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Marine Debris in Circular Blue Economy

5. The role of blue economy industries in plastic pollution generation

(Tutorial, Discussion or Fieldtrip)

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Universiti Malaysia Terengganu
UMT

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Content

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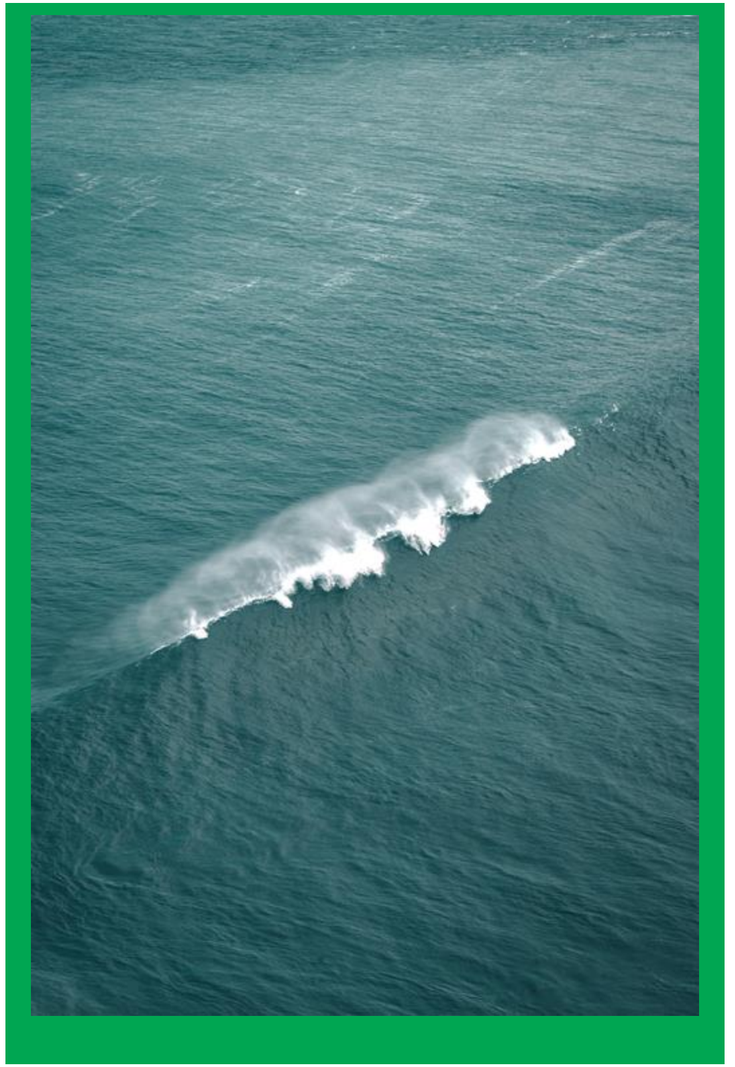
Introduction

This tutorial explores practices strategies to reduce waste generation and improve recycling rates, including waste soring systems, technological innovations, public educations, and infrastructure development. In discussion session, participants will develop and present targeted action plans or proposal for circular economy initiatives, focusing on specific sectors or geographic regions.



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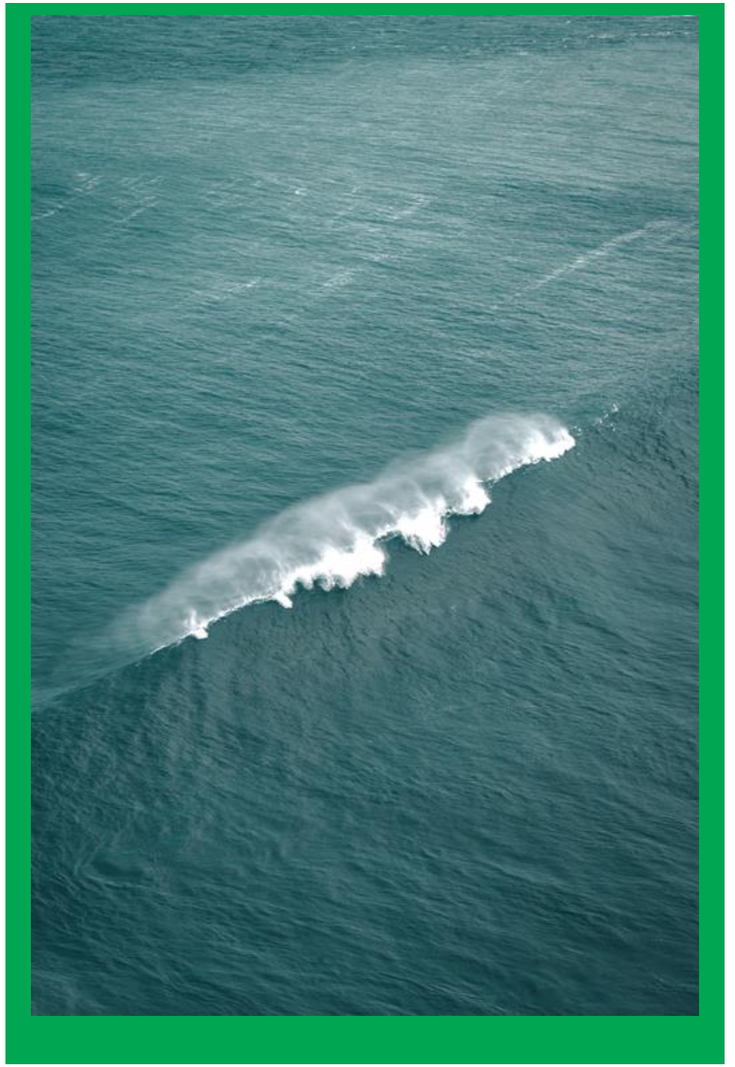
Learning outcome:

- Identify and evaluate waste reduction strategies.
- Design circular economy projects for real-world application
- Enhance communication and collaboration skills.



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1. Learning points

Discussion between students and lecturer (or self-reflection) about common marine waste types and propose realistic reduction and recycling solutions.

Example of discussion points:
•Waste hierarchy: Reduce, Reuse, Recycle
•Types of recyclable materials (plastics, metals, glass, organic waste)
•Community-based recycling systems
•Technological innovations in recycling (e.g. AI sorting, bio-recycling)
•Marine litter interception technologies (e.g., river booms, floating barriers)
•Government and industry roles in waste management
•Behavioural change and public education strategies
(10 – 15 mins)

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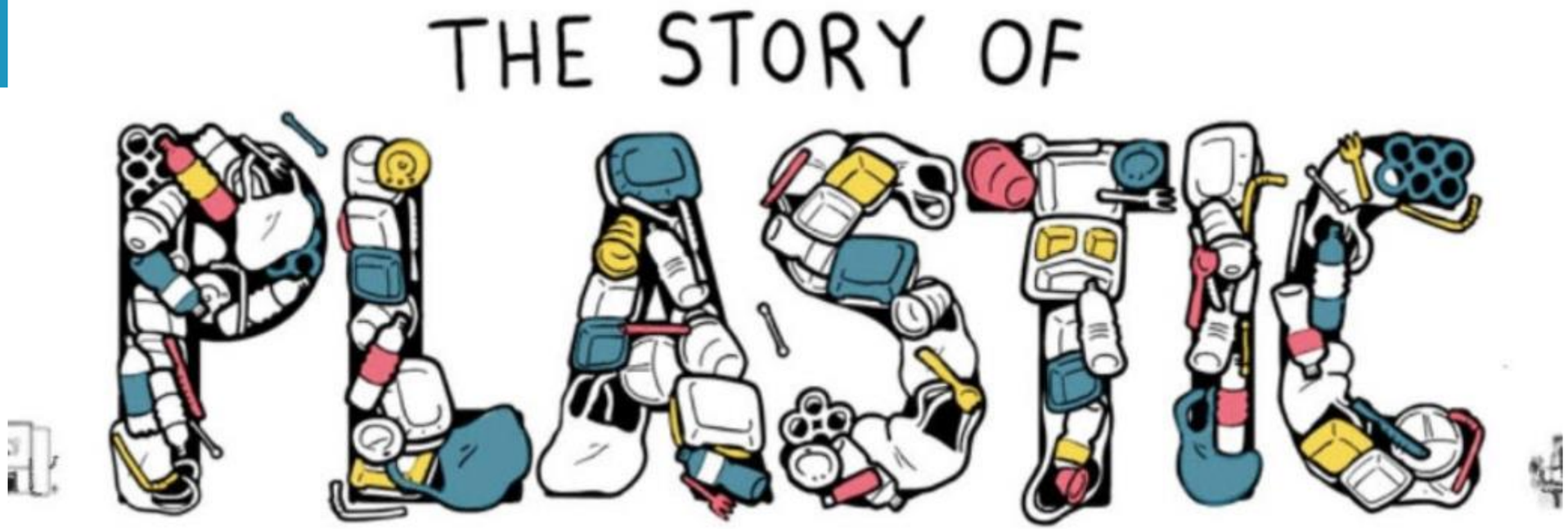
2. Video



CREDITS: Narration by Tiza Mafira Animation by Ruben DeLuna Creative Written & produced by Brett Chamberlin, Michael O'Heaney, and Ruben DeLuna Based on The Story of Plastic documentary, directed and produced by Deia Schlosberg

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SustainaBlue – Transnational Training Event at Athens, Greece, 2025.
Study visit to Blue Cycle.

