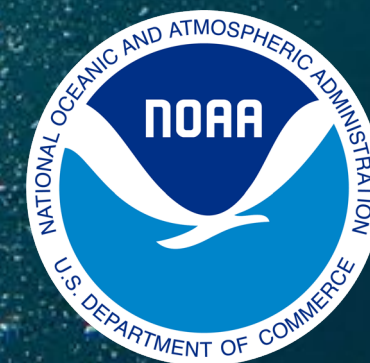


Microplastics

Microplastics

What they are and why they matter



Workshop

Goals

By the end of the workshop
participants will understand:

1. What microplastics are and why they are in the environment.
1. How they affect ecosystem and human health.

Agenda

1. Introduction of Presenters & Group Norms
2. Introduction to Microplastics
3. Sources and Impacts of Microplastics
4. Interactive Activity



Group Norms

1. We are respectful of each other and our ideas
 2. Asking questions is encouraged
 3. All ideas are good ideas, and each contributor
has value
 4. Any other group norms?
-

Microplastics

What Do You Think Microplastics Are?

Overview



Microplastics

Plastics are man-made materials that come from things like polyethylene, nylon, fossil fuels (crude oil or coal), and recycled plastics



Plastic granules: what they are, applications, our grinding systems

Microplastics are specifically plastics that have an upper size limit of 5mm

Primary Microplastics

These plastics are intentionally produced at a small size for multiple uses. This includes nurdles, a common raw material in the manufacturing of plastic products.

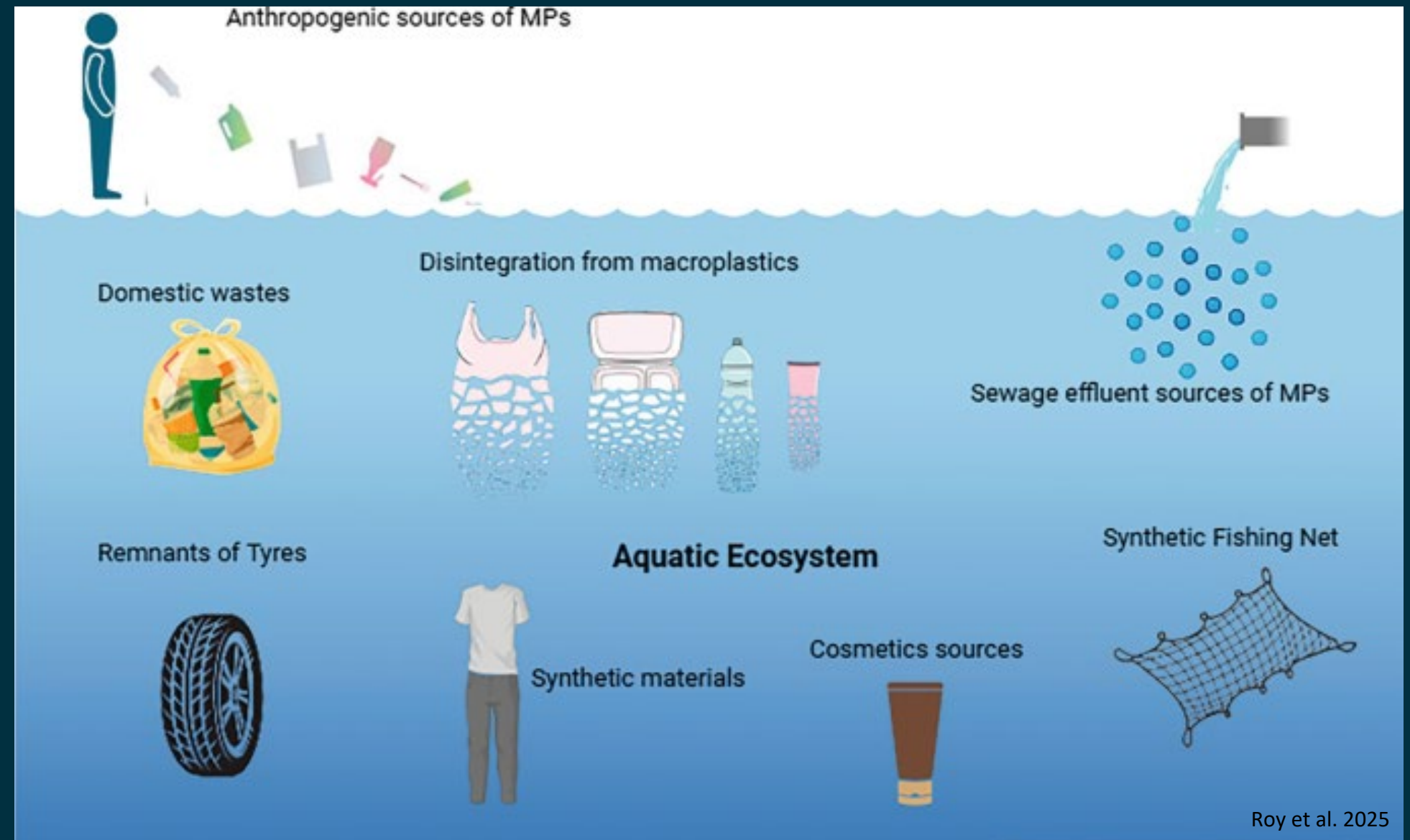
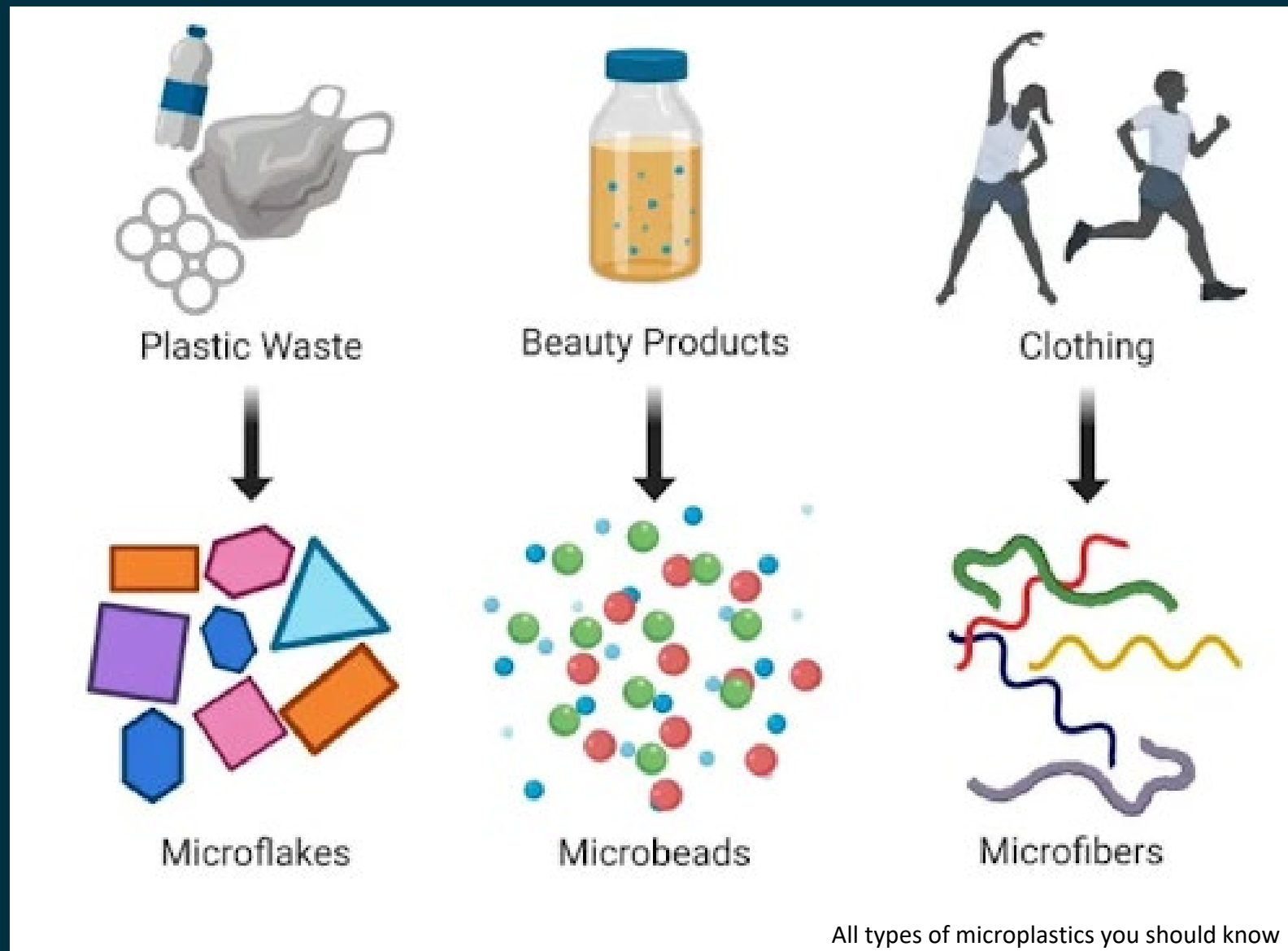


