

PLASTIC™  
OCEANS

# A PLASTIC OCEAN

Education & Discussion Guide

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# About This Guide

This companion guide to the film **A Plastic Ocean** helps educators teach their students to use the information presented in the documentary to learn about and create potential solutions to our plastic pollution problem. This guide is organized to follow along with the topics in the film **A Plastic Ocean**.

## How To Use This Guide

This guide offers a variety of activities and resources to help students explore the ideas and problems presented in the film and then consider potential solutions to our plastic problem. This guide was designed to be used as a whole, or you can select individual activities as you best see fit.

### This Guide Is Designed For:

- Students, post-screening **A Plastic Ocean**
- Classes, events, or trainings in areas such as:
  - Environmental Science
  - Marine Biology
  - Government and Politics
  - Business and Entrepreneurship
  - Science and Technology
  - Service Learning
  - Social Entrepreneurship



# About the Film

## Scientists Solving a Jigsaw Puzzle ... Gyre by Gyre

In the center of the Pacific Ocean gyre our researchers found more plastic than plankton. ***A Plastic Ocean*** documents the newest science, proving how plastics, once they enter the oceans, break up into small particulates that enter the food chain where they attract toxins like a magnet. These toxins are stored in seafood's fatty tissues, and are eventually consumed by us.

If it was happening in one gyre, they suspected it was happening in all of them. But the filmmakers needed experts to prove it.

Scientists were brought in at each stage to analyze the findings from one part of the story to add their data to the overall report on the five gyres.

- Producer Jo Ruxton joined an expedition to the so-called Great Pacific Garbage Patch in the North Pacific Gyre, 1500 miles off the coast of San Francisco, to ascertain its impact. When the expedition discovered free-floating microplastics instead of an anticipated solid mass that could be contained, Jo knew she had to begin the film that would become ***A Plastic Ocean***.
- Jo had worked for the WWF International in Hong Kong and partnered with director and journalist Craig Leeson. Their first collaboration was on a documentary about endangered Pink Dolphins in Hong Kong.
- Jo and Craig brought on Dr. Lindsay Porter, an expert in cetaceans (whales and dolphins).
- Together they contacted the world's experts to see what was known about plastic pollution in the gyres.
- The team expanded to include Dr. Bonnie Monteleone who had already found microplastics in other gyres she had investigated. She joined the expedition to the South Pacific gyre.
- With new information emerging about the extent of the issue in each of the Ocean gyres, free diving champion Tanya Streeter joined the team. Together they set off on what would be a four-year global odyssey to explore the issue of plastics in our oceans and its effect on marine ecosystems and human health, including endocrine disruption.

# Director's Q&A: *Craig Leeson*

## Why did you want to get involved?

The creatures that inhabited the sea became a source of intrigue and study, the waves my playground. From an early age I noticed the severe effects industrial pollution was having on the Coastal waters where I grew up and also the effect it was having on me personally.



## When did you start recognizing plastic as a global environmental issue?

In 2010, I became aware of one increasing source of pollution, which had until then escaped my notice. It was something I'd been told and taught was disposable. Plastic. From that moment, I noticed plastic everywhere and began to study intensely its effects on marine life and humans.

## Why do you think this is such an important issue for the world to address?

Plastic is a man-made substance. It isn't supposed to be in the environment and the environment has no way of dealing with it, so it is building up and poisoning our earth like a disease. We live in a world where we are using up those resources faster than is sustainable. Very few of us are taught that our oceans keep us alive. As Dr. Sylvia Earle says "without the blue there is no green." Our weather systems, oxygen, clean water, food sources, medicines, come from the oceans or are sustained by them.

**What do you hope to accomplish with the film, *A Plastic Ocean*?**

If you do not know, then you cannot care. With knowing comes caring. By raising this issue we hope to begin a discourse on the problem that will promote and invoke change. We need to recognize solutions that work and come up with others that solve the problem of plastic that is already in the environment. Only through the sharing of information on this issue will the public change policy on how we treat plastic.

**How have you changed since taking on this project?**

I've become more self aware of the impact I'm having on the world around me. Directly, I've become a megaphone for campaigning against single-use plastic: I find myself informing supermarket check-out people, takeaway servers, café owners, bankers, politicians and anyone who will listen about the detrimental impact of single use plastic. I have developed a keen interest in green and sustainable financial funds and businesses where profit is based on sustainability and environmental responsibility.



