Design of Low-Cost Seabin for Efficient Marine Debris Collection

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Abstract - SEABIN is a revolutionary floating bin designed to tackle the growing problem of marine pollution by removing floating garbage from the water. The purpose of this research work is to remove floating garbage from all of the country's water bodies and make them litter-free. Our approach involves the use of a floating bin called the "SEABIN 0.1 " which has several important features. The Seabin is a floating rubbish bin designed to be located in water bodies such as marinas, docks, yacht clubs, and commercial ports.. Our research work involves testing the SEABIN in different water bodies and assessing its effectiveness in removing floating debris. For this particular SEABIN model, we used a plastic water bottle cut in two to create a reservoir, which was fitted with a homemade water pump made from a DC motor, a homemade propeller, and two bottle caps. We also used a mosquito net or fabric as a filter, attached to the bottom for buoyancy, and a Styrofoam ring. The prototype was designed to follow the flow of the water body, and any floating trash was gathered by the filter. The water was then drawn in from the surface, passed through the filter, and pumped back into the water body using the homemade water pump. Our findings suggest that SEABIN is an effective solution for removing floating debris from water bodies. By installing SEABINs in marinas, docks, yacht clubs, and commercial ports, we can help to keep our water bodies clean and litter-free.

***Keywords*—marine litter; riverine litter; ocean plastics; plastic waste management; circular economy.**

I.INTRODUCTION

Water pollution has become a major concern worldwide due to its devastating impact on the environment and its inhabitants. The pollution of our waterways not only affects aquatic life but also has far-reaching consequences on human health and the economy. It is therefore imperative to develop effective solutions to combat this issue and preserve our water bodies for future generations. The Seabin Project is a revolutionary initiative that aims to tackle water pollution by developing innovative solutions for cleaning up our oceans. The Seabin is a floating bin equipped with a water filtering system designed for use in contained environments such as marinas and ports. Its unique design enables it to attract and capture floating debris and litter, including plastic waste and oil, from the water's surface. The primary goal of this research is to manufacture an efficient and cost-effective.Seabin that can automatically collect floating garbage and debris using the shore's electric power. The hypothesis is that Seabins can significantly reduce the amount of marine litter in water bodies, thus minimizing the impact of pollution on the environment and aquatic life. By constructing Seabins, we aim to provide a solution that is not only effective in cleaning up our waterways but also sustainable and economical in the long run.

II. SCOPE OF WORK:

The scope of this project involves designing and constructing a low-cost Seabin equipped with a homemade water pump that will efficiently collect floating garbage and debris from small water bodies. The use of this Seabin will eliminate the need for manual labour and make it easier to collect floating debris. The collected plastic can be recycled and used to make more Seabins, making this a cost-effective and sustainable solution. By implementing this Seabin in small water bodies, we aim to reduce the harmful impact of marine litter on aquatic life and preserve our waterways for future generations.In summary, the low-cost Seabin project is a promising solution to the problem ofwater pollution in small water bodies. The research goals of this project are to manufacture an efficient and cost-effective Seabin that can automatically collect floating garbage and debris. The hypothesis is that this Seabin can significantly reduce the amount of marine litter in small water bodies, thus minimizing the impact of pollution on the environment and aquatic life. By constructing this lowcost Seabin, we aim to provide a sustainable and economical solution that can help preserve our water bodies for future generations.

