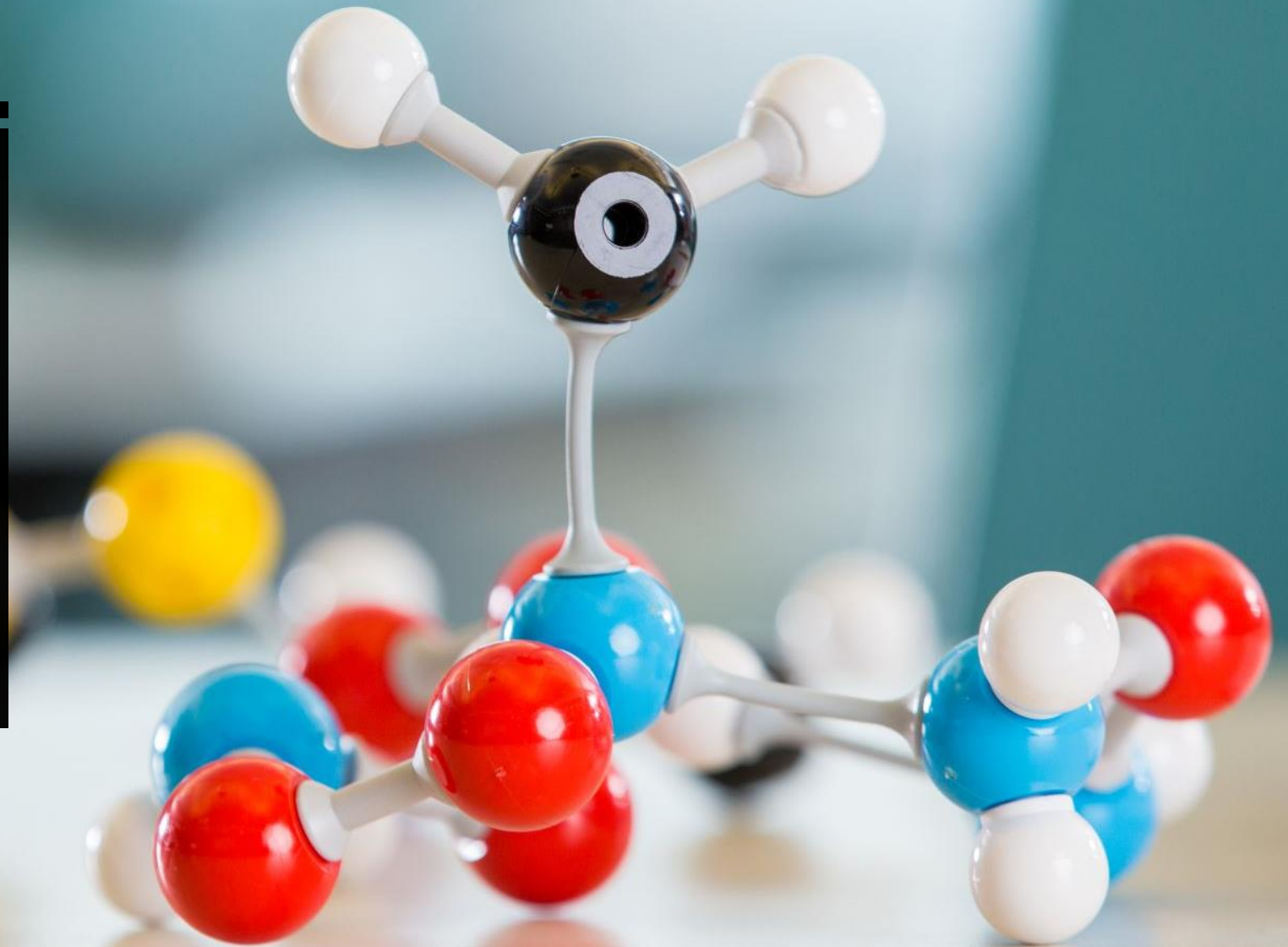


BIOPLASTIC AS THE ALTERNATIVE FOR CONVENTIONAL PETROLEUM PLASTIC

K SUDESH

UNIVERSITI SAINS MALAYSIA



What is plastic used for?



Source: Hopewell et al. (2009)

PLASTIC AGE?



Age of plastics

(Pliable and easily shaped)

Plastics is a product of Applied Chemistry – Polymer Chemistry

The first synthetic polymer was invented in 1869 by John Wesley Hyatt, to substitute for ivory.