# Key Facts

# The Problem: Plastic is Indestructible.

Every item of plastic that has ever been created is still with us on the planet today. In the mid 50's we were told that plastic was suitable for single use and could simply be thrown away. We now know that to be untrue yet we continue to treat it as such.

## Our Plastic Use



# Beverage Bottles



100.7 billion plastic beverage bottles were sold in the U.S. in 2014, or 315 bottles per person, according to the Container Recycling Institute.

57% of those units were plastic water bottles: 57.3 billion plastic water bottles sold in 2014. This is up from 3.8 billion plastic water bottles sold in 1996.

The process of producing bottled water requires around six times as much water per bottle as there is in the container.

14% of all litter comes from beverage containers. When caps and labels are considered, the number is higher.

# Plastic



**Plastic is made from oil with a combination of chemical ingredients to form different types of plastics.**



**All plastics are made from synthetic polymers.**



**Plastics contain different chemicals that give them their unique structure, flexibility and use.**

Many of the chemicals used mimic estrogenic activity. This happens when a chemical like BPA or phthalate leeches from the plastic and enters the body, mimicking the hormone estrogen.

# Our Oceans and Plastic Pollution

There are five main ocean currents, also known as ‘gyres’ which are created by the Earth’s rotation and the resulting predominant winds. These are: North & South Pacific, North & South Atlantic, and Indian.



**80%**

of ocean waste originates from land.  
This waste travels to the center of the gyre where it collects.

Scientists estimate that it takes about

**20  
years**

for waste to reach the center of the ocean.



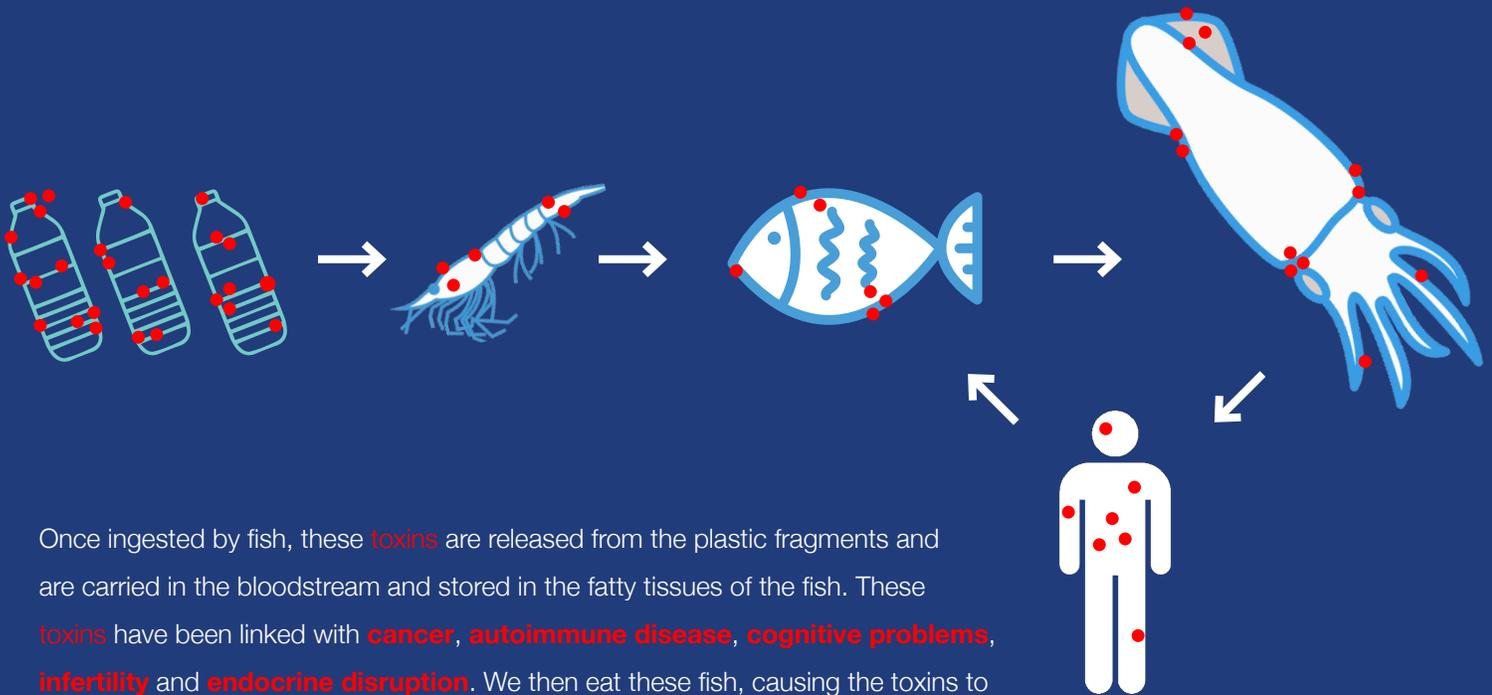
Plastic waste pieces break up into much smaller bits as they are eroded by sunlight, salt water, currents and waves. These pieces of plastic have rough, pitted surfaces.

