



MICROPLASTICS

UNKNOWNTROPICALWWIDE
IMPACTENTANGLEMENTSFRAGMENTSMM
SPECIESDISPERSALCONCEALABLELARGERRESERVOIR
APPENDAGESSATIATIONMUSSELS
SMALLERSUFFERSYNTHETIC
MARINECLOTHES
BIODIVERSITYPHYSICALWASHING
RANGEEDULISDENSELYPARTICLES
PELLETSDOXINSLEACHENDANGERING
ENVIRONMENTWILDLIFE
TEXTILEOCEANS
PROPAGATEDLEVELS
DEBILITATIONGEOCHEMICAL
AREASEXFOLIANTS
PLASTICEFFECTSFIBERS
AMBIENTSHOWNSHARM
ORGANISMORGANICSEA
DEBRISADSORPTION
THREEFOLDGLOBAL
MANIFOLDUNEQUIVOCALLY
BIODEGRADABLEPOLLUTANTS
CONSPICUOUSABRASIVESFOULING
ADDITIVESPERSISTENT
FOOD

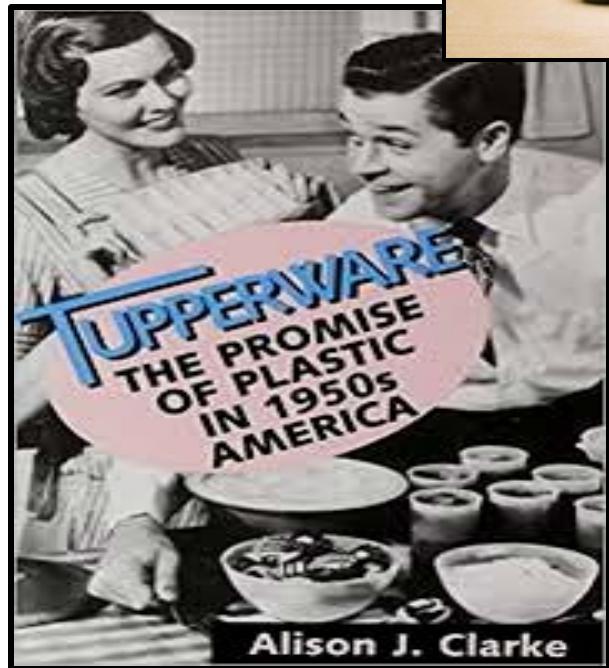
Micro Plastics are Polluting our Oceans!

It Is Time to Change Our Relationship
with Plastic

Where Do They Come From?
How Long Until Plastics Degrade?
Why Should We Care?

**What are The Consequences for our
Water supply?**
What Can We Do About It?

Post WW2 Plastic



https://en.wikipedia.org/wiki/Timeline_of_plastic_development



What Have We Found in Our Oceans? our Arizona Water ?

**By 2050 there will more plastic by weight than fish in the oceans.
Currently more than 8 million tons of plastic is dumped into our
oceans every year.**

plasticoceans.org

What Does This Cost Us?



Marine litter costs \$13 Billion a year globally

It puts the overall SOCIAL and ENVIRONMENTAL cost of plastic pollution at
\$ 139 Billion a year. Trucost/Standard & Poor's

11 Billion Pieces of Plastic Are Riddling Corals With Disease



“in Indonesia, we were seeing 26 pieces of plastic in an area the size of a Manhattan two-bedroom apartment,” (est. 1,000 sq’)

Your place: If 2500 sq’ equals 65 pieces of plastic

How microplastics are produced

Plastic products



Plastic particles used in facial scrubs



river

Ultraviolet rays

ocean

Animals mistake them for food



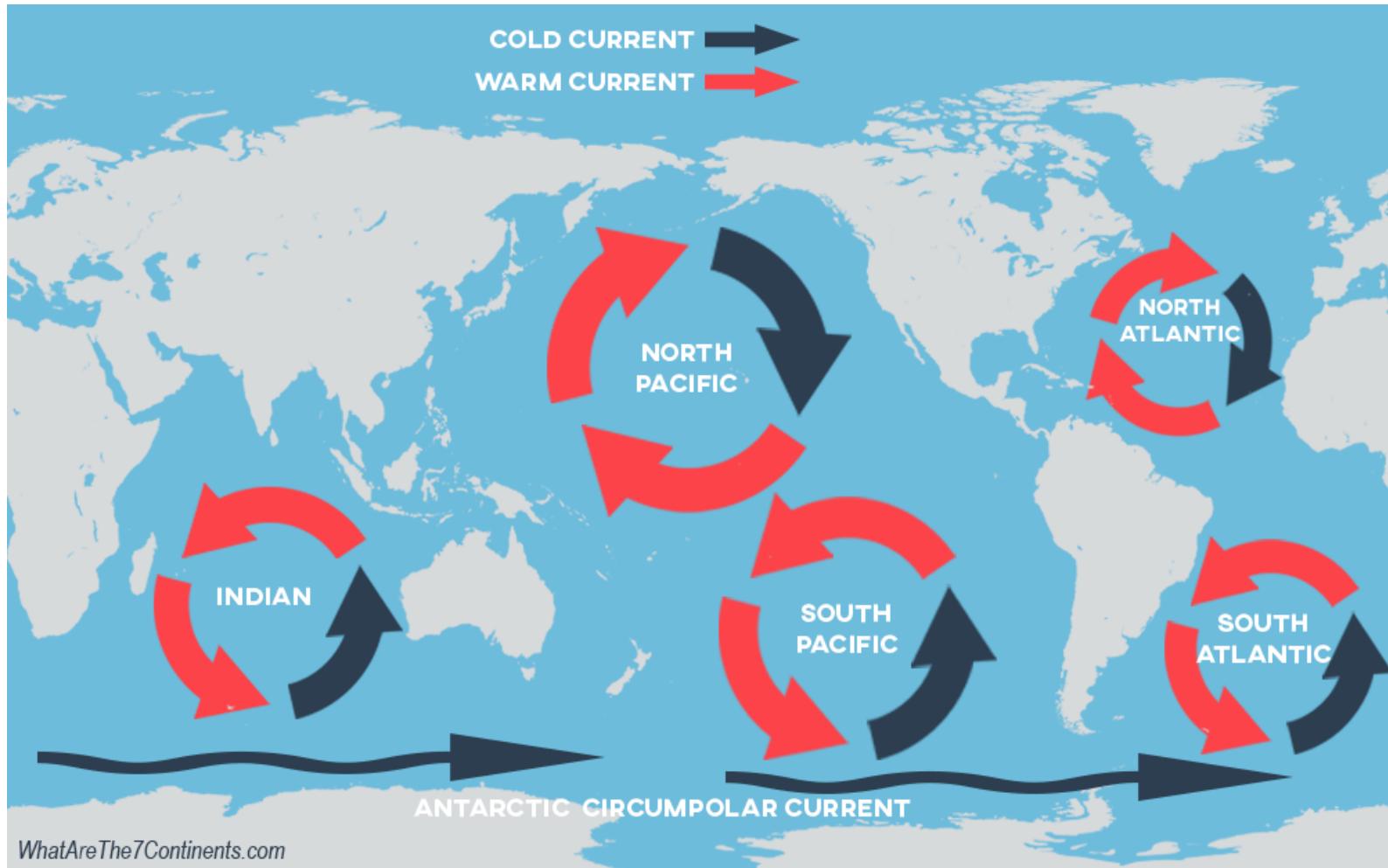
Plastic products break down into fragments

KYODO GRAPHIC

[http://www.cnn.com/videos/us/2016/11/30/
microplastic-animation-explainer-midway-
plastic-island-orig-io.cnn](http://www.cnn.com/videos/us/2016/11/30/microplastic-animation-explainer-midway-plastic-island-orig-io.cnn)

1:07

Ocean Garbage Patch Gyres



https://en.wikipedia.org/wiki/Great_Pacific_garbage_patch

It's Not Going Away

**Every single piece of plastic ever
made still exists!**



What we do today will affect tomorrow and the future.