Raubenheimer, 2024



Betham, 2023

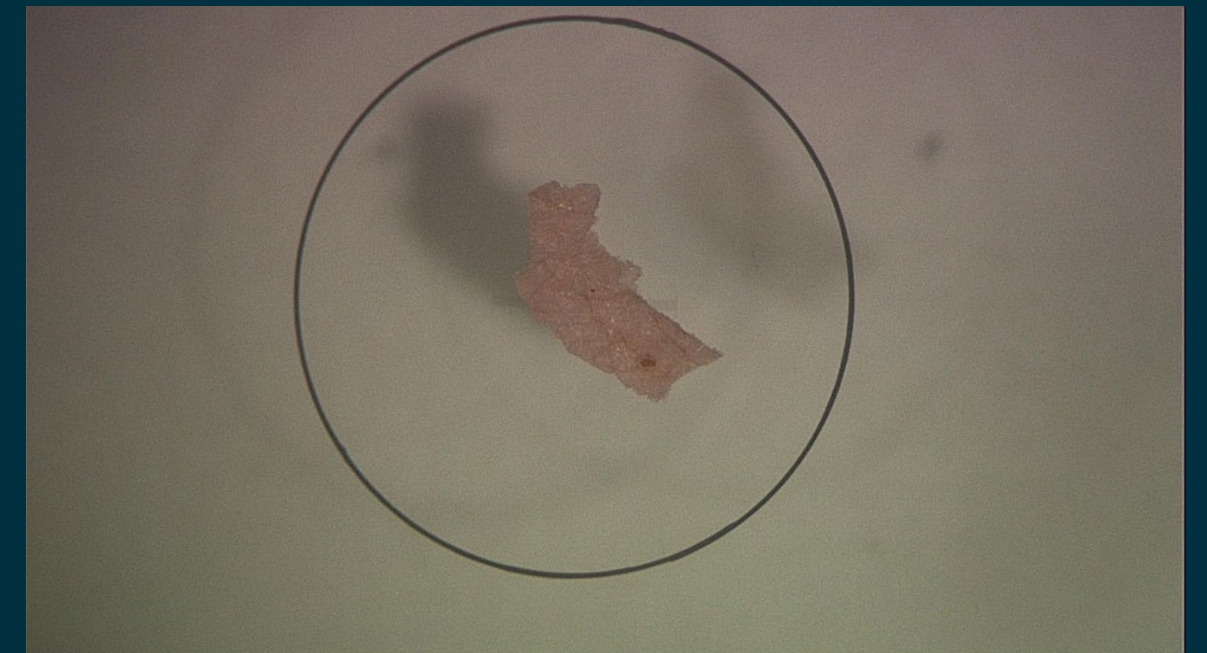
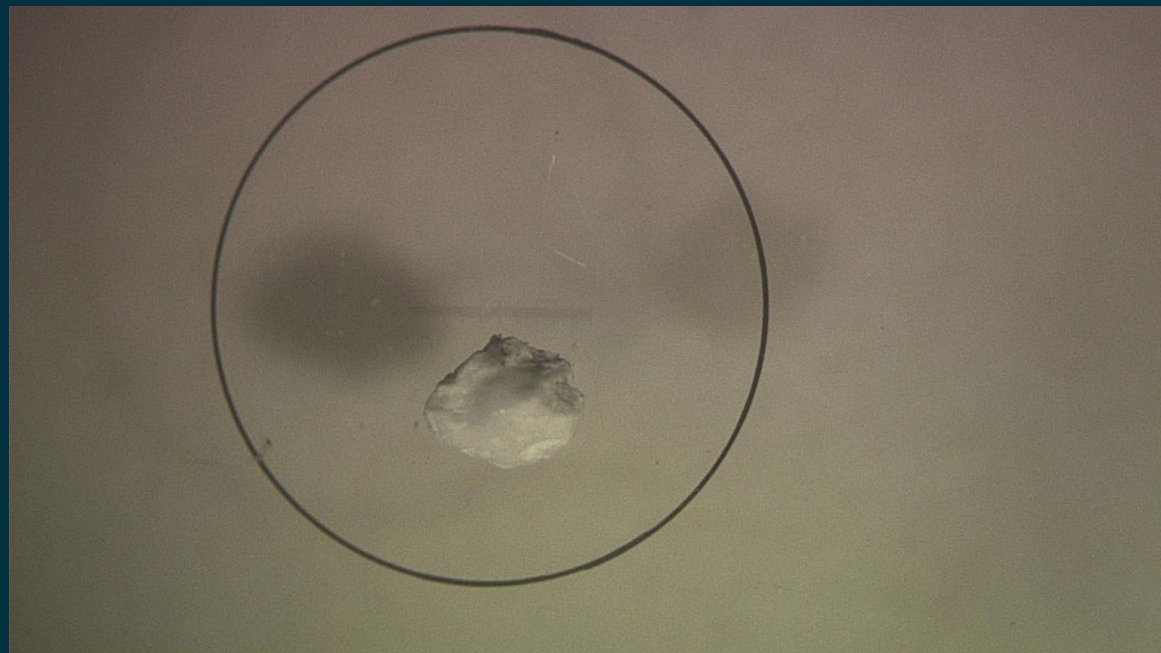
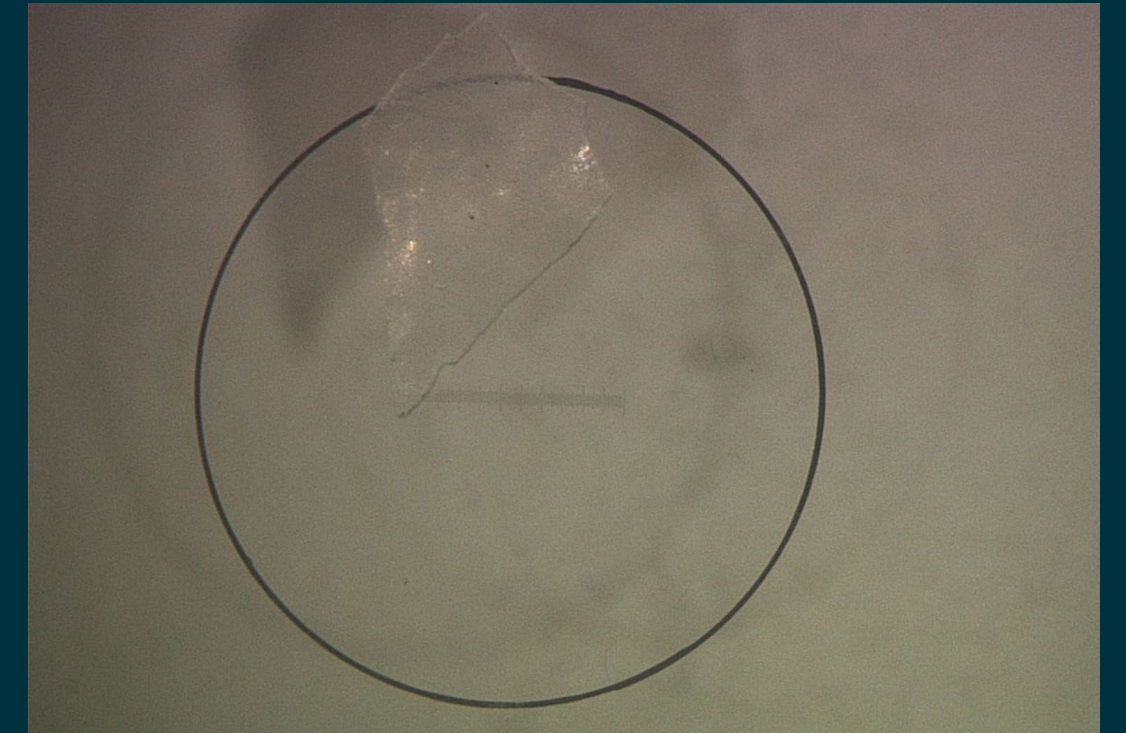
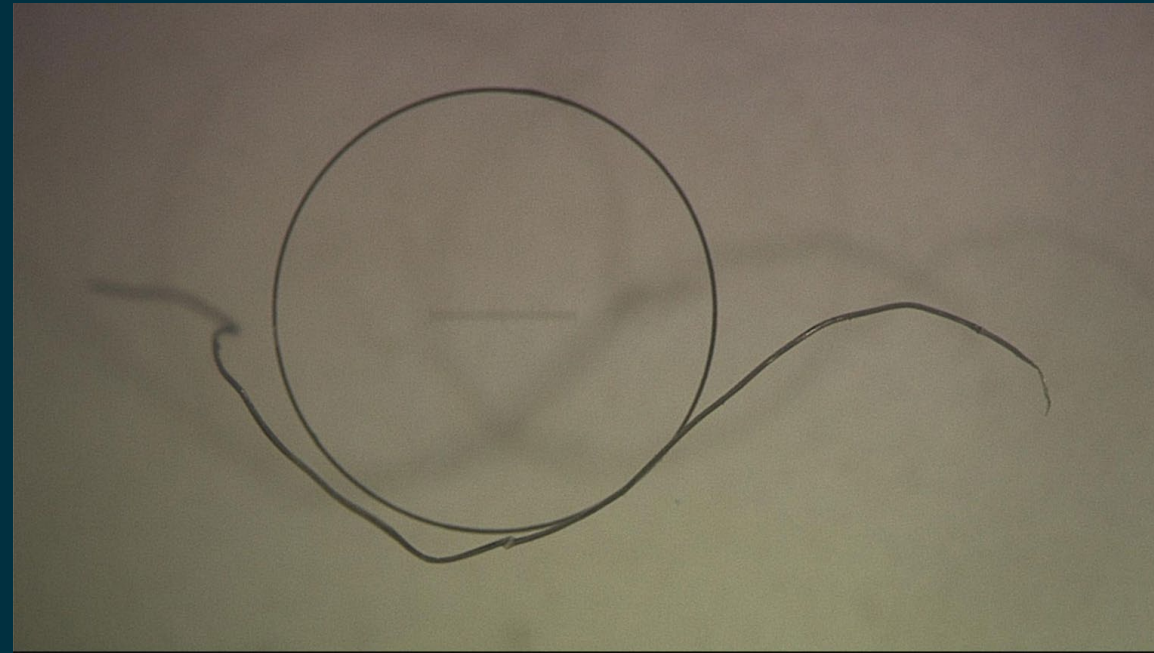
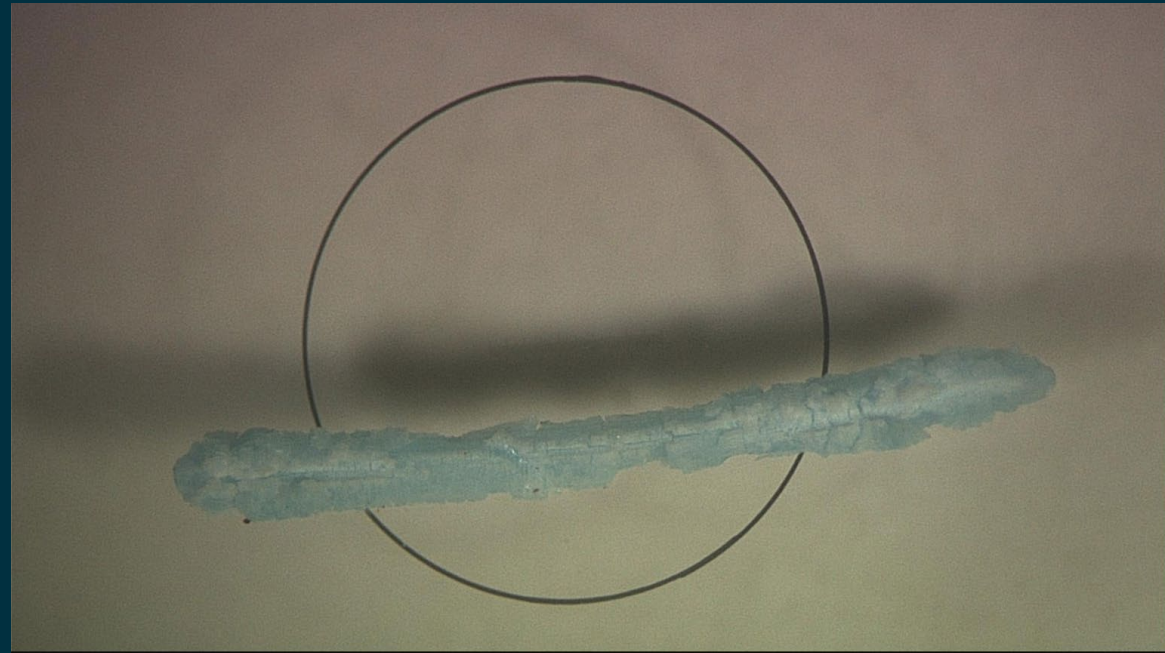
Microplastics: What They Are