More than **50%** of marine debris, including plastic, will sink.

# The Food Chain and Plastics

There are two types of plankton: **zooplankton** (animals) and **phytoplankton** (plants). Zooplankton feed on phytoplankton, small fish feed on zooplankton, squid feed on small fish and so it goes on up the food chain.

**Water born chemicals**, from decades of industry and agriculture attract to plastic like a magnet. When these plastics mix with plankton, they are eaten by fish and become part of the food chain. These **toxins** 'hitch-hike' on plastics. Different types of plastics attract **toxins** at different rates, making some more potent than others.



Once ingested by fish, these **toxins** are released from the plastic fragments and are carried in the bloodstream and stored in the fatty tissues of the fish. These **toxins** have been linked with **cancer**, **autoimmune disease**, **cognitive problems**, **infertility** and **endocrine disruption**. We then eat these fish, causing the toxins to enter our bodies.

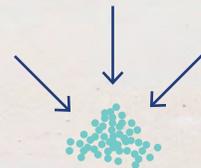
# 60%

of the world's population rely on fish as its main source of protein.

# Nurdles:

The pre-production raw pellets formed when you turn oil into plastic. People, animals and birds can confuse them for eggs/food. They are also known as mermaid tears.

Nurdles have been found on every single beach scientists have studied... even on the most remote islands of the planet. They were found in every surface trawl made during the filming of *A Plastic Ocean* and scientists have evidence that they have even made their way to the pristine waters of Antarctica.



Micro plastic beads are used in many health care and cleaning products as they are cheaper than pumice or rice. We are flushing these plastics straight into the ocean.

Scientists have found that plankton at the base of the food chain have eaten “micro plastics” such as nurdles.



The oceans provide more than

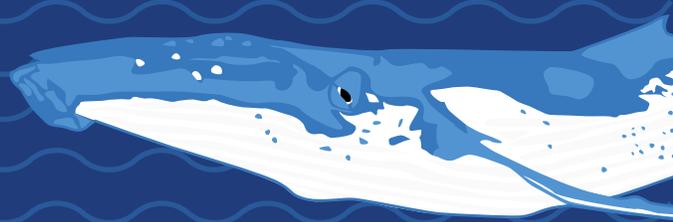
# 50%

of the oxygen we breathe, thanks to the phytoplankton. That's more than the rainforests!

# Animals and Plastic Pollution

The Blue Whale filmed by the team in Sri Lanka ingests

# 75,000 liters



of water every time it opens its mouth. Imagine how much plastic it must take in!



Parent birds will eat what they see that is bright and reflective. Plastic pieces look like fish or squid to the parent birds who feed these to their young.



Over

# 40%

of all sea birds have ingested plastic.

The record number of pieces of plastic found in one 90-day old seabird chick is

# 276 pieces

=

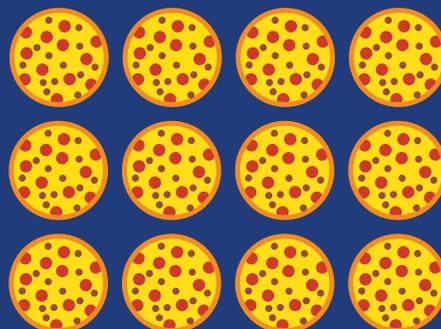
# 15%

of that bird's body mass.

Translated into human terms, that's 6-8 kilos of plastic, or the equivalent of

# 12 pizzas

inside your stomach.



