



Water Boards

STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

Implementation of Senate Bill 1422 – Microplastics in Drinking Water

March 2, 2021

Dr. Scott Coffin, Ph.D.

State Water Resources Control Board

 @DrSCoffin

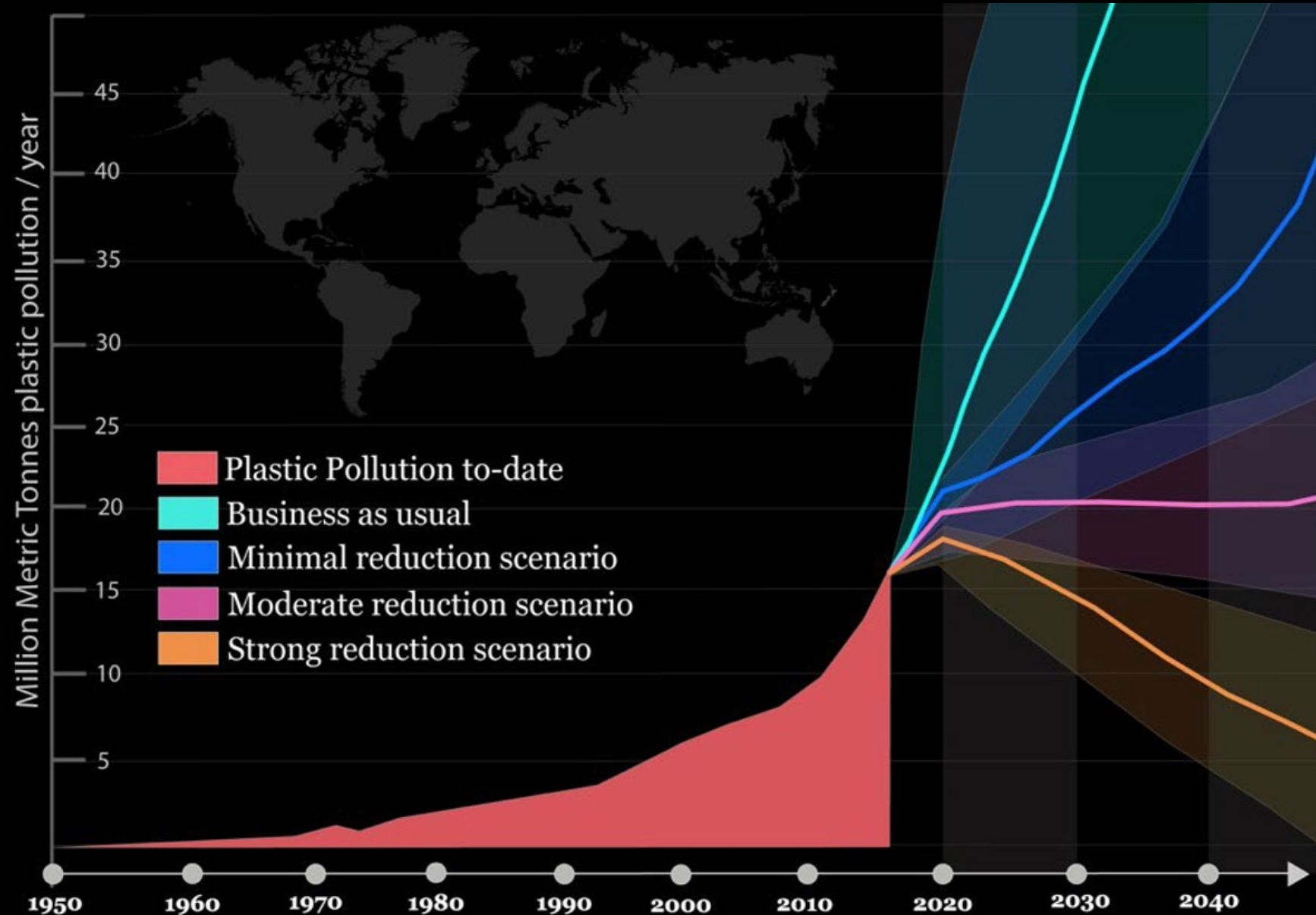
Photo: Mandy Barker



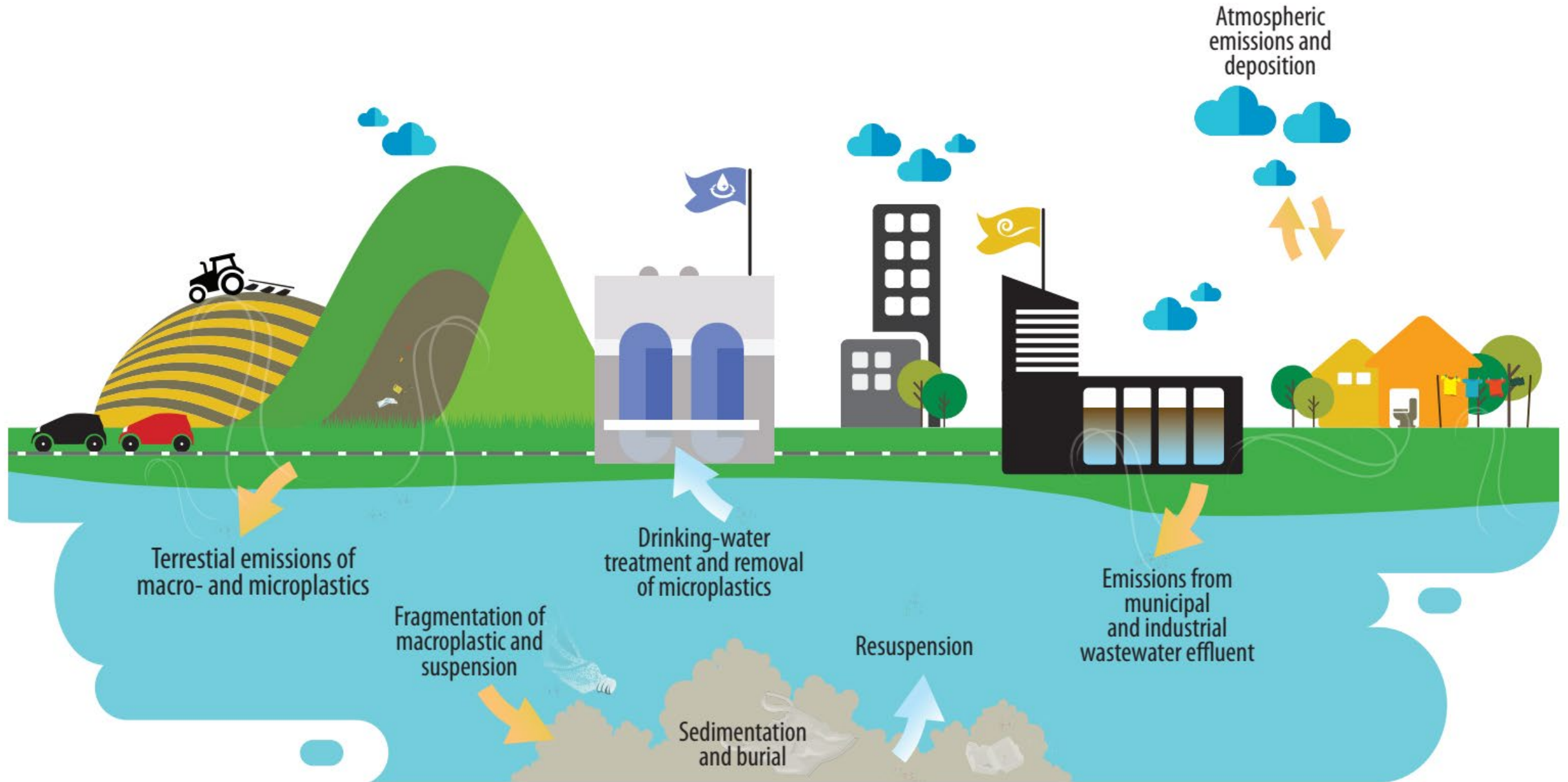


PHOTO BY GREG

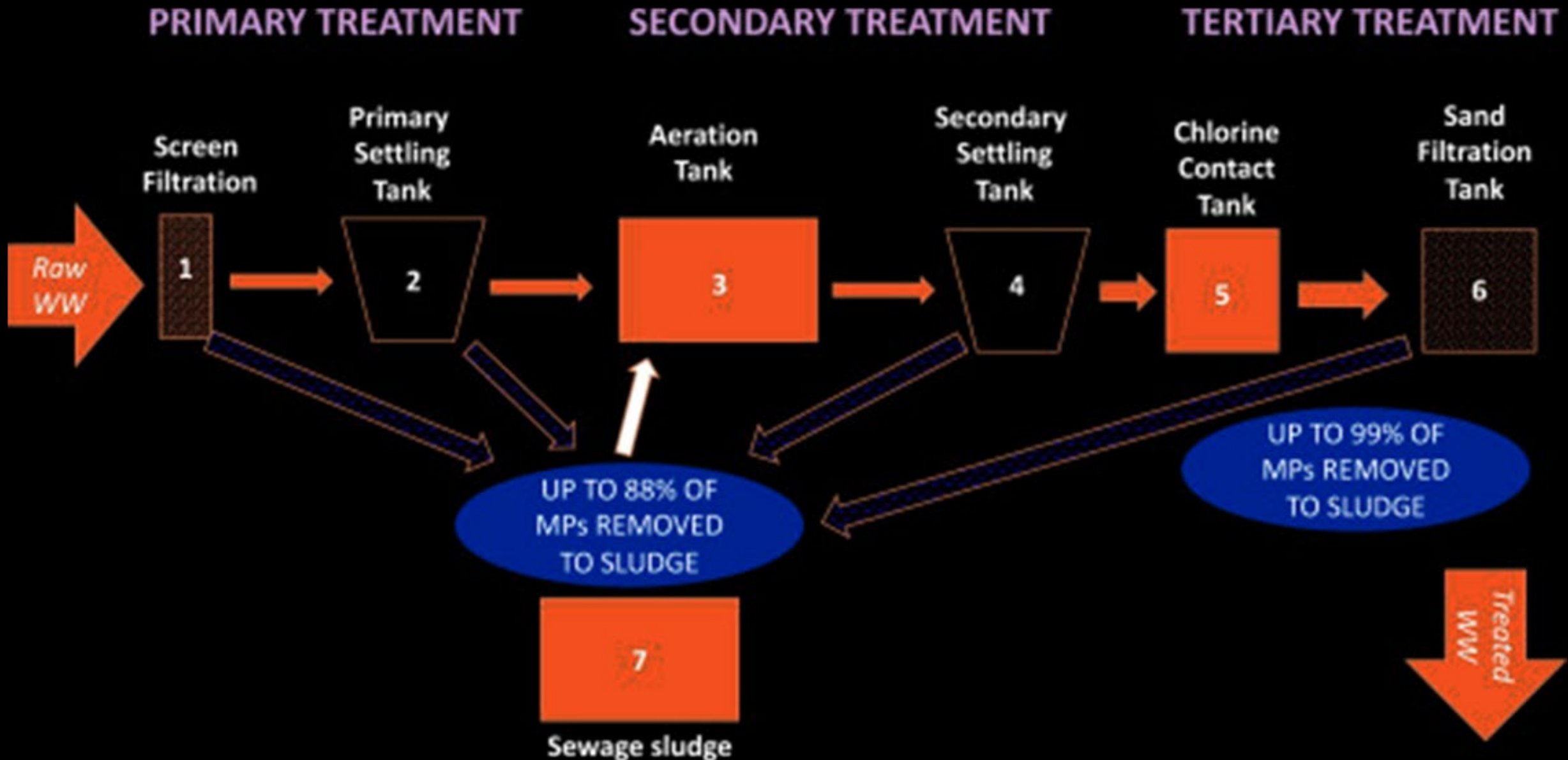
Plastic Pollution Increases Exponentially



