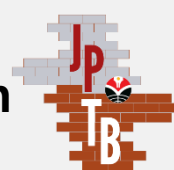




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Community Involvement in Bandung River Cleanup for Flood Control

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ABSTRACT	ARTICLE INFO
Rapid urban growth worldwide, including in Indonesia, has led to serious environmental challenges, particularly the decline in river quality due to widespread pollution. This condition has turned vital waterways into “garbage dumps,” negatively affecting urban ecosystems, tourism development, and public safety. In Bandung, poor river and drainage systems worsen these problems, leading to frequent floods and economic losses. Addressing these challenges requires effective urban river management through comprehensive and collaborative efforts involving government, the private sector, and local communities. A case study design involved 46 community members and volunteers along the Cikapundung River from October to November 2023. Primary data was collected via structured questionnaires, supplemented by secondary data and field observations. Data analysis using Excel described community understanding and participation levels. Survey results showed high community understanding of river cleanliness urgency (71% strongly agreeing). Participation effectively raised awareness (73.9% strongly agreeing on significance), and participants reported high satisfaction (67.4% strongly agree) and motivation (80.4% strongly agree). Crucially, 73.95% of respondents linked cleanup efforts to flood risk reduction. These findings suggest community participation is a valuable model for environmental awareness and flood mitigation. The study concludes that sustained community engagement in urban river management is pivotal for environmental sustainability and effective flood mitigation.	Article History: Submitted 8 March 2025 First Revised 9 March 2025 Accepted 20 April 2025 Available Online 25 April 2025 Publication Date 25 April 2025 Keywords: Community Participation; Flood Risk; River Cleanliness; Urban River Management

1. INTRODUCTION

Urban environments globally are grappling with significant environmental challenges, largely driven by rapid and often unregulated expansion. A prominent manifestation of this issue is the widespread degradation of urban rivers, including those throughout Indonesia. These vital waterways frequently suffer from severe pollution, contaminated by diverse forms of waste, including household refuse, industrial discharges, and raw sewage (Tariq & Mushtaq, 2023). This pervasive contamination transforms rivers into de facto "garbage dumps," a phenomenon that not only imposes a substantial environmental burden on urban areas but also adversely affects the development of urban tourism and the overall quality of life. The consequences of uncontrolled urban growth extend to increased flood risks, as inadequate urban river systems and drainage infrastructure become overwhelmed, leading to destructive floods, considerable economic losses, and direct threats to human safety. This complex interplay of environmental, economic, and social factors underscores that urban river degradation is not merely an isolated ecological concern but a multifaceted challenge demanding integrated urban planning and management strategies (Odume et al., 2022; Murphy et al., 2022). The impact of this is that the existence of urban rivers adds to the environmental burden in urban areas.

Bandung, as one of Indonesia's densely populated metropolitan cities, faces serious challenges related to waterlogging and flooding. This problem is exacerbated by the condition of rivers such as the Cikapundung, which has suffered severe degradation and contamination from pollutants (Gunawan et al., 2025). As a consequence, the existing drainage system often fails to handle the volume of water during heavy rains, leading to overflow and flooding at various points across the city. This phenomenon is not new. Metropolitan cities in Indonesia, including Bandung, frequently face similar issues due to uncontrolled urban growth (Jatayu et al., 2022). This inadequate urban river system ultimately results in economic losses and threats to human safety (Suryani & Nurjaman, 2022). Therefore, effective urban river management is not only the responsibility of the government but also requires active participation from all segments of society, including local communities (Kiss, 2022). Only through collaboration between the government, private sector, and community can solutions tailored to Bandung's socio-environmental context be found to address flooding and waterlogging issues sustainably.

Therefore, active participation and awareness of the community in urban river management have several benefits. One of them is that community participation can increase their understanding of the importance of a good river system and the associated flood risks. Increased knowledge and attitudes toward a disaster risk, such as an earthquake, can be achieved through education (Dermawan et al., 2024). This principle is particularly relevant in the context of urban river management, where community-led 'River Clean Up' activities are not only physical cleanup efforts but also serve as a participatory educational medium. Through this direct interaction, the community not only contributes concretely but also strengthens their understanding of the importance of river cleanliness in reducing flood risks and preserving ecosystems (Wulandari & Firmansyah, 2023).

With increased awareness, communities are encouraged to modify behaviors that contribute to the deterioration of river systems, such as littering and the development of illegal structures within water catchment areas. Furthermore, community involvement in urban river management planning ensures that decisions reflect the needs and aspirations of local residents. By engaging the community in these processes, planning becomes more inclusive and is likely to result in more effective and sustainable solutions (Saputro et al., 2022).