Secondary Microplastics

Plastics that are not manufactured as small particles and turn into small pieces of plastic through chemical, physical, and/or microbial degradation

Microplastics: Pictures



How Plastics are Produced

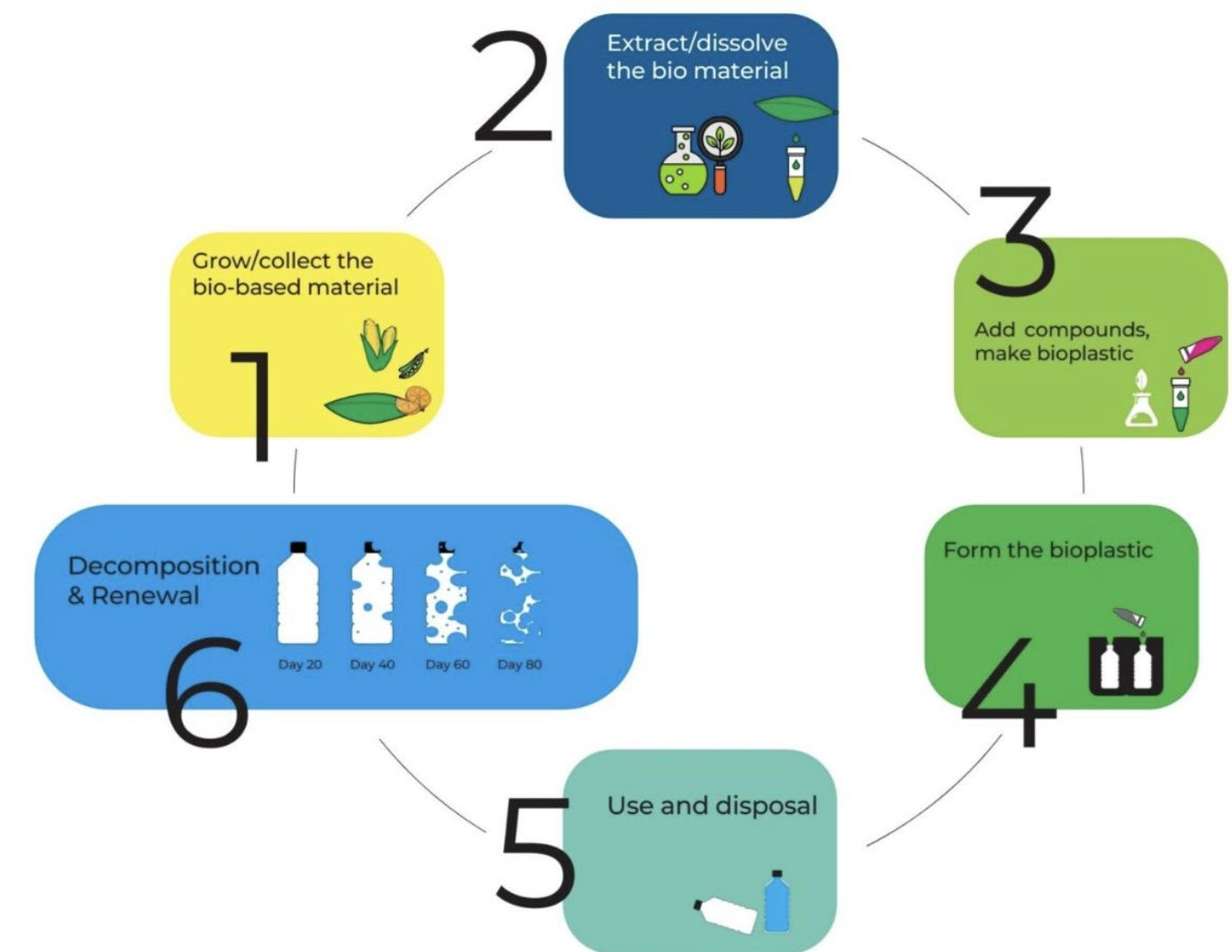
Common Plastics

1. Extracting natural gas, coal, and crude oil from the earth
2. Chemically break these down to ethylene and propylene
3. Mixed with other chemicals and put under high temperature and pressure conditions to create the actual plastic

Bioplastics:

1. Use natural sources to create plastics
2. Bacteria break them down or chemical synthesis
3. Polymerization and cooled to shape

The life cycle of bioplastics



Biodegradable Plastic Manufacturing Process, 2023

Microplastics

What Are Common Sources of Microplastics?

Microplastics

Common Sources of Microplastics

Textiles

What they are

- Textiles is a broad term to encompass various fiber-based materials. This includes clothes, towels, ropes, safety equipment, and more.
- They can either be natural or synthetic

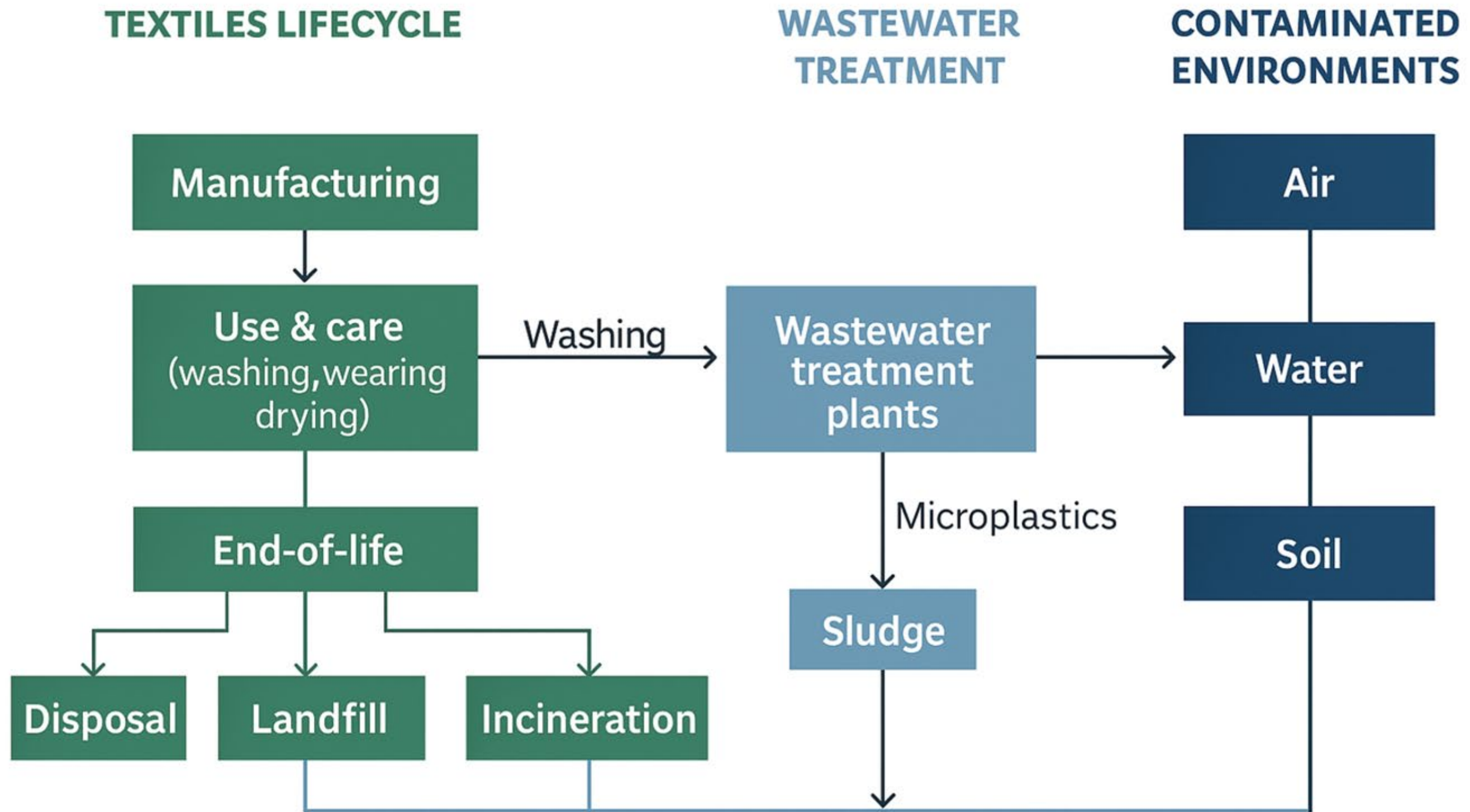
What they do

Shed microfibers through:

- Travel
- Washing
- Manufacturing
- Wearing
- Disposal

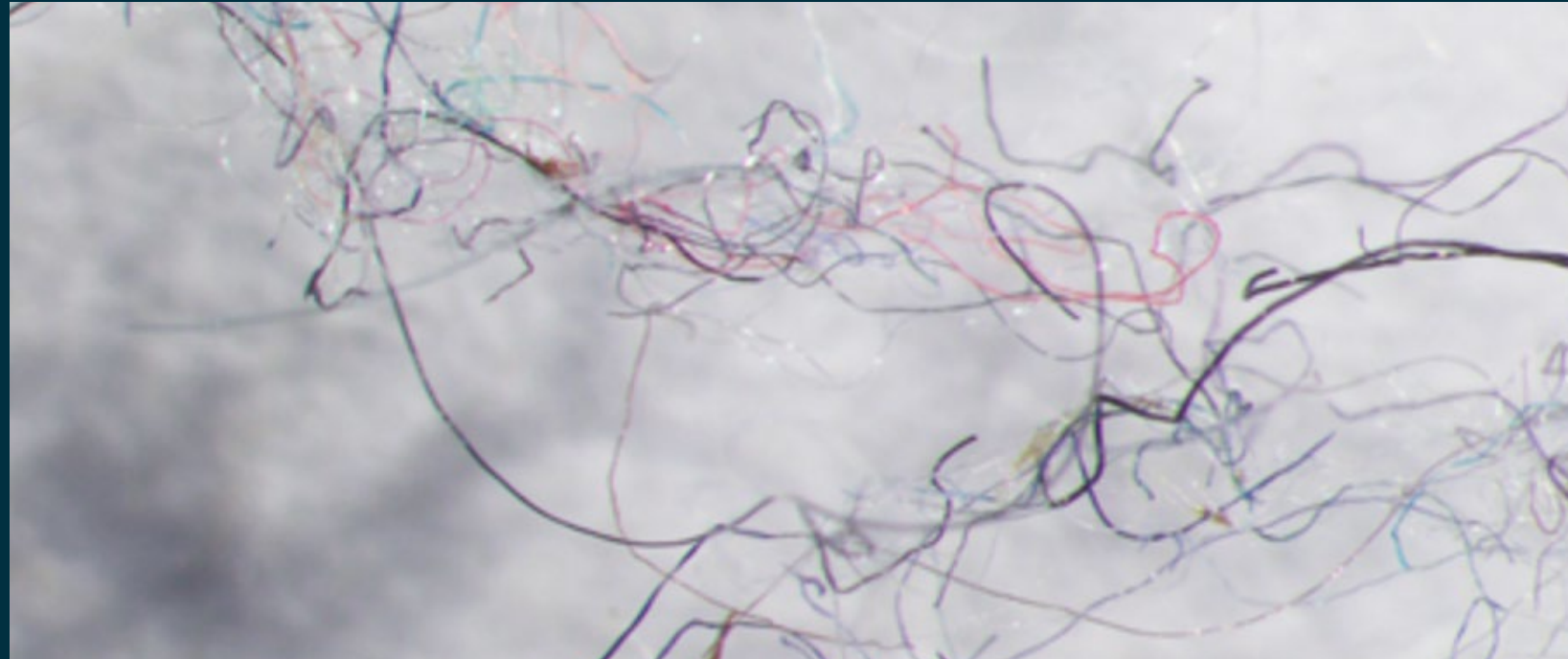
Effect

- 35% of microplastics in the ocean after from washing synthetic materials
- Release 0.2–0.5 million tons per year of microplastics into the ocean



- Material and product flows
- Microplastic release and transfers
- Macroplastic release and transfers

Microplastics: Common Sources



O'Connor

Wastewater Effluent

Wastewater treatment plants have sources coming from:

- Domestic Wastewater
- Commercial Sources
- Industrial Discharges
- Urban Runoff



Enabling Control Over a Wastewater Treatment Plant

With large volumes of water being processed, the smallest of microplastics and fibers are not filtered out

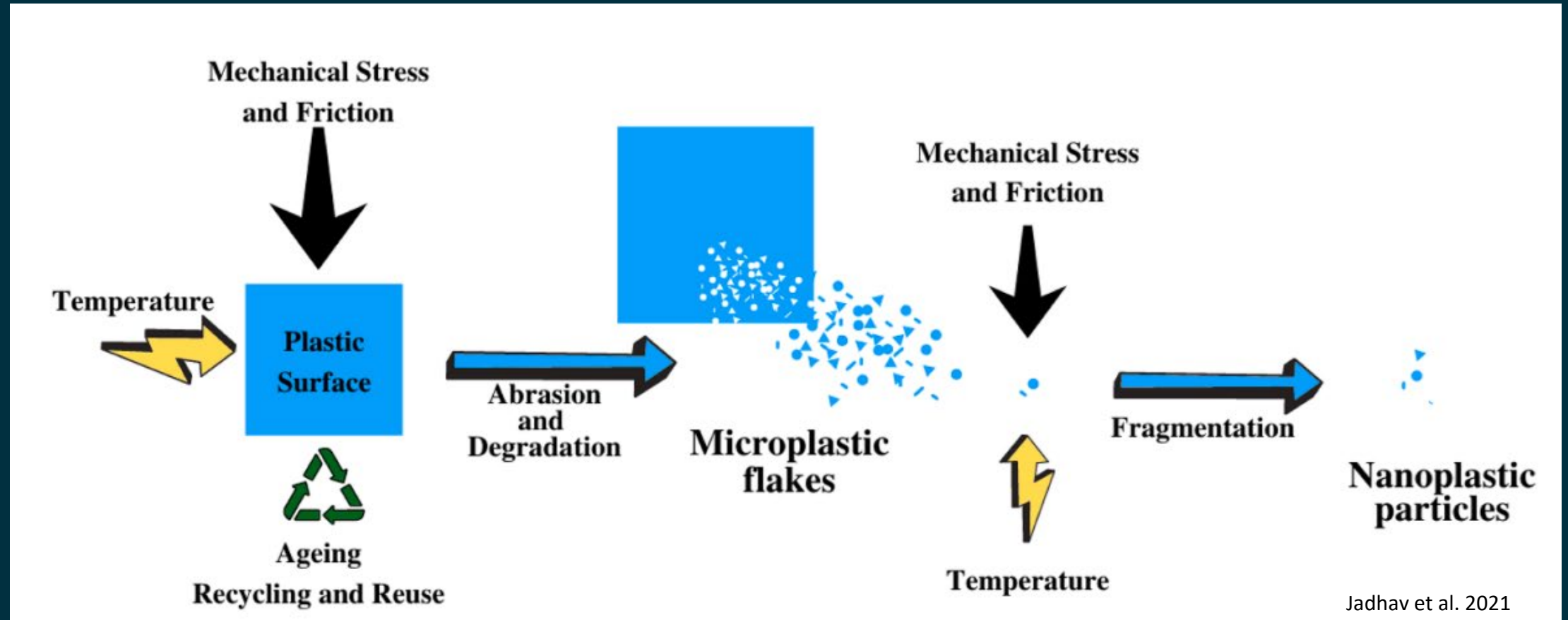
Packaging

Plastic packaging includes:

- Water bottles
- Containers
- Cutlery
- Food Wrappers
- Straws

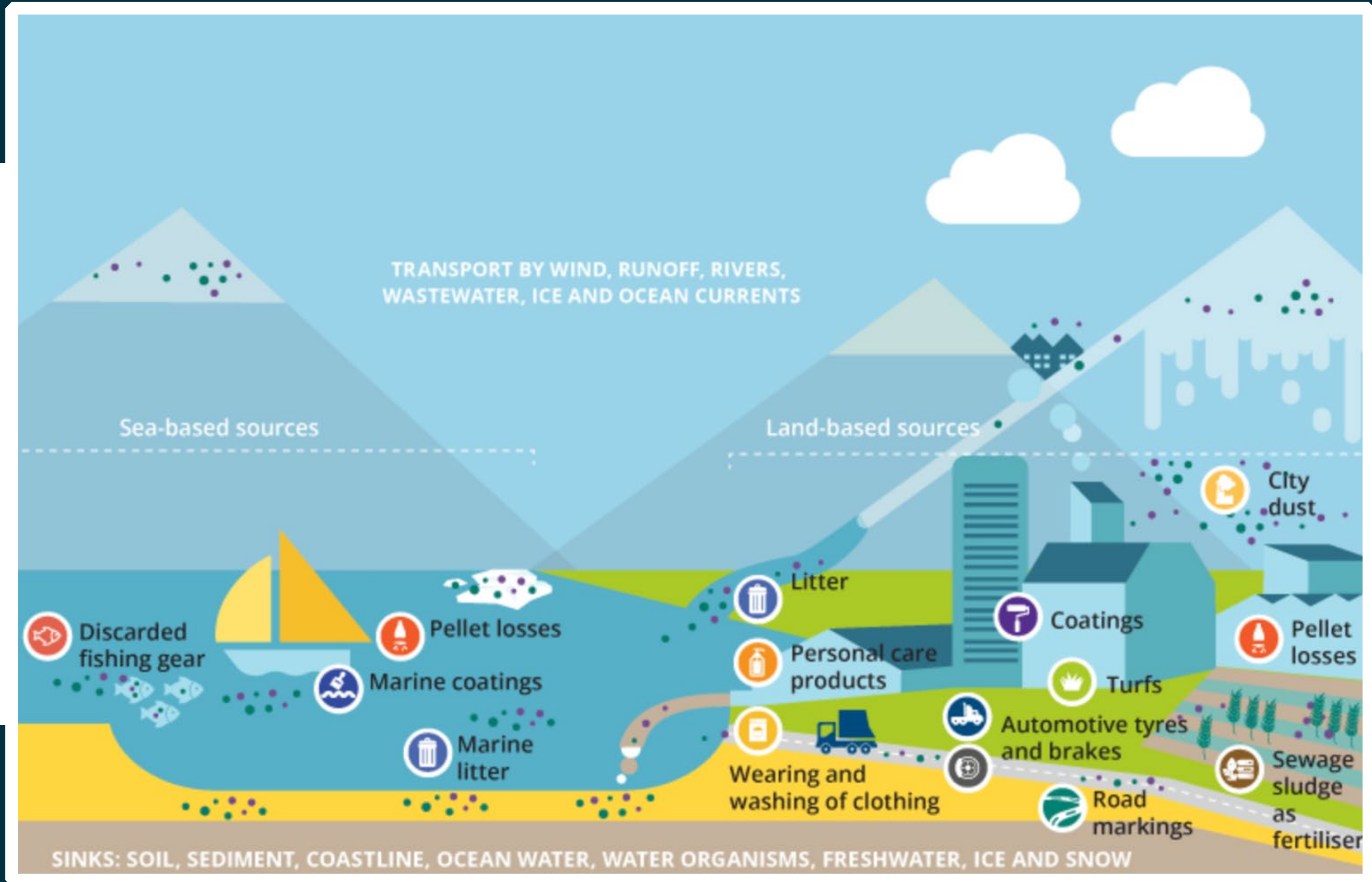


The Different Types of Plastic Packaging and Their Uses, 2024

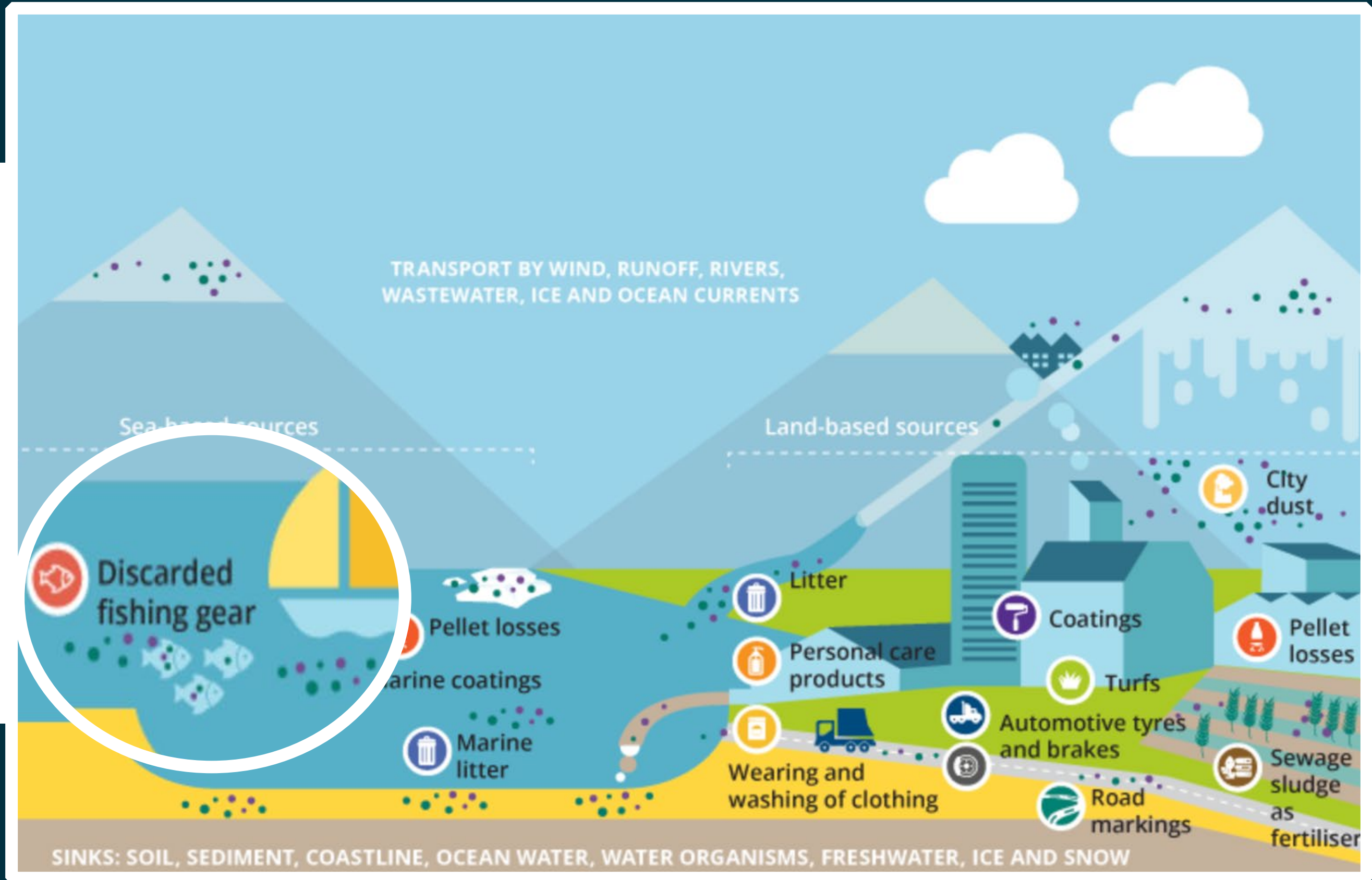


This packaging can become degraded through means of reusing, cutting, tearing, opening, and warming up.