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3. Example

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Photos were taken by Jennie Lee during the visit.

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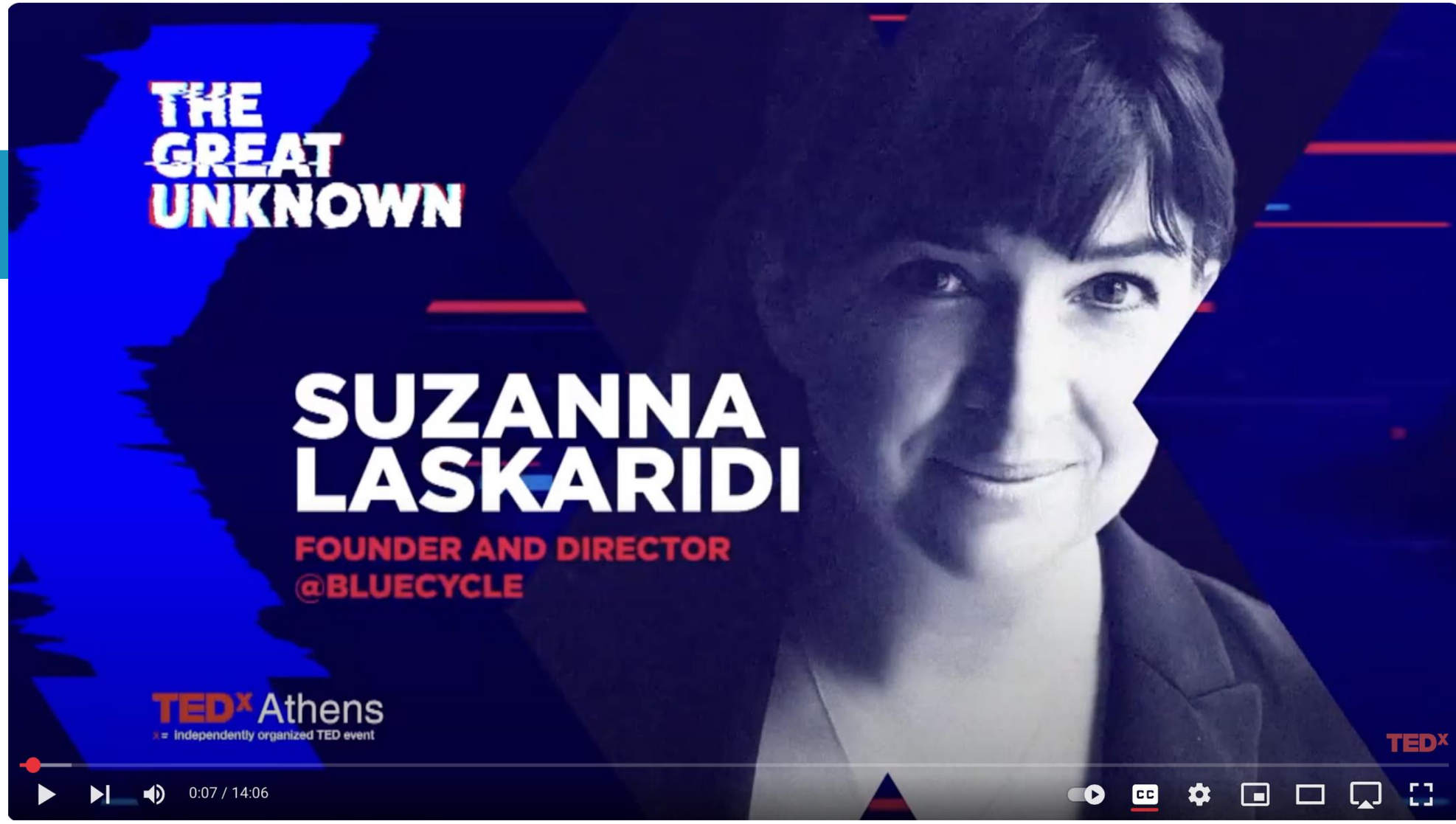
3. Video



This video will be discussing the problem of lost fishing gear globally and in Greece, how it can be tackled by increasing recycling and why circular economy is the preferred economic approach of the future.