Despite the urgent need, there is currently no study particularly looking at community involvement in river cleanup programs as a flood risk reduction method in Bandung City. Given Bandung's distinctive features as a heavily populated urban area that is regularly affected by flooding, this research is extremely pertinent. The main issue under investigation is the serious degradation of Bandung's urban rivers, which have been heavily contaminated by sewage and other debris, thus transforming them into massive "junk dumps." In addition to adding to the city's overall environmental load, this environmental degradation has a detrimental impact on the growth of urban tourism. A typical problem in many Indonesian metropolitan areas, unchecked urban growth has also resulted in inadequate drainage infrastructure, making the city extremely vulnerable to damaging floods, financial losses, and hazards to public safety.

This study measures two important factors in order to produce important conclusions. First and foremost, it aims to measure the degree of community awareness regarding the critical function of healthy river systems and their direct link to reducing the danger of flooding. Second, and possibly most crucially, the project will evaluate how well community participation works in real-world river cleanup initiatives, particularly when it comes to lowering flood risks in the Bandung metropolitan region. In densely populated, flood-prone urban environments like Bandung, the research aims to provide unique insights into how active community participation can be leveraged as a significant component of urban river management and flood disaster mitigation strategies by providing empirical data on these aspects.

2. METHOD

This research method uses a quantitative approach with a case study-based research design. The research was conducted in Sungai Cikapundung, Jl. Dagopojok, Dago, Coblong District, Bandung City, West Java, during October-November 2023. According to (Sugiyono, 2020), the quantitative approach is a research method that focuses on studying a population or several samples, where data is collected using research instruments. Data analysis using the quantitative approach aims to test pre-established hypotheses.

The research subjects involve community members or volunteers participating in the River Clean Up activities at the Cikapundung River. This study involves research subjects who have experience and understanding of the river's condition and their participation in cleanup activities. Data collection, reduction, and presentation are part of the research process. Google Forms were used to distribute questionnaires directly to participants to collect primary data. Meanwhile, secondary data was collected from internet publications, scientific articles, literature reviews, and field observations. The collected data was then condensed by selecting, summarizing, and focusing

on key components to identify relevant themes and patterns.

Additionally, an in-depth summary of participants' opinions and experiences was provided by presenting compressed data, particularly questionnaire results. In this study, surveys or questionnaires serve as the primary tool. This tool was designed to measure participants' engagement and perceptions using recognized theories and frameworks. The research instrument used is a questionnaire/survey. This instrument was developed by referring to established theories and frameworks (Jovita et al., 2023). The scale categorization used in this survey refers to four levels of assessment. Each statement in the questionnaire is given answer options that represent the respondent's level of agreement with the statement. The assessment scale consists of 1 for "strongly disagree", 2 for "disagree", 3 for 'agree', and 4 for "strongly agree". This scale is used to quantitatively measure respondents' attitudes, perceptions, and participation regarding various indicators in river management and cleanliness.

The response percentage was calculated by dividing the number of responses for each item by the total number of respondents, then multiplying the result by 100 to obtain the percentage value. Meanwhile, the average level of understanding and participation was determined by calculating the total score obtained by all respondents and dividing it by the total number of respondents. Through this descriptive calculation, the study aims to present a clear overview of community involvement in river management and flood control efforts, which is essential for formulating effective and sustainable flood mitigation strategies.

3. RESULT AND DISCUSSION

Bandung City, as one of Indonesia's metropolitan cities, has a dense and diverse population. According to data from the Central Statistics Agency in 2022, the population of Bandung City reached more than 2.59 million people with a density of around 15,491 people per square kilometer. This makes Bandung vulnerable to various environmental problems, including river pollution and flood risk. The high level of social and economic activities of the community also contributes to the pressure on river ecosystems, especially the Cikapundung River which is the research location. The Cikapundung River is one of the most important rivers that divides Bandung City from north to south, with a flow length of about 28 to 38 kilometers and a watershed area of about 154 km².

The river has its headwaters in the Bukit Unggul Mountain area in Lembang, which is known as a cool area and an important water catchment area for Bandung City. However, along with population growth and dense urban activities, the Cikapundung River faces high pollution pressure. Household waste, industrial waste, and sedimentation from development activities are the main threats to river water quality and ecosystem sustainability. The people who live along the banks of the Cikapundung River have diverse social backgrounds, ranging from traders, informal workers, to students who are active in the surrounding area. The level of public awareness about river cleanliness varies, but the presence of communities such as River Clean Up is starting to encourage people to care more about the condition of the river. The Cikapundung River not only acts as a waterway, but also as part of the city's identity and a potential public space if managed properly.

