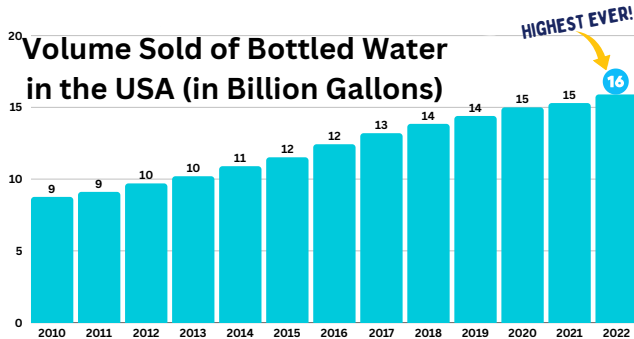


RETURN

THE FULLY SUSTAINABLE WATER BOTTLE

Team: Reduce, Reuse, Return. Briana Harris & Kevin Bustamante Fontanel, bharris2@student.waubonsee.edu
Waubonsee Community College | SDGs 3, 12, 13, 14, 15



The Problem with Plastic Bottles

- Every day, consumers in the U.S. throw away over 60 million plastic water bottles. Unfortunately- we are not slowing down.
- There are 244,000 metric tons of plastic floating in our oceans, and by 2050, there could be more plastic than fish.
- The United States' landfills are overflowing with 2 million tons of wasted water bottles. It will take at least 1,000 years for every bottle to decompose, releasing contaminants and microplastics into our soil.

“But isn’t bottled water still better for my health?”

If only. Many of the supposed advantages of bottled water lack research support, and it is estimated that between 10% and 93% of bottled water samples are contaminated, including with microplastics.

Concerning health issues:

Microplastics are everywhere. They enter our bodies through food, water, and air. The accumulation of these particles can lead to numerous health concerns. Researchers have also identified invisible nanoplastics.



Rising consumption:

The US has an annual demand for 29 billion water bottles. The manufacturing process alone requires 17 million barrels of crude oil. However, consumers in the US only recycle about 9-12% of plastic bottles.



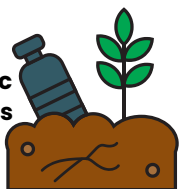
Drastic oceanic pollution:

The oceans are burdened with tons of plastic waste. Each year, 33 billion pounds are added globally. The Great Pacific Garbage Patch, a well-known example, is a 1.8 trillion plastic particle blanket in the ocean, an area twice the size of Texas.



Lasting Land pollution:

Once it enters the environment, plastic can persist, leaching harmful chemicals and microplastics for over 500 years. Most plastic bottles today are produced from PET, which is derived from chemicals that can be detrimental to the environment.



SDG 3

Reduction of microplastics and nanoplastics in the human body.

SDG 12 & 13

Repurposing waste byproducts and informing consumers about biodegradability.
Minimizing the use of crude oil and CO2 emissions.

SDG 14 & 15

Reducing plastic waste in oceans and landfills.
Promoting a cleaner environment and ecosystems for all living things.

3 GOOD HEALTH AND WELL-BEING



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



13 CLIMATE ACTION



14 LIFE BELOW WATER



15 LIFE ON LAND



WE NEED A SOLUTION TO STOP THIS CRISIS: "RETURN" IS UP TO THE TASK.

RICE BRAN WAX (1ST LAYER)

Rice bran is a byproduct of the rice milling industry; it is sometimes utilized but frequently considered waste.

This waste-derived wax creates an outer layer that is both waterproof and resistant to moisture. This safeguards the bottle against environmental harm and guarantees it retains water for extended durations.

CELLULOSE ACETATE (2ND LAYER)

Cellulose acetate is a man-made polymer that serves as the primary structural component, offering rigidity, strength, and biodegradability even in seawater. We source this from pure cellulose waste, a byproduct of the wood pulp and paper industry.

Whether blown or molded, this will be the primary material that makes up the bottle's structure and shape.

PROOF OF CONCEPTS (CASE-SENSITIVE)

Production of triacetin from industrially sourced purified glycerol:

<https://bit.ly/POCTriacetinReturn>

Rice bran wax, a suitable replacement for fossil fuel-based Montan wax for coatings in October 2024 study:

<https://bit.ly/POCRiceReturn>

Study producing cellulose acetate from cellulose in wood pulp:

<https://bit.ly/POCAcetateReturn>

SO, WHAT IS "RETURN"?

Return is our 100% biodegradable water bottle that supports a circular economy by utilizing waste byproducts for its materials.

We've created a layered composite structure to fit our ideal characteristics: Strong, durable, flexible, ability to hold shelf life for ~12 months, and ability to decompose after 18 months.

