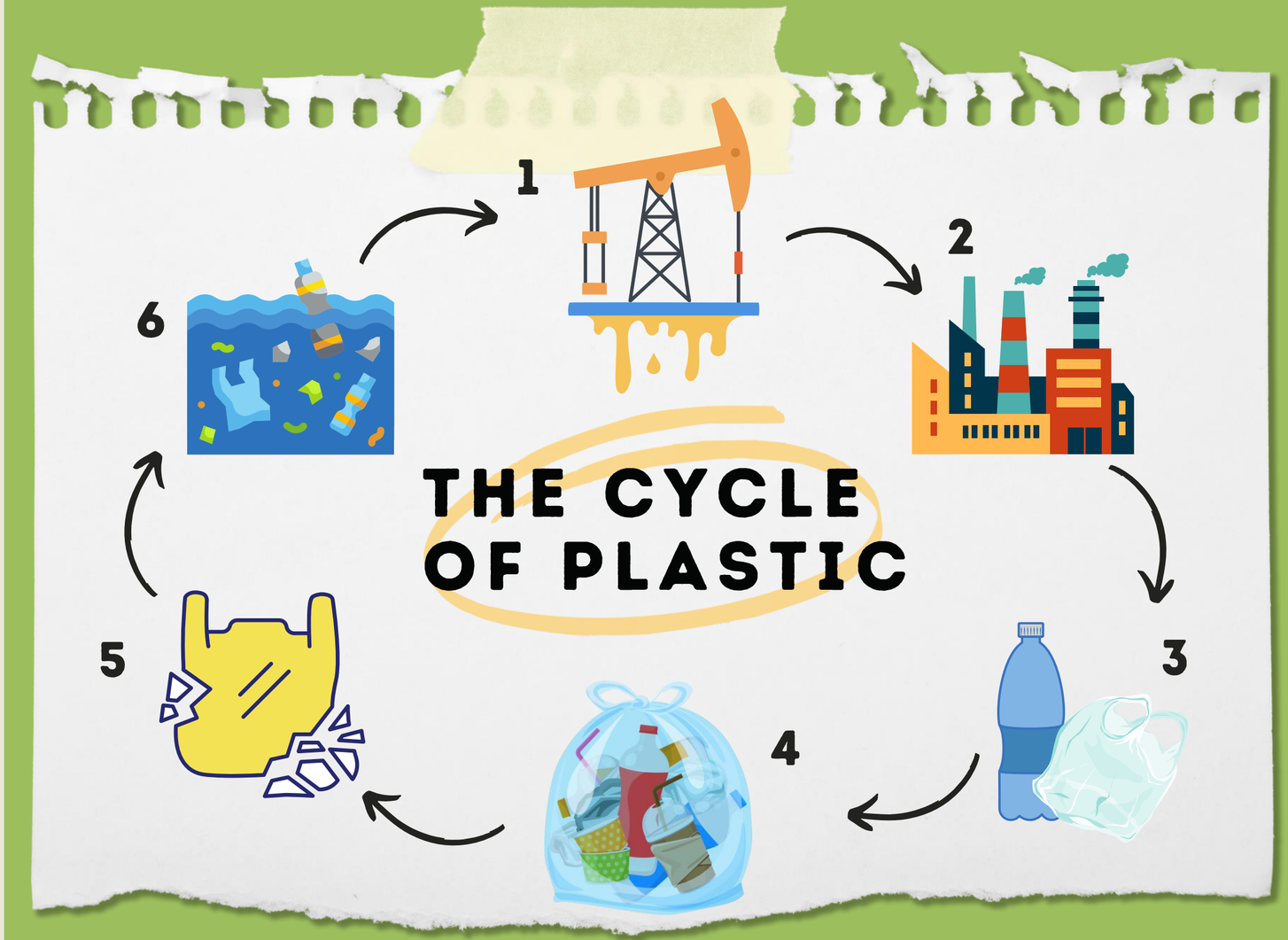
ISOLATING MICROPLASTICS IN MANGROVE SEDIMENTS

Method development by Melinda Paduani & Keren Duran

WHY IS THERE SO MUCH PLASTIC?