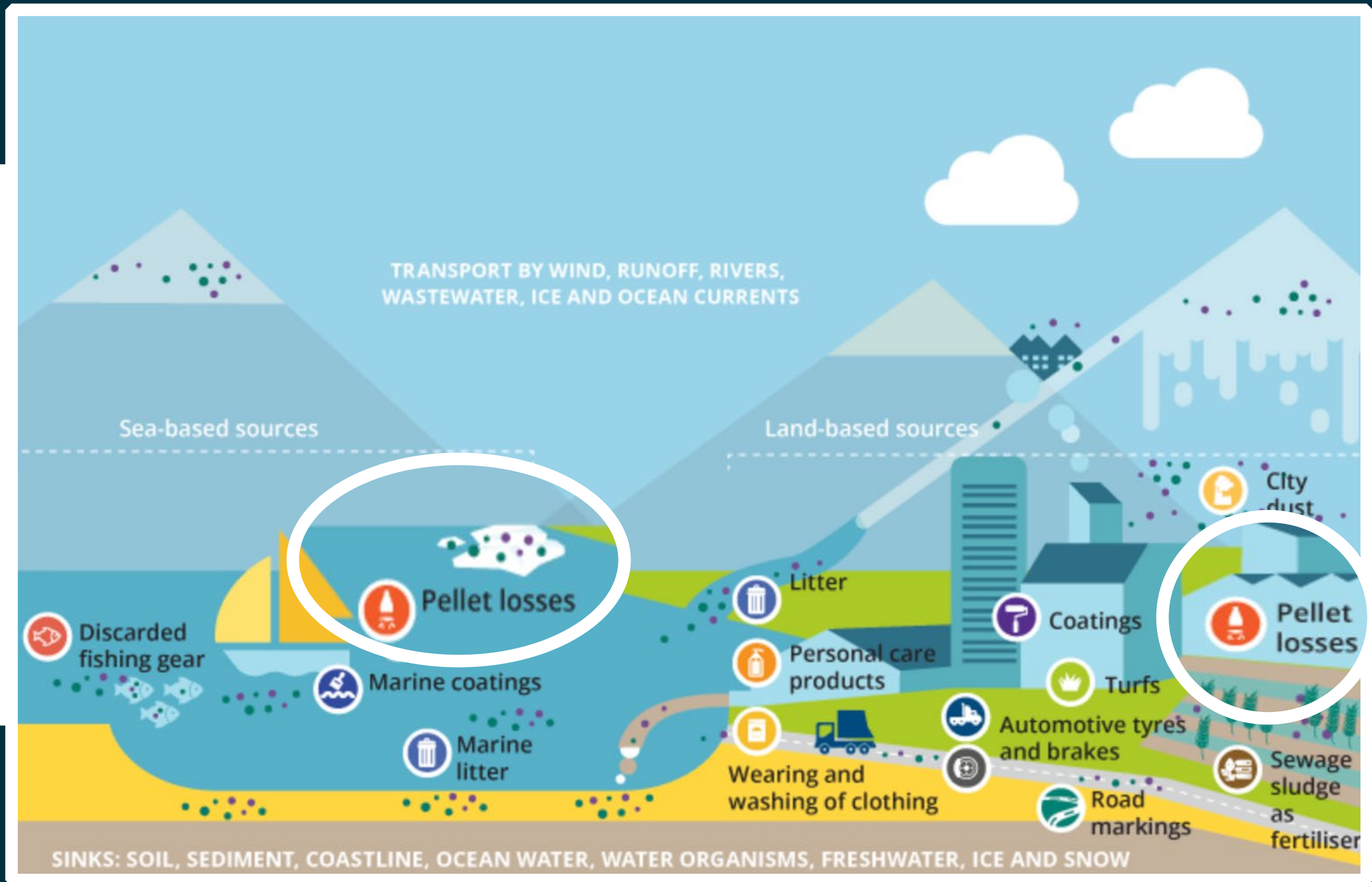
Microplastic Release Routes



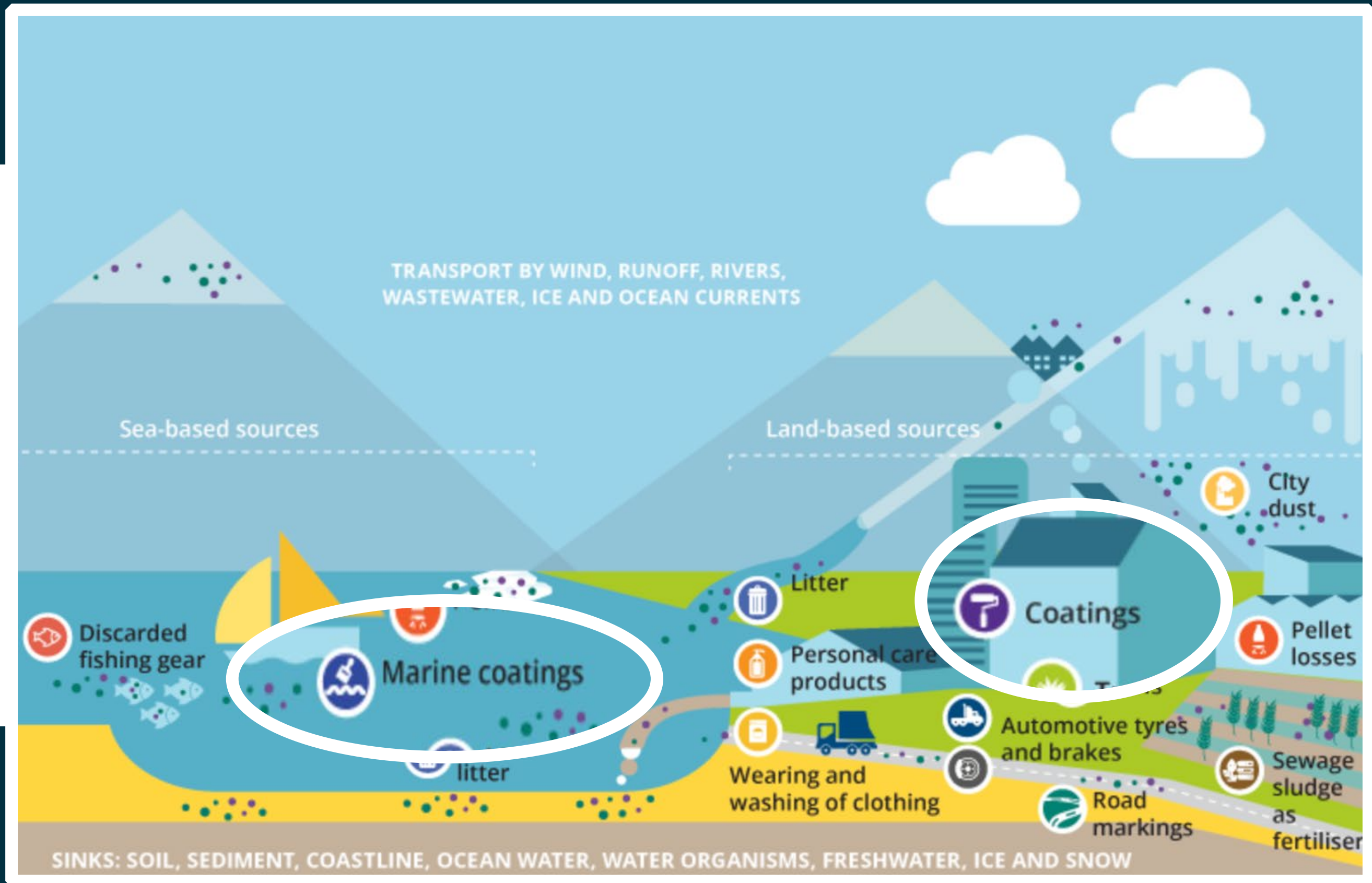
Microplastic Release Routes



Microplastic Release Routes



Microplastic Release Routes



Impacts

Ecosystems

Marine Life

Humans

**Plastic Bi -
Products
(PFAS)**

Impacts on Ecosystems

Alters microbial communities

Pollutes Air

Contaminates Soil

Bioaccumulation

Habitat Degradation

Impacts on Marine Life

Effects

- Degrading plastics potentially entangle animals
- Cut or block their digestive tract
- Spread toxins throughout their body
- Spread throughout food web



Thompson 2018

Impacts on Humans

The effects on microplastics on humans are still mostly unknown, but potentially have the same effects as other vertebrates.



How to Avoid Microplastics in Water Bottles: The Harms & Fix

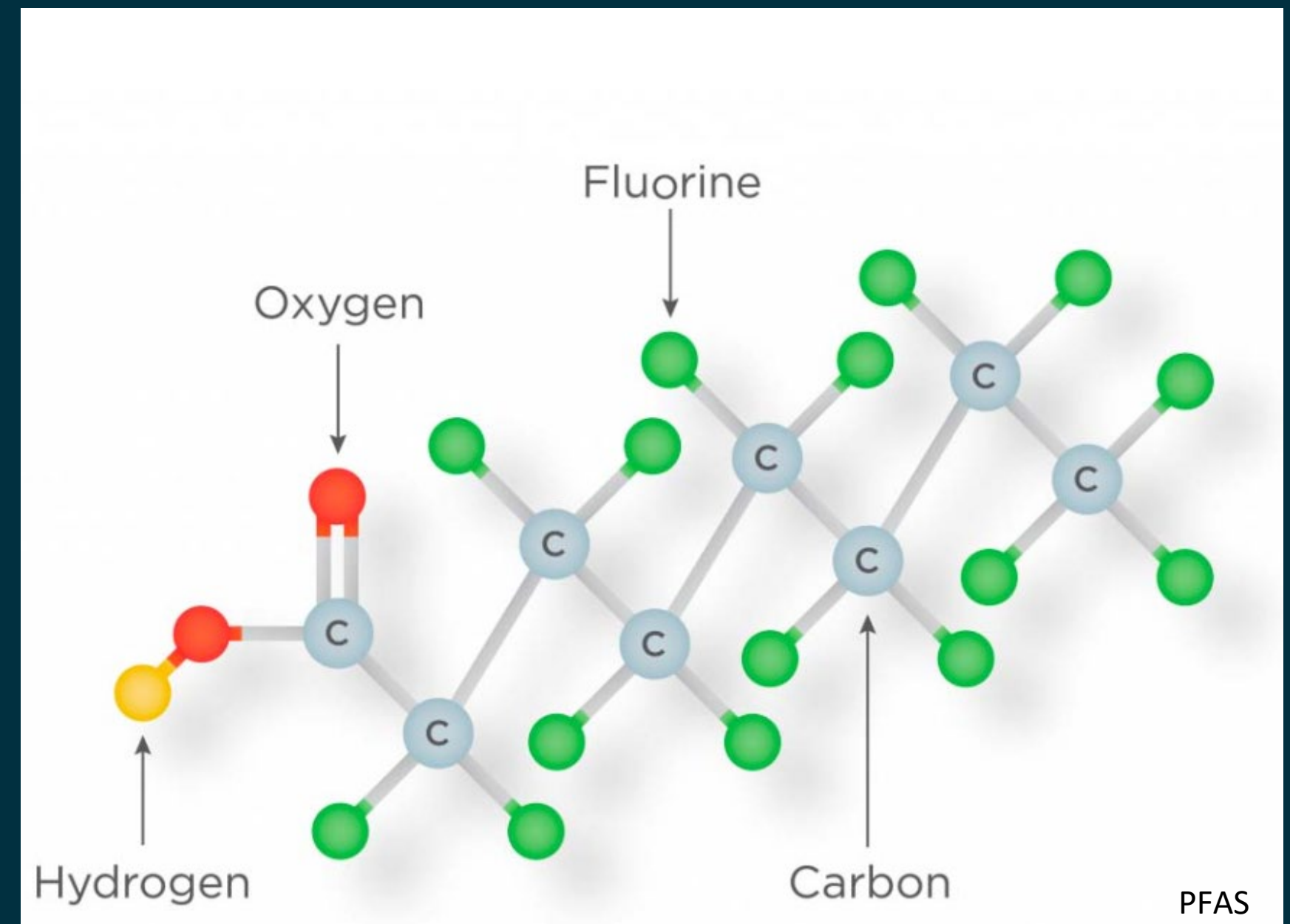
Microplastics have been found in:

- Tap water
- Bottled water
- Beer
- Sea salt
- Seafood
- Fish
- Honey
- Sugar
- Milk
- Teas*
- Baby Formula*

*once heated to certain temperatures

PFAS: What are they?

- Per- and poly -fluoroalkyl (PFAS) are a common chemical pollutant that easily become attached to microplastics
- Have been referred to as “forever chemicals”
- Two categories of PFAS
 - Short-chained
 - Long-chained



Products that contain PFAS

- Carpet
- Cleaning Products
- Construction Materials
- Cookware
- Furniture
- Hand Soaps
- PPE
- Paints, Primers, and Coatings
- Refrigerators, Freezers, and Ice Makers
- Clothing

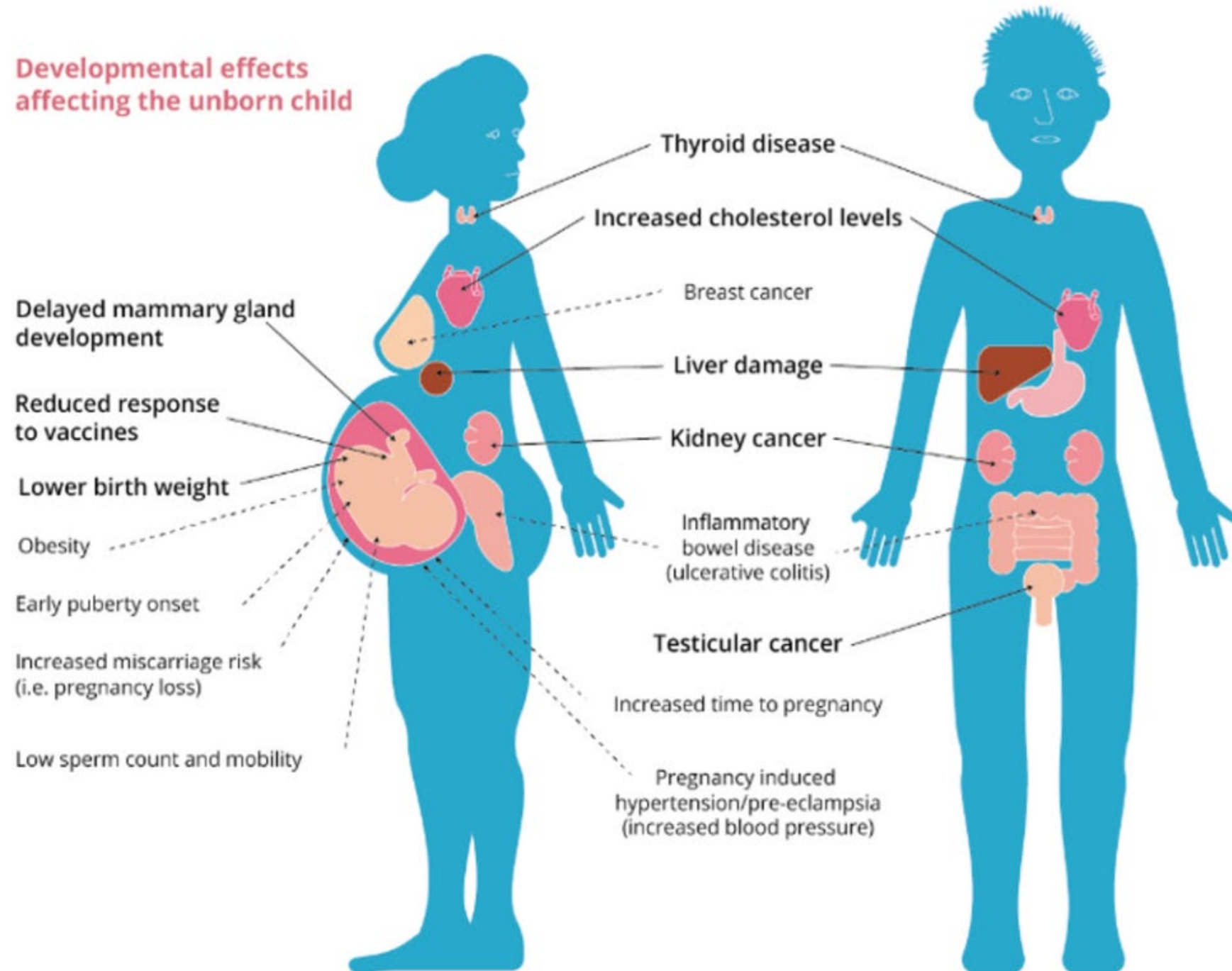


Understanding PFAS, 2020

Microplastics: Impacts

— High certainty
- - - Lower certainty

Developmental effects affecting the unborn child



Health Impacts- PFAS Contamination in Agriculture

PFAS Effects

- Potentially cause effects for:
 - Endocrine system
 - Reproductive Issues
 - Birth & Developmental issues
 - Cancer
 - Immune system damage