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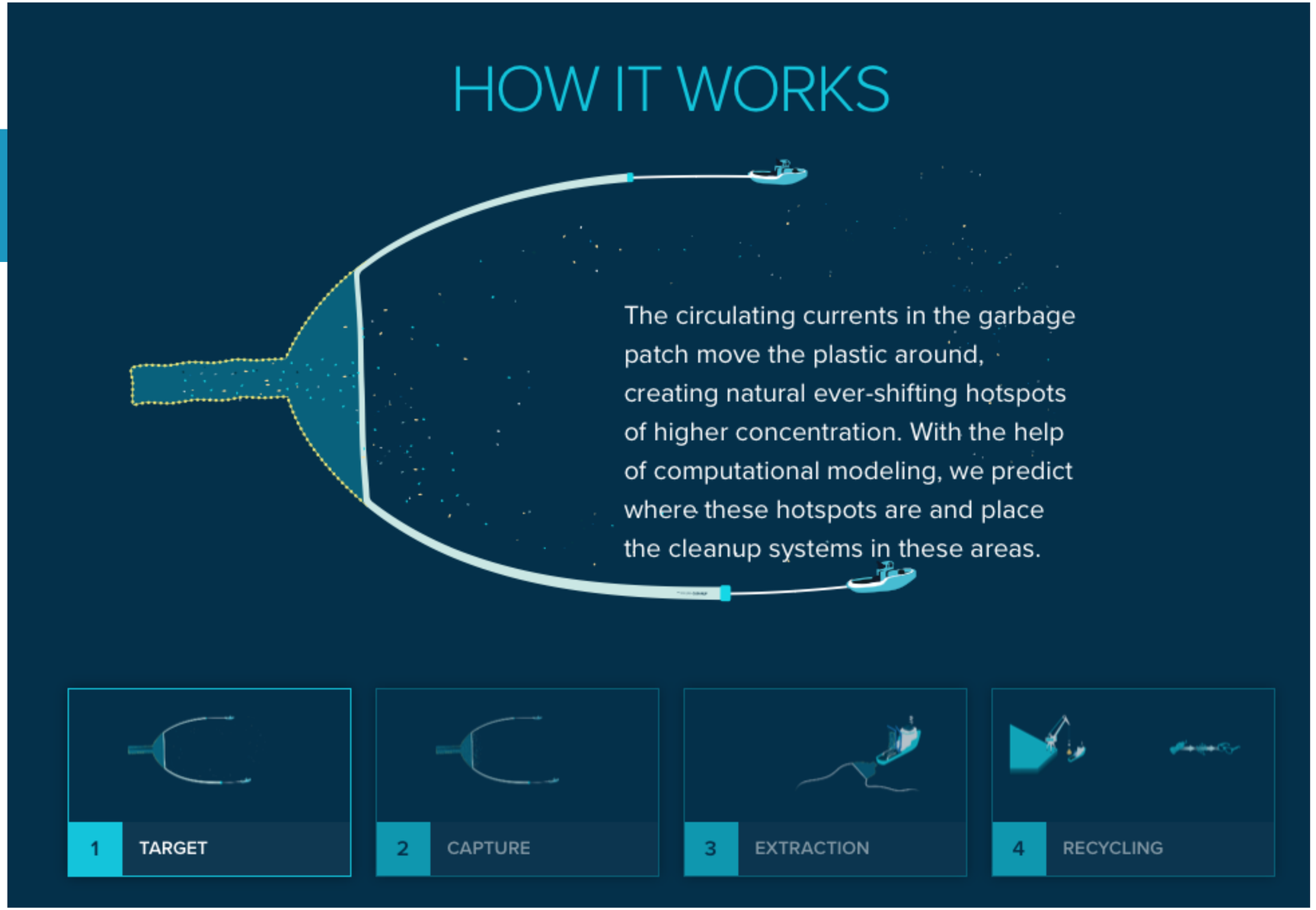
3. Example