Plastic Breaks Down and Enters Surface Waters



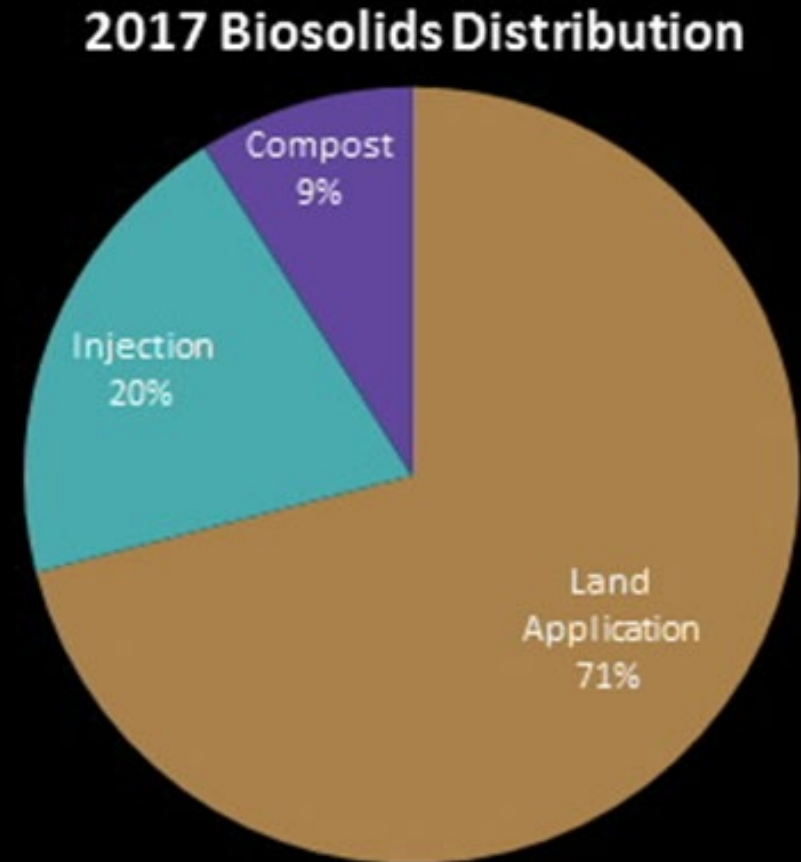
Wastewater Removes 88-99% of Microplastics



Some Sludge Applied as Biosolids



Biosolids applied to an agricultural field in the Central Valley, CA



Biosolids application from LA County Sanitation District

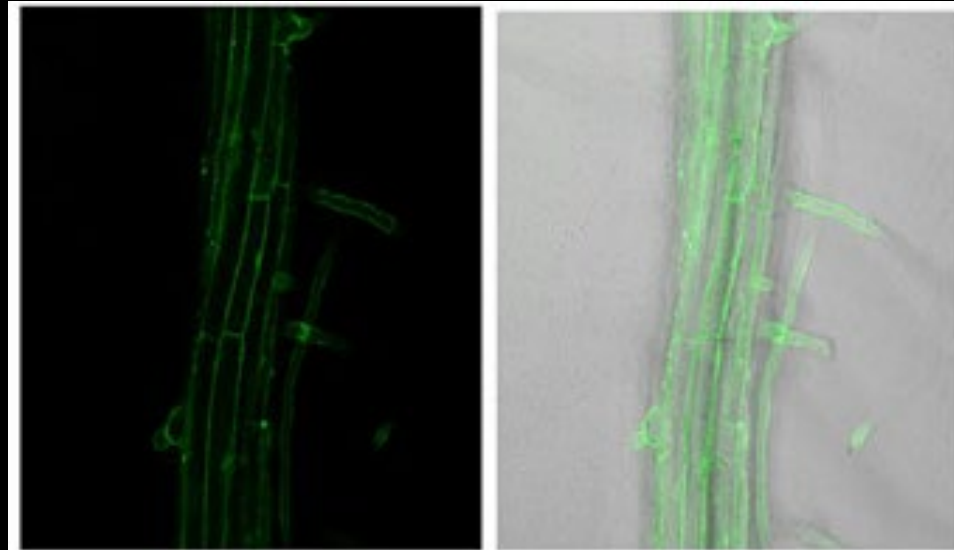
Microplastics Concentrate in Agricultural Soils



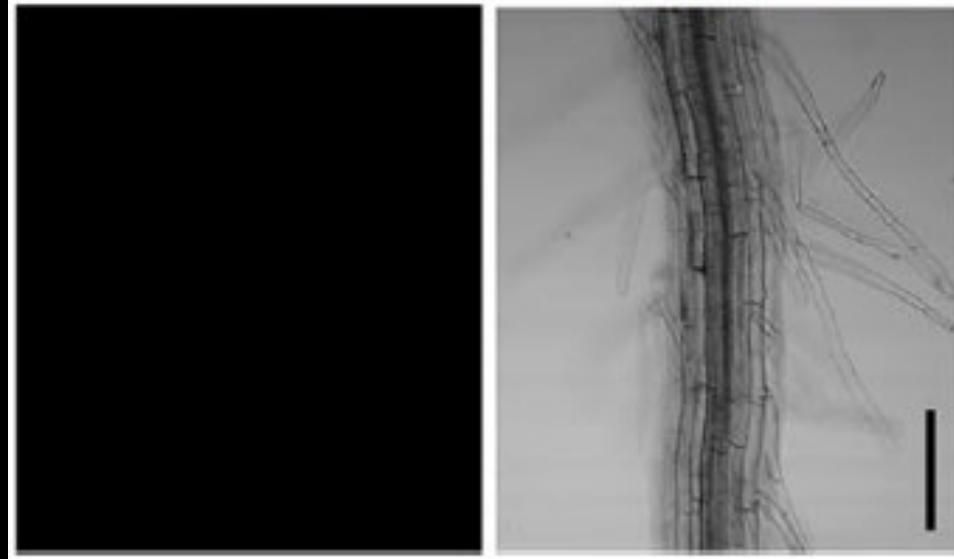
Photo: Kumar et al. (2020). *Environmental Pollution*

