

Education and Implementation of Inorganic Waste Management Through Waste Bank at Tirto Tani Djojo Tourism

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Abstract: Waste management has become one of the key issues in sustainable development, particularly in tourist areas that tend to generate large amounts of waste. Tirto Tani Djojo Tourism, located in Tiru Lor Village, Gurah District, Kediri Regency, faces serious challenges related to inorganic waste especially plastic waste which poses a threat to the environment and diminishes the site's attractiveness. The purpose of this article is to describe a community service program focused on education and implementation of an inorganic waste management system through a waste bank. This program employed the *Participatory Action Research* (PAR) method, encompassing five stages: *to know, to understand, to plan, to act, and to change*. The results show an increase in community awareness of the importance of waste sorting, the successful establishment of a plastic bottle waste bank facility, and a collective behavioral shift among residents and tourism managers in maintaining environmental cleanliness. Through a participatory approach, the program not only provided a short-term solution in the form of waste management facilities but also fostered long-term social and cultural transformation toward the realization of an environmentally friendly and sustainable tourism model.

INTRODUCTION

Waste management has become one of the most urgent environmental issues in the modern era. Population growth, increased consumption, and the expansion of the tourism sector have significantly contributed to the rising volume of waste, particularly inorganic waste that is difficult to decompose (Indonesia, n.d.). Data from the Ministry of Environment and Forestry shows that Indonesia produces more than 64 million tons of waste per year, with around 15% being

plastic (SIPSN – National Waste Management Information System, n.d.). This condition requires proper management strategies, especially in tourist areas with high visitor traffic that generate large amounts of waste daily.

Based on initial observations and social mapping, it was estimated that household waste production reached 1–2 kg per household per day, dominated by mixed organic and inorganic waste (Rachman et al., 2024). The accumulation of household waste has become a major environmental concern, closely linked to population growth and low public awareness of the negative impacts of waste on human health and environmental sustainability (Kharisma & Arsanti, 2023). Environmental education is therefore needed, often implemented through creative and marketable activities, such as crafting and making handicrafts from waste materials (Zaman et al., 2024).

To address waste-related problems, active participation from all community members is crucial, beginning with individuals and families and expanding to the broader society. Another effective approach is integrating various social elements through household waste management programs, particularly the implementation of a waste bank system (Peningkatan Pengelolaan Sampah Melalui Aplikasi Bank Sampah di Desa Truko Kendal | TEMATIK, n.d.).

Tirta Tani Djojo Tourism, located in Ringinrejo Hamlet, Tiru Lor Village, Gurah District, Kediri Regency, is one of the local tourism destinations with great potential as a center for recreation and local economic empowerment. With its natural tourism concept combining springs and rural scenery, Tirta Tani Djojo attracts hundreds of visitors every week. However, this potential is accompanied by environmental challenges, especially waste management. Initial observations indicated that there was no proper waste sorting system in the area. Organic and inorganic wastes were often mixed, complicating the recycling process and threatening environmental cleanliness, including the water sources that form the core attraction of the site.

Based on these challenges, an intervention was needed not only to provide short-term solutions but also to build long-term awareness and habits regarding waste management. The program “*Education and Implementation of an Inorganic*

Waste Management System through a Waste Bank at Tirto Tani Djojo Tourism” aimed to provide a comprehensive approach involving education, facility provision, and partnership building with relevant stakeholders.

The program began with intensive coordination among tourism managers, village authorities, local business owners, and the Kediri Regency Environmental Agency. The participation of Mrs. Meika Dwi Nastiti Mulyaningsih, S.T., M.A.P as the main speaker was a strategic addition that strengthened the educational aspect of the program. The educational materials covered topics such as the importance of waste sorting, the benefits of waste banks, and the economic potential of recycling (“Science and Technology for Society,” n.d.). As a concrete contribution, a waste bank facility dedicated to collecting plastic bottles was donated to support waste segregation, optimize recycling potential, and reduce environmental pollution.

The waste management principles were based on the 3R cycle—reduce, reuse, and recycle. Although this method has been long established, its implementation often faces challenges in communities due to mixed waste, which makes sorting difficult (Junaidi & Utama, 2023). Ideally, waste sorting should begin at the household level and continue at the management level of residential, commercial, and industrial areas, as well as public facilities (Rachman et al., 2024).