Ocean Clean Up

https://theoceancleanup.com

Processes

1. Target
2. Capture
3. Extraction
4. Recycling



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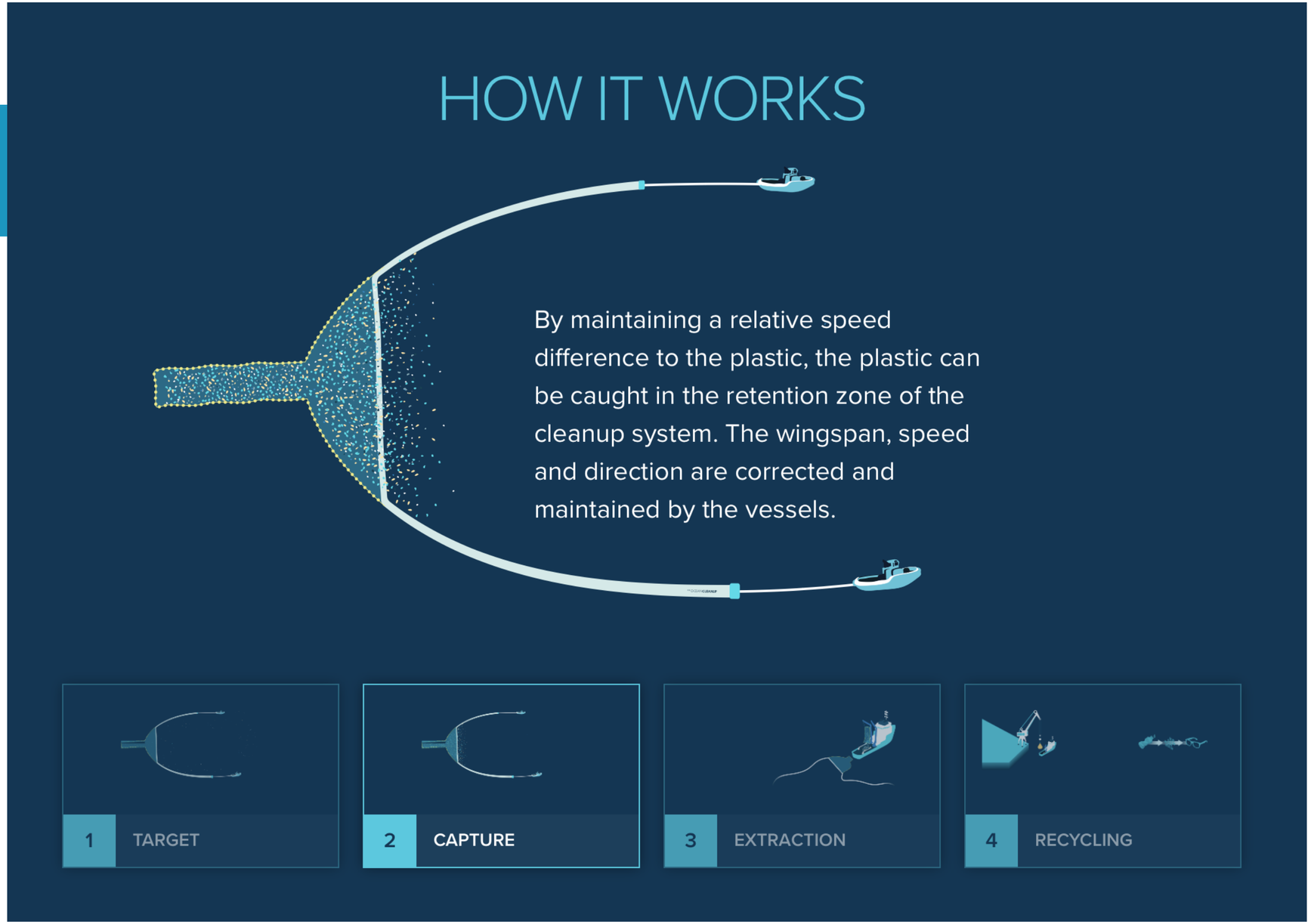

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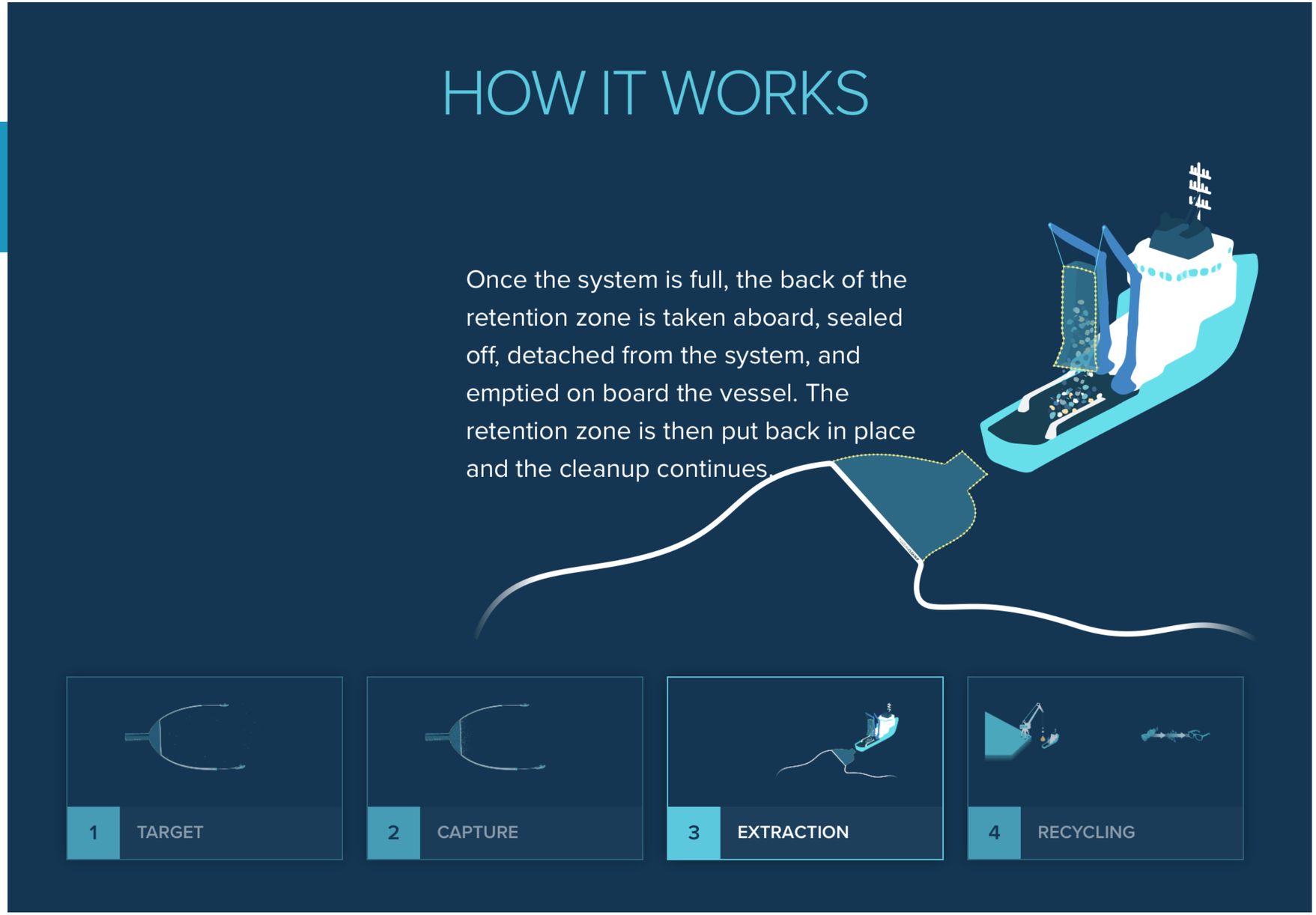