Fig 1. Experimental Design for SEABIN

III. Methodology:

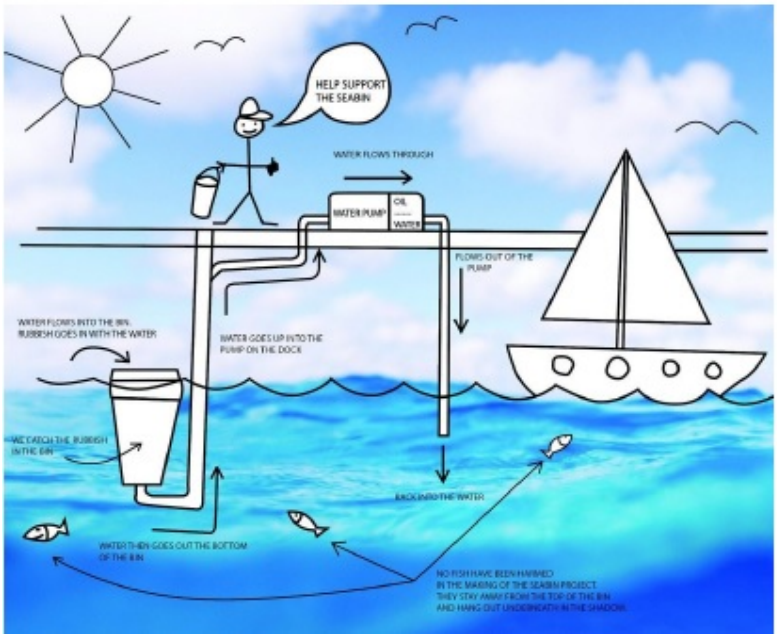

Fig 2. Working of SEABIN 0.1

For this study, we aimed to create a low-cost version of the Seabin by using easily accessible materials. Our research model involved building a prototype of the Seabin using a plastic water bottle, mosquito net, Styrofoam ring, bottle caps, homemade propeller, and DC motor.

First, a plastic water bottle was cut in two to create a plastic reservoir. A mosquito net was used as a filter and joined with the bottom of the reservoir for buoyancy.A Styrofoam ring was used, and two bottle caps were attached to it. A homemade propeller was then created, and a DC motor was used to create a water pump. The water pump was attached to the bottom of the water bottle to create a miniature C-Bin.

To conduct the experiments, we placed the prototype in small water bodies, such as buckets or bathtubs, and tested its efficiency in collecting floating debris. We conducted multiple trials to test the prototype's performance and collected data on the amount and type of debris collected in each trial. To analyze the data, we recorded the weight and type of debris collected in each trial and analyzed the trends in the data. We also examined the modifications made to the Seabin design and evaluated their effectiveness in collecting debris.

One significant modification made to the Seabin design was the use of a mosquito net as a filter. This modification was made to create a low-cost version of the Seabin while still maintaining its effectiveness in collecting debris. The use of the Styrofoam ring and homemade propeller also helped to reduce costs and make the prototype more accessible.

IV. ADVANTAGE OF SEABIN :

The following are some advantages of employing our Seabin in water bodies:

1. It reduces the amount of effort required by humans to manually collect floating garbage and debris.

2. Our Seabin design is low-cost, making it accessible to more people.

3. It does not require any additional power source to operate, making it more eco-friendly.

4. It removes garbage and other floating and suspended debris from water bodies efficiently.

5. Our Seabin design is easy to construct and can be modified based on the user's needs.

Our low-cost Seabin is a small-scale solution, but it is a great start in the fight against marine trash in our water bodies. By working with marinas, ports, and yacht clubs, we can locate the Seabin in ideal locations and let Mother Nature send us the trash to catch. We may not be able to catch everything, but it is a step towards a cleaner and healthier marine ecosystem. Moreover, we can recycle the plastic waste we collect from water bodies to construct more Seabins, making it a sustainable and circular solution to reduce marine litter.

CONCLUSION:

Overall, this study aimed to demonstrate the potential of low-cost and accessible technologies to address the issue of marine pollution. The prototype created in this study serves as a starting point for further innovations in the development of low-cost and effective solutions for marine pollution. We strive to be as close to zero waste as possible with our low-cost Seabin. The catch bag, made from mosquito net or fabric, is one of the key components of our Seabin, which traps the marine debris efficiently. The use of low-cost and biodegradable materials in our Seabin makes it a sustainable and cost-effective solution to reduce the harmful impact of marine litter on aquatic life and preserve our waterways for future generations.

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