Next Step

Discussion

Microplastics

Microplastics

How to stop them

Workshop

Goals

By the end of the workshop
participants will understand:

1. How individuals can take practical steps to reduce microplastic pollution
2. How municipalities can take charge

Agenda

1. Short Summary
2. Discuss individual, community, and policy changes
3. Wrap-Up

**Primary vs. Secondary
Microplastics**

Common Sources

Impacts

**Now: What You Can
Do**

Individual



**Remember:
Sources of Single
Use Plastic?**

Microplastics: Individual Actions

Avoid Single-Use Plastics

By avoiding single-use plastics you are creating more sustainable choices for not only yourself, but the environment




Singh, 2019

Microplastics: Individual Actions

*Florida and the 2020
75% Recycling Goal*

Volume 2 - Appendices



Prepared by the Department of Environmental Protection
for the Florida Senate and the Florida House of Representatives



Disposal and Recycling

Important that citizens
recycle, but also imperative
that they are doing so
properly

How to Recycle These Common Items?

Aluminum Cans



Cardboard



Glass



Mixed Paper



Plastic Bottles



Steel Cans



Recycling Plastics

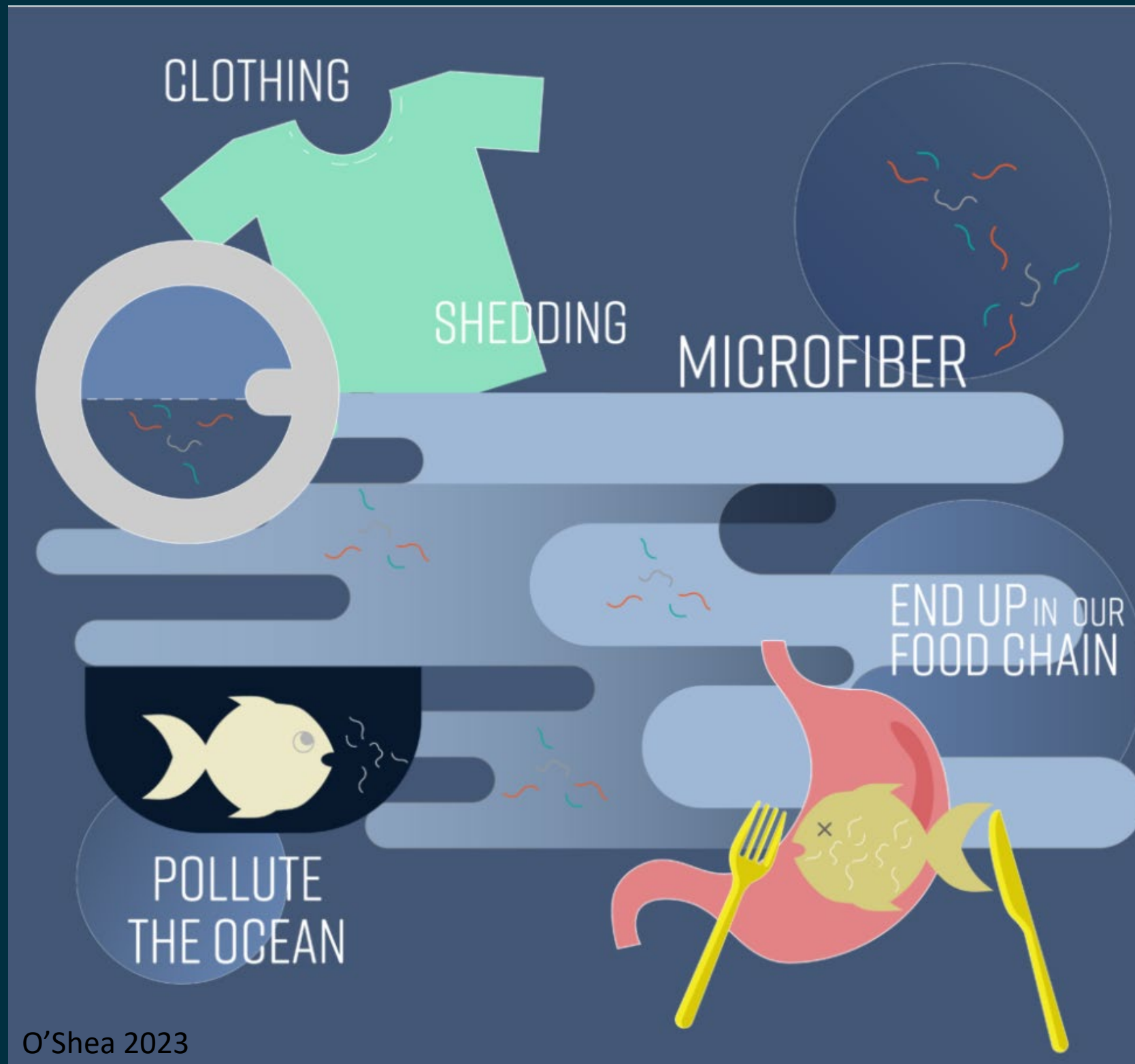
- Try not to purchase single use plastics in the first place
- If you must purchase them, look at the labels to make sure they can be recycled
- Rinse the bottles and take off the labels if they are able to go in curbside bin
- If not, must go to recycling centers to properly dispose of them

About the Numbers on Plastic

The numbers on plastic items tell you what kind of plastic it is. Not all plastics are recyclable curbside. Check your local recycling rules to see which type can go in your curbside recycling bin.

 1 PET	 2 HDPE	 3 PVC	 4 LDPE	 5 PP	 6 PS	 7 OTHER
Polyethylene terephthalate Food containers, water bottles, polyester fibers	High-density polyethylene Plastic bags, plastic milk containers, detergent bottles	Polyvinyl chloride Flooring, window frames, plumbing pipes	Low-density polyethylene Plastic bags, squeeze bottles, frozen food bags	Polypropylene Disposable cups, food and yogurt containers, furniture	Polystyrene Styrofoam toys, CD cases, video cassettes, takeout containers	All other plastics Bioplastics, CDs, baby milk bottles, reusable bottles
						

Microplastics: Individual Actions



O'Connor 2018

MICROFIBER CONTAMINATION



Sea Salt

Beer

Tap Water

Limit Synthetic Fibers

Limit the release of microfibers in the environment by:

- Purchasing Natural Fibers
- Avoiding Fast Fashion
- Investing in Long-Lasting Pieces
- Using Mild/Liquid Detergent
- Short and Cold Wash Cycles

The Pledge



Florida Microplastic
AWARENESS PROJECT



Actions in Pledge

- Read labels on personal care products and avoid products containing polyethylene
- Use paper or reusable shopping bags instead of single use plastic ones
- Avoid using plastic straws
- Bring reusable water bottle/cup instead of single-use
- Bring washable coffee/hot drink cup instead of using a disposable one
- Bring foil or washable to container for leftovers or lunch
- Recycle as many plastic items as possible
- Choose more natural fabrics rather than microfiber or synthetic ones

Take the Pledge!



Volunteering

Citizens can volunteer to help with two aspects of the Florida Microplastics Awareness Project:

- Collecting Data
- Educational Outreach



Microplastics

Municipalities & Nations

The Invisible Threat: How Microplastics Are Devastating Marine Ecosystems



Community Cleanups

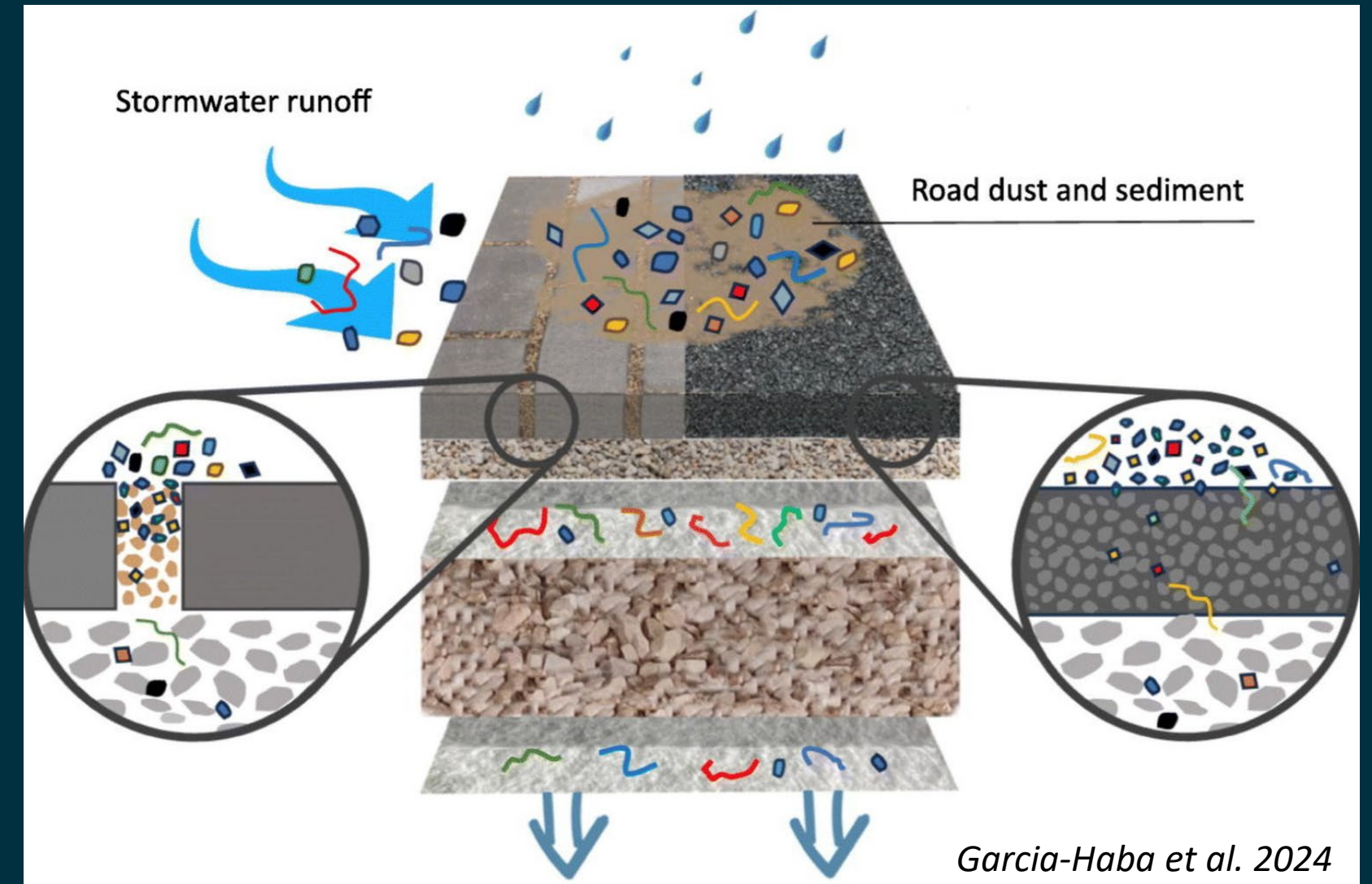
- Prevents the creation of secondary microplastics
- Raises public awareness of plastics in local environment
- Citizens can work with local cleanup businesses