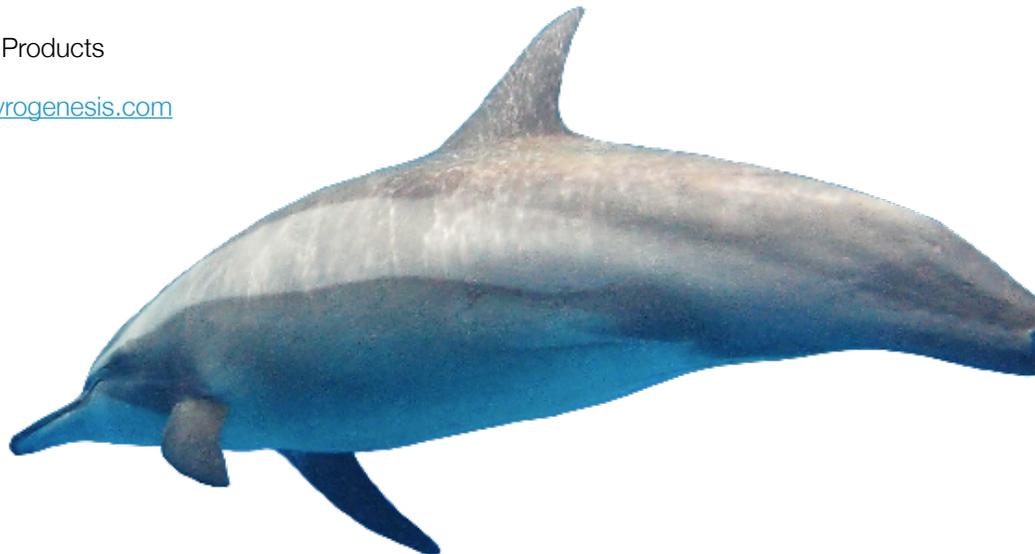
# Possible Solutions, Possible Problems

## Long-Term & Bridge Solutions

Our plastic problems can be addressed with a combination of solutions and all need to be incorporated to bring needed change. Long-term solutions work to remove petrol-plastic and their by-products from the environment. Bridge solutions work at removing only some petrol-plastic products, but still leave behind some plastic product and their negative by-products. However, it is important to note that without the chance of our collective behavior and political will, these solutions will not be enough. Below are possible solutions, as well as their advantages and disadvantages.

### Potential Solutions:

- A. Rethink Plastic
- B. Recycling
- C. Incineration
- D. Thermal Cracking - Molten Metal Incineration
- E. Reconfiguration
- F. Pyrolysis
- G. Re-use Via Deposit System
- H. Biodegradable Plastic Products
- I. Pyrogenesis – [www.pyrogenesis.com](http://www.pyrogenesis.com)



A. **Rethink Plastic:** For every item offered or chosen, consider an alternative that is not made of plastic. Do this by:

- **Refuse:** Single-use plastics end up in our oceans so ask for alternatives that can be used again.
- **Reduce:** Is it possible to reduce your plastic footprint by eliminating the amount of plastic products used? Eg: Use foil instead of plastic wrap for food
- **Re-use:** If you can't use an alternative to plastic, make sure you re-use it where possible and dispose of responsibly.
- **Recycle:** If you must purchase plastic, where possible, opt for those that are recyclable to reduce additional material ending up in a landfill.

## B. Recycling

- Advantages
  - Reduces our requirement on virgin plastics, thus reduces our oil consumption
  - Prevents used plastic from ending up in the environment
- Disadvantages
  - Contaminants in food packaging are likely to concentrate over repeated recycling processes
  - Recycling makes us believe the perception that we can continue our dependency on disposables. Recycling should be considered a last resort for 'disposable' plastics after reducing, recovering, redesigning, reusing and replacing

### Two Types of Recycling

1. Mixed Plastic Recycling ([www.gruener-punkt.de](http://www.gruener-punkt.de))
  - Advantages
    - Most plastics can be recycled including simple household items, buckets, plant pots, garden furniture
    - Relatively cheap
  - Disadvantages
    - Limited use - mixing different colours tends to result in dark grey pellets
    - PVC and Styrenes still need to be separated

## 2. Separating Plastics for Recycling

- Advantages
  - Higher value pellets
  - Clear and lighter colors have more uses
  - ‘Closed loop’ recycling is the most sustainable system available
- Disadvantages
  - Higher initial investment cost for plant that separates types
  - Plastic should be separated at collection point, which adds considerable cost. This would only work efficiently if the public is willing to separate their plastic waste.
  - Legislation over food grade plastics places a burden on manufacturers



## C. Incineration

- Advantages
  - Plastic can be converted into energy, including electricity
  - Prevents waste plastics from reaching the environment and raw material (oil) has a second life
- Disadvantages
  - Poisonous gases are bi-product and must be safely removed from the process
  - Not as sustainable as recycling, a process that can be repeated many times
  - Simple incineration without energy production may prevent material reaching the environment, but is costly and inefficient

