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Application of Floating Trash Barrier (Trash Barrier) Based on Paralon Pipes to Hold Waste

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Abstract: *The river in Tanjung Senang Village, Bandar Lampung City, has a problem of household waste being dumped directly into the river body. The accumulation of garbage causes the flow of water to be disrupted and risks causing flooding during heavy rains. This activity aims to install a floating trash barrier based on a paralon pipe as an effort to prevent waste from being carried away downstream. The methods carried out include location observation, problem identification, tool design, manufacturing process using hollow iron and paralon pipes as buoys, installation in the river, and periodic monitoring and cleaning. The results of the activity showed that the tool was able to hold waste at one point so that it was easier to collect and transport. The water flow continues to run smoothly and the condition of the river looks cleaner than before. Community involvement in the installation and maintenance of the equipment also helps to maintain the sustainability of the program. The application of this trash barrier can be a simple and easy-to-apply solution to help reduce river waste in residential areas.*

Introduction

Tanjung Senang Village is one of the areas in the city of Bandar Lampung that is passed by a river that is the boundary between ward 1 and ward 2. The river is a rainwater drainage and drainage channel for the surrounding residential areas. The current condition of the river has not been managed properly, characterized by a lot of household waste that is dumped directly into the river body. The accumulation of garbage causes the flow of water to be obstructed, so that during high rainfall there is often an overflow of water that results in flooding in the surrounding area. This condition is in line with the results of Miranda's (2023) research, which states that the presence of garbage and obstructions in the river can affect the speed of water flow and potentially worsen inundation if not managed properly.

The problem of waste in rivers not only has an impact on flooding, but also reduces the quality of the environment and the comfort of the community. Garbage that accumulates in the river body can cause an unpleasant odor, damage the scenery, and become a source of disease. Waste management in

waterways requires solutions that are simple, easy to implement, and in accordance with local environmental conditions. One solution that can be used is to install a Trash Barrier, which is a garbage filter that is installed transversely in the water stream to hold garbage from being carried away by the current. The application of Trash Barrier on irrigation canals in irrigation canals in Karangpapak Village has been proven to be able to significantly reduce the amount of waste and have a positive impact on water quality and the surrounding environment (Heliani et al., 2025).

The use of a Trash Barrier is necessary as a technical solution because manual cleaning without a retaining device is temporary and ineffective in the long run. Garbage carried by the current will accumulate again if there is no tool to stop its movement. The Trash Barrier functions to hold garbage floating at a certain point to facilitate the collection and cleaning process routinely. According to Faisal et al. (2024), community service activities carried out in Pinrang district show that the installation of trash barriers is able to reduce waste that carries downstream and supports more targeted river waste management, especially when accompanied by community involvement in equipment maintenance and environmental cleanliness. The implementation of a trash barrier based on a paralon pipe on the border rivers of Ward 1 and Ward 2 of Tanjung Senang Village is expected to help reduce waste and reduce the risk of flooding in the area.

Research Methods

The research was conducted at the border river between Ward 1 and Ward 2 of Tanjung Senang Village, Tanjung Senang District, Bandar Lampung City, due to the high level of waste pollution and the accessibility of the location for the installation and monitoring of the Trash Barrier. Based on field observations, the river condition is very concerning because it functions as a channel for plastic and household waste that flows directly into the sea without any filtering system. Therefore, the study focused on designing and implementing a floating Trash Barrier based on paralon pipes to reduce waste accumulation in the river. The planning stage considered several technical aspects, including material selection, size and shape calculations, and a design that supports easy installation and maintenance. The installation process was carried out by placing the assembled barrier on the water surface and connecting it with mining ropes attached to iron hooks fixed to the riverbank concrete. Initial load testing was conducted to ensure the structure could withstand water pressure. Furthermore, periodic maintenance was performed through regular waste cleaning and monitoring of the trapped waste volume to prevent overload. Visual monitoring was also carried out routinely to ensure the buoyancy pipes and iron structures remained in good condition and properly positioned.

Results and Discussion

The first step to overcome environmental pollution caused by waste in the Tanjung Senang Village River is to conduct observations to identify the source of waste and the characteristics of the river flow. This involves field surveys and discussions with local communities. Based on the information obtained, then design a trash barrier design that suits the size and needs of the river. This design includes the materials to be used, the size, and the installation location.

The next step is to determine the materials needed for manufacturing Trash Barrier, as for the materials used and the installation procedure Trash Barrier namely:

Tools and materials

1. Hollow Iron 4X4 cm, length 1 m, 10 rods.
2. 4 inch paralon pipe, 1 m length, 10 rods
3. Pipe cap cap, 10 pieces
4. Welding equipment such as grinders, meters etc

Installation of tools and materials

1. Mine , 15 meters
2. Concrete nails, hammers and plancu

The process of making a trash barrier begins with measuring the width of the river to determine how many tools are needed to be able to optimally hold waste without completely obstructing the flow of water. 4 inch diameter PVC paralon pipe is cut to a uniform size and closed using a cap, which is firmly glued to make it waterproof so that it functions as a buoy. The paralon is then arranged in parallel and reinforced using a welded iron frame to form a sturdy structure. An iron stand is added to keep the

paralon position from shifting due to current pressure. The retaining pole is installed to improve the stability of the tool against garbage loads and water discharge. After the entire circuit is completed, a re-check is carried out on the weld joint and an initial resistance test is carried out before the tool is installed transversely in the river using a mining rope tied to a permanent iron hook on the river bank.