Plants Uptake and Accumulate Nanoplastics

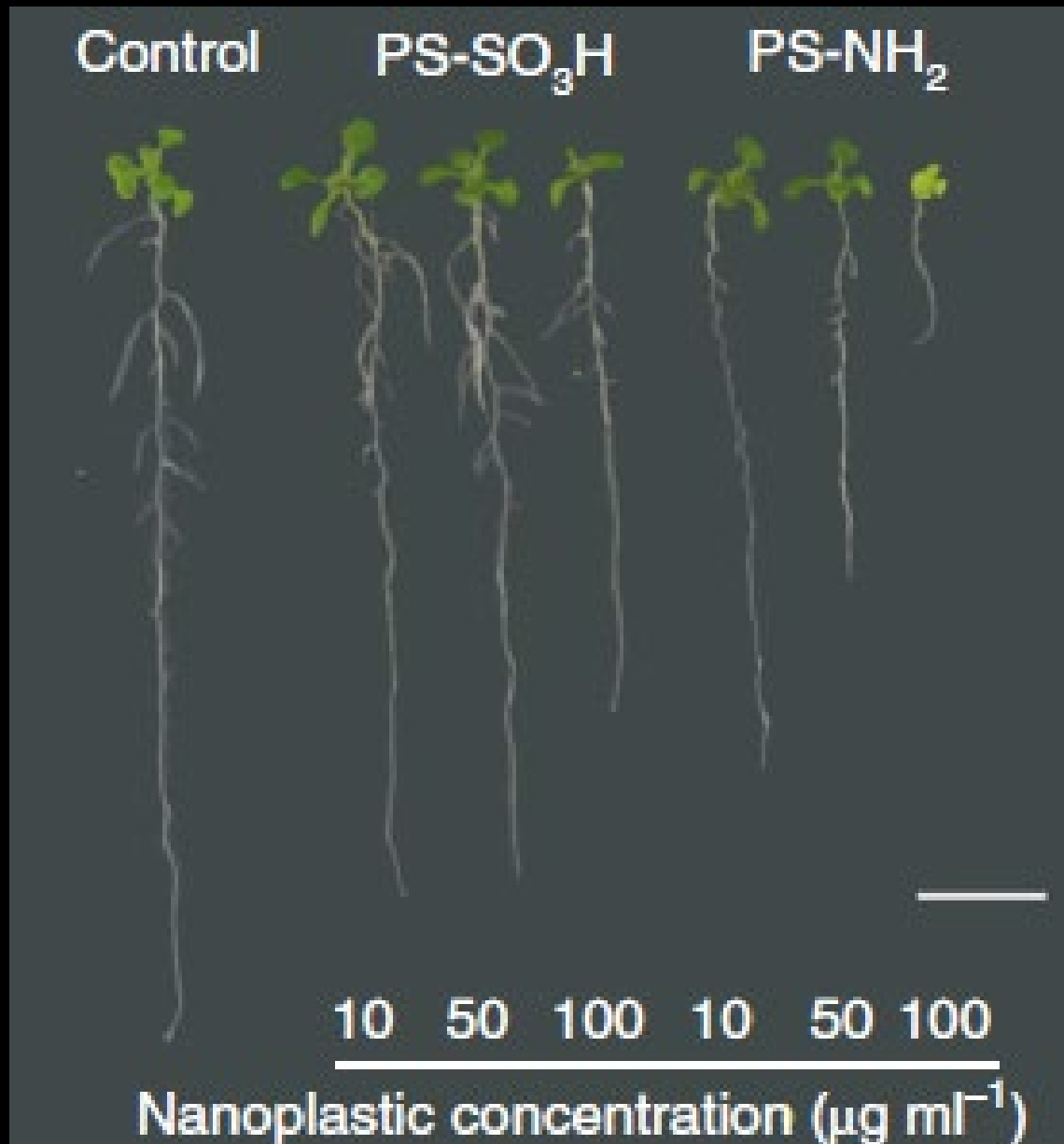
Microplastics



Control



Nanoplastics Reduce Plant Growth



Microplastics Decrease Tomato Production





PLASTIC FIBERS IN TAP WATER, 2017



orb. one world. one story.

PREVALENCE OF MICROSCOPIC PLASTIC FIBERS BY SAMPLE SOURCE LOCATION.



WORLDWIDE

83%



USA

94%



EUROPE

72%



INDONESIA,
JAKARTA

76%



INDIA,
NEW DELHI

82%



LEBANON,
BEIRUT

94%



UGANDA,
KAMPALA

81%



ECUADOR,
QUITO

75%



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July 1, 2020

California Senate Bill 1422 (2018)

- Define 'microplastics'



July 1, 2021

- Standard method
- Accredited laboratories
- Health-based guidance level
- Four years of testing

Deadlines



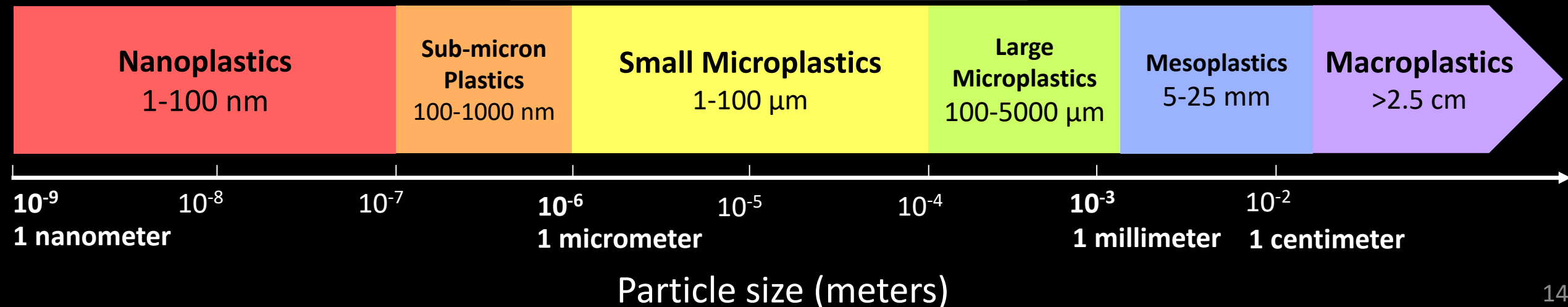
Photo: Mandy Barker

Official Definition: ‘Microplastics in Drinking Water’

‘solid polymeric materials to which chemical additives or other substances may have been added, which are particles which have at least three dimensions that are greater than 1 nanometer and less than 5,000 micrometers.

Polymers that are derived in nature that have not been chemically modified (other than by hydrolysis) are excluded.’

Size-Based Classification



Polymers included in Regulatory Definition

All “Traditional” Plastics...



Polymers included in Regulatory Definition

...and “Non-Traditional” Plastics



Synthetic rubber



Synthetic fibers



Silicones



Bio-based and
biodegradable polymers



Cellulose acetate

European Microplastics Definition Excludes Biodegradables



‘solid polymeric materials to which chemical additives or other substances may have been added, which are particles which have at least three dimensions that are greater than 1 nanometer and less than 5,000 micrometers.

