4REVS
CO-CREATIVE ECOSYSTEM

Case Study

Title	**AZURE: Catching plastics in the rivers before they arrive in the oceans**

Main Theme (please checkbox "☒" below):

☐ Food/agriculture/protein

☒ Water

☐Resources/circular/ecosystems

☐Energy/climate/greenhouse gasses

Sub Theme	**River pollution, plastic pollution, innovation, start-ups**
Region/Country	**LATAM / Ecuador**
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Abstract

Ichthion Limited is a start-up that through technological innovation seeks to solve the problem of plastic pollution in the oceans. This initiative has won several awards that have allowed it to finance and develop **a turbine that collects plastics in water sources, such as rivers, and does not let them reach the sea.** They also gather information on the plastic collected to solve the pollution problem through exact data. **Finally, by collecting plastic, they are rescuing materials that can be recycled and reintegrated into the plastics industry, hence promoting a circular economy.**

This initiative was born from an issue that affects the entire planet: **the large number of plastics that end up in the oceans unbalancing marine life. Annually, the ocean receives almost eight-million tons of plastic waste, and 90% of this waste comes from 10 different rivers across the world**. This means that tackling this problem in the rivers is a good starting point to decrease ocean contamination. **Collecting the plastics in the rivers is Ichtihion's goal,** reducing significantly the quantity of waste that pollutes the oceans.

Overall Description

The global production of plastics increases year by year. However, their recovery or recycling does not increase at the same rate. As a result, tons of plastic garbage is being generated on the planet, most of which it ends up in landfills and polluting ecosystems. Currently, **only 9% of the plastics that have been produced in the history of mankind have been recycled.** 12% of these plastics have been incinerated, creating a negative environmental impact as a result of the gases that are produced during the process. 79% of them have become garbage that pollutes the environment in multiple ways.

Making correct plastic waste disposal does not guarantee it will end up being recycled. In many places around the world, you can find important constraints in terms of the waste disposal infrastructure and functioning, including **serious process loop-holes at one or more points of the overall waste disposal systems and cycles**. Additionally, factors such as

storms, rain, and wind can end up taking to the rivers or sewerage systems plastic objects that had been managed correctly. **Most of these objects end up in the ocean even if it is miles away from the place where the initial waste disposal took place.**

Plastic pollution is showing its negative consequences in places so remote as the Galapagos Island. This island is located 1,000 km from Ecuador across the Pacific Ocean. **It is home to marine animals, land animals, and plants that only exist in this place of the world,** thus, the importance of its preservation. Galápagos was the place where Charles Darwin got inspired to talk about his theory of evolution, largely because of its uniquely evolved species. However, **in the last years, its natural landscapes have become landscapes filled with plastics that are not even produced or disposed of on the island**.

Is there a solution?

Inty Grønneberg, an Ecuadorian Ph.D. student, created an alternative solution for cleaning the rivers and avoiding plastic waste to arrive into the oceans. His **ocean-cleaning startup** is called **Ichthion** and has been awarded several times for its innovation and achievements. **He was inspired by Galapagos' situation because it is a beloved place for him and his country. However, this innovation could help clean oceans worldwide.**

His solution is focused on **collecting plastic waste from the water before it reaches the sea.** It focuses on the rivers, which are the main highway for plastics to go outside the cities and into the ocean.

How to focus on the rivers with so many rivers in the world?

Each year, the ocean receives almost eight-million tons of plastic waste and 90% of this waste comes from just 10 rivers. By focusing on these ten rivers, even if these are miles away from Galapagos, **the ocean would be receiving around seven-million fewer tons of plastic waste annually.**

Inty Grønneberg believes that given the current tendency in many countries around the world to ban single-use plastics, by 2035 this kind of waste could end. However, while this happens, **plastic waste is still arriving in enormous quantities to the ocean and it is important to take care of that situation now.**

> *"It is estimated that the use of disposable plastics could end by the year 2035, but before then, by 2025 the amount of plastic used will have tripled compared to the current level"*
>
> Inty Grønneberg

The story behind Ichtion

As a Ph.D. candidate in the Imperial's Dyson School of Design Engineering (London), **Inty Grønneberg developed a project together with Robert Rouse. This start-up was initially called "Remora Marine"** and they **developed turbines that helped to catch plastic waste in rivers.** Both had seen marine landscapes in which plastic waste predominated and wanted to do something about it.