How Long Until It's Gone?

Paper
Cigarette Butts
Aluminum Can
Glass Bottle
Styrofoam
Plastic Bottle
Fishing Line
Plastic Bag

Decomposition Rates

Paper	5-10 Weeks
Cigarette Butts	10-15 Years
Aluminum Can	200-500 Years
Glass Bottle	1,000,000 Years
Styrofoam	Never
Plastic Bottle	Never
Fishing Line	Never
Plastic Bag	Never

Source: Operation Seanet

China bans foreign waste – but what will happen to the world's recycling?

- GOOD NEWS?

- BAD NEWS?



In 2015 alone, the Asian giant bought 49.6 Million tonnes of rubbish according to the latest government figures.

We Live in the Desert, Right?



WHY SHOULD WE CARE?



New Study Reveals Global Water Supply Contaminated by Microplastic Fibers

September 11, 2017 by [Sustainable Brands](#)

159 Tap Water Samples from 14 countries: 83% were contaminated w/ Plastic Fibers. (US 93%)

ORB Media

Arizona statistics: http://static.azdeq.gov/wqd/microplastic_beads.pdf

Should You Worry About Microplastics in Bottled Water?

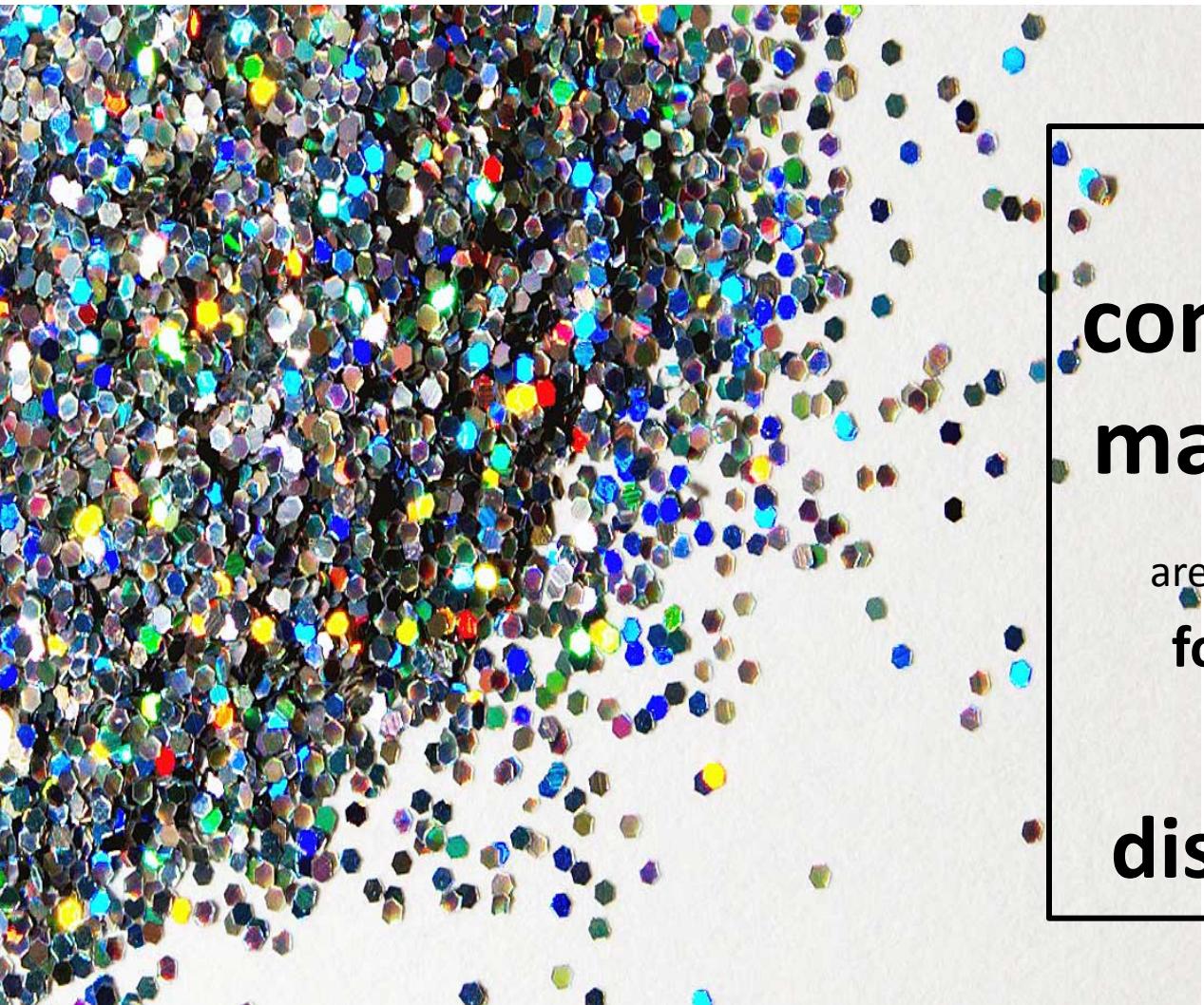
“Bottled water may be riddled (93%) with microplastics, according to a new report, and

Zero to 325 p.p.Liter

There are some very good reasons why you needn't panic about that.”