## D. Thermal Cracking - Molten Metal Incineration ([www.stxmulfed.com](http://www.stxmulfed.com))

- Advantages
  - Plastic waste generates energy
  - Waste gases can be used in cooling systems – cleaner process
  - Higher efficiency rates than standard incineration
- Disadvantage
  - Initial investment is high

**E. Reconfiguration – using plastic, without changing with heat, as a raw material for other products – [www.affresol.com](http://www.affresol.com), [www.cynarplc.com](http://www.cynarplc.com)**

- Advantage
  - Plastic is used as a raw material for other products, so there is no need to change its properties. However, chemicals or other products are added. For example: material for building blocks, clothing, cartons etc.
- Disadvantage
  - Limited use currently

**F. Pyrolysis - the thermal process using high temperatures to breakdown waste in the absence of oxygen.**

- Advantages
  - Thermochemical decomposition of plastic changes its structure to produce oil for fuel
  - Profitable
  - Less dependence on fossil fuels
  - Can be very small scale for individual or company use – [www.blest.co.jp](http://www.blest.co.jp)
- Disadvantage
  - Could produce harmful gases if not treated correctly to remove these

**G. Re-use via Cash Deposit System**

- Advantages
  - Pricing for drinks in plastic bottles includes deposit paid by consumers – incentive to return them
  - Conveniently placed machines at supermarket entrance accepts bottles in exchange for vouchers, creating incentive for recycling
  - Machines sort bottles into plastic types on site ready for specific recycling
- Disadvantages
  - Water has to be potable – may not be option for developing countries



## H. Biodegradable Plastic Products

- Advantages
  - Will degrade naturally given the right conditions – currently only available in commercial composting plants
  - Could replace many ‘disposable’ plastic products and therefore reduce dependence on oil reserves
  - Fungi and Algae are being used successfully to produce polymer chains that may eventually become more ‘degradable’
- Disadvantages
  - Bioplastics are not necessarily biological, and degradability issues also need to be considered. In an aerobic, sunlit environment bioplastics will degrade at a faster rate - but in oceans and landfill degradation is extremely slow and waste still must be dealt with
  - Using disposable items perpetuates the culture that using something once and throwing it away is acceptable
  - Monoculture is encouraged by this process and available land that could produce food would be reduced

## I. Pyrogenesis (or Plasma Gasification) – an extreme thermal process using plasma which converts waste into a synthesis gas, primarily made up of organic matter, hydrogen, carbon and oxygen – [www.pyrogenesis.com](http://www.pyrogenesis.com)

- Advantages
  - A process that uses plasma to generate high temperatures which effectively vaporizes the waste
  - Pyrogenesis plants are small enough for very low-scale incineration such as onboard vessels at sea
  - Resultant solid residue is extremely small and benign
  - Gases are collected and removed before entering the atmosphere and can be recycled to generate energy needed to power the process
- Disadvantages
  - It is in no way a self sustaining system
  - There are initial limitations due to an inability to scale up plasma technology to beyond 50 tons a day - but now companies are starting to do this on a larger scale
  - High initial investment – best for dealing small-scale waste problems or in addition to pyrolysis or recycling plant

# Discussion Questions

**Instructions:** When the film finishes, immediately begin a guided discussion. The following are some questions and topics to stimulate a discussion after the film. Please also refer to the Frequently Asked Questions (Page 21) to guide your discussion.

1. Where does plastic come from?
2. How does plastic get in our oceans?
3. What scene from the film most personally affected you? Why?
4. What does business and industry need to do to help our plastic pollution problem?
5. What does government need to do to help our plastic pollution problem?
6. What do we as a society need to do to help reduce our plastic pollution?
7. What are some ways we can galvanize our community to solve our plastic pollution problem? (i.e. call representatives, letter writing campaign, Plastic Free Pledges etc.)
8. How can we reduce our plastic use on this campus?
9. What can we do personally? (Also See Page 21 of the FAQ for Ideas)
10. How can we creatively and effectively spread this message?



# Frequently Asked Questions

**Instructions:** The following are some questions and topics typically brought up after a screening. Please use this FAQ, along with the provided discussion questions, to guide your post-screening dialogue.