Therefore, this research focuses on the involvement of communities around the Cikapundung River in river clean-up efforts as one of the strategies to reduce flood risk and improve environmental quality in Bandung City. River Clean Up is a community dedicated to cleaning and preserving rivers from trash, as well as educating the public about river restoration efforts. The community conducts education through social media and engages in social activities by organizing volunteer initiatives or collaborating with various sectors and other communities.

To further understand the impact of the River Clean Up community outreach, data was collected through a questionnaire distributed using Google Forms. Based on the results of data collection using the structured questionnaire, 46 respondents were obtained, covering various age ranges, ranging from 16 years to 47 years. Based on this data, the majority of respondents in this study were female, as many as 31 people or around 67%, while men amounted to 15 people or around 33%. In terms of employment, the majority of respondents are students, as many as 26 people or around 57%. Respondents who work in the private sector were recorded as many as 6 people (13%), while the student group amounted to 4 people (9%). The remaining 10 people, or 22%, came from a more diverse range of professions, such as freelance, graphic designer, waiter, health worker, admin, and quality control. This composition shows the significant involvement of the young and educated in activities related to river cleanliness and environmental management. The profile of the respondents in this study was observed to provide an overview of the research sample. Respondents were categorized based on several groups namely gender, age, occupation of the respondents as seen at **Table 1**.

Table 1. Survey Results on River Protection and Cleanup

No	Indicator	Response			
		1	2	3	4
1	Knowledge in protecting the river for the environment	-	-	29%	71%
2	Benefits of river cleaning	-	-	13%	87%
3	Environmental impacts	-	-	6,5%	93,5%
4	Environmental awareness	-	-	30,4%	69,6%
5	Community participation	-	2,2%	25%	73,9%
6	Personal satisfaction	-	3,25%	29,35%	67,4%
7	Motivation	-	-	19,6%	80,4%
8	Relating to flooding	-	-	26,05%	73,95%

The results of the study show a high level of understanding regarding the importance of maintaining river cleanliness among respondents. As many as 71% of respondents strongly agree that they understand the importance of maintaining river cleanliness, know the sources of pollution and environmental problems that affect rivers, and the steps that can be taken to maintain river cleanliness. In response to the benefits of river cleaning, 87% of respondents strongly agreed that the cleaning of the Cikapundung River had a positive impact on the welfare of the surrounding community. In addition, respondents saw many benefits for the local

community from a cleaner Cikapundung River.

The environmental impact of river cleaning was also viewed positively by respondents, with 69.6% agreeing that the impact of river cleaning on the condition of the river ecosystem is significant, and respondents agreed that this activity has encouraged the community to be more concerned about the river environment. Next, in community participation in river cleanup activities was considered significant by 78.3% of respondents, while 69.6% of respondents believed that this activity had successfully encouraged more people to participate.

In terms of personal satisfaction, 67.4% of respondents stated that they were satisfied with their contribution to the river cleanup activity and felt that they had the ability to help maintain the cleanliness of the river. Then in motivation to participate in river cleanup activities is also quite high, with 80.4% of respondents highly motivated to participate alongside the River Clean Up community. Regarding flood risks, approximately 73.95% of respondents stated they are aware of the connection between river cleanup and flood risk reduction, and feel that these activities contribute positively to managing flood risks in the area. The summary of these community perceptions and participation levels in river cleanup activities can be seen in **Figure 1**, which illustrates the average scores across various indicators assessed in this study.