Through this program, Tirto Tani Djojo Tourism is expected to serve as a model for environmentally friendly tourist destinations that implement sustainable waste management practices. Furthermore, it is expected to create a multiplier effect, where increased awareness and good waste management practices in the tourism area spread to surrounding communities. Ultimately, this initiative aims not only to provide short-term benefits but also to leave a lasting legacy in the form of a sustainable waste management system and culture that benefits both the environment and society.

RESEARCH METHODS

This community service activity is explained in Law No. 20 Article 20 of 2003 concerning the National Education System. The article states that community service is an activity carried out by the academic community in applying Science and Technology (IPTEK) to advance the intellectual life of the nation and promote public welfare.

In implementing this community service, our group conducted the activity using the mentoring method. The mentoring method is a way of engaging the community to take part in an activity. The strategy used by our group in this community service was Participatory Action Research (PAR), a strategy that involves the people of Tiru Lor Village in assessing ongoing activities to encourage change toward a better direction based on the people's own initiatives (Rahmat & Mirnawati, 2020).

Pretty and Guijt, as cited by Britha Mikkelsen, explain that the practical implications of this approach include the following: The Participatory Action Research (PAR) approach must start with people who know the most about their own life systems. This approach must assess and develop their knowledge and skills and provide the necessary means for them to develop themselves. This requires a transformation of existing practices and mindsets, alongside developmental support (Mikkelsen, 2011).

This approach aims to promote learning in solving community problems and meeting practical needs, as well as to produce knowledge and encourage processes of social and religious change. In Participatory Action Research (PAR), empowerment is viewed as a method (approach) rather than a direct solution to every issue that arises within the community (Denzin & Lincoln, 2010). Within the theory of Participatory Action Research (PAR), there are stages that serve as benchmarks for the success of empowerment-based research. These stages are known as KUPAR, which stands for to Know, to Understand, to Plan, to Action, and to Reflection.

To Know (understanding real conditions): This is the initial stage of empowerment, considering the researcher's subjective view of the community's life, such as identifying human and natural resources.

To Understand (understanding community problems): This stage is a process where researchers and the empowered community identify problems that exist in their lives and correlate them with the assets they possess, enabling them to build a shared commitment to addressing strategic issues within their community.

To Plan (planning): At this stage, activities are planned to resolve problems that emerge in the community. The planning process must consider the balance between human and natural resources, as well as the involvement of stakeholders who organize and support the community. This stage must be maximized through the full participation of the community in solving their own problems so that empowerment is understood not only as social change but also as a form of community education.

To Action (taking action): This stage involves implementing the community's collective ideas to develop, manage, and optimize their assets so that they can function effectively and proportionally.

To Reflection (reflection): This stage is where researchers and the community evaluate and monitor the empowerment activities that have been carried out, ensuring that the empowerment process remains focused and measurable.

RESULTS AND DISCUSSION

1. To Know (understanding real conditions)

At this stage, the process serves as the initial step in empowerment by considering the researcher's subjective perspective on the community being studied, such as identifying natural and human resources, as well as building mutual understanding so that the researcher is accepted by the community (Rahmat & Mirnawati, 2020). Based on their characteristics, waste can be classified into two types: organic waste, which consists of biodegradable materials

such as food scraps and fallen leaves also known as “wet waste”; and inorganic waste, which consists of non-biodegradable materials such as plastic, glass bottles, cans, and metal commonly referred to as “dry waste” (Junaidi & Utama, 2023).

The *To Know* stage in the Participatory Action Research (PAR) method focuses on the process of recognizing, understanding, and identifying the real problems faced by the community. In the community service activity in Tiru Lor Village, this stage was carried out through an initial observation at Tirto Tani Djojo Tourism Site. Our group found that there was no proper waste separation system, even though the busy tourism activities generated large amounts of waste, particularly plastic waste from street vendors and visitors.

Through this identification process, the team not only stopped at recognizing problems but also explored local potentials and available resources. Tirto Tani Djojo has a main attraction in the form of natural springs and tubing rides, whose cleanliness must be maintained to preserve their value for both the community and visitors. However, unmanaged waste poses a serious threat to environmental sustainability and the local community’s economic continuity.

The *To Know* stage also involved establishing initial communication with tourism managers, village officials, vendors, food stall owners, and local residents. From these dialogues, it was revealed that public awareness regarding waste management was still limited, highlighting the need for education and innovation through the establishment of a waste bank as a solution. Thus, the to know stage not only resulted in problem mapping but also opened the path toward formulating a collaborative strategy that aligns with the needs and realities of the local community.