TRIACETIN- NATURAL PLASTICIZER (3RD LAYER)

Glycerol and acetic acid combine to form the compound triacetin.

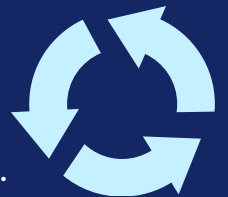
We intend to source waste glycerol from the expanding biodiesel industry to produce this compound sustainably.

This ensures that the cellulose acetate stays both flexible and durable. It also helps to prevent water absorption for a longer time than natural glycerol and maintains the bottles integrity.



LIFE CYCLE

Ideal shelf life for 12 months with materials used, biodegrading into natural materials from 18-24 months.



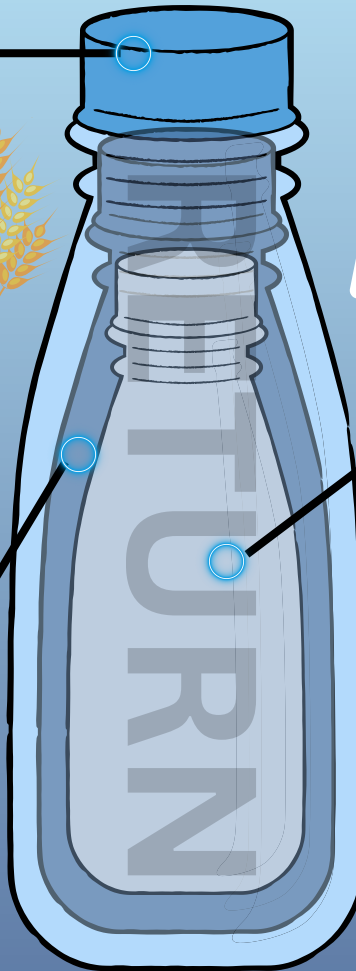
ACCELERATED SIMULATION



Return will go through accelerated aging tests to simulate responses to long-term moisture & UV exposure and test overall biodegradability.

OUR GOAL

Return will reduce and replace the crisis caused by single-use water bottles.



THE PLAN

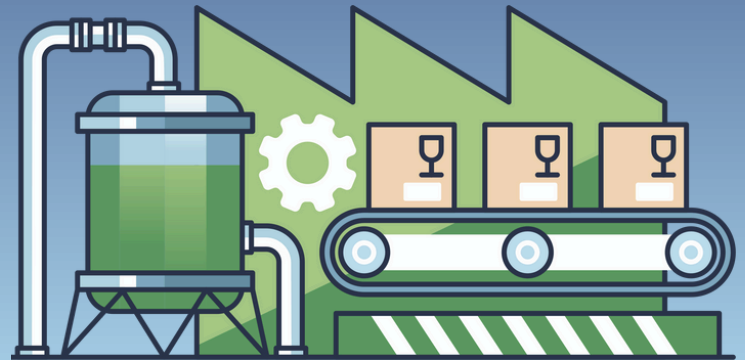


REPURPOSING WASTE BYPRODUCTS

Source byproducts of rice bran, crude glycerol, and cellulose from the rice milling, biodiesel, and wood pulp & paper industries. (Ideally, they will pay "Return" to take their waste away!)

TESTING & MANUFACTURING

Performance of accelerated biodegradability tests and balancing of layers for best results. Production of "Return" while aiming for efficient energy usage and cost of process.



MARKETING

DIGITAL MARKETING AND SOCIAL MEDIA. FILM RESULTS OF PRODUCT TESTING AND BIODEGRADABILITY TO GAIN TRACTION FOR THE PRODUCT & EDUCATE.

EXPOSURE AT CORPORATE, PUBLIC, AND SCHOOL EVENTS WHERE WATER BOTTLES ARE FREQUENTLY BOUGHT AND SHARED.

OFFER WHOLESALE OPTIONS FOR EVENTS, AND PROVIDE SMALLER GROUPINGS/INDIVIDUAL SALES ONLINE AND IN PERSON.

RETURN'ED TO EARTH

- Creating a sustainable product without taking field space away from food production.
- Educating consumers on natural plastics- supporting the switch.
- Reducing the health risks of ingesting microplastics.
- Protecting our land, oceans, and climate from the dangers of plastic leaching.

Product timeline: Estimated testing through 2025-26. Launch in USA on social media with proof of concept proceeding product launch. Global potential.

Product price: When sold individually, equal to or less than a standard water bottle is possible with production costs.

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Huge thank you to David Voorhees, Professor of Earth Science • Liberal Arts and Sciences • Waubensee's UIUC Sustainability Competition coordinator. We appreciate all of your time and support with our passion. Email at dvoorhees@waubonsee.edu.