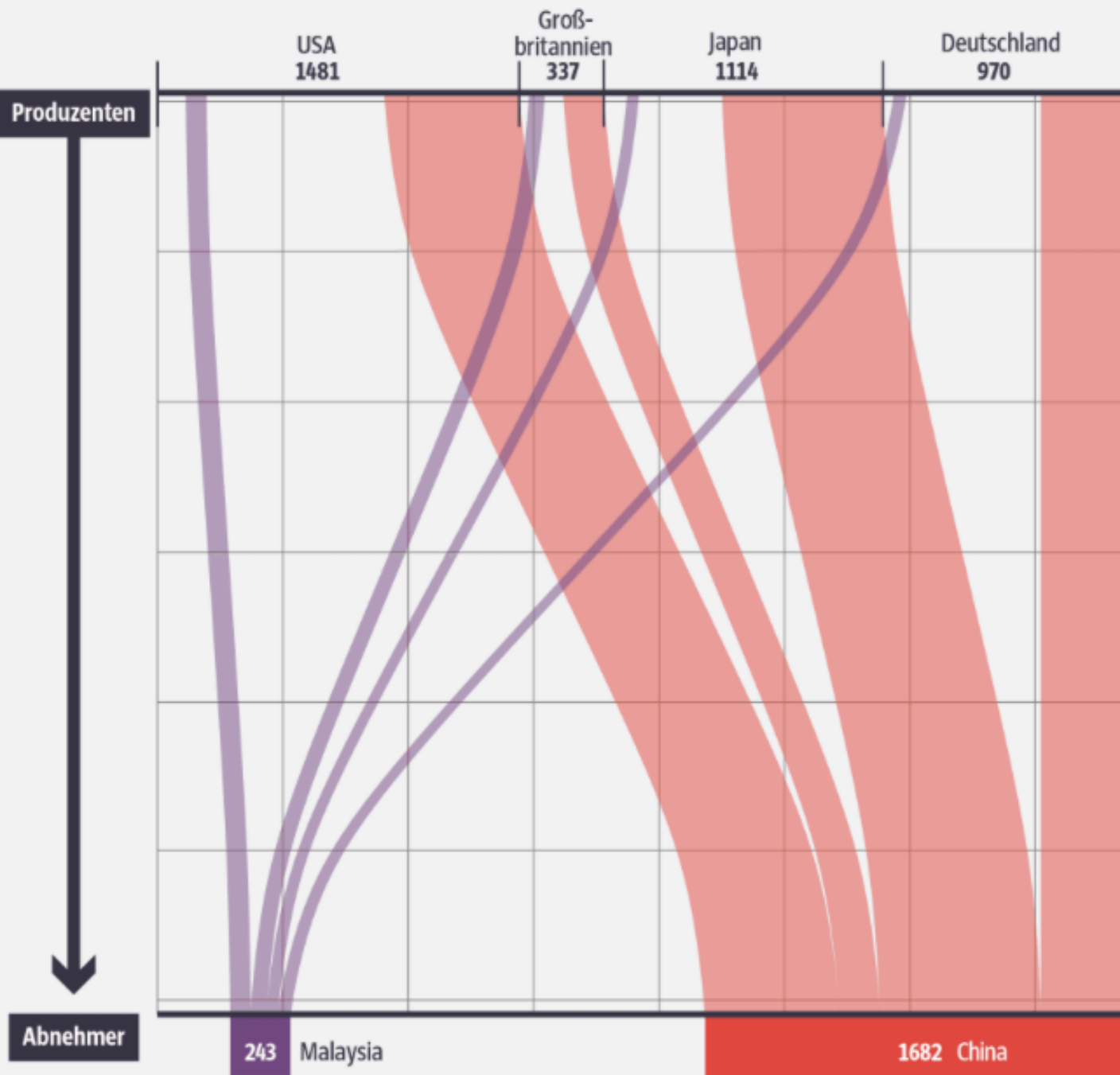
Misleading information – this is not plastic but natural food (crab)



