
Restoring River Ecosystems through Community Engagement: A Participatory Action in Sleman Regency, Indonesia

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ABSTRACT

River ecosystems are vital for environmental sustainability but are increasingly threatened by domestic waste accumulation and sedimentation. This community service initiative aimed to restore the ecological function of a local river while fostering pro-environmental behavior among residents. Conducted on July 2, 2026, in Padukuhan Kepitu, Sleman Regency, Special Region of Yogyakarta, the program utilized a participatory approach rooted in the local wisdom of gotong royong (mutual assistance). The activities encompassed preparation, physical cleaning of the riverbanks, and waste segregation. The outcomes demonstrated significant improvements in water flow, enhanced environmental sanitation, and strengthened social cohesion. This initiative highlights that community-driven grassroots actions are essential for sustainable environmental conservation and disaster mitigation.

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INTRODUCTION

Rivers function as the lifeblood of ecological systems, playing a critical role in water regulation and environmental balance (Limburg et al., 2013; Wang & He, 2022). However, rapid anthropogenic activities often lead to severe environmental degradation, primarily through the accumulation of domestic waste and sedimentation caused by weeds and mud deposits (Kabir et al., 2026; Okorundu et al., 2022). If left unmanaged, these issues not only diminish environmental aesthetics but also escalate the risk of flooding during the rainy season and create breeding grounds for diseases (Bibi et al., 2023).

Recognizing the urgency of water ecosystem preservation, the residents of RT 04 RW 018 in Padukuhan Kepitu, Kalurahan Trimulyo, Sleman Regency, initiated a grassroots environmental movement. Driven by gotong royong (Lukiyanto & Wijayaningtyas, 2020; Rahayu et al., 2015), a traditional Indonesian value of collective mutual assistance, this community service program aimed to physically revitalize the river ecosystem while simultaneously enhancing public awareness regarding environmental stewardship.

METHOD

This community service (Crompton et al., 2026; Sondari et al., 2024) activity was conducted on July 2, 2026, employing a participatory community engagement (Pfeiffer et al., 2026; Wentworth et al., 2024) method. The target participants were the local residents of RT 04 RW 018, encompassing community leaders, adults, and the local youth. The implementation was structured into three sequential phases:

1. Preparation Phase

Coordination meetings were held by the neighborhood committee to identify waste accumulation hotspots and blocked waterways. Residents were mobilized to bring self-provided tools, including hoes, sickles, boots, gloves, and trash bags.

2. Execution Phase (Physical Cleaning)

Participants collaboratively descended into the riparian zones and the river body. The primary actions included: (a) extracting inorganic waste (plastics, styrofoam, and household debris) trapped in rocks and waterways, (b) clearing wild grass and shrubs along the riverbanks to prevent the intrusion of pests into residential areas, (c) conducting light dredging of sediment and removing tree branches that obstructed the river's flow.

3. Waste Management Phase

The collected waste was systematically segregated. Inorganic waste was centralized for transportation to the local final disposal site (TPA) or recycling facilities, while organic waste, such as leaves and twigs, was designated for natural composting.

RESULT

The implementation of the participatory river-cleaning action in Padukuhan Kepitu yielded multidimensional outcomes that extend far beyond the immediate physical removal of waste. By analyzing the results through the lenses of ecological restoration, public health, social capital, and grassroots sustainability, it becomes evident that community-driven initiatives serve as a foundational pillar for

holistic environmental management.

The most immediate and observable outcome of the community service was the physical rehabilitation of the river's hydrological function. Prior to the intervention, the riverbed and riparian zones were severely compromised by the accumulation of anthropogenic debris, primarily non-biodegradable plastics and household waste, coupled with natural sedimentation and unchecked weed growth. These elements created artificial dams that significantly reduced water velocity and disrupted the natural flow dynamics.

Through the collective physical cleaning phase, the removal of these obstructions successfully restored the river's natural current. This ecological restoration plays a critical role in hydrological resilience, particularly in mitigating the risk of hydrometeorological disasters (Li et al., 2025). In regions like Sleman, which experience distinct and heavy rainy seasons, maintaining unobstructed waterways is a primary defense against localized flooding. Furthermore, clearing the riparian zone of excessive shrubbery and invasive weeds helped stabilize the riverbanks, reducing the risk of topsoil erosion while simultaneously allowing native aquatic flora and micro-ecosystems to recover from the suffocation caused by plastic pollutants (Tisserant et al., 2021).