Nestle tested 6 bottles: found between 0 to 5 p.p.Liter

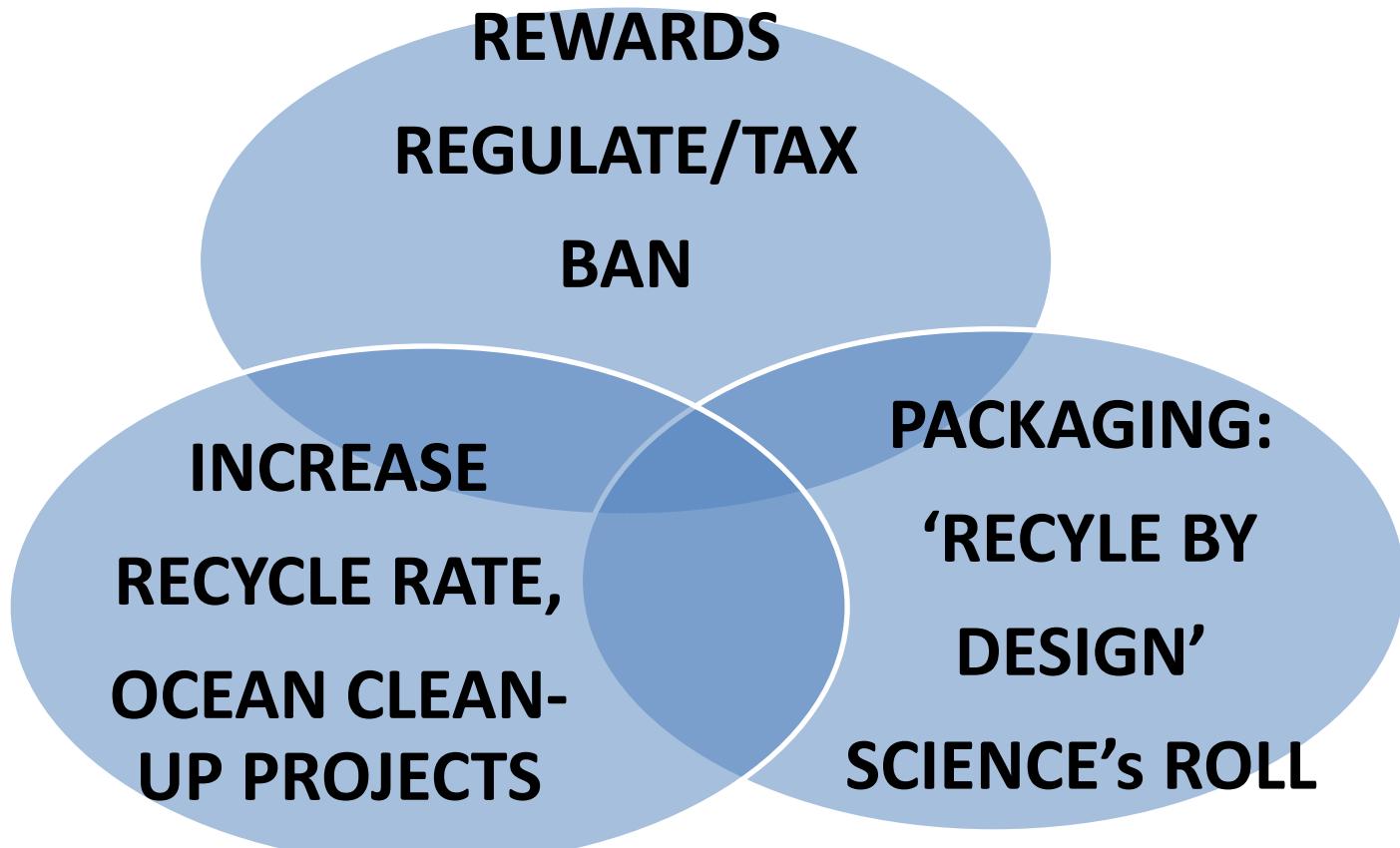




Both consumers and manufacturers are responsible for shifting from a make, use, dispose culture

to a make, reuse, repurpose, and recycle culture,
also known as a circular economy.

What Can Be Done **NOW & in the **FUTURE** about Plastics Pollution?**



**Legislative/Government Regulations-Local/National
Packaging Design/Manufacturers/Distributors
Individuals/Environmental Activism/Environmental Cleanup**

What Do These States Have in Common?



HAWAII

CALIFORNIA

ARIZONA FLORIDA IDAHO INDIANA MICHIGAN
MISSOURI WISCONSIN IOWA MINNESOTA

<http://www.ncsl.org/research/environment-and-natural-resources/plastic-bag-legislation.aspx>

Eat This Food Packaging Instead of Throwing It Away



The seaweed-based packaging—which claims to be high in fiber, vitamins and minerals—can be wrapped around an endless number of items. For instance, you can dunk whole sugar packets right into your hot coffee. You can wrap a sheet around a burger and consume it whole. Don't want to eat it? Compost it.

<https://www.ecowatch.com/edible-food-packaging-seaweed-2513270686.html>

Recycled Plastics vs. Sustainable Materials

UPCYCLE OR? BIODEGRADABLE



https://www.ecowatch.com/adidas-shoes-ocean-plastic-2547494872.html?utm_source=EcoWatch+List&utm_campaign=6be2dd21f6-EMAIL CAMPAIGN&utm_medium=email&utm_term=0_49c7d43dc9-6be2dd21f6-86076853

Plastic-eating worms could help wage war on waste

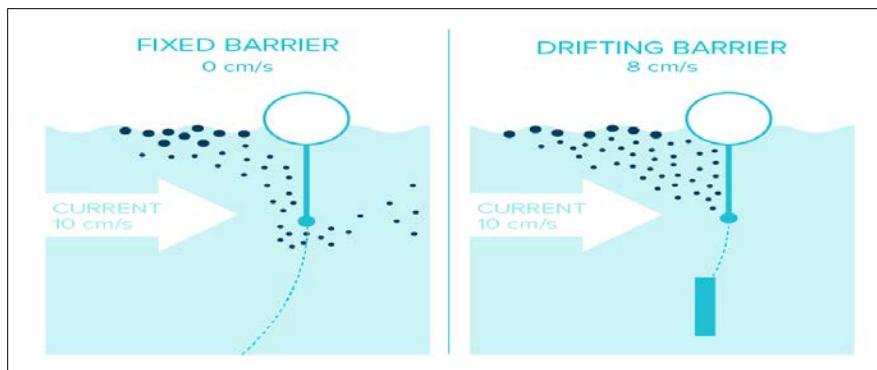
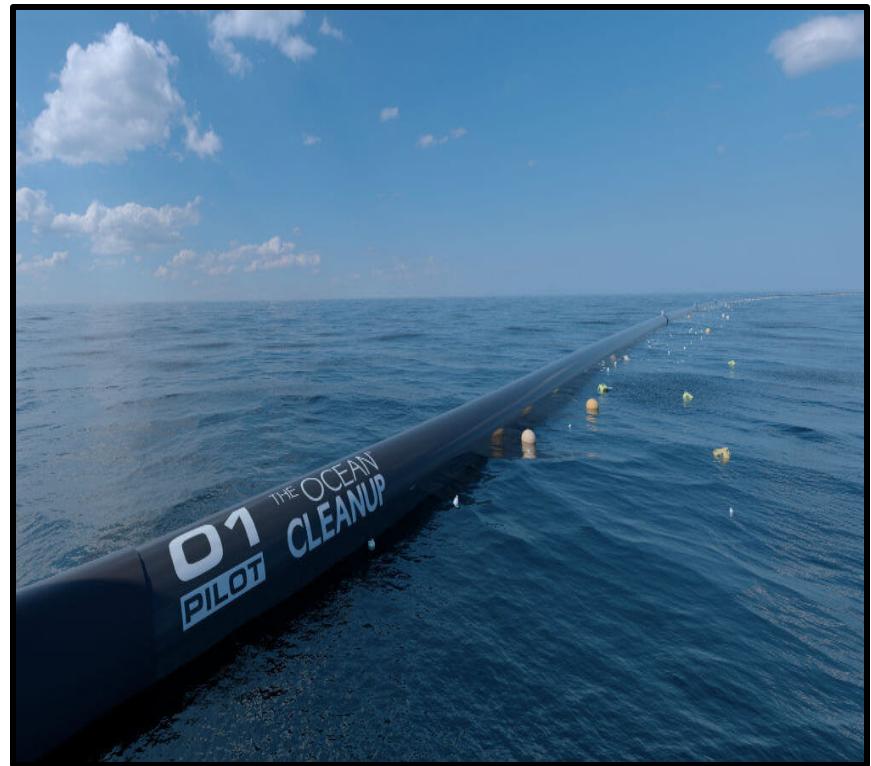


Waxworms, which grow into the *Galleria mellonella* moth, have been found capable of ingesting polyethylene plastic, suggesting a new way to break down the trillion plastic bags the world uses every year.