## Frequently Asked Questions:

- Problems to Current Solutions
- Film Production

## Solutions To Current Problems

### Q. What can we do?

**A.** We need to stop using single-use plastic wherever that is possible. Here are some more potential solutions:

- Go to our website for inspiration and please donate if you can to help us: <https://www.plasticoceans.org>
- Bring your own bag to the shops
- Drink tap water and carry it in your own bottle
- Don't buy body scrubs - in many countries those tiny beads are usually made of plastic
- Choose fruit and vegetables that are not wrapped in plastic
- Use matches instead of 'disposable' lighters or use a re-fillable one
- Don't use 'single-use' plates, knives, forks etc and wash up after you eat
- Wherever you can, choose liquid products that can be re-filled rather than bought new
- Refuse plastic straws in your drinks
- If you can't find an alternative to single-use plastic, make sure you recycle it
- Don't celebrate with balloon releases, because the chances are that the balloons will land in the ocean, choking seabirds, turtles and marine mammals
- Use crystal deodorants – they last far longer, are more effective and some even come with no plastic packaging at all
- Use good old-fashioned soap – it works as well as liquid soap and lasts longer
- Buy butter wrapped in paper instead of in a plastic tub

### Q. Is compostable or biodegradable plastic the answer?

**A.** Not yet. They are both options that may have potential in the future and hopefully will be developed further.

- **Compostable Plastic** - is currently only an alternative if it is separated out from the waste stream, collected separately, and then placed in an industrial composter. Compostable plastic will not 'break down' in the ground. Compostable plastic needs light, oxygen and heat, none of which will be available in a landfill. Until that happens compostable plastic will act like normal plastic and can continue to harm wildlife.
- **Biodegradable Plastic** - is in its infancy and there are many unsuitable types on the market.
  - For example: biodegradable plastic bags bound together with vegetable components. Once the vegetable has degraded, small pieces of plastic remain in the environment and cause just as much harm as any other plastic.
  - In addition, these bags often look so much like non-biodegradable plastic, they are neither separated nor collected differently. Thus, the bags are likely to end up either in recycling – which will not work - or in a landfill where they still take years to degrade. And, if the bags do end up in our oceans, they will still harm wildlife via entanglement and ingestion, due to their long breakdown time.

### Q. How can we remove the plastic that is already in the oceans?

**A.** At the moment there is no realistic way to remove all the plastic from the oceans.

- The oceans are far too big.
- The majority of the plastic has already sunk to the depths.
- The plastic in our oceans breaks into tiny fragments that mix with plankton. Removing the plastic would also mean losing the plankton. This is especially problematic as plankton is the vital base of the marine food chain. Similarly, the plant element, phytoplankton, provides more than half of the Earth's oxygen supply and absorbs more of our CO<sub>2</sub> than our forests.
- Beach clean-ups can help prevent plastic on the beach reaching the oceans and causing harm. Beach clean-ups also raise awareness, as long as the plastic is sorted and recycled responsibly.
- Putting booms at river mouths can also help, as long as the collected waste is responsibly disposed of.

**In conclusion, stopping plastic at the source is our best solution.**

**Q. Is it dangerous to eat seafood? Do you eat seafood?**

**A.** This is a hard one to answer, as we can't experiment on humans with toxins. Also, linking a disease or disorder to a fish that may have been eaten years before is almost impossible.

- What we do know from published science: the chemicals that are carried by or leach from plastics have been associated with diseases and disorders in the lab.
- Currently 25% of fish and 100% of mussels studied contained plastic. Even if this is at a level where it is not causing harm, we cannot afford to let it become worse.



# Activities

## Activity A: Possible Solutions, Possible Problems

1. Break the class into small groups. Research and brainstorm possible solutions to our plastic pollution problem for the following:
  - Group # 1: Recycling
  - Group # 2: Incineration
  - Group # 3: Biodegradable plastics
  - Group # 4: Pyrolysis (plastic to diesel)
2. 10 Minutes - Come back together as a big group. What are the advantages and disadvantages of each possible solution?
3. 10 Minutes - How can we share this message and move forward? Possible ideas include: school campaigns, presentations to other classes, letters to papers, beach cleans, lobbying local government, etc.

## Activity B: Rethinking Plastic

**Instructions:** Read the following aloud to the class: “In order to reduce our plastic use, always consider an alternative to a plastic item offered. You can do this with The 4-Rs to Rethinking Plastic:

- **Refuse:** single use plastics end up in our oceans, so ask for alternatives that can be used again.
- **Reduce:** Is it possible to reduce your plastic footprint by eliminating the amount of plastic products used?
- **Re-use:** if you can't use an alternative to plastic, make sure you re-use it where possible and dispose of responsibly.
- **Recycle:** If you must purchase plastic, opt for items that are recyclable to reduce additional material ending up in landfills. From a sustainability perspective, recycling remains one of our key solutions. Recycling reduces our requirement on virgin plastics (thereby reducing our consumption of oil, as plastic is made from oil) and also prevents used plastic from ending up in the environment.