With "Remora Marine", Grønneberg was recognized with the award **"Innovators under 35 Latin America 2018 MIT Technology in Spanish".** This award came with a monetary price which helped Inty and Robert to test and develop to a bigger extent their invention and start-up. **Thanks to different grants and recognitions, they had the opportunity of developing their start-up, which at some point changed its name to the current one (Ichthion).**

Picture: Inty Grønneberg recognition by the MIT Technology Review.

Currently, Ichtion has **three models of plastic catching turbines,** each one designed to catch different sizes of plastics (starting with bigger ones, like bottles, and ending up with microplastics).

Is this technology in the market?

Although this technology is still being tested in labs, they are now implementing it in real-life scenarios. **Grønneberg signed an agreement with the Ecuadorian government to start applying the technology in the river Portoviejo, in the Manambí province. They should have started building the first AZURE system in June 2020** (we do not have the information if this happened or was postponed due to the pandemic).

Main Features or Highlights

- **Ichthion is a start-up that offers three types of turbines** capable of filtering and collecting plastics from the water, mainly from rivers. **Each type is designed to catch different sizes and types of plastic waste, including microplastics.**

    - **Azure – macro plastics in rivers:** Azure is a barrier which catches up to 80 tons of plastics per day. It is intended to catch big pieces of plastics in rivers and stop them from getting to the ocean. This system aims to integrate with recycling technologies because of the quality of the type of material it catches. It encourages the circular economy

and recycling economy by catching materials that can be integrated again into production systems. This system is now on a pilot-scale (applied in real-life scenarios).

- **Cobalt – micro and plastic particles in rivers and coastal areas:** The Cobalt system is still in bench-scale research and has not been implemented yet in rivers. It is a turbine composed of different membranes. When water passes through them the turbine rotates and any particle of micro.-plastic gets caught in these membranes. This turbine is placed on the sides of the boats. This way, any time a boat navigates a river it will be cleaning it simultaneously. It can also be placed in coastal areas and docks.

- **Ultramarine – Dynamic system for ships:** This is the less developed system at the moment and it is only in the invention and research stage. It is intended to be placed in ships and collect a bigger amount of plastics and microplastics than the first two models.

- The three models also **collect data on the plastic that's being extracted.** This information is a powerful tool for governments, companies, and other types of organizations to take measures and design circular economy strategies.

Why is this Revolutionary?

These turbines are revolutionary because they can **help collect plastic waste before it reaches the ocean,** where it is inevitably dispersed and becomes more difficult to recover. The turbines are designed to collect waste in rivers, which act as freeways, connecting between them to end up in the sea. On the other hand, **these turbines are designed to coexist with existing infrastructure, making the application of the innovation more affordable and therefore more viable and replicable.**

However, plastics are not the only thing that these systems collect, as **they also collect data.** Having the data on the number of plastics

collected in a certain place can lead to major innovations or effective measurements to reduce plastic pollution.

Finally, by collecting plastic waste, they are collecting material that can be recirculated and reintegrated into the production system. **This is a step towards a circular economy.**

