A SUSTAINABLE APPROACH TO REDUCE PLASTIC POLLUTION AND FLOATING DEBRIS IN RIVERS, CANALS AND OCEANS

Project Reference No.: *48S_BE_3079*

College : P.E.S. College of Engineering, Mandya
Branch : Civil Engineering
Guide(S) : Prof. Madhusudhan M S
Student(S): Ms. M Meghana
Ms. Nimisha M Gowda
Ms. Ramya H L
Mr. Suhas Nayak I S

Keywords:

Floating barrier, Debris, Pollutants, canal etc**.**

Introduction:

Water is a very important resource, we use water for almost every activity like drinking, washing, cooking, cleaning, etc. This precious resource is largely getting wasted due to human carelessness and lack of planning and hence we are facing the scarcity of water. This project focuses on developing a sustainable system to reduce plastic pollution and floating debris in rivers and canals using eco-friendly materials like bamboo. The model integrates collection mechanisms to trap waste efficiently while allowing water to flow freely. By using renewable resources and low-cost technology, the project aims to provide an environmentally and economically viable solution for waterway cleanup. The system can be adapted for various water bodies, contributing to healthier aquatic ecosystems and reducing harm to marine life. This approach promotes long-term sustainability by encouraging community involvement and raising awareness about plastic waste management.

Objectives:

- The project main objective is to remove the debris and to reduce the amount of pollution in the river and canals.
- To conduct surveys to assess the type quantity and source of debris in the canal.
- To develop smart floating barriers for the control of pollutants.
- To prevent the downstream flow of debris into larger water bodies like rivers, oceans by intercepting within the flow reach.
- To remove the collected debris in the waste collector and quantifying over a period of time.
- To prepare a report on quantity of waste collected and report it to the concerned authorities.
- To support the recycling initiatives and promote sustainability.

Methodology:

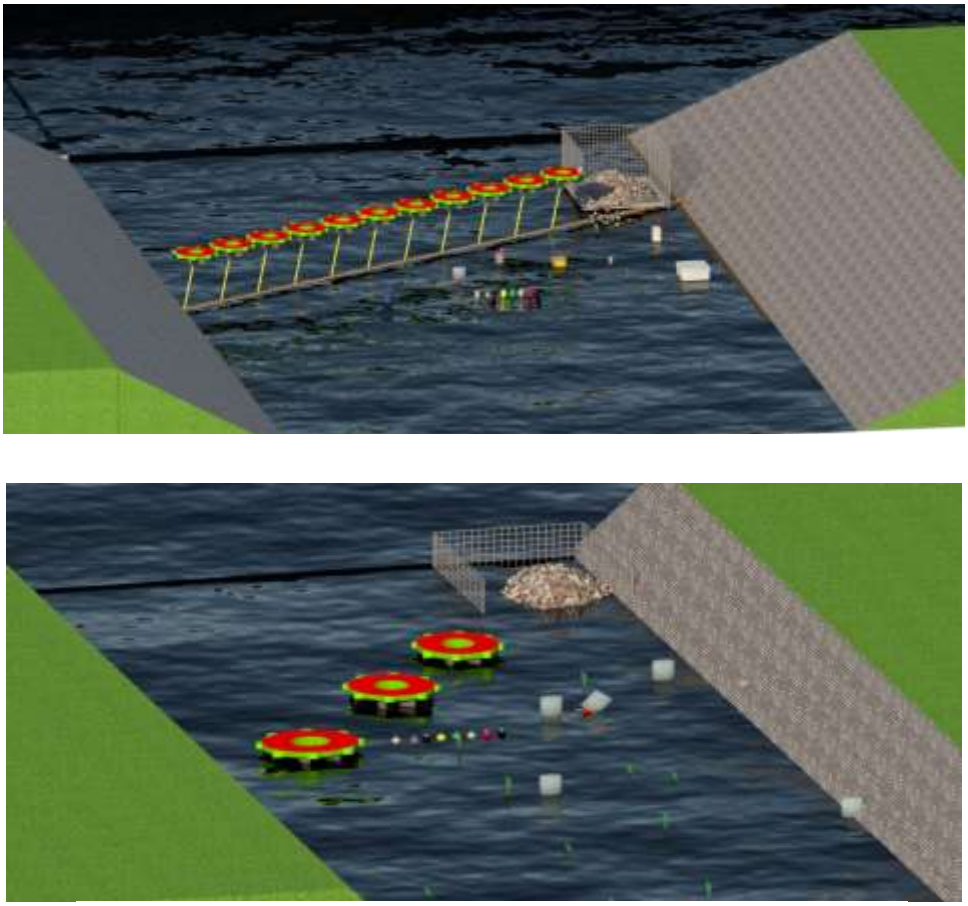

Figure 1: Working Model representation

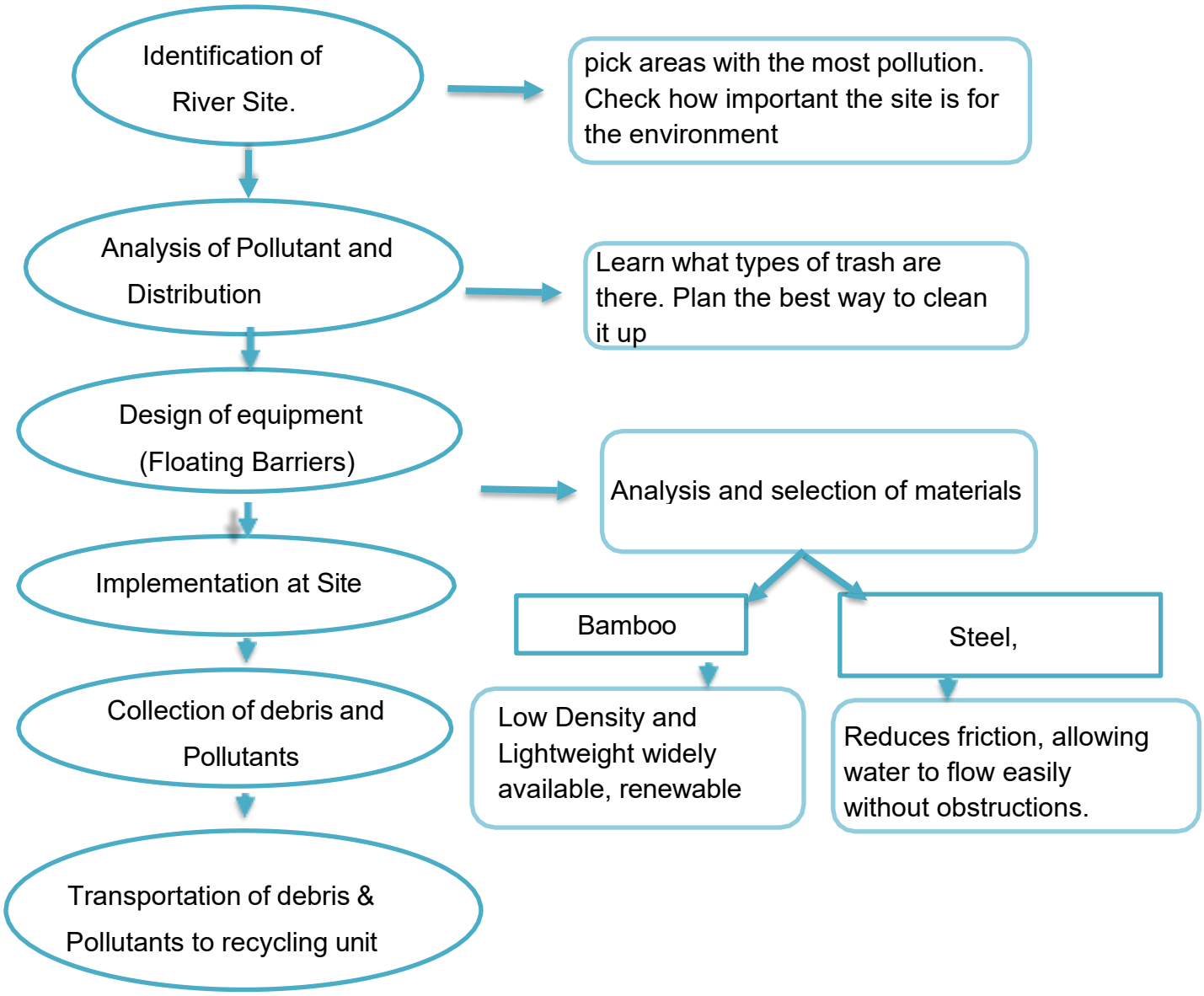

Figure 2: Methodology

The river cleaning project employs a comprehensive methodology designed to tackle plastic pollution effectively. The first step is the identification of river sites, where specific locations along the river are selected based on pollution severity, environmental significance, and accessibility. This ensures that efforts are concentrated in areas where they can have the most impact. Once the site is identified, the next step is to understand the nature and distribution of these pollutants helps in designing targeted strategies for their removal. This step involves developing or selecting specialized tools. These could include floating barriers to trap surface plastics, to collect waste from the water, or even automated devices capable of operating continuously. Once the equipment is ready, it is implemented at the river site. Careful installation and strategic placement ensure that the equipment operates