Now, let's brainstorm. How can you use the 4-R's to rethink plastic? For example:

- **Refuse:** Say no to single use plastic products, ask for alternatives to single use plastic plates, cutlery or cups when eating out, use bar soap instead of liquid.
- **Reduce:** Carry a refillable water bottle, use stainless steel straws, bring reusable shopping bags.
- **Re-use:** Refill a plastic water or soda bottle, turn plastic bottles into art.
- **Recycle:** Never let a balloon fly away.

## Activity C: Creative Activism

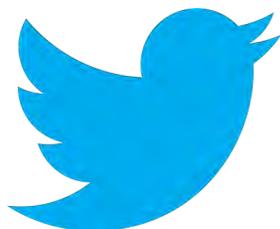
- Ask each student to bring in a single-use plastic item from their household that would have been thrown away.
- Use these plastic items to create a public art display. Place the display somewhere prominent in the school to incite discussion and spread awareness.
- Or ask students to use their creativity to express a message, such as through a drawing, painting, poster, or t-shirt design.



## Activity D: Social Media Campaign

**Instructions:** Break the class into small groups. Each group will design, create, and execute a social media campaign to help further their knowledge, raise awareness, and create possible solutions to our plastic pollution problem. Have students complete the following:

1. Describe the problem.
2. Develop the social media plan. Remember to consider:
  - Shocking or interesting facts you want to share
  - Videos and pictures you want to share
  - Frequency and schedule of posting
  - Creating a video of yourself, making a call to action
3. Please use Plastic Oceans to help spread the word by tagging our accounts and using relevant hashtags:



### Hashtags

#PlasticPollution  
#PlasticFree  
#RethinkPlastic  
#SaveOurSeas

Have students create three of their own.

## E. Draft an Editorial

**Instructions:** Draft an editorial for your school newspaper. Persuade your campus to ban one of the following items: plastic bags, plastic takeout containers in the cafeteria, or plastic drinking straws. (Helpful hints for drafting a great editorial here: <https://www.geneseo.edu/~bennett/EdWrite.htm>)

## F. Zero Waste Experiment Day

**Instructions:** For one day, instruct students to produce as little waste as possible. Have students keep a log of all the times during the 24-hour period they could have produced waste (i.e. purchasing coffee in a to-go cup), and what alternative method they used.

After this personal experiment have students journal about the following:

- A. What surprised you about this Zero Waste Experiment? Do you create more or less waste than you thought?
- B. When was it difficult for you to not create waste? (i.e. in the cafeteria, at Target, etc.)
- C. When was it easier for you to not create waste?
- D. After this Zero Waste Experiment, what are some things you would like to do from now on to reduce your overall waste?

## G. Lobby Your Official

**Instructions:** Students will create one key piece of legislation (ban i.e. plastic bags) they would like to lobby their official on.

1. Create a lobbying campaign goal and mission.
2. Identify key problems or resistance and solutions to overcome these barriers.
3. Create a lobbying campaign strategy and design: letter writing, coordinated social media efforts, attending town hall events, meetings with your legislator, collecting a petition, a march, etc.
4. Identify partners who will advocate for your cause. How can you include these partners in your campaign strategy and design?
5. Implement your campaign.

\*this activity could work for a city/town officials, or for the Student Government Association.

## Activity H: Plastic Ocean Word Search

C E Z B O O P X E D P E P T T  
 G E D C Z L R S R O W V L E U  
 L Y E U A V U I L D A I A G R  
 A A R S C E B I S T R T N N T  
 N V T E L A C R A Q T A K A L  
 D I G G E Y T S F H S N T H E  
 C U N S U S N I X O T R O C E  
 F I S O L U T I O N S E N V H  
 S N U R D L E B E N X T L N F  
 K N I H T E R L O L M L T I H  
 F P R I V E R S C T A A E H E  
 E S U E R E N M W Y T H O P A  
 W B L Y T O K G F N C L W L L  
 N Z N A V D N X A R N E E O T  
 V W W F I S H J A M W J R D H