*Polymers that are derived in nature that have not been chemically modified (other than by hydrolysis) are excluded, **as are polymers that are (bio)degradable.**”¹*



¹European Chemicals Agency (2019). “Annex XV Restriction Report Proposal for a Restriction: Intentionally Added Microplastics. Version 1.2

Some Plastic Ingredients are Endocrine Disruptors

Estrogen

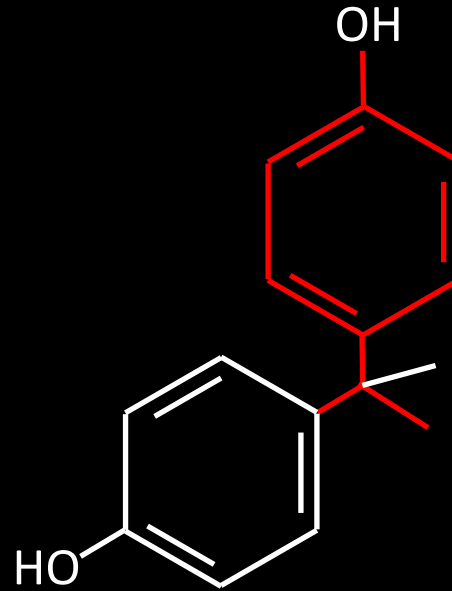
Natural Hormone



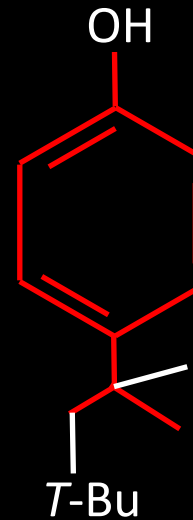
17- β -estradiol

Common Plastic Additives

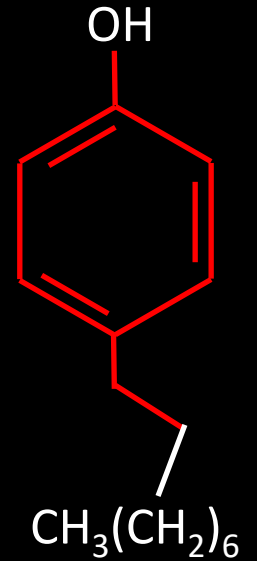
Unnatural Hormones



Bisphenol A



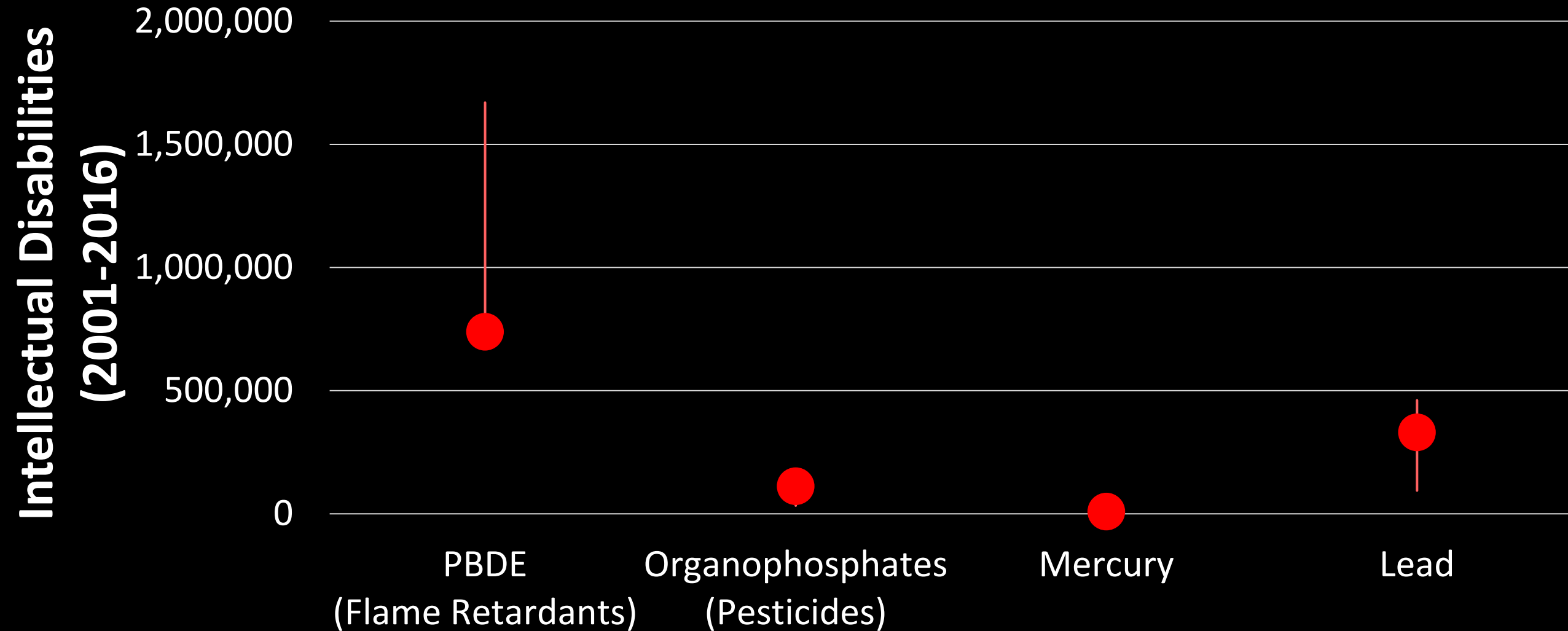
4-*tert*-octylphenol



4-n-nonylphenol



Some Endocrine Disruptors Cause IQ Loss



WHERE FLAME RETARDANTS ARE FOUND

In home insulation

In upholstered furniture containing polyurethane foam — manufacturers add it to meet flammability standards enacted by California but followed nationwide