THE MIND UNLEASHED
UNCOVER YOUR TRUE POTENTIAL



Januar bis Oktober 2017

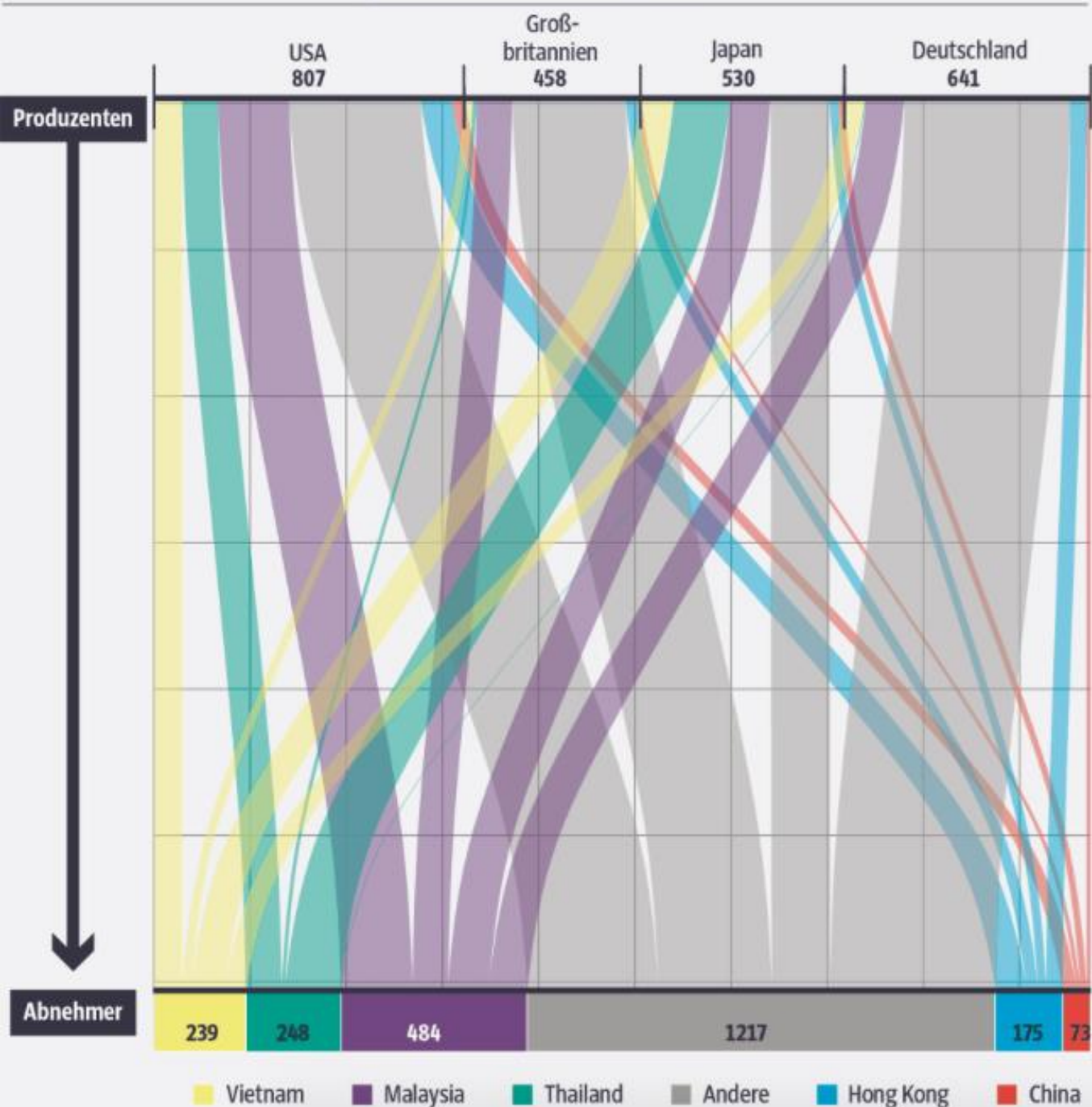


As recently as in 2017, China was the most important consumer of plastic waste: almost half of the worldwide trade volume landed there. On 1 January 2018, the Government of the People's Republic stopped the import of plastic waste from abroad.



Plastic wastes in Malaysia, Aug 2018

Januar bis Oktober 2018



In 2018, Malaysia became by far the most important import country for plastic waste.