Green Infrastructure

Infrastructure such as:

- Bioretention Systems
- Stormwater Ponds
- Permeable Pavements
- Constructed Wetlands

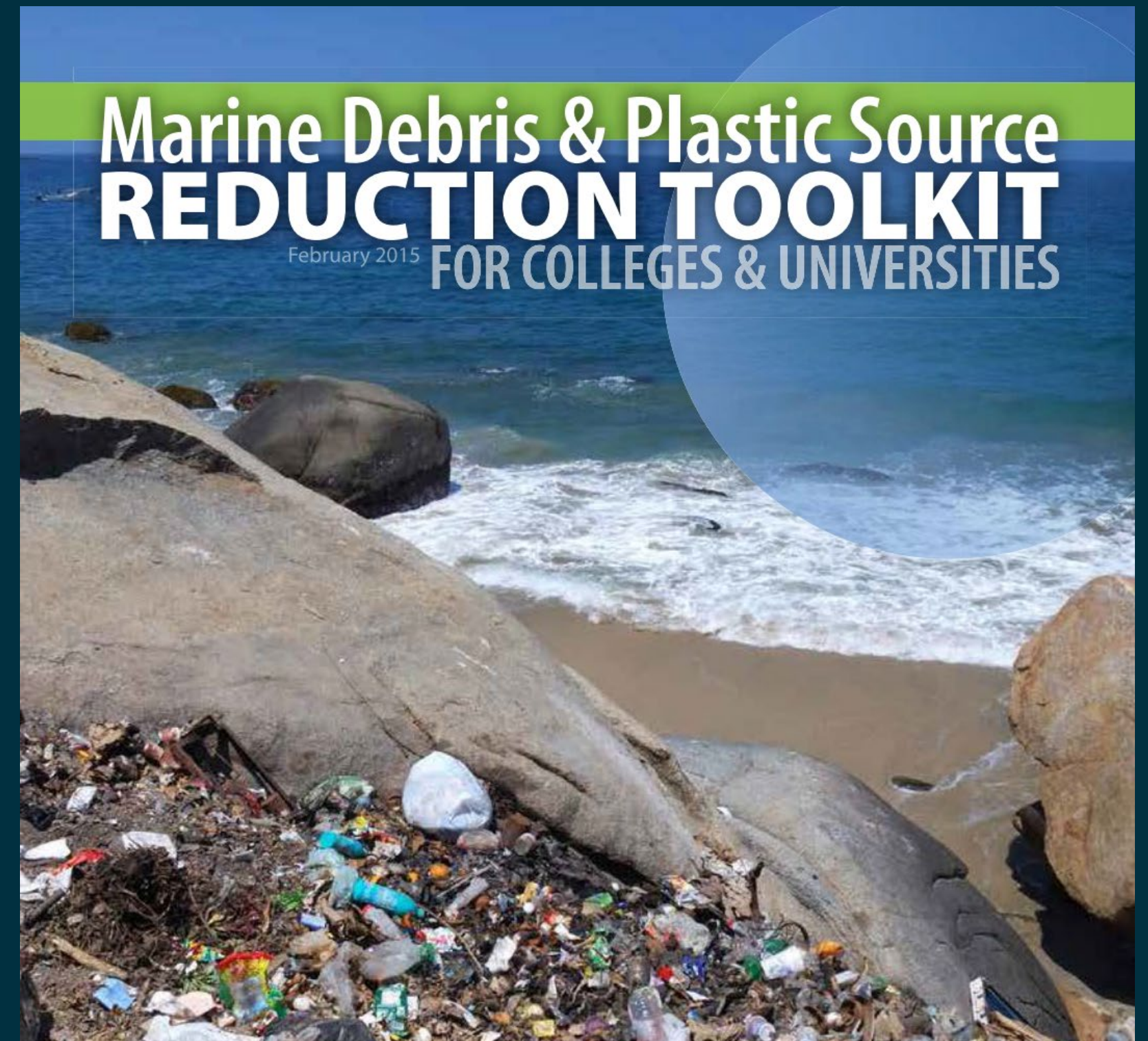


Filters out about 28–99% of large plastics before it reaches other bodies of water

Improving Education

Actions to Improve Education:

- Providing alternatives to single-use plastic available in public spaces
- Uploading infographics and videos on social media
- Hosting workshops
- Putting posters up in public spaces
- Creating new educational materials on reducing microplastics
- Educating local schools

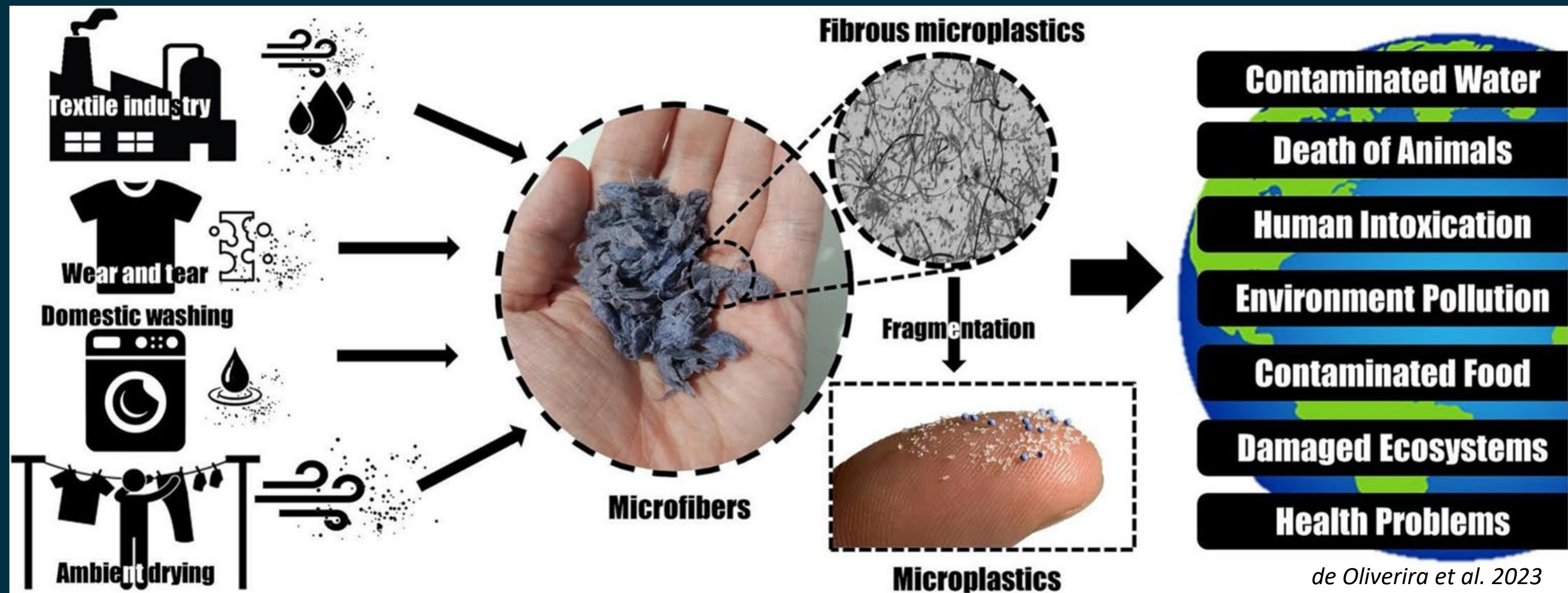


Bioplastics

- Bioplastics are biodegradable plastics created from bacteria
- Has its own pros and cons
- Polyhydroxyalkanoates (PHAs) are one of the most studied and most similar to everyday plastics

Increase Filtration Systems

More extensive filtration systems in industrial processing sites and thermal treatment for leftover sludge will prevent microplastics from moving into the environment



de Oliverira et al. 2023

Microplastics

Successes So Far

Microbead -Free Waters Act

Amended the Federal Food, Drug, and Cosmetic Act to ban rinse off cosmetics containing microplastics



What are microbeads and why are they ruining the environment



The Hidden Microplastics in our Homes: Microbeads, 2024

Products that contained microbeads:

- Body Scrubs
- Toothpaste
- Body Washes
- Lip Sticks
- Eyeliner
- Sunscreen
- Deodorant
- Cleaning Products

France's Anti-Waste Law for a Circular Economy

Includes changes such as:

- Zero Disposable Plastic by 2040
- Reusable Tableware at Fast Food Restaurants
- Ban of Plastic Bags
- Plastic Microfiber Filter on Washing Machines
- Water Fountains Available
- No Plastic Packaging around Produce
- & Much More



Ministère de la Transition Ecologique 2020

Recap



The **plastic problem**
that's harder to see

Further Questions?

Resources:

- Anna Braswell
(a.braswell@ufl.edu)
- Local Extension Office
- Florida Microplastics
Awareness Project

Website

Actions to take:

- Reflect on your plastic use habits
- Research local cleanups
- Be the change!

Microplastics

Thank you!



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