- Easy to obtain (mass produced)
- Is very abundant
- Has a variety of uses



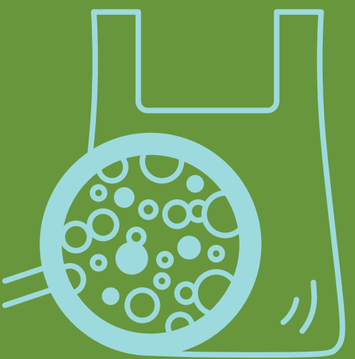
1 - Fossil fuel is extracted
2 - Plastic is manufactured
3 - Plastic goods are purchased
4 - Used plastics end up as waste
5 - Large plastics are broken up into MP
6 - Ends up in waterways and oceans

WHAT ARE MICROPLASTICS?

- Plastic debris
- Less than 5mm in size
- From consumer products & industrial waste

TYPES OF MP'S WE USED

• PVC	• Polyvinyl Chloride
• PS	• Polystyrene
• PP	• Polypropylene
• EPS	• Expanded Polystyrene
• PET	• Polyethylene Terephthalate
• Nylon	• Polyamide
• Polyester	• Type of PET
• LDPE	• Low Density Polyethylene
• HDPE	• High Density Polythylene



1	2	3	4	5
PVC	**PS**	**PP**	**EPS**	**PET**
Pipes, medical devices, cables, flooring, kayaks.	Egg cartons, CD's, DVD's, packing peanuts, food packaging.	Toys, luggage, car parts, plastic containers.	Packaging & insulation.	Soda & water bottles, Peanut butter & vegetable oil containers
				

Nylon

Fabric, fishing line, electrical equipment.

Polyester

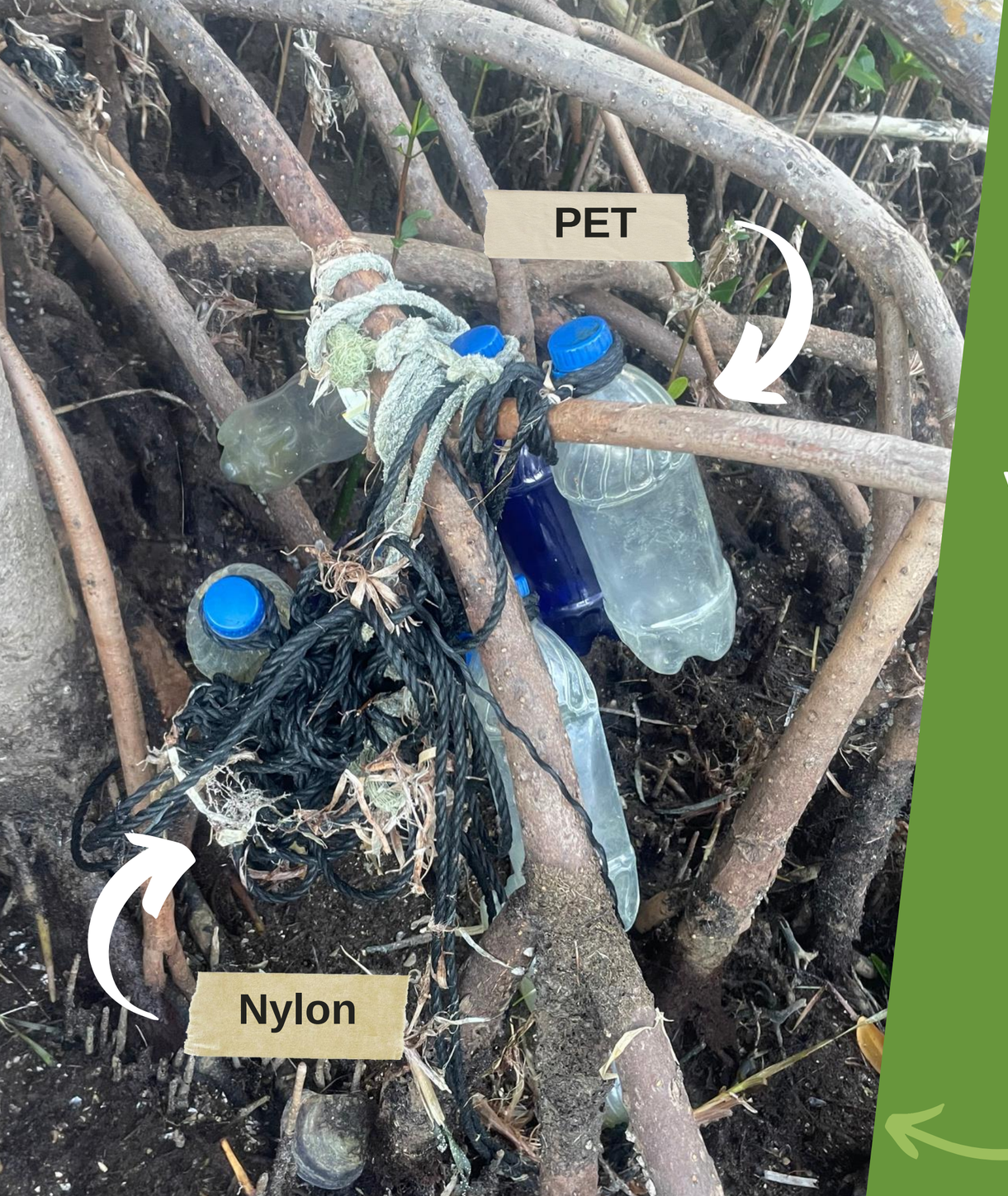
Shirts, jackets, pants, hats, bedsheets, blankets.