"Since China banned the import of plastic waste, the developed countries have redirected their export to Southeast Asia, including Malaysia," said Malaysian Minister of Energy, Science, Technology, Environment and Climate Change (MESTECC) **Yeo Bee Yin** (35 year-old)

Nature's 10 people who mattered last year
Nature 2018 332 (**564**)





SUSTAINABLE DEVELOPMENT GOALS



GrabFood

We're saying
no to single-use
plastic

Grab
ForGood





PIXABAY

Your tea could contain billions of plastic particles

By [Eva Frederick](#) | Sep. 26, 2019, 3:20 PM



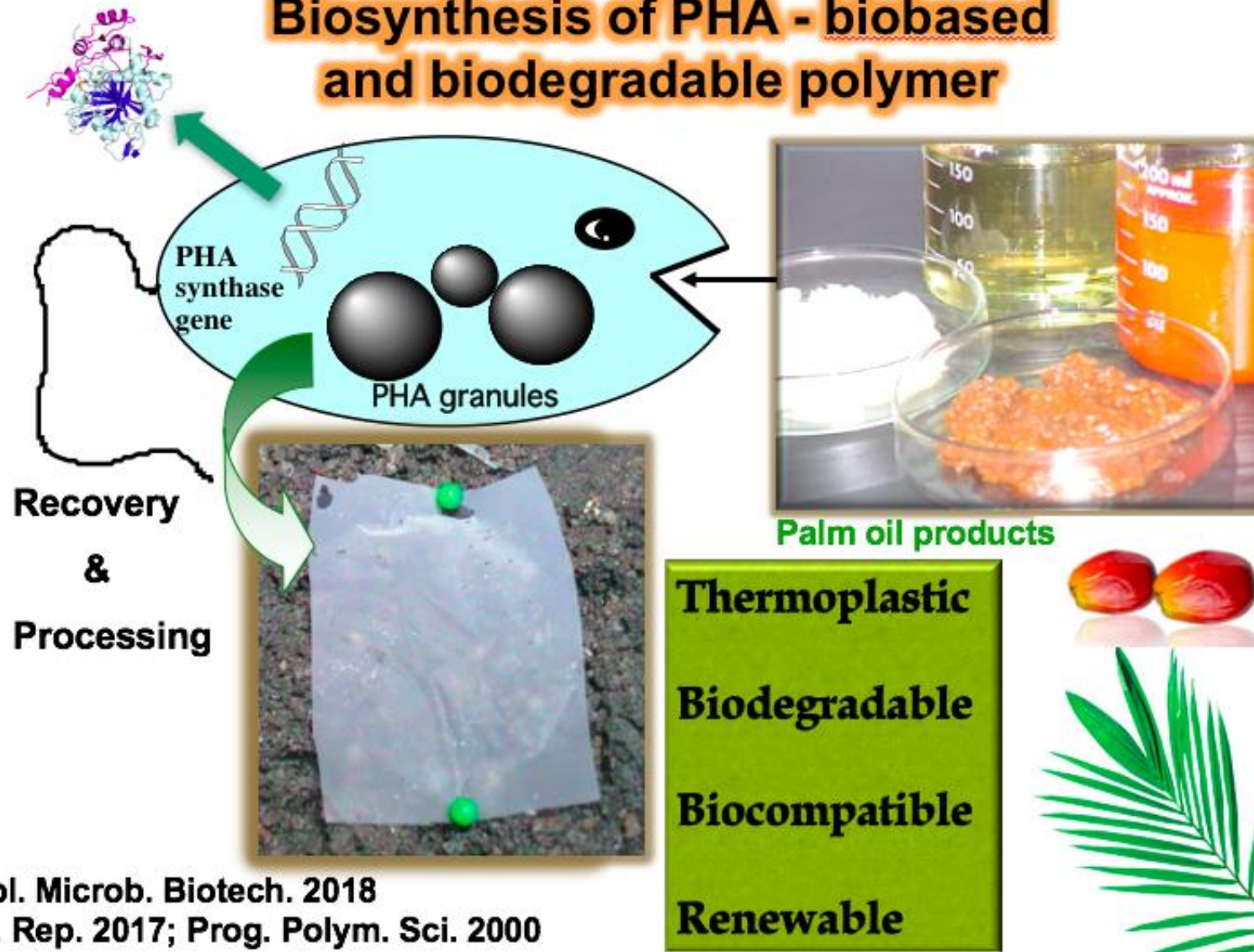
MICROPLASTICS

BIOPLASTICS

- Plastics that are derived from biological/renewable materials (not from petroleum which is non-renewable)
- Starting materials for bioplastics come from plants (sugars, oils, CO₂)
- Production involves the use of living organisms or their components
- May or may not be biodegradable
- To minimize dependency on petroleum, reduce CO₂ emission, reduce pollution and disposal problems