University of Cambridge

The OCEAN CLEANUP project

22 yr old entrepreneur raises 30 Million



U shaped buoy with a screen extending a few meters below captures plastic 1 cm up to discarded fishing nets. Models show a full-scale cleanup system roll-out (2018) could clean up 50% of the Great Pacific Garbage Patch in 5 years. Natural rotation of sea currents (Gyres) utilized.

We create tools that make it easier to start recycling plastic.

<https://preciousplastic.com>

<https://next.preciousplastic.com/plan.html>

<https://www.youtube.com/user/hakopdetak>



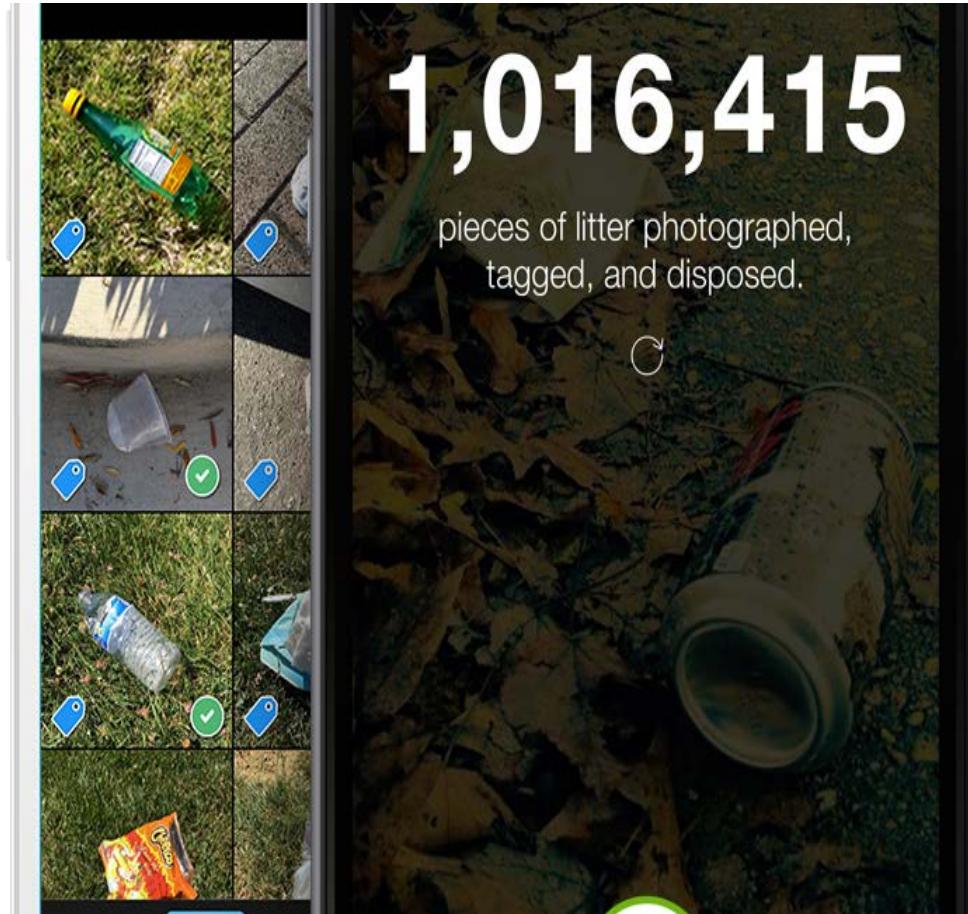
The Plastic Bank



[https://www.ted.com/talks/david katz what if you could turn plastic trash into cash?utm_source=newsletter_daily&utm_campaign=daily&utm_medium=email&utm_content=button](https://www.ted.com/talks/david_katz_what_if_you_could_turn_plastic_trash_into_cash?utm_source=newsletter_daily&utm_campaign=daily&utm_medium=email&utm_content=button) 2018-01-25

11:53

TURNING PLASTIC TRASH INTO CASH



This App Makes It Fun To Recycle: Litterati

[https://www.ted.com/talks/jeff kirschner this app makes it fun to pick up litter](https://www.ted.com/talks/jeff_kirschner_this_app_makes_it_fun_to_pick_up_litter) 6:10