LDPE

Grocery bags, plastic wrap, plastic coatings.

HDPE

Shampoo bottles, pipe systems, chemical containers, milk jugs.



WHAT DOES THIS HAVE TO DO WITH MANGROVES?

WHAT MANGROVES DO

Filters out

- Heavy metals
- Excess nutrients

HOW MP'S END UP IN MANGROVES

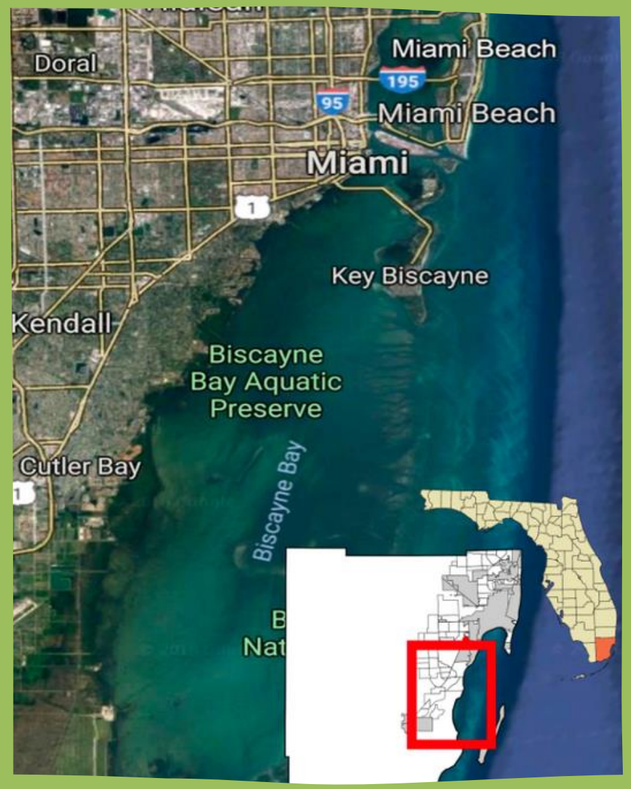
- Plastic pollution
- Water Runoff
- Improper waste disposal

FIBROUS ROOTS

1 HOW IT ALL STARTED

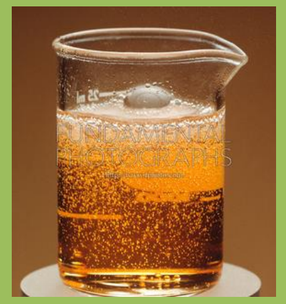
WHERE?

Samples of **Fringe Mangroves** were collected from the **Biscayne Bay** area of South Florida.



WHY?

Mangrove ecosystems are **hotspots** for accumulating **plastic debris** through the mesh created by their roots.



HOW?

Finding an **efficient** method for **isolating** microplastics.

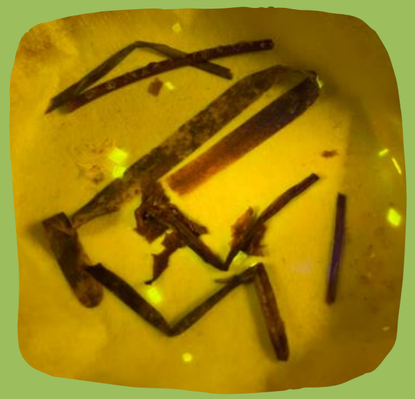
Because of...

- Too much organic matter
- Density similarities in plastics
- Plastics being destroyed during oxidation

Tested reagents

- Nitric Acid
- Fenton's Reagent
- Hydrogen Peroxide

2 IN THE LAB



WHAT IS NILE RED?