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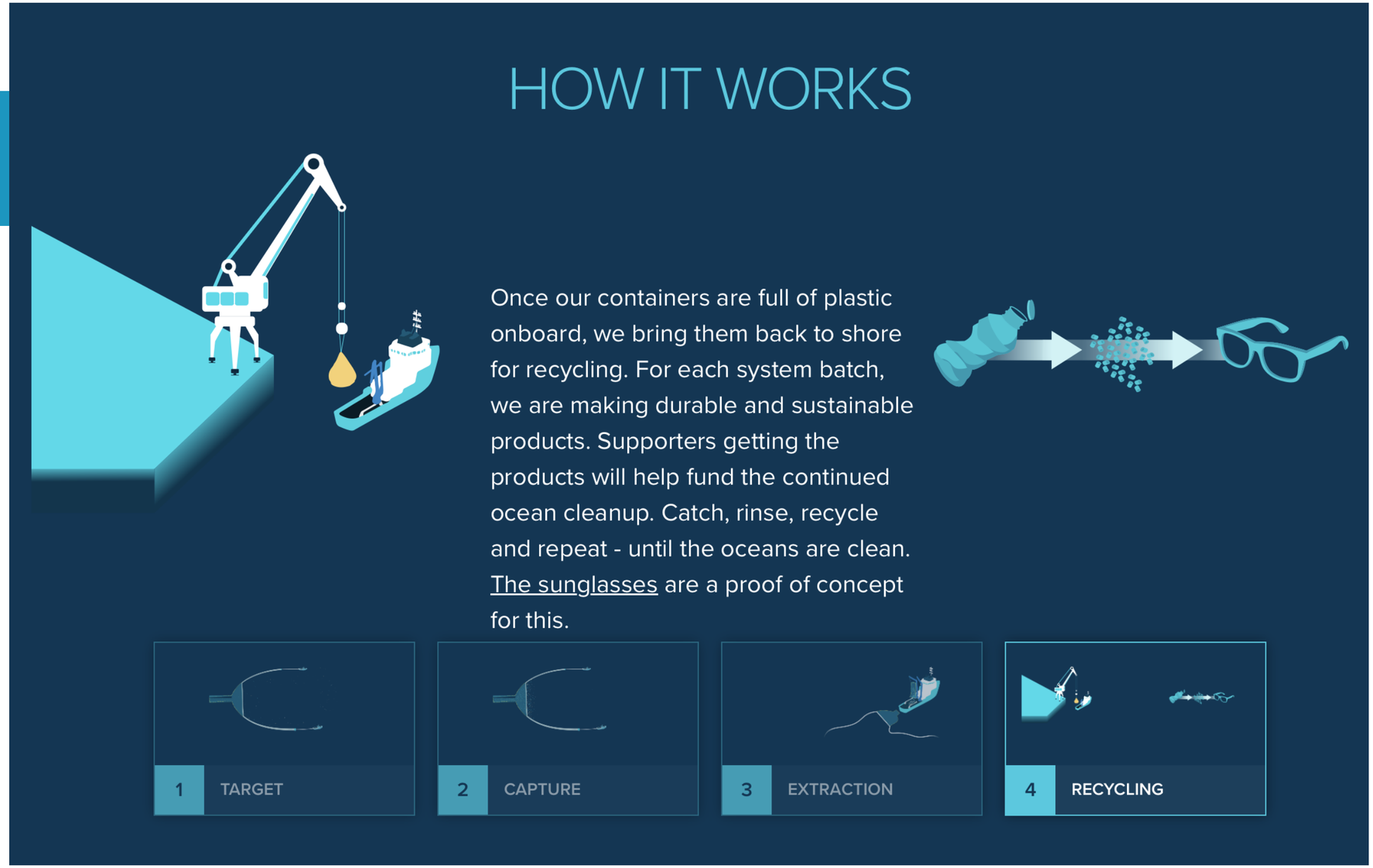