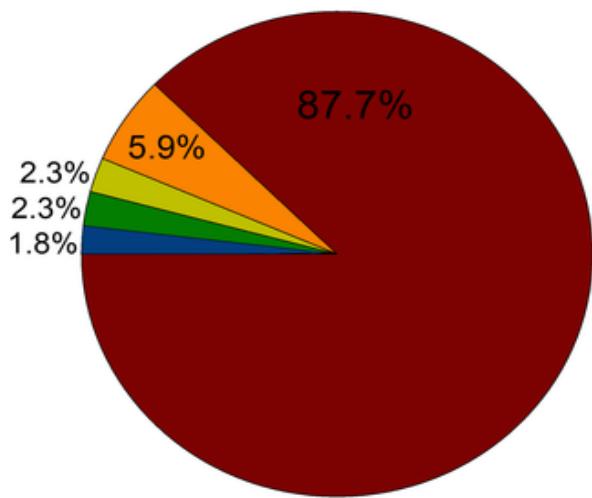
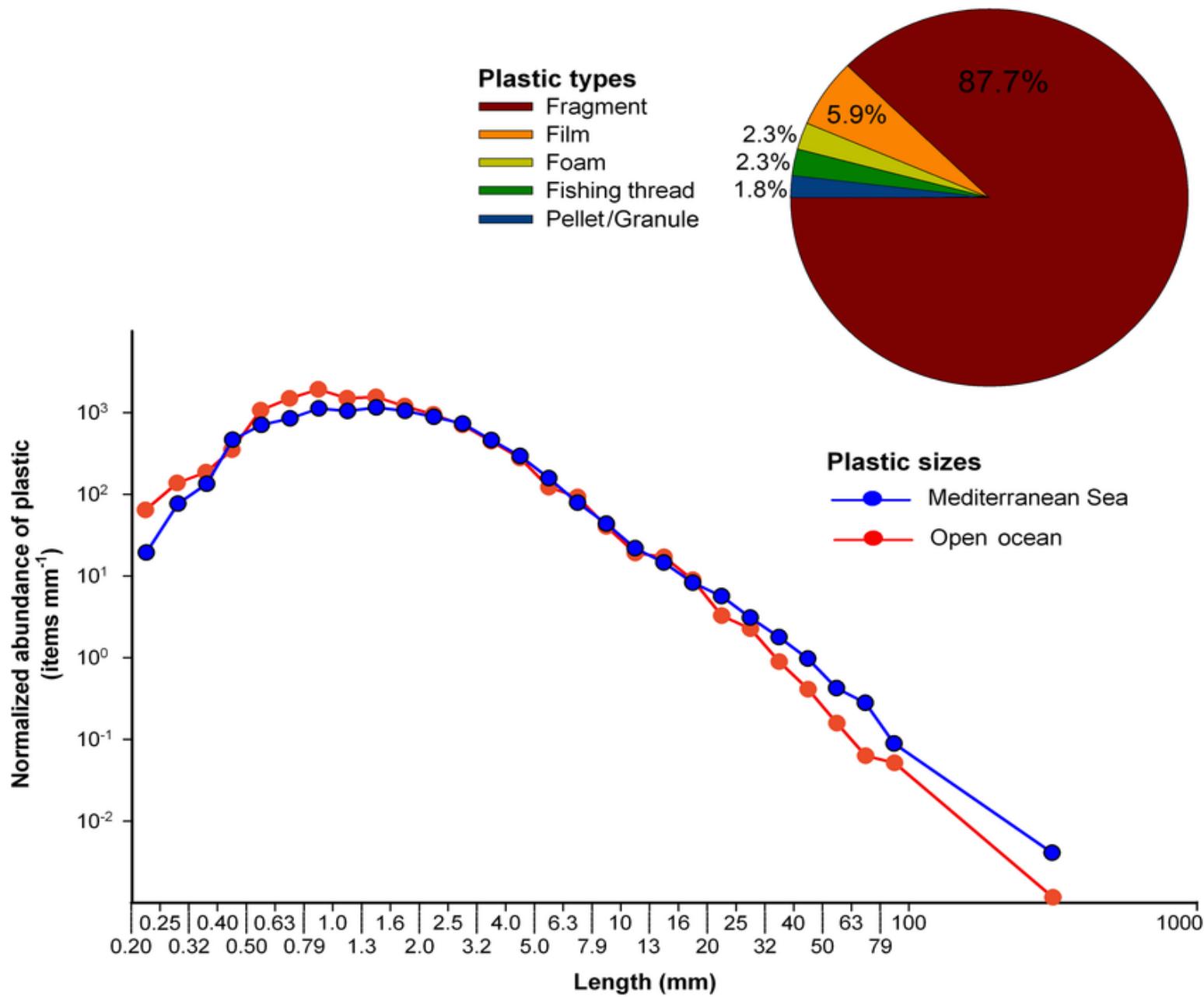
App used to Identify, Collect, & Geo Tag the world's litter.