Figure 1. Atmosphere during the event

2. To Understand (understanding community problems)

At this stage, it can be understood as a process in which researchers and the empowered community are able to identify the problems that exist in their lives, then correlate them with the community's assets, thereby fostering a collective commitment to address the strategic issues they face (Rahmat & Mirnawati, 2020).

The *To Understand* stage in the Participatory Action Research (PAR) method focuses on deepening the problems that were previously identified. After our group discovered that Tirto Tani Djojo Tourism Site did not yet have a proper waste management system, the next step was to gain a deeper understanding of the root causes and their impacts on both the community and the surrounding environment.

This understanding was achieved through coordination and discussions with tourism managers, village officials, vendors, and food stall owners. From these dialogues, it was revealed that the low awareness of waste separation stemmed from the lack of education and habitual practices in reducing waste at its source. Single-use plastic waste, which dominates tourism activities, emerged as the main problem because it is difficult to decompose and poses a high risk of polluting the river the site's primary natural attraction.

The *To Understand* process was further strengthened through educational sessions featuring a guest speaker from the Environmental Agency of Kediri Regency. The material emphasized that waste problems are not only about handling waste after it accumulates but also about minimizing waste generation from the start. This awareness is crucial, as the impact of accumulated waste is extensive obstructing river flow, polluting the air when burned, and contributing to global warming (Environment, 2021).

Thus, the *To Understand* stage helps the community develop shared awareness that waste is not merely something to be discarded but a serious environmental, health, and economic issue that requires collective behavioral change. This awareness serves as the foundation for creating practical solutions, such as establishing a waste bank and promoting waste separation habits in the tourism area.



Figure 2. Group photo with the speaker and the village head

3. To Plan (Designing Community Problem-Solving Strategies)

The *To Plan* stage in the Participatory Action Research (PAR) method is the phase of designing concrete actions based on the previously identified and understood problems. After recognizing and analyzing that the Tirto Tani Djojo Tourism Area faces serious issues related to waste management, our group, together with the community and local stakeholders, developed a strategic plan that actively involves all parties.

The planning process began with internal coordination to formulate a relevant program, followed by a joint meeting with tourism managers, village officials, vendors, food stall owners, and local educational institutions. Through this discussion, all parties agreed that the proposed solution should not only focus on education but also include the provision of a waste bank facility specifically for plastic bottles as an initial step toward implementing a waste sorting system.

Additionally, our group collaborated with the Environmental Agency of Kediri Regency by inviting a guest speaker, Mrs. Meika Dwi Nastiti Mulyaningsih, S.T., M.A.P., to provide direct education to the community and students. This collaboration became an essential part of the planning process, ensuring that the program was not merely ceremonial but oriented toward long-term sustainability.

Thus, the *To Plan* stage produced an integrated program design that includes:

1. Education and workshops on the importance of waste sorting and its environmental impact.
2. Provision of a waste bank facility as a practical means to support new waste management habits.
3. Cross-sector collaboration (village government, tourism managers, vendors, schools, and the Environmental Agency) to ensure program continuity.

This stage ensures that the planned program serves not only as a short-term solution but also as a means to foster community awareness and collective habits in preserving environmental sustainability.



Figure 3. Remarks and directions from the Village Head

4. To Action (Implementing the Program)

The *To Action* stage is the phase of actual implementation of the plans that were previously developed together with the community. In the community service activities in Tiru Lor Village, this stage was realized through the implementation of an education program and the establishment of a waste bank in the Tirto Tani Djojo Tourism Area.

The first step was conducting an educational workshop on waste management, featuring a guest speaker from the Environmental Agency of Kediri Regency, Mrs. Meika Dwi Nastiti Mulyaningsih, S.T., M.A.P. The event involved tourism managers, village officials, vendors, food stall owners, as well as teachers and students from MTs Nasyatul Mujahidin. In her presentation, the speaker emphasized the importance of reducing waste at its source, such as by bringing personal containers or tumblers to minimize single-use plastic consumption.

The next step was the provision of a plastic bottle waste bank facility placed in a strategic location within the tourism area. This facility serves as a medium for visitors and vendors to start practicing waste sorting. The presence of the waste bank not only helps reduce pollution but also provides economic value to the community since inorganic waste can be collected and sold.