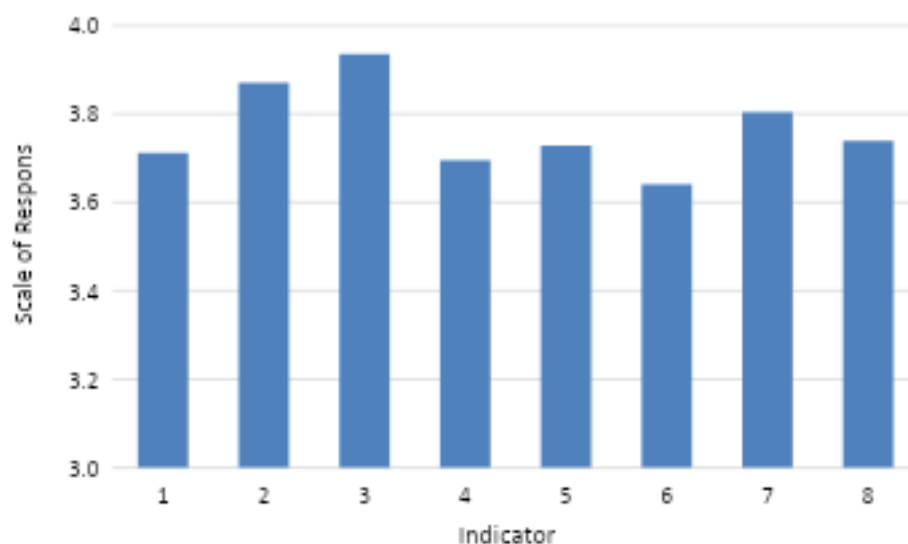


Figure 1. Average Respondent Scores on River Cleanup Indicators

Figure 1 illustrates the average scores given by respondents across eight indicators related to river cleanup activities. The vertical axis represents the scale of responses, while the horizontal axis indicates each assessment indicator evaluated in the study. It can be observed that indicator 3, related to environmental impact, received the highest average score, reflecting respondents' strong awareness of the positive environmental effects of river cleanup activities. Indicators 2 and 7 also show relatively high average scores, indicating that the community recognizes the benefits of river cleaning and feels motivated to participate in such activities.

Meanwhile, indicators 5 and 6 show slightly lower average scores compared to the others, which may suggest areas where further community education or engagement could be enhanced. Overall, the chart demonstrates a consistently positive perception from the community regarding

river cleanup activities, with all indicators scoring above 3.5 on average, indicating that respondents generally agree on the benefits and importance of maintaining river cleanliness and participating in such initiatives. This suggests that environmental impact is the aspect most recognized and valued by the community in relation to river cleanup activities (Suryawan et al., 2024).

Overall, the findings indicate that the community has a good understanding of the importance of maintaining river cleanliness and recognizes the benefits, environmental impacts, and the importance of community participation in such activities (Walker, 2021; Mastiah et al., 2022). Positive ratings were also noted for aspects such as environmental awareness, personal satisfaction, motivation, and the connection between river cleanup activities and flood risk reduction (Chan et al., 2021; Rentschler & Williams, 2022).

These findings align with the study by (Priambudi & Utami, 2020), which emphasized the crucial role of river care communities in conserving the Baki River in Sukoharjo Regency, highlighting their success in improving river cleanliness while raising public awareness of river sustainability as a vital urban ecosystem. Similarly, the results are consistent with the study by (Fadjarajani et al., 2018) on community participation in preserving the Cimulu River in Tasikmalaya City, which demonstrated that community involvement is a key factor in river conservation and flood risk reduction efforts.

Therefore, this study reinforces the evidence that River Clean Up activities contribute not only to reducing river pollution but also serve as effective educational tools for enhancing environmental awareness and promoting disaster risk mitigation in urban areas. Furthermore, the high level of community participation found in this study demonstrates that environmental programs can be successfully implemented through collaboration between local communities and environmental organizations. This synergy is essential in ensuring the sustainability of river ecosystems in urban areas, as communities become active agents of change in protecting their environment (Bănăduc et al., 2022). Active involvement from residents helps to build a sense of ownership and responsibility, which in turn strengthens efforts to maintain river cleanliness and reduce disaster risks.

In addition, the study highlights the potential for replicating River Clean Up initiatives in other urban areas facing similar challenges related to river pollution and flood risk. By integrating educational components into river cleanup activities, stakeholders can promote long-term behavioral changes within the community, fostering a culture of care for the environment (Altassan, 2023; Shutaleva, 2023; Fitriani et al., 2017). This finding suggests that environmental education and practical action can be combined effectively to achieve sustainable urban river management, providing a valuable reference for policymakers and community organizations in designing future environmental initiatives.

4. CONCLUSION

The results of the study show that the people of Bandung have a high understanding of the importance of maintaining river cleanliness, especially the Cikapundung River. The majority

support these efforts, recognizing the sources of pollution and the steps to address them. River cleanup activities involve significant community participation, increasing environmental awareness and serving as a model for promoting urban awareness. Community-based cleanup projects are effective in managing urban rivers and reducing the risk of flooding. The government and non-governmental organizations need to prioritize community empowerment programs related to river health. The high interest and satisfaction of participants indicate that this program can be sustainable if adequately funded, resulting in cleaner rivers, lower flood risks, and an environmentally conscious community. This participatory approach has proven to support environmental sustainability.

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