THANK YOU

**PDF to follow
Additional slides
included, plus
Resources Links
for Plastic Pollution
Solutions Word doc.**

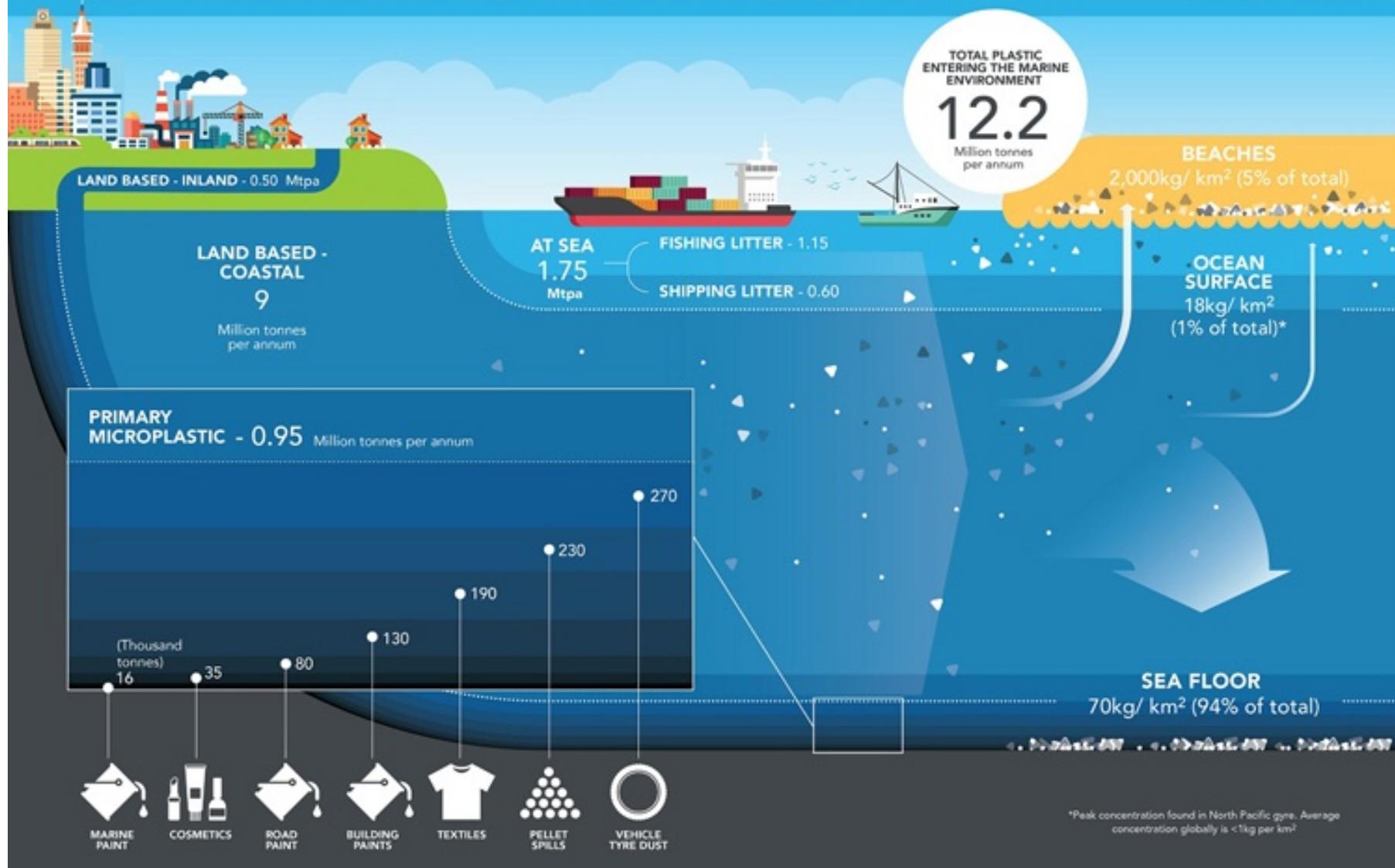


**Controlling plastic pollution
on land will limit what ends
up in our water**

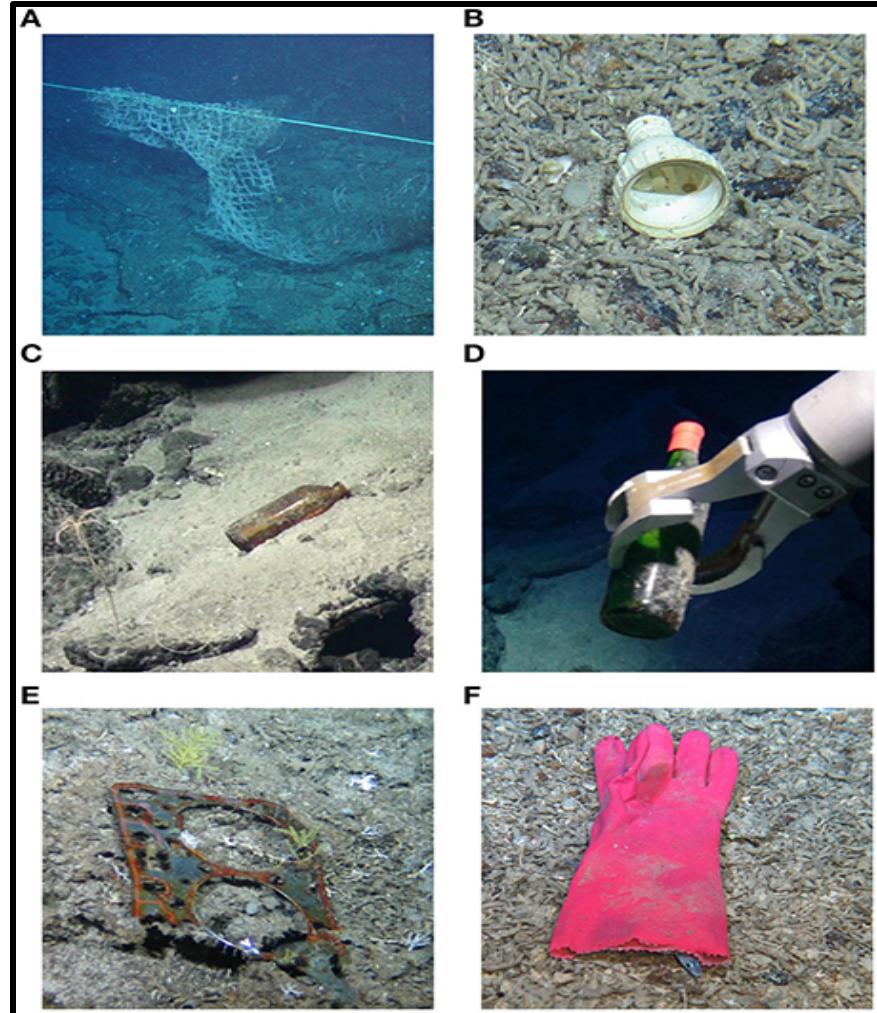


PLASTICS IN THE MARINE ENVIRONMENT: WHERE DO THEY COME FROM? WHERE DO THEY GO?

eunomia



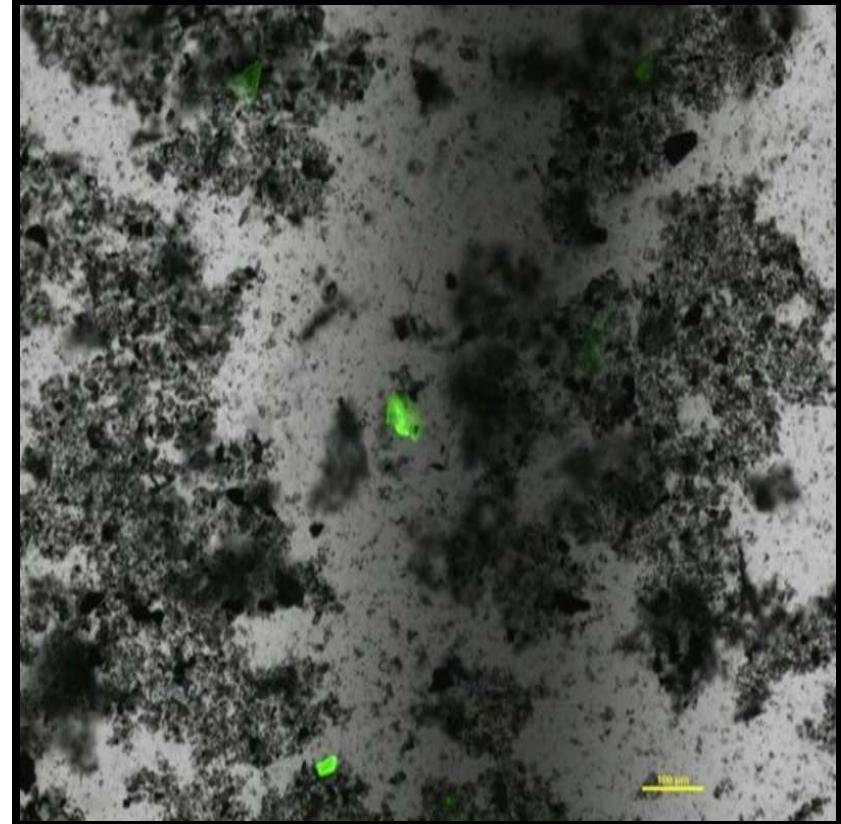
Our Junk in the Ocean



'Lost' 99% of ocean Microplastic to be identified with dye?