The physical degradation of the river previously posed indirect but significant threats to public health (Biswas et al., 2026). Stagnant water pockets, formed by trapped waste and sediment, act as optimal breeding grounds for disease vectors, particularly mosquitoes responsible for dengue fever and malaria, endemic risks in tropical climates (Sharma, 2014). By eliminating these stagnation points and restoring a continuous water flow, the community proactively dismantled these breeding habitats, thereby executing a crucial preventive health measure.



Figure 1. Community members collecting domestic waste during the participatory river-cleaning action to restore the ecosystem's hydrological function (Source: Padukuhan Kepitu)

Furthermore, the aesthetic transformation of the riverbanks significantly improved the spatial quality of the neighborhood (Nasirian et al., 2026). Environmental psychology suggests that living in a visibly degraded environment can induce communal apathy, leading to the "broken windows" effect, where

existing litter attracts more litter (Bergquist et al., 2023). Conversely, the newly sanitized and visually appealing riverbanks foster a renewed sense of pride and territorial ownership among the residents. This aesthetic enhancement directly correlates with an elevated standard of environmental sanitation, creating a healthier, more livable habitat that positively impacts the psychological well-being of the local population.

Beyond the tangible environmental metrics, the community service program functioned as a powerful catalyst for revitalizing social capital (Flanagan et al., 2015). In the context of Indonesian rural and peri-urban socio-cultural dynamics, gotong royong (mutual assistance) is not merely a method of organizing labor; it is an institution of social solidarity. However, modern urbanization often threatens to erode such traditional communal values (Angkasawati, n.d.).

The successful mobilization of the residents in RT 04 RW 018 demonstrated a high degree of collective efficacy. The activity facilitated active intergenerational collaboration, bridging the gap between community elders, who possess historical knowledge of the local environment, and the youth, who provide energy and modern perspectives. This collaborative physical labor reinforced mutual trust, reciprocity, and civic responsibility. When community members invest their own sweat and time into cleaning a public space, they inherently develop a stronger collective commitment to protecting that space, thereby institutionalizing pro-environmental behavior at the grassroots level (Zhang et al., 2020).

A profound secondary impact of this initiative is the cultivation of a "green orientation" within the community's mindset. Environmental awareness is often the first step toward broader sustainable practices that can permeate other aspects of community life (Perea et al., 2025). By actively segregating the collected waste into organic and inorganic categories during the cleanup, residents were directly introduced to the practical applications of waste management and the circular economy.

This experiential learning process is particularly vital for the socio-economic fabric of the Sleman region, which is populated by numerous micro, small, and medium enterprises (MSMEs). When a community adopts a green orientation, this mindset inevitably influences local grassroots economic activities (Alnajem, 2024). For instance, the organic waste collected from the riverbanks (such as leaves, twigs, and agricultural runoff) was designated for natural composting. This practice not only diverts waste from overburdened final disposal sites (TPA) but also provides free, high-quality organic fertilizer that can be utilized by local residents for urban farming or by micro-agricultural businesses.

Moreover, this shift toward environmental consciousness encourages local economic actors to consider the ecological footprint of their daily operations. A community that values a clean river ecosystem is more likely to support neighborhood initiatives aimed at reducing single-use plastics or adopting sustainable resource management, thereby bridging the gap between civic environmentalism and sustainable micro-enterprise practices (Vall-Casas et al., 2024).

CONCLUSION

The river cleaning initiative conducted by the residents of RT 04 RW 018 in Padukuhan Kepitu serves as a definitive model of community-based environmental conservation. This participatory action proves that safeguarding environmental quality requires direct, hands-on involvement from local communities. Moving forward, it is highly recommended to transform these incidental actions into institutionalized routine agendas. Furthermore, continuous environmental education is essential to prevent

future domestic waste dumping, thereby ensuring a healthy, sustainable, and resilient ecosystem in Sleman Regency.

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