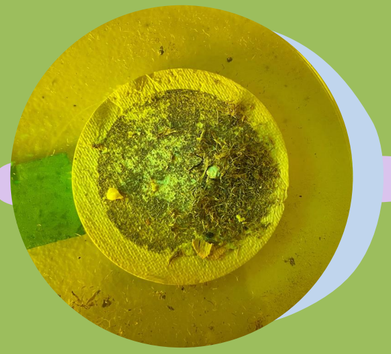
A red stain that can cause plastic to **fluoresce** a bright yellow color.

- Counted & weighed microplastics.
- Spiked fringe samples.
- Weighed samples.

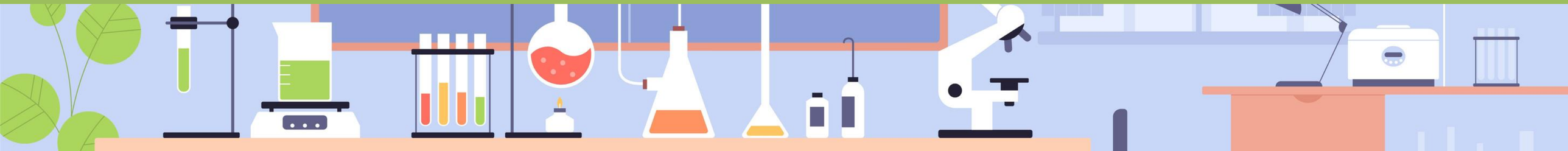
- Wet sieved samples using 4mm on top of 0.125mm.
- Digested samples using an oxidizing reagent for 5 days.

- Centrifuged oxidized samples.
- Removed top layer using a turkey baster.

- Vacuum filtrated samples.
- Allowed product to dry for 2 days.
- Weighed sample.



- Dyed samples using **Nile Red**.
- Observed product w/ blue light under yellow shield
- Calculated MP recovery