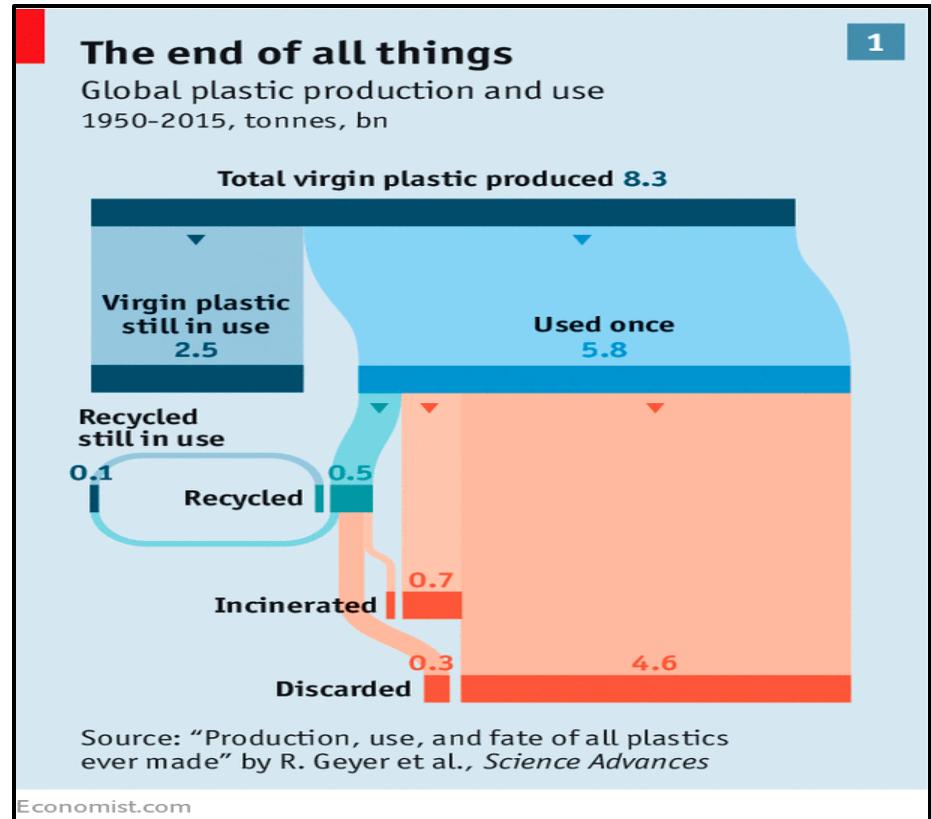
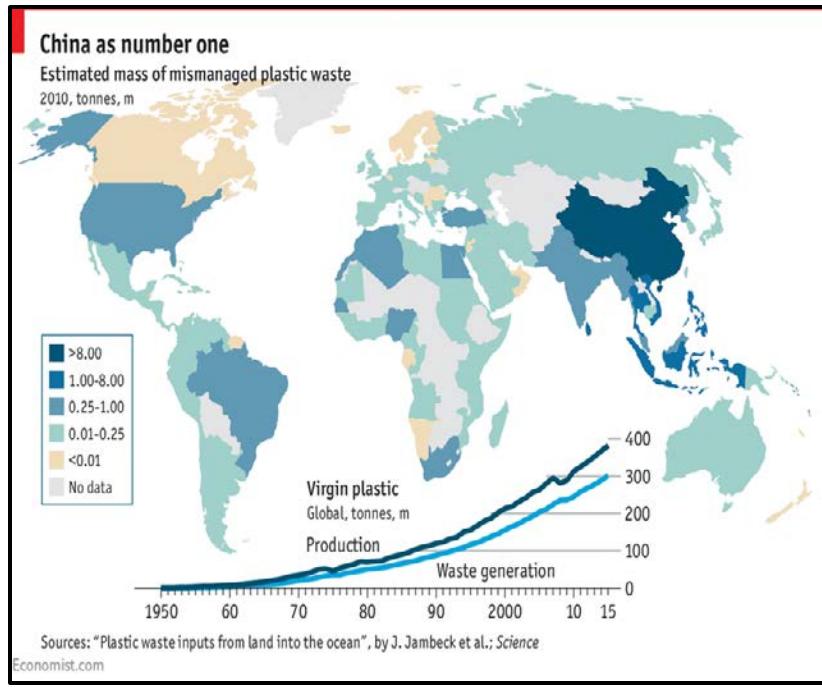
11-23-17 University of Warwick

- By using a Fluorescent Dye that binds to the plastic particles,
- Fluorescence Microscopy and
- Image analysis software
- the greatest abundance of Microplastics of this small size was Polypropylene, a common polymer which is used in packaging and food containers – demonstrating that our consumer habits are directly affecting the oceans



Smaller ocean microplastics (below 1mm) made visible with fluorescent dye Nile Red

The known unknowns of plastic pollution



https://www.economist.com/news/international/21737498-so-far-it-seems-less-bad-other-kinds-pollution-about-which-less-fuss-made?utm_source=pocket&utm_medium=email&utm_campaign=pockethits

We Are Drowning In Plastic, and Fracking Companies Are Profiting



https://www.ecowatch.com/plastic-fracking-companies-2534968663.html?utm_source=EcoWatch+List&utm_campaign=9be1dda175-EMAIL CAMPAIGN&utm_medium=email&utm_term=0_49c7d43dc9-9be1dda175-86076853

Oceanic plastic trash conveys disease to coral reefs



Plastics make ideal vessels for colonizing microscopic organisms that could trigger disease if they come into contact with corals. When plastic debris meets coral the likelihood of disease increases from 4 to 89 percent - a 20-fold change.

1-25-18

Cornell University

Where to Begin?

Should Plastics be Taxed?

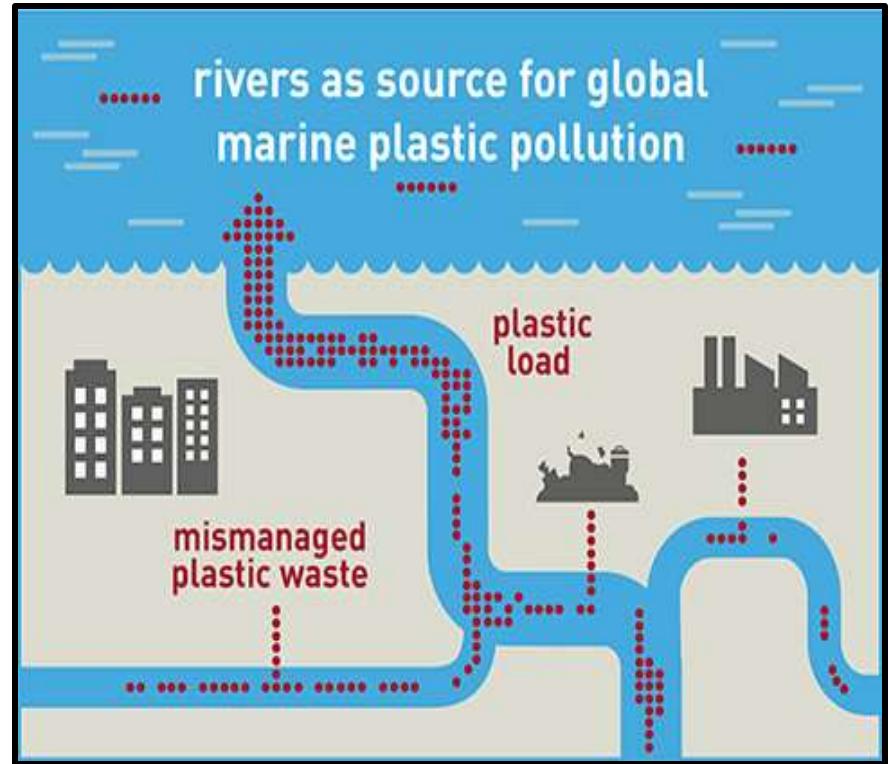
Tax plastic takeaway boxes?

the scourge of the oceans



Better managing of plastic waste

in 10 waterways could potentially reduce
the total contribution from all rivers by 45%



UK Nursery [chain] Bans Glitter

"While glitter is only a small part of the microplastic load getting into watercourses and the sea, steps like these will all add up to something greater.