Figure 1. River width measurement

Figure 2. Cutting and closing of the paralon pipe

Figure 3. Iron cutting

Figure 4. Trash barrier tool assembly

Figure 4, Installation of ropes on Trash Barrier

Figure 5. Trash Barrier tool installation process

Figure 6. Day 1 Installation of trash barrier in the Sultan Haji river

Figure 7. Inauguration of the Trash Barrier tool

Figure 8. Monitoring the Trash Barrier

The installation of trash barriers in the border rivers of Ward 1 and Ward 2 shows quite

visible changes in the condition of water flow. Garbage that had previously spread along the river body began to collect at one point on the front of the device. The types of waste that are most retained are plastic packaging, drink bottles, and shopping bags. This condition is in accordance with the findings of Astuti et al (2023), who stated that plastic waste is the dominant component of rivers in residential areas. After the tool is installed, the river visual looks neater than before installation. It is also easier for residents to see the amount of waste that enters every day. The change shows the function of the tool as an initial buffer for floating waste. Control becomes more directed because the gathering point is clear.

The effectiveness of the tool is greatly influenced by the physical condition of the river where it is installed. The location selection is carried out in a section with a relatively calm flow so that waste is easily contained. Zainalarifin et al (2023), explained that hydrological characteristics such as river width and flow speed affect the distribution of solid waste in waterways. The slightly diagonal position of the tool following the direction of the current helps to maintain the stability of the frame. During the monitoring period, the water flow continued to run unimpeded, meaning that the retained garbage did not cover the entire river body. Regular cleaning is carried out so that the capacity of the tool is not exceeded, in addition, placement that adjusts to field conditions supports optimal performance of the trash barrier.

In terms of construction, the use of hollow iron and paralon pipes has proven to be quite effective as the main structure. The paralon functions as a float so that the tool stays afloat while holding the load of waste. The welded iron frame keeps the shape sturdy and does not shift easily. Fajeriadi et al (2023), stated that appropriate technology made from simple materials is easier to apply in community-based activities. The concept is seen in the assembly process that does not require special equipment other than standard welding tools. The manufacturing cost is also relatively affordable so that it is possible to replicate and maintenance can be carried out independently by local residents.

Before the installation of the trash barrier, garbage cleaning is done manually and unscheduled. Garbage is often only cleaned up after it has accumulated at certain points. Mustika et al (2024), explained that household waste management that is not accompanied by a control system can increase the pollution burden on water bodies. Once the equipment is installed, the collection process becomes more efficient because the waste is immediately retained in one location. The time needed for cleaning is shorter than before. Transportation is carried out periodically so that there is no excessive accumulation. This system helps to create a more organized management pattern. The control since the river flow makes the load downstream can be suppressed.

Community involvement is an important factor in the sustainability of this program. During the activity, residents helped during the initial installation and cleaning process. Sitinjak et al (2025), stated that institutional support and environmental information can increase community participation in waste management. Direct interaction with river conditions makes residents better understand the impact of the habit of littering. The waste collected every day is a real picture of the amount of waste that enters the waterstream. This awareness encourages discussions about the importance of maintaining the cleanliness of the river. The support of the surrounding environment makes the appliance unabandoned after installation. Active participation strengthens the sustainability of management.

The implementation of a trash barrier based on parallel pipes in the Tanjung Senang River shows that a simple solution can have a real impact at the environmental level. Floating waste can be controlled without fully obstructing the flow of water. Husna et al (2025), stated that river waste management requires a technical approach supported by social awareness to run effectively. Field results show that the tools of containment and citizen involvement provide immediate visible changes. The risk of blockages on bridges and sluices can be reduced because

waste is already retained early. The river looks cleaner and more organized than the previous condition.

Conclusion and Recommendation

The application of a paralon pipe-based floating trash barrier in the border river of Ward 1 and Ward 2 of Tanjung Senang Village is able to hold floating waste at one point, making it easier to collect and clean up. The tool designed using hollow iron and paralon pipes proved to be quite sturdy, stable, and did not significantly obstruct the flow of water. After installation, the condition of the river looks cleaner and the garbage no longer spreads along the river body as before. The management process becomes more targeted because cleaning can be carried out regularly at the point of detention. Community involvement in installation and maintenance also supports the sustainability of this program. The application of this simple technology can be an alternative solution for river waste control in residential areas and help reduce the risk of flooding due to garbage accumulation.

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