. He predicted that the pollution in Kali Item is primarily due to upstream waste and windblown debris. Mr. E mentioned that Kali Item's condition improved during Ahok's tenure as governor, thanks to the construction of river embankments. He opposed the proposal to plant Water Hyacinth (*Eichhornia crassipes*) in Kali Item, arguing it would exacerbate the odor and citing a lack of scientific basis for the proposal. He believes that the installation of nets is the more effective solution.

Mr. M, 59, a resident of Sunter Jaya and owner of a food stall, stated that Kali Item has had an unpleasant odor since he arrived in 1988. He suspects the smell originates from

waste from tofu and tempeh factories. He views the installation of nets as effective in mitigating the smell, noting an improvement since their installation, though this is an improvement from conditions 30 years ago. He observed that many of the nets are now damaged due to residents discarding trash improperly. Young people congregating near Kali Item at night also contribute to the odor, as they discard trash in the dark without facing any consequences. Despite prior government warnings and penalties for damaging nets, illegal dumping persists. Mr. M noted that the odor from Kali Item is not caused by local residents, as their waste management is systematic and involves regular disposal at a final disposal site. He was unaware of the Water Hyacinth planting proposal and felt that it would worsen the situation by obstructing water flow and accumulating waste, similar to the situation at Danau Sunter. He supported the use of nets over Water Hyacinth for managing pollution, emphasizing that government supervision is crucial for effective waste management, given Jakarta's diverse urban culture. Improvements in Kali Item since Ahok's tenure, as well as A' administration, have been significant.

According to Mr. R, 42, Kali Item has been better managed under recent governors compared to earlier administrations. Under Governor Ahok, improvements included deepening the river, adding two water gates, and constructing concrete walls. These changes have improved water flow and reduced odors. The installation of nets was part of preparations for the Asian Games to prevent the river from appearing unsightly. Mr. R felt that while the nets did not eliminate the odor, they were a temporary solution for the event. After the Games, the nets were removed. He noted that Kali Item has always been foul-smelling and that the condition has been exacerbated by illegal dumping, particularly in areas near the river's edge. The construction of water gates has prevented flooding and improved local conditions. He disagreed with the proposal to plant Water Hyacinth, citing concerns that it would exacerbate problems by trapping waste and increasing odors. Mr. R believed that the installation of nets was more effective at preventing intentional dumping and improving the river's condition. He stressed the need for increased governmental oversight to address the persistent issues, particularly in areas with poor waste management practices

Based on interviews with Mr. E, Mr. M, and Mr. R, it is evident that Kali Item has long suffered from unpleasant odors. While opinions differ on the effectiveness of net installations, there is general agreement that they do not fully resolve the odor issue and do not prevent residents from dumping trash into the river. The lack of proper socialization before and after installing the nets and considering the Water Hyacinth proposal is highlighted. Effective problem-solving requires community participation and proper communication. Socialization is essential for influencing and engaging communities in environmental initiatives (Suyanto, 2010). The Linear Models theory on Pro-environmental Behavior suggests that direct communication about environmental issues can foster greater environmental awareness (Gumelar, 2016). Increased knowledge and understanding are crucial for effective participation (Lehrer, 1990). Enhancing community awareness through socialization can lead to improved environmental practices and more effective solutions. Addressing environmental problems like those in Kali Item requires both community engagement and government intervention to ensure proper waste management and environmental protection.

Social issues related to environmentally unfriendly behavior affecting Kali Item are not limited to areas previously covered by nets (e.g., the area near the athlete housing). Informants noted that poorer neighborhoods exhibit worse waste disposal practices. Urbanization in Jakarta exacerbates waste issues (Ahmed, 2006), and lifestyle patterns contribute to these problems (Sahil et al., 2016). Effective waste management systems are essential in urban settings, with components including institutional frameworks, operational techniques, regulations, financing, and community roles in Law No. 18 of 2008. The Water Hyacinth planting proposal was deemed inappropriate by informants, who felt it would exacerbate the river's issues by trapping debris. Socialization and knowledge

dissemination are vital for ensuring that community members understand and support proposed environmental solutions.