Just like microbeads—which have now been banned in the UK—

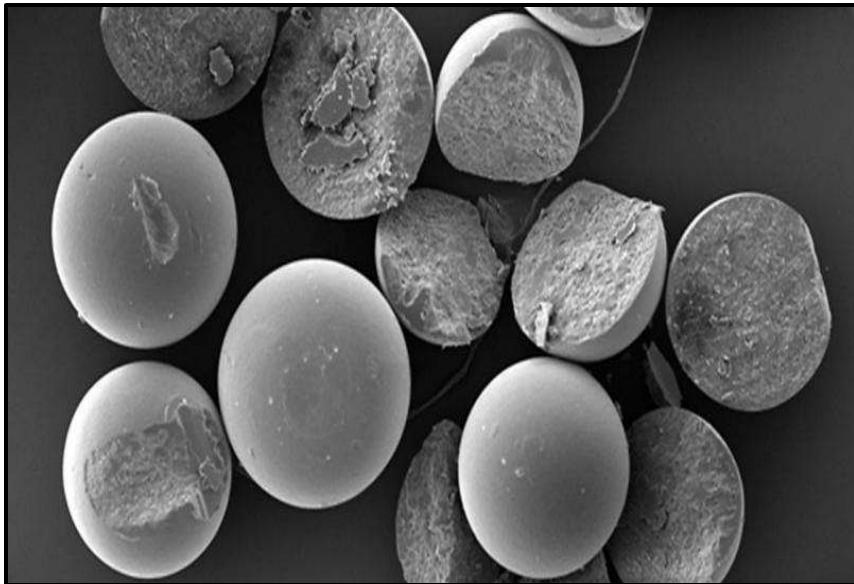
glitter is a microplastic that can do "terrible damage" to our seas, oceans, marine life and, ultimately, us too"



Microbeads in cosmetics might already be on the way out, new research suggests

August 2015, [a study published by the University](#) {of Plymouth} showed almost 100,000 microbeads could be released in every single application of products such as facial scrubs

Read more at: <https://phys.org/news/2018-01-microbeads-cosmetics.html#jCp>



University of Plymouth image showing the contrast in levels of microbeads found in cosmetics products, 2015 and 2018.

Credit: University of Plymouth 2018



Dunkin Donuts committed to replacing foam cups

- **"We have a responsibility to improve our packaging",**
 - preventing nearly 1 billion foam cups from entering the waste stream each year
 - "...a change that will take 500,000 pounds of material out of the waste stream per year once completed in summer 2018." [Global by 2020]

Circular Economy Strategies

https://ec.europa.eu/commission/news/first-ever-europe-wide-strategy-plastics-2018-jan-16_en

- The first-ever [European Strategy for Plastics in a Circular Economy](#) adopted on January 16, 2018 will transform the way plastic products are designed, used, produced and recycled in the EU.



Better design of plastic products, higher plastic waste recycling rates, more and better quality recyclates.

<https://thecirculars.org/our-finalists>

<https://www.phoenix.gov/public-works/reimagine>

In 2015, Phoenix became the first city in the United States to join the Ellen MacArthur Foundation CE100. In 2017, the compost facility became the first project in Arizona to earn Envision Silver certification from the Institute for Sustainable Infrastructure.

City of Phoenix Public Sector 2018 finalist

Annual Awards are hosted at the World Economic Forum's annual meeting in Davos, Switzerland



Reimagine Phoenix
Transforming Trash Into Resources



A Revolution by Design

“I would pass one piece of legislation that would require all products to :

- **Include Second Life Use** by asking:
 - How can it [the product] be made to last a long while and set up a system of **reuse & recovery** to get it back.
- **Include Third Life Use** by designing for:
 - **Maximum Material Value**, keeping it as high as possible
Because if you downgrade(like **mixed or inseparable materials, or complicated disassembly**) **you get trash”**

JUNK RAFT by Marcus Eriksen, quoting Sophie Thomas, circular economy design engineer, at Poly Talk 2016 Brussels, sponsored by Plastics Europe

Easy to change carpet pieces increase sustainability and reduce replacement costs



Forest floor biomimicry | Interface

Carpet squares (some nylon sourced from recovered fishing nets) last up to 15 yrs., **Interface** takes them back replacing sales with service.

One **Interface** factory in the Netherlands is operating with 100% renewable energy, uses virtually zero water in mfg. processes, and has attained zero water use.

InterfaceFLOR carpeting mfg. also utilizes **Zero Glue TacTiles**

Metabolix develops biomaterials as environmentally-friendly alternatives to plastics



PHA (Polyhydroxyalkanoate)-functional biodegradable plastic. Can replace PETE (polyethylene) as a thin film to line coffee cups with or as the agricultural films used on farms to keep weeds out and water in.

<https://en.wikipedia.org/wiki/Polyhydroxyalkanoates>

REDUCE THE AMOUNT OF WASTE YOU CREATE

- BUY ONLY WHAT YOU NEED
- BUY PRODUCTS THAT CAN BE REUSED
- BUY PRODUCTS WITH LITTLE PACKAGING
- BUY NON-TOXIC PRODUCTS WHENEVER POSSIBLE
- RECYCLE MOTOR PRODUCTS

Ways to Reuse

- Using durable coffee mugs.
- Using cloth napkins or towels.
- Refilling bottles.
- Reusing boxes.
- Purchasing refillable pens and pencils.

What's in your Rubbish Bin?



https://www.globalcitizen.org/en/content/how-to-stop-using-plastic/?utm_source=Iterable&utm_medium=email&utm_campaign=iterable_campaign_US_Feb_2_2018_Fri_content_digest_actives_alive_180d



Abandoned "ghost nets" take a deadly toll on fish and aquatic ecosystems around the world.

The NetWorks program in the Philippines attacks the problem by paying fishermen to haul up old nets and then sends them to Europe and the US to be recycled into commercial carpeting. <https://www.pri.org/stories/2015-09-14/philippines-project-turns-ghost-fishing-nets-carpets> PRI'S The World 5:23

How We Can Keep Plastics out of Our Ocean

National Geographic 2016

- [https://www.youtube.com/
watch?v=HQTUWK7CM-Y](https://www.youtube.com/watch?v=HQTUWK7CM-Y)



Dr. Rolf Halden, ASU
The BioDesign Institute

<http://www.fao.org/3/a-i7677e.pdf>

Microplastic contamination of aquatic environments

will continue to increase in the foreseeable future and at present there are significant knowledge gaps on the occurrence in aquatic environments and organisms of the smaller sized microplastics (less than 150 µm), and their possible effects on seafood safety. Currently there are no methods available for the observation and quantification of nanoplastics in aquatic environments and organisms

page 7 of 147 page study report

<https://biodesign.asu.edu/rolf-halden>



Is BPA on Thermal Paper A Health Risk?

<http://www.plasticpollutioncoalition.org/pft/2016/12/23/is-bpa-on-thermal-paper-a-health-hazard>

- **So what should you do to reduce your exposure?**

- Be aware that thermal paper discolors easily when scratched with a coin or paperclip.
- Don't accept receipts whenever possible.
- Go with a paperless receipt via email or text message. This is an increasingly available option at many retailers.
- If you must handle a receipt, try to touch only the nonglossy backside. It contains much less BPA.
- Carefully store receipts. If you absolutely need a receipt, place it in an envelope. Its BPA will rub off on everything: your hands, pocket, wallet, or purse, even the folding money in your wallet.
- Quickly wash your hands after touching a receipt. Scrub with soap and water. If you wait longer than four minutes, it's too late.
- Wear latex gloves if your job requires the frequent handling of receipts.

Bisphenol A (BPA) & Bisphenol S (BPS)