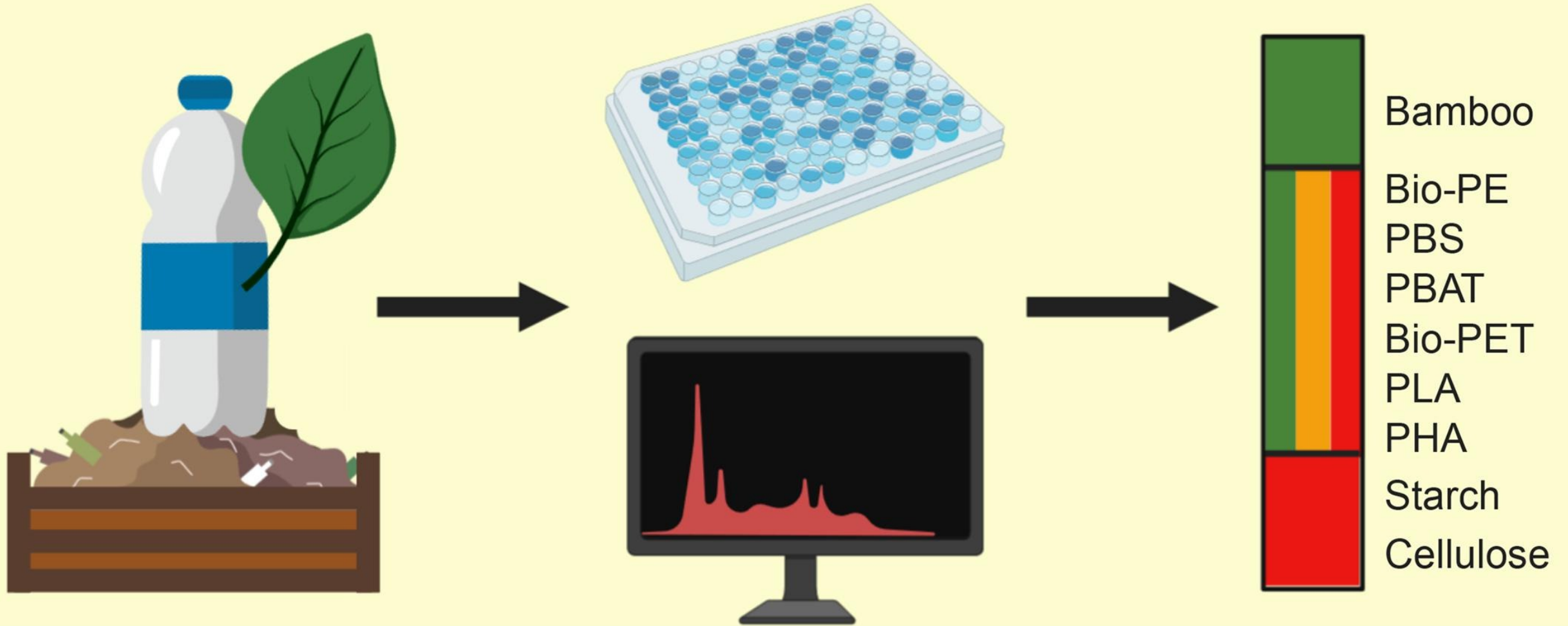
In the plastic casing of some electronics

In dust — children are exposed to higher doses of flame retardants than adults because they spend more time on the floor and put things in their mouths

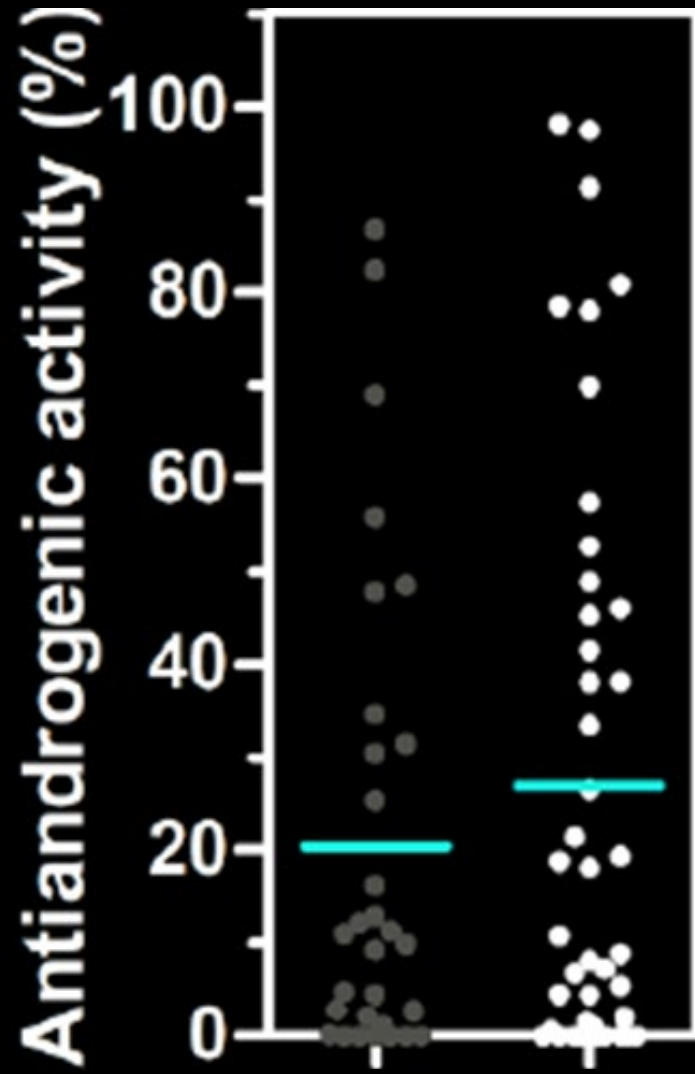
In carpet padding made with recycled foam

In some baby products containing polyurethane foam, including highchairs and diaper-changing pads

Are Bioplastics Safer than Conventional Plastics?



