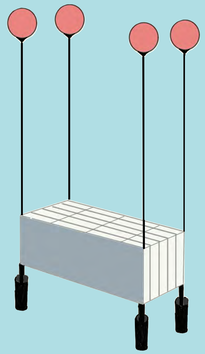
THE CURRENT PROJECT

Device while in operation



The device is stabilized with heavy anchors as well as buoys. This is to ensure the ocean current or changes in the ocean floor do not move the device.

The anchor is equipped with expandable projections that can facilitate its stability in any target water column.

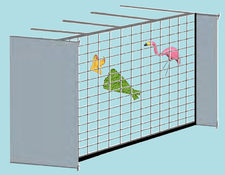
Boat connected to the device

The device can be found from the surface of the water thanks to the buoys.

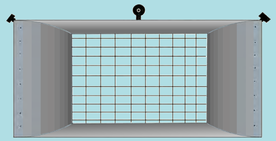
A boat attaches the buoys to a pulley system to pull in the top panel which is connected to the gathered plastic.

Once emptied on the boat the top panel and plastic nets are placed back into the device.

Inside device



Front of device



Background and vision

Plastic has become an indispensable part of modern life, offering numerous societal advantages and experiencing a surge in global demand over recent years. However, this widespread use has also led to a concerning rise in plastic pollution, posing significant environmental challenges worldwide. The current project might help addressing this concerning pollution. Plastic extraction from surface water has been successfully implemented in several heavily plastic-polluted river mouths. However, there remains concern regarding the fate of plastic debris flowing with water currents at different depths of the ocean. Harnessing ocean currents for deep-water plastic debris collection fills a crucial gap in current cleanup strategies.

"The Current Project" aims to utilize the natural ocean current transporting plastic underwater and intercepting it. This prevents the plastic from embedding itself into the ocean floor and becoming impossible to extract without damaging the ocean floor. Further it requires no external force applied to function since underwater currents are a naturally occurring phenomenon. Additionally, this project can propose legislative measures to address microplastic pollution in fish by conducting potential plastic source analysis.

Procedure

- Locate an area where plastics are flowing with the ocean currents.
- Power the sensors, camera and deterring devices.
- Place the device into to the ocean current, tilting it with the expandable projections such that it flows directly into the mouth of the device.
- As soon as the plastic starts to fill up one of the nets a sensor system will detect it and pull the bottom part of the net up, making it flow more plastic through the entire system.
- Extract the plastic from the device using a boat and pulley system connected to the buoys.
- The boat crew will sort and recycle the plastic as well as take some of the aquatic biodiversity for inspection.
- After the nets are emptied and cleaned they are refitted and lowered back into the device.
- Stay in area or relocate depending on plastic amount.
- Start again from step 1.

Challenges

Deployment: A possible problem with deployment could be the force of the current acting on the device, and also wind and weather. If it were to be implemented to river systems it would also be a problem with sediments entering the system and filling it up.

Maintenance: The maintenance of the non-extractable part would have to be done by removing the whole device, while the nets can be maintained during plastic removal. Furthermore, clogging of the nets could cause issues.

Cost of operation: The main costs of operation would be in the extraction of the plastics which have accumulated in the nets. Cost of manpower- and fuel on the extraction vessel would be a regular payment.

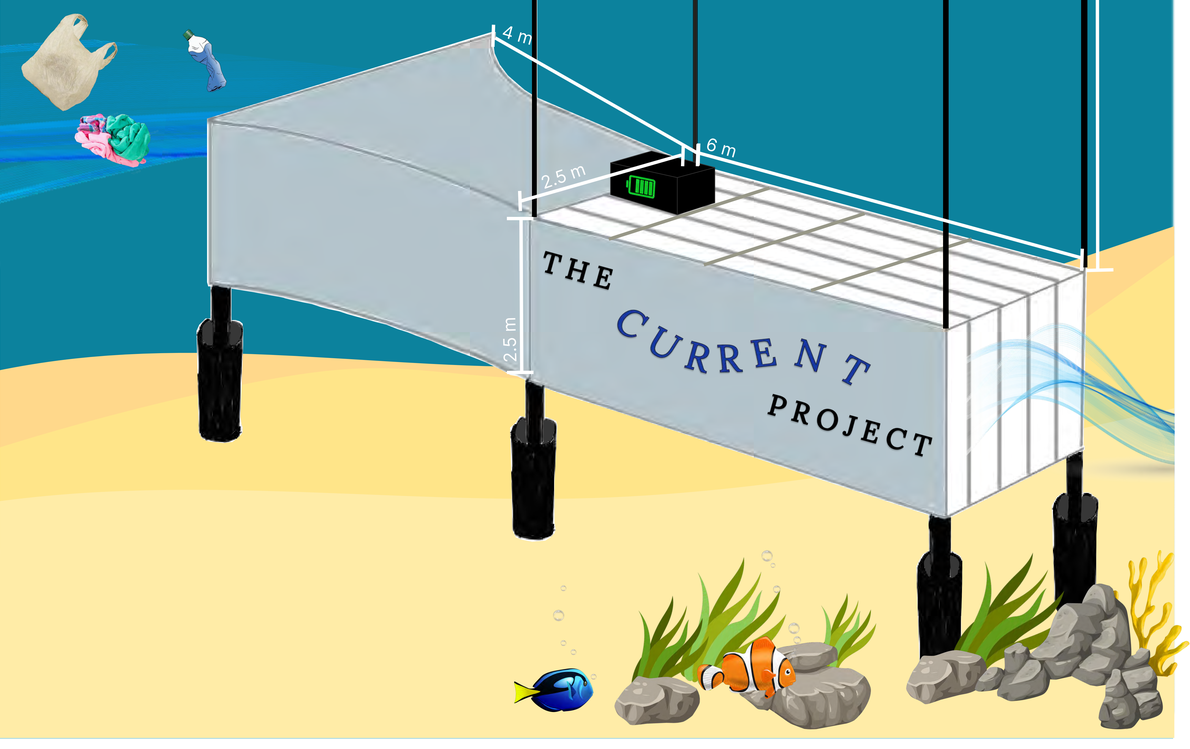
Remaining issues: For further research there should be made a prototype which would test out the integrity of the system while applied various forces on all sides of the device. Removal of the device and anchors in a sustainable manner should also be studied further.

Welfare of Aquatic Organisms

The aquatic life affected by plastic debris and pollution deserve better. Our device comes with ***Acoustic Deterrent devices (ADD)***. These are devices that emit sounds with a range of frequencies to fish and other marine life riding the currents. Marine life will activate the ADD when detected by the ***sensors*** on the nozzle of the system. The emitted frequencies gently force the fish to move away to not get trapped and killed.

The device's anchors are also minimally invasive and disruptive to the seabed. This ensures that marine life (both animals and plants) is disturbed, damaged and endangered as little as possible.

In addition, microplastics are very minute in size, and it is impossible to collect or remove them completely from the ocean. Regarding this, this project can help finding the possible migratory route, and types of microplastic consumed or entangled with the marine organisms. In that case, some random marine fish and other organisms can be trapped and collected through the device by deactivating the sensor and sonic apparatus. Next, microplastic can be extracted from them and tested through the FTIR polymer analysis to possibly identify the plastic types, sources and migration routes with the animals.



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