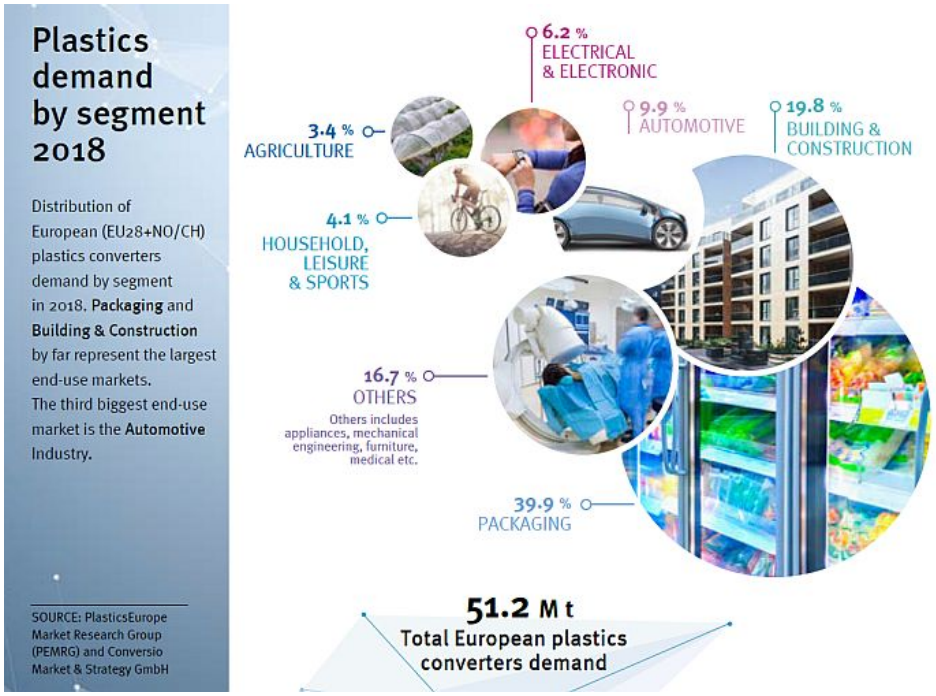
Concrete Examples

The implementation of Azure began in April 2020 in the river Portoviejo, in the Manabí province. By winning a contest offered by the **Benioff Ocean Initiative,** they gained the money and support for the implementation of this new technology. Thanks to this, Ichtihion began to be part of the **Ocean Cleanup and Protection coalition**, together with organizations from all over the world.

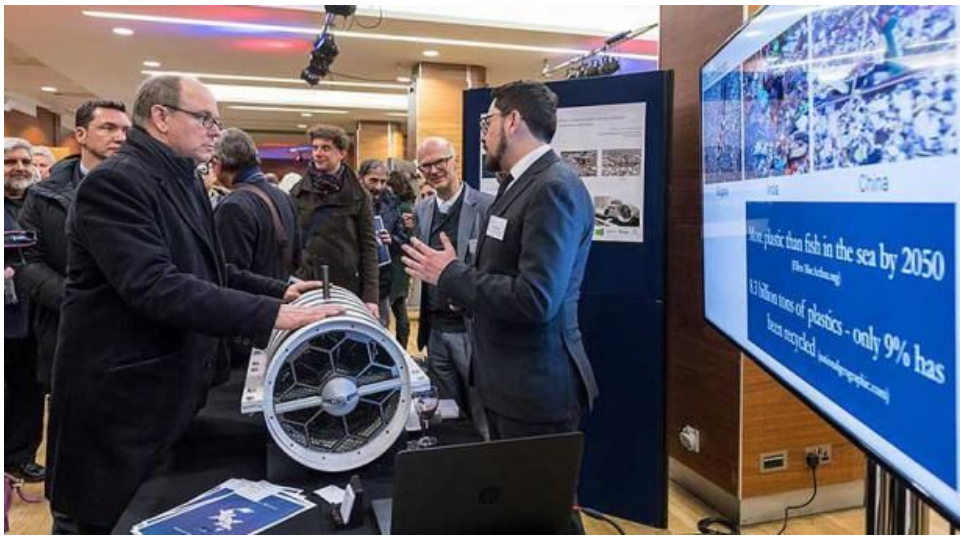
Watch Video HERE

Visuals (incl. references)

Picture: Inty Grønneberg and his turbine



Picture: Plastic demand in Europe by industry segment.



Picture: In 2019, the president of Ecuador, Lenin Moreno, awarded Inty with the "National Order of Merit in the rank of great commander", for the development of his turbine.

Links, related resources, people behind

Ichthion, Inty Grønneberg's enterprise
https://ichthion.com/technology/

Ichthion Video
https://twitter.com/i/status/1248648994122760192

Plastic in paradise: the battle for the Galápagos Islands' future
https://www.youtube.com/watch?v=aS8IBxi2xJE&feature=emb_logo

Imperial entrepreneur named Latin America Inventor of the Year
https://www.imperial.ac.uk/news/189255/imperial-entrepreneur-named-latin-america-inventor/

World Oceans Day: How one startup is fighting plastic pollution
https://www.verdict.co.uk/world-oceans-day-plastic-pollution-remora-marine/

An award was given to an Ecuadorian who invented a turbine to collect plastics from water
https://www.ecuadortimes.net/an-award-was-given-to-ecuadorian-who-invented-turbine-to-collect-plastics-from-water/