		BIOBASED			
NON-BIODEGRADABLE	Biobased and non-biodegradable		Biobased and biodegradable		BIODEGRADABLE
	Biobased and non-biodegradable	Biobased and pseudo-biodegradable	Biobased and compostable	Biobased and marine-degradable	
	• bioPE	• PEF • bioPET	• PLLA • bioPBS	• PHA • PA4	
	• PE, PP • PS, PVC • PA	• PET • PU	• PBS • PBAT	• PCL	
	Oil-based and non-biodegradable	Oil-based and pseudo-biodegradable	Oil-based and compostable	Oil-based and marine-degradable	
Oil-based and non-biodegradable		Oil-based and biodegradable			
OIL-BASED					
© EMBO					

Biosynthesis of PHA - biobased and biodegradable polymer

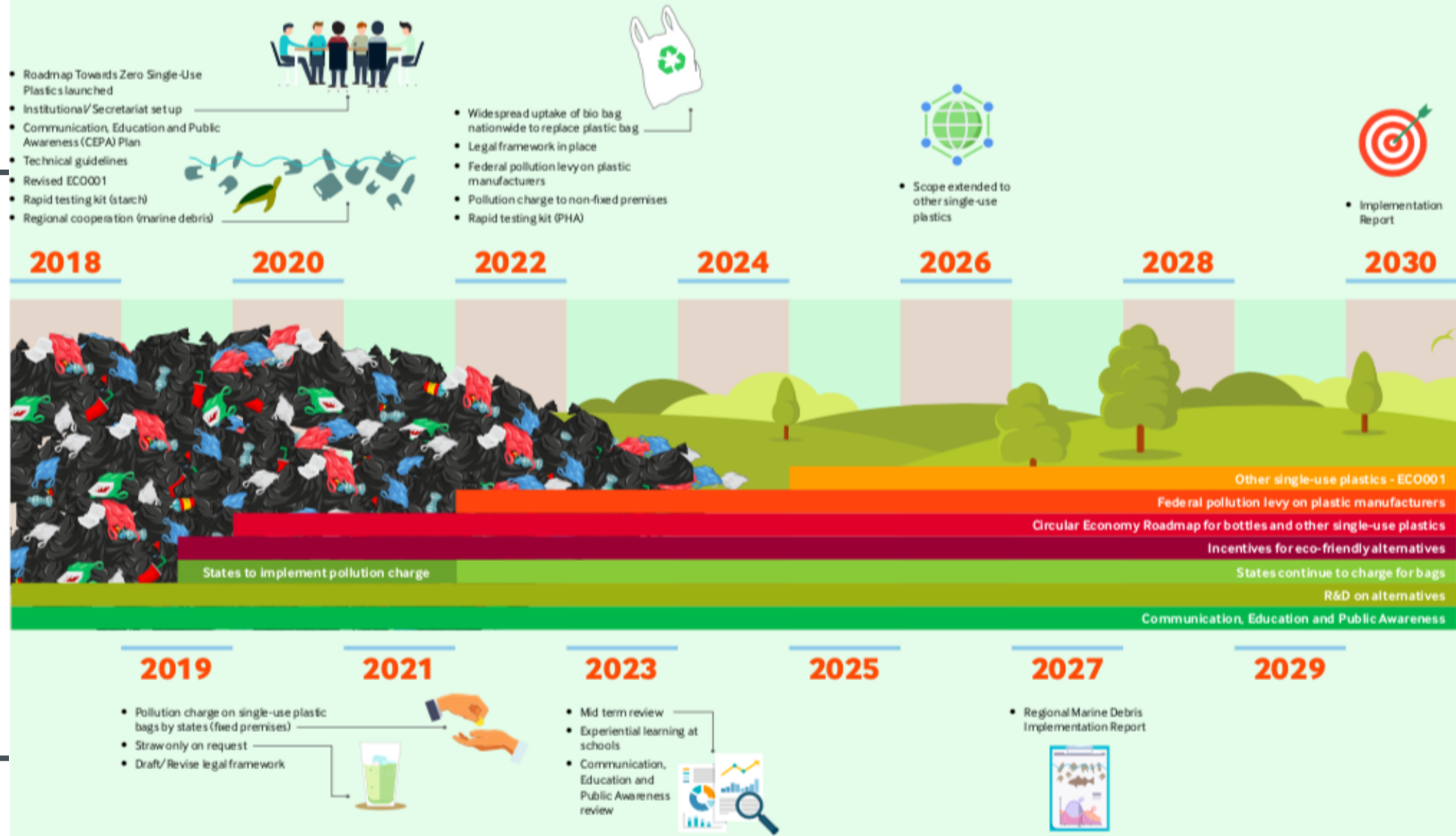


Appl. Microb. Biotech. 2018
Sci. Rep. 2017; Prog. Polym. Sci. 2000

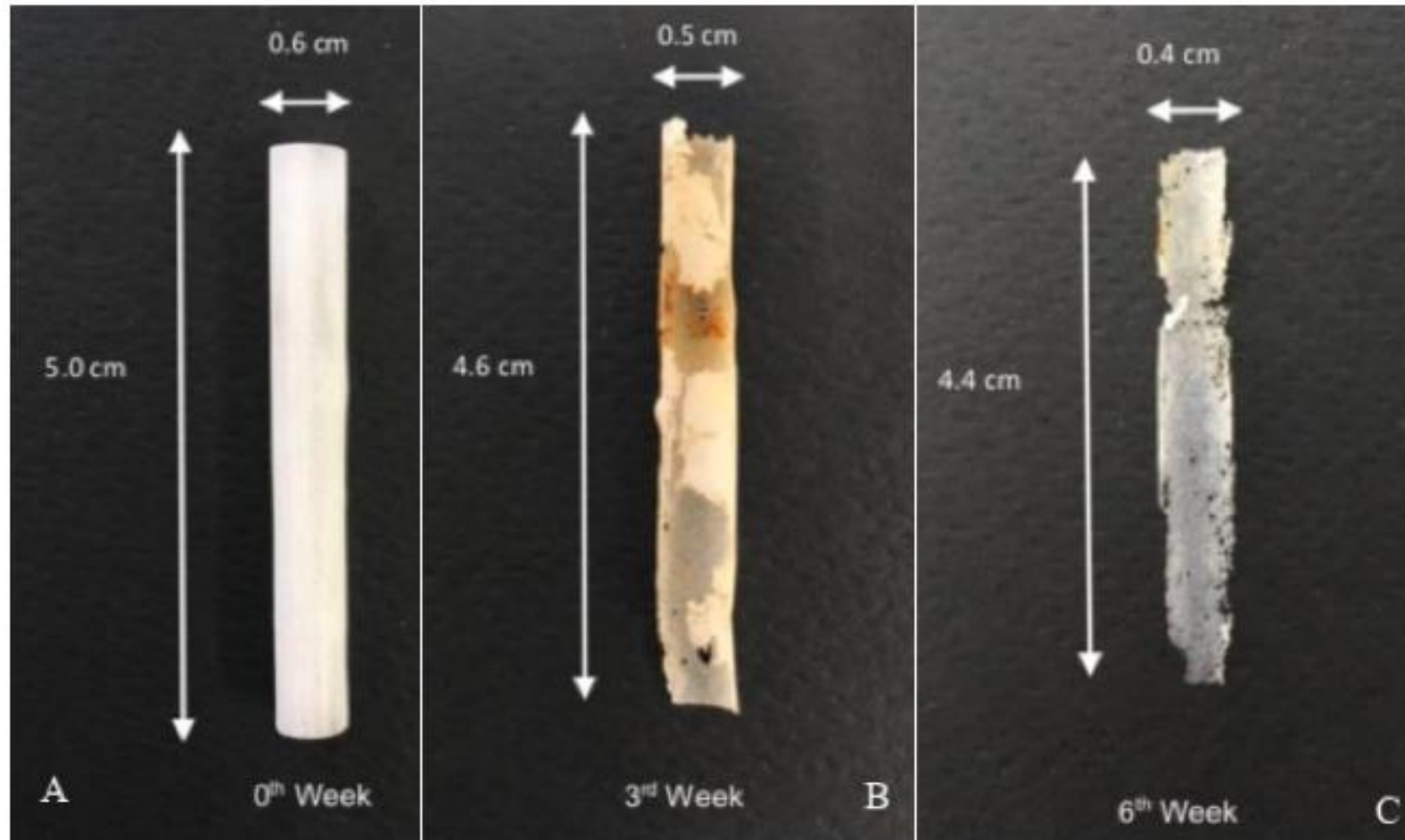
ROADMAP TOWARDS ZERO SINGLE-USE PLASTICS

2018-2030

Towards a Sustainable Future



BIODEGRADATION OF PHA STRAW IN MANGROVE





USEFUL PROPERTIES OF MATERIALS THAT SHOULD BE POSSESSED BY BIODEGRADABLE POLYMERS

- Easy to obtain (low cost)
- Easily shaped (pliable)
- Durable (long lasting)
- Light
- Strong
- Consistent quality
- Non reactive (rusting etc)
- Easy to clean and store
- (Bio-based, renewable, biodegradable)