RESULTS

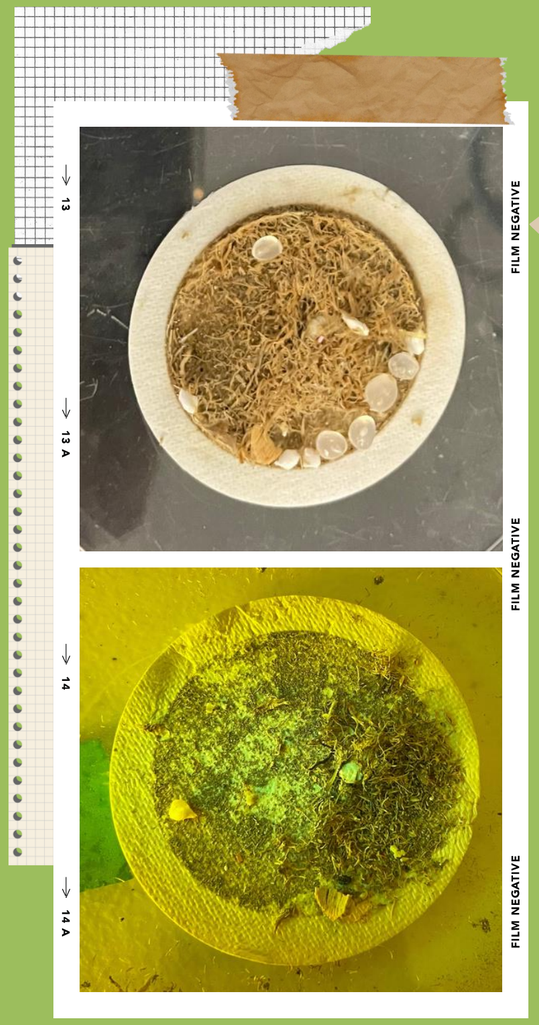
WHEN TESTING REAGENTS

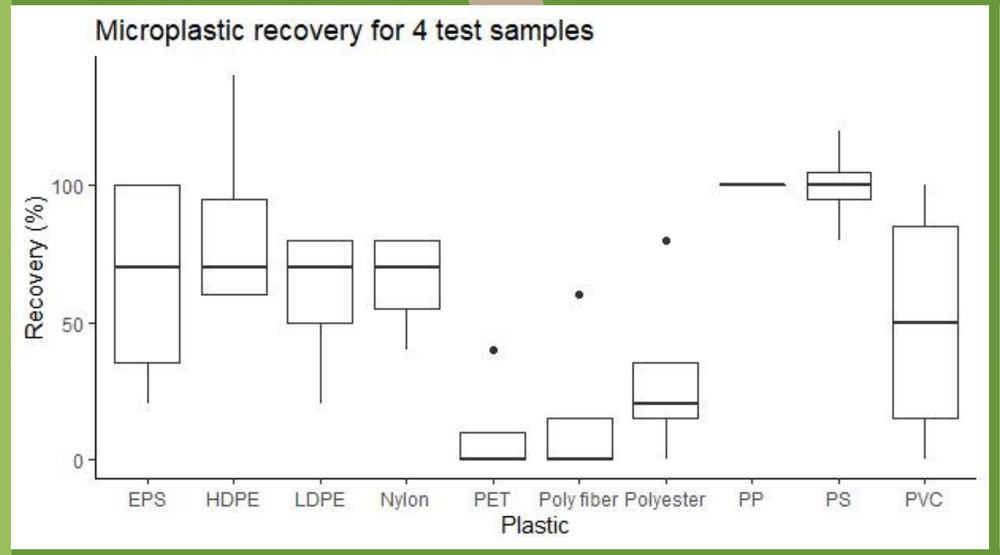
- **Nitric acid** destroyed some plastics.
- **Fenton's reagent** left orange iron residue.

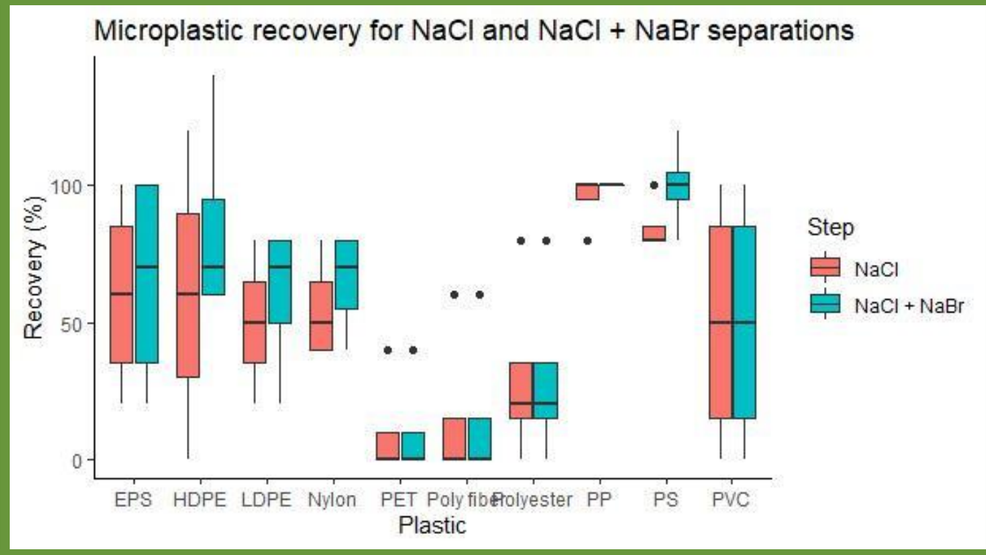
WHEN USING HYDROGEN PEROXIDE

- Didn't destroy plastics.
- Broke down some but not all organic material.
- Easier to manage.

Material	Med Weight Loss	Standard Deviation
Microplastics	45.8%	93.9%
Sediment with Microplastics	59.3%	22.1%







HOW CAN MICROPLASTICS BE MANAGED?

POLICY CAN:

- Minimize SUP production
- Reduce MP pollution
- Set community programs to reduce litter
- Inform citizens on the effects of MP and SUP

EPA - SOUTH ATLANTIC STRATEGY FOR TRASH FREE WATERS

PROPER WASTE MANAGEMENT

SUPPORT CITY WASTE AMNESTY DAYS	MINIMIZING COST & IMPROVE EASE OF USE	PAYMENT FOR PLASTIC RECYCLING, TIRE DEPOSIT, ETC.
REDUCE ILLEGAL DUMPING	PROPER WASTE & RECYCLING DISPOSAL	INCREASE ACCESS TO WASTE MANAGEMENT

WHAT CAN WE DO?

- Plastic packing
- Avoid SUP (like straws)
- Support businesses that sell sustainable products
- Opt for clothing with natural fibers
- Use a reusable shopping bag

Being aware of our plastic intake can lower plastic waste & prevent MP's from getting into our waterways.

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FILM NEGATIVE

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ACKNOWLEDGMENTS

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THANK YOU!