efficiently, capturing the maximum amount of plastic waste without harming aquatic life or disrupting the ecosystem. With the equipment in place, the process of collection of pollutants begins. Plastic waste and floating debris are gathered systematically, using automated systems, depending on the scale of pollution and the tools deployed. Regular monitoring and maintenance are conducted to ensure the equipment remains functional and effective throughout the clean-up process. The final step involves the recycling of collected pollutants. All the gathered plastic waste is transported to recycling facilities, where it is processed and transformed into reusable materials. This step not only prevents the waste from returning to the environment but also promotes sustainability by contributing to a circular economy. Through this detailed and methodical approach, the project aims to restore the health of rivers and reduce the impact of plastic pollution on the environment.

Result and Conclusion:

Figure 3: waste composition in River

In Conclusion**,** the bamboo-floating barrier offers a sustainable, cost-effective, and efficient solution for plastic waste removal in rivers. It operates without the need for electricity or fuel-powered mechanisms, which reduces operational costs and environmental impact. The use of bamboo, a renewable resource, ensures an environmentally friendly approach, minimizing reliance on synthetic materials and significantly reducing the carbon footprint. This innovation presents a promising method for tackling plastic pollution while promoting ecological sustainability.

Project Outcome & Industry Relevance:

- This project helps stop waste before it enters water treatment plants, protecting water quality.
- This project is intended for patent application to secure its intellectual property and highlight its innovation in waste management
- It offers a green solution by using bamboo, which is natural and eco-friendly.
- The system is practical and can be used in real cities or rural areas.
- It can create employment opportunities, especially for local workers.
- It reduces the pressure on water treatment systems, saving money and energy.
- Industries and government bodies working in sanitation, environment, or urban planning can use this.
- It encourages sustainable waste management, which is good for the planet.
- The project could inspire more eco-friendly designs using natural materials.
- A challenge is that bamboo needs special coating to last longer in wet or dirty conditions and future versions can be focused on improving durability while keeping it sustainable.

Working Model:

This project involved the development of a physical working model. We built a real, functional prototype using bamboo and other locally available materials to demonstrate how floating barriers can be used to collect debris and reduce water pollution in canals. The model was tested in actual water flow conditions to observe its performance and effectiveness.

Project Outcomes and Learnings:

- Our bamboo-based floating barrier was able to stop plastic and other debris from flowing further.
- We studied the type, quantity, and source of waste found in canals and small rivers.
- This project proved that simple and low-cost methods can help control water pollution.
- The waste collector helped gather all the floating waste in one place.

- We recorded the amount and type of waste collected and prepared a report based on it.
- The waste was sent for recycling to turn it into reusable materials.
- We learned how to design and build a working model using local and eco-friendly materials.
- We understood the importance of keeping our canals clean and protecting the environment.
- This project gave us hands-on experience and made us more aware of real-world problems and solutions.

Future Scope:

- The bamboo-based floating barrier can be extended to longer stretches of canals and small rivers in rural and urban areas.
- Design improvements can be made to make the system more stable and efficient during varying water flow conditions.
- The waste collection basket can be made larger or more durable to handle higher volumes of debris.
- The collected waste can be documented and reported to local authorities to help them take further action.
- Regular data on waste quantity can assist in planning cleanup schedules and recycling drives.
- Awareness campaigns can be conducted using the project as a live example of sustainable environmental solutions.
- The simple and low-cost design makes it ideal for schools and colleges as part of environmental science projects.
- Collaboration with local governments can help expand the project under eco-restoration or cleanliness missions.
- The system supports the goal of reducing floating plastic waste and promoting a clean water ecosystem.
- Recovered waste can be linked with recycling centers, encouraging responsible disposal and sustainability.
- This project can act as a model for developing similar eco-friendly systems in other parts of the country.