4. Conclusions

Kali Sentiong, also known as Kali Item, in North Jakarta has long faced severe pollution issues due to waste and industrial discharge. Despite various cleanup efforts, including enhancing embankments, installing netting, and employing aeration technology, pollution problems persist. The use of synthetic netting, while intended to address odor issues, has been criticized for its effectiveness and high cost. Additionally, the netting's degradation into microplastics can further harm water quality and impact both aquatic organisms and human health through the food chain.

To achieve effective pollution control, a more integrated and participatory approach is needed. The proposed use of aquatic plants such as water hyacinth (*Eichhornia crassipes*) presents both opportunities and challenges, necessitating thorough public engagement and education. Enhancing community awareness and involvement through educational sociology can foster a positive environmental attitude and improve public participation. Ultimately, a collaborative effort between the government and the community is crucial for successfully addressing the pollution issues of Kali Item.

Acknowledgment
The authors would like to express their sincere gratitude to the anonymous reviewers for their invaluable comments and insightful suggestions, which greatly contributed to improving the quality and clarity of this manuscript.

Author Contribution
All author contributed fully to the writing of this article.

Ethical Review Board Statement
Not available.

Informed Consent Statement
Not available.

Data Availability Statement
Not available.

Conflicts of Interest
The author declare no conflict of interest.

References

Ahmed, S. M. (2006). *Using GIS in Solid Waste Management Planning A case study for Aurangabad, India*. Linköpings University.

Gumelar, G. (2016). Nilai Lingkungan dan Sikap Ramah Lingkungan Pada Warga Jakarta Di Pemukiman Kumuh. *Jurnal Psikologi*, *12*(1). https://ejournal.uin-suska.ac.id/index.php/psikologi/article/view/3007

Hurley, R., Woodward, J., & Rothwell, J. J. (2018). Microplastic contamination of river beds significantly reduced by catchment-wide flooding. *Nature Geoscience, 11,* 251 – 257 https://doi.org/10.1038/s41561-018-0080-1

Lehrer, Keith. (1990). *Theory Of Knowledge*. University of Arizona

Liao, S. W., Chang, W. L. (2014). Heavy Metal Phytoremediation by Water Hyacinth at Constructed Wetlands in Taiwan. *Journal Aquat Plant Manage*, *42*, 60-68 https://doi.org/10.3996/042014-JAPM-011

Mufid, M. (2009). *Etika dan Filsafat Komunikasi Edisi Pertama*. Prenadamedia Group.

Nainggolan, C. (2012). *Metode Penangkapan Ikan Edisi I*. Penerbit Universitas Terbuka

Sahil, J., Muhdar, M., Rohman, F., & Syamsuri, I. (2016). Sistem Pengelolaan dan Upaya Penanggulan Sampah di Kelurahan Difa-Dufa Kota Ternate. *Jurnal Bioedukasi, 4*(2). https://dx.doi.org/10.33387/bioedu.v4i2.160

Subkhan, I. (2018). *The Pomp of the Games: Sports, Politics, and Ritual in the Indonesian Asian Games.* The Henry M. Jackson School of International Studies, University of Washington. https://jsis.washington.edu/seac/news/pomp-of-the-asian-games/

Suyanto, J. (2010). Gender dan Sosialisasi. Jakarta : Nobel Edumedia, hal 13

Tan, D., Manchester, L. C., Mascio, P., Martinez, G. R., Prado, F. M., & Reiter, R. J. (2007). Novel rhythms of N1 acetyl N2 formyl 5 methoxykynuramine and its precursor melatonin in water hyacinth: importance for phytoremediation. *The FASEB Journal.* https://doi.org/10.1096/fj.09-150002

Biographies of Authors

Berliana Nur Kholila, School of Environmental Sciences, Universitas Indonesia.
- Email: berliana.nur@ui.ac.id
- ORCID: N/A
- Web of Science ResearcherID: N/A
- Scopus Author ID: N/A
- Homepage: N/A

Divo Ario, School of Environmental Sciences, Universitas Indonesia.
- Email: divo.ario@ui.ac.id
- ORCID: N/A
- Web of Science ResearcherID: N/A
- Scopus Author ID: N/A
- Homepage: N/A

Putri Alverina, School of Environmental Sciences, Universitas Indonesia.
- Email: putri.alvernia@ui.ac.id
- ORCID: N/A
- Web of Science ResearcherID: N/A
- Scopus Author ID: N/A
- Homepage: N/A