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3. Case study

Reef Check

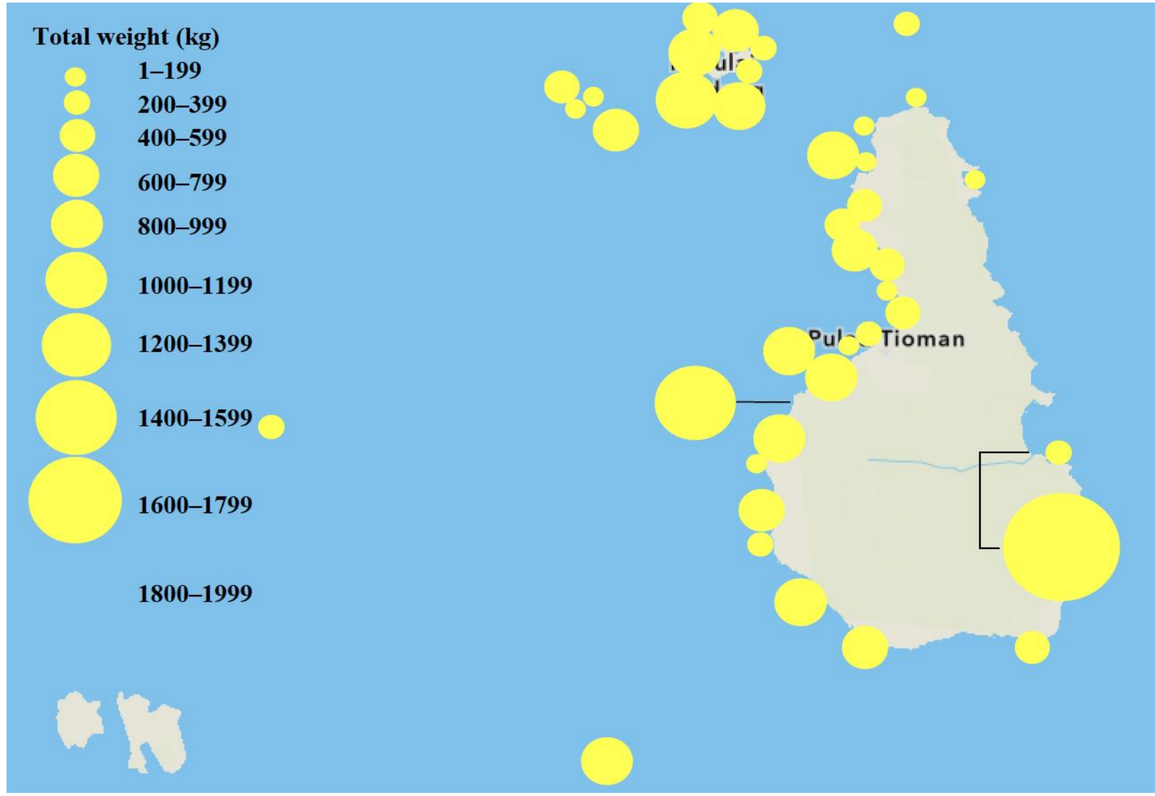
Tackling Ghost Nets

Ghost nets removed by RMCG

Ghost nets contribute to ocean pollution by causing extensive social, economic and environmental impacts. They trap and entangle marine life, besides smothering and damaging important ecosystems such as coral reefs and seagrass beds.

Reef Check Malaysia's teams on the islands have been receiving reports of ghost nets, and have been working hard to remove them from the marine environment before they cause extensive damage. In just the first quarter of 2024, our local group on Redang Island, the Redang Marine Conservation Group (RMCG), successfully removed approximately 140 kg of ghost nets, all found near the village jetty! The nets collected were given to the local youth of the island, who planned to recycle them into football goalpost nets.

https://www.reefcheck.org/coral-bleaching-and-ghost-nets-mark-start-of-malaysia-survey-season/



Weight (kg) of ghost nets retrieved within the period of 2016 and 2022 around Tioman Island.