Many Bioplastics Contain Hazardous Chemicals



Conventional Bioplastics





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Method Development and Standardization



Drinking Water



Ocean Water



Fish Tissue



Sediment

>35 Participating Organizations





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- **Accredit laboratories**
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Deadlines



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Health Effects Expert Panel

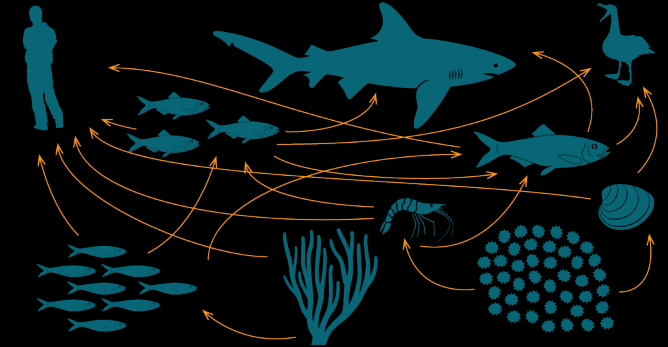


Human Health

October 2020

—

April 2021



Ecosystem Health

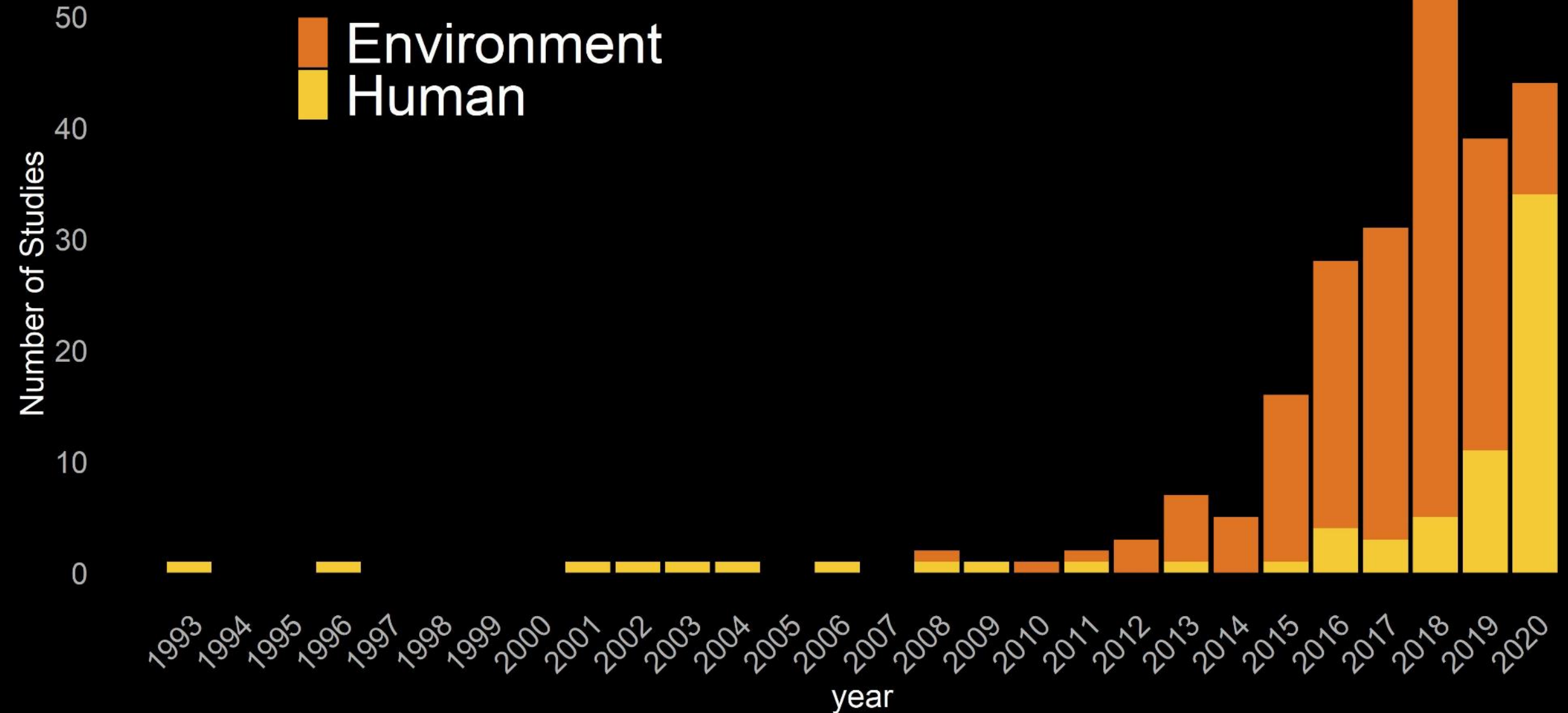


UNIVERSITY OF
TORONTO





Microplastics Toxicity Studies Increase by Year



Microplastics Recently Found in Human Placenta

- 4/6 placentas contained microplastics
- Evidence of **translocation**
- $<10\ \mu\text{m}$ particles