In addition to education and facility provision, the *to action* stage also involved cultivating environmentally friendly behavior among community members and visitors. This was reflected in the active participation of residents in various activities, from discussions and sorting practice to a shared commitment to maintaining the cleanliness of the river, which is the main attraction of the tubing tourism.

Thus, the *To Action* stage was not only a technical implementation but also a momentum for collective behavioral change. The community and tourism managers began to realize that maintaining environmental cleanliness is not merely an obligation but a long-term investment in environmental sustainability and local economic continuity.



Figure 4. Group photo with the waste bank

5. To Change (Building Awareness for Change and Sustainability)

The *To Change* stage in the Participatory Action Research (PAR) method represents the phase of real transformation that occurs after the processes of problem identification, understanding, planning, and action have been carried out collaboratively. In the community service activities in Tiru Lor Village, this change was evident in the growing collective awareness among the community and tourism managers to manage waste more responsibly.

Through educational activities, the community began to understand that waste is not merely garbage but a resource that can be managed and holds economic value. This understanding encouraged the development of new behaviors, such as sorting waste from its source, bringing reusable containers, and utilizing the plastic bottle waste bank that had been provided. Changes were also visible among the tourism managers, who became more committed to maintaining the cleanliness of the river environment to preserve it as the main attraction of tubing tourism.

Beyond behavioral changes, this stage also resulted in social transformation marked by increased participation from various parties including the village government, schools, and vendors in preserving the environmental sustainability of the tourism area. The waste bank program not only served as a facility for waste management but also became a symbol of a cultural shift toward a cleaner, healthier, and more sustainable lifestyle.

Thus, the *To Change* stage emphasizes that PAR does not end with ceremonial activities but instead creates long-term impacts in the form of new

habits, mindsets, and systems within the community. This transformation stands as a significant legacy of our community service program, ensuring that waste management at Tirto Tani Djojo Tourism Area continues sustainably even after the program has concluded.



Figure 5. Presentation of souvenirs and photo of the waste bank

CONCLUSIONS AND RECOMMENDATIONS

The program “Education and Implementation of an Inorganic Waste Management System through a Waste Bank at Tirto Tani Djojo Tourism” conducted by our group has been successfully implemented despite several technical challenges. This activity has succeeded in raising public awareness about the importance of waste management, particularly plastic waste, which poses a threat to environmental sustainability and the continuity of tourism. The success of this program can be analyzed through the stages of the Participatory Action Research (PAR) method as follows:

1. To Know

The stage of identifying and recognizing the problem was carried out through initial observation. Our group found that the tourism area did not yet have an adequate waste sorting system, causing organic and inorganic waste to mix and potentially pollute the environment.

2. To Understand

The stage of deepening the problem was conducted through coordination with tourism managers, the village government, vendors, and educational sessions from the Environmental Agency. From this, it was understood that the root cause lies in the community's low awareness of reducing waste from its source.

3. To Plan

At the planning stage, our group and the community developed a strategic program that included waste management education, the provision of a waste bank facility, and the involvement of various stakeholders to ensure program sustainability.

4. To Action

The implementation stage was carried out by holding an educational workshop and establishing a plastic bottle waste bank in the tourism area. This activity involved community members, students, vendors, and the village government in directly practicing waste sorting.

5. To Change

The change stage was marked by the emergence of collective community awareness to start sorting waste, bringing reusable containers, and maintaining the cleanliness of the river as a tourism attraction. The change was also reflected in cross-sector collaboration to ensure sustainable waste management.

Through these five stages of PAR, this program not only provided a short-term solution in the form of a waste bank facility but also fostered behavioral, mindset, and social system changes that support the creation of environmentally friendly tourism. This has become an important legacy for Tiru Lor Village, particularly the Tirto Tani Djojo Tourism Area, in preserving nature while improving community welfare sustainably.

This paper further describes action research as an alternative research method for community empowerment studies and activities. Action research is based on the assumption that research must be linked to an agenda for social change. It is conducted not only to obtain truth but also to create desired conditions. Action research can be effectively used in both academic studies and

community empowerment efforts, given its participatory nature that emphasizes active citizen involvement. Through action research, appropriate formulas can be developed based on the community's specific conditions to strengthen empowerment efforts.

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