Chelliah et al. (2024)

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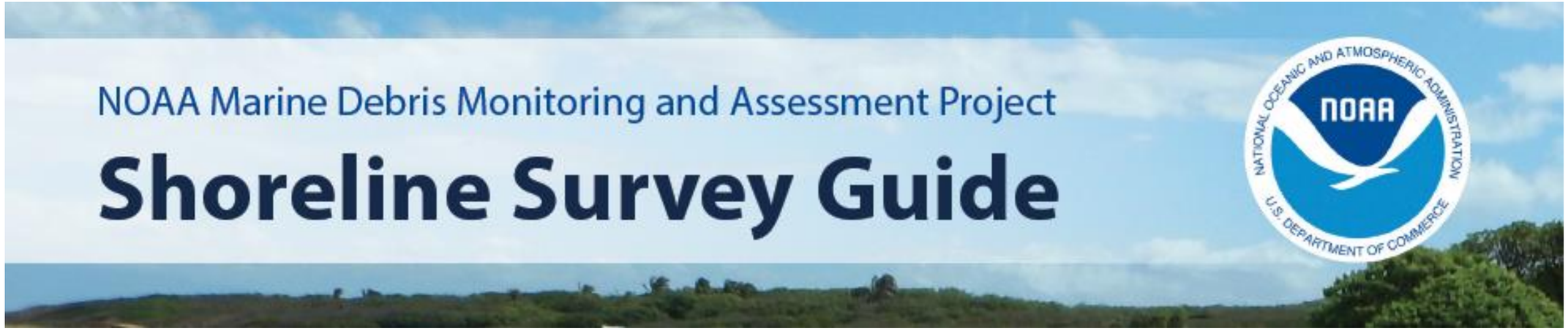
4. Group Activity

In group(s):
- Categorize the waste
- Identify which items can be reduced, reused, or recycled
- Propose realistic solutions (e.g., reusable fishing gear, eco-packaging)



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4.

[Download reading materials here:
https://marinedebris.noaa.gov/our-work/monitoring/marine-debris-monitoring-and-assessment-project](https://marinedebris.noaa.gov/our-work/monitoring/marine-debris-monitoring-and-assessment-project)

MDMAP *at a glance*

Choose a site
Select a 100-meter shoreline survey site

Select transects
Randomly select four 5 meter transects

Record conditions
Record site condition information

Survey for debris
Within each transect search for and document items 2.5 centimeters or larger

Enter data
Enter data online in the MDMAP database

Repeat!
Repeat, aiming for monthly surveys at each site

Photo: NOAA

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Burges et al. (2021)

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5. Group Presentation and Discussion

Option 1 (if fieldtrip is available for students)

Worksheet Activity:

- Identify types of waste from a coastal clean-up report
- Propose reduction and recycling solutions for each waste type

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5. Group Presentation and Discussion

Option 2 (if fieldtrip is not permissible for students)

Worksheet Activity:

1. Divide students into small groups (4–5 people)
2. Each group selects a sector (e.g., tourism) or region (e.g., coastal Malaysia/Indonesia)
3. Develop a proposal or roadmap for a circular economy solution (e.g., reusable packaging program for beach resorts)
4. Present the proposal to the class for peer feedback
5. Reflection on feasibility and implementation challenges

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Further Reading

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Kamyshnikov, I. N., Smirnova, T. S., & Tikhonov, A. I. (2021). Sustainable Development: Waste Recycling and Circular Economy (pp. 101–108). Springer, Cham. https://doi.org/10.1007/978-3-030-73110-6_11

Mélon, L. (2019). A Critical Assessment of the EU Circular Economy Action Plan in the Light of the Access to Finance for Circular Economy Projects. Social Science Research Network. https://doi.org/10.2139/SSRN.3716255

Waste and Circular Economy (pp. 1–18). (2022). The Royal Society of Chemistry eBooks. https://doi.org/10.1039/9781839164682-00001

Wu, Z., Wang, L., Ye, Q., & Feng, W. (2022). The Recycling of Construction and Demolition Waste from a Circular Economy Perspective. https://doi.org/10.1061/9780784484562.025

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Chelliah, A.J., Chen, S.Y., Shahir, Y. & Dolorosa, R.G. (2024). Incidence of ghost nets in the Tioman Island Marine Park of Malaysia. The Palawan Scientist, 16(1): 28-37. https://doi.org/10.69721/TPS.J.2024.16.1.04

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THANK YOU

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