 @MicheleDoesArt



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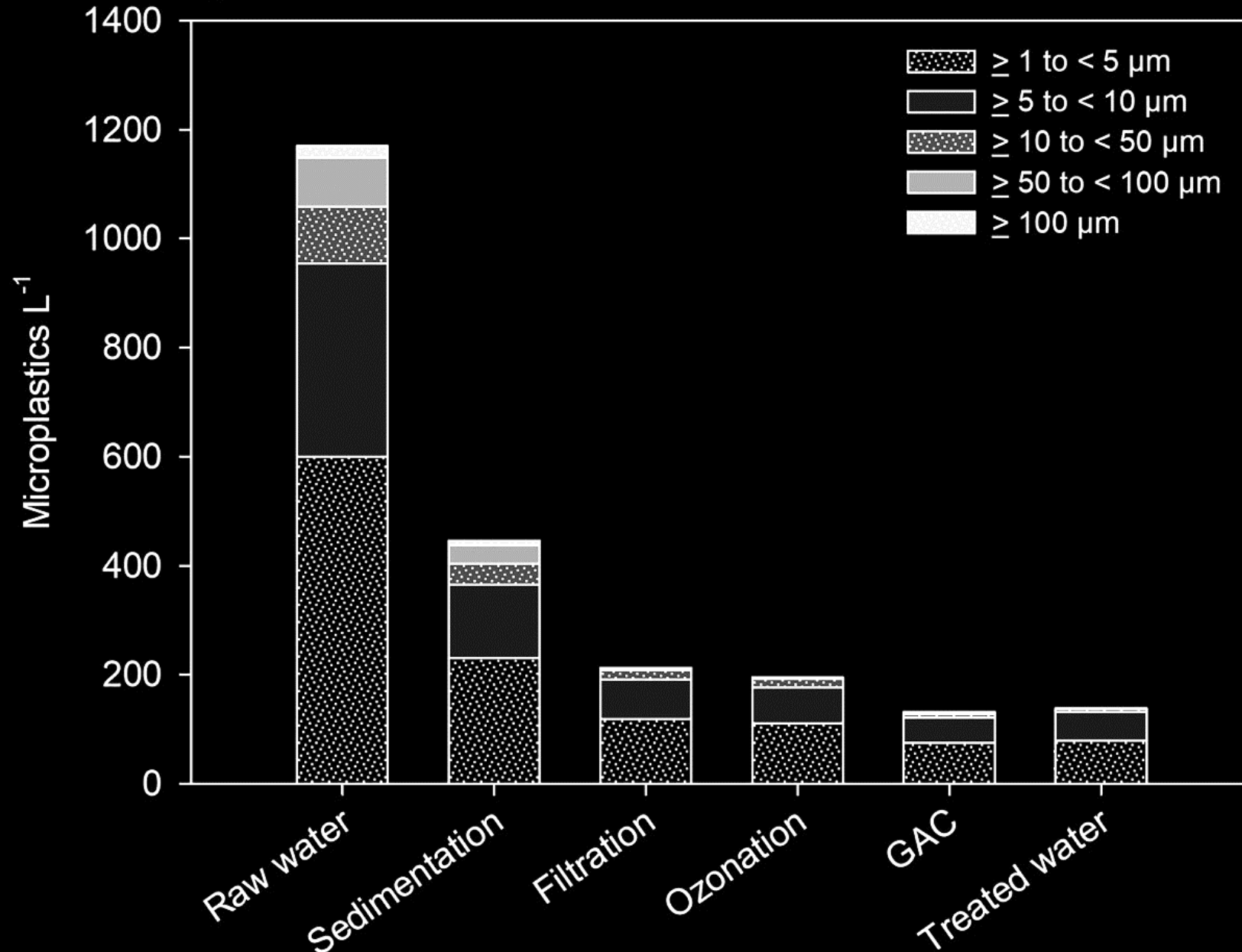


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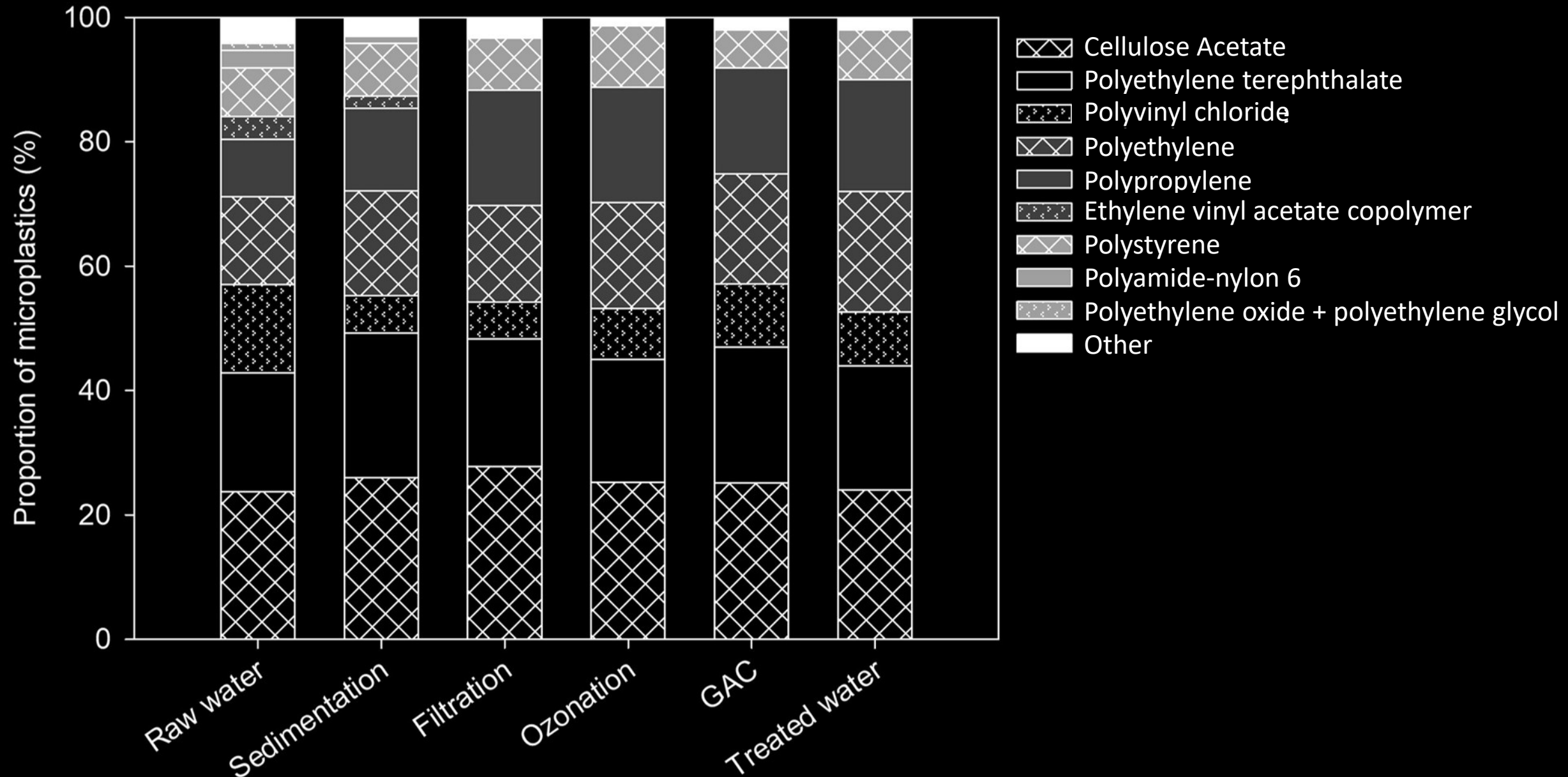
Deadlines

Drinking Water Treatment Removes >10 μm Microplastics





Diverse Polymers Found in Drinking Water





Conclusions

- Plastic breaks down into smaller particles
- Plastic degrades slowly, and contaminates water
- Regulatory definition, methods, accreditation provide consistency
- Health effects uncertain – but gaining evidence
- Monitoring beginning 2021



CALIFORNIA

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Thank you