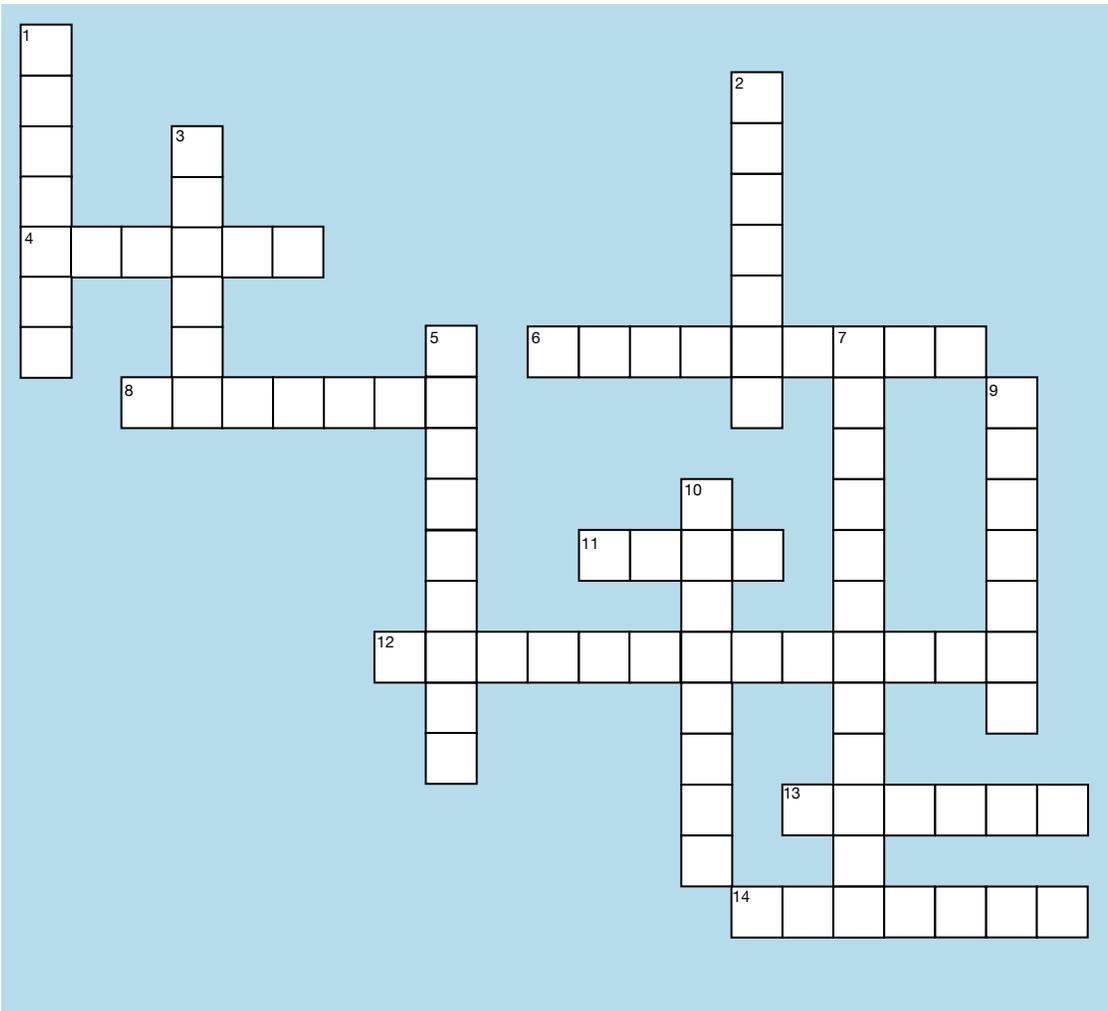
**ALTERNATIVE**  
**BOTTLE**  
**CHANGE**  
**CURRENT**  
**DOLPHIN**  
**EDUCATION**  
**FISH**

**GYRE**  
**HEALTH**  
**LAND**  
**MAGNET**  
**NURDLE**  
**OCEAN**  
**PLANKTON**

**PLASTIC**  
**POLICY**  
**RECYCLE**  
**RETHINK**  
**REUSE**  
**RIVERS**  
**SEABIRD**

**SINGLEUSE**  
**STRAW**  
**TOXINS**  
**TURTLE**  
**WATER**  
**WHALE**

# Activity I: Plastic Ocean Crossword



## Word List

- AWARENESS
- BIOACCUMULATE
- CHANGE
- ENTANGLEMENT
- FOOD
- JELLYFISH
- MINUTES
- NURDLES
- PLASTIC
- REFUSE
- RECYCLE
- RETHINK
- SOLUTION
- TUVALU

### Across

- 4** The island paradise drowning in plastic
- 6** Behavioural change starts with this
- 8** The last Resort in the 3 R's
- 11** 1 in 3 sea birds mistake plastic for this
- 12** For toxins to travel up the food chain
- 13** The first choice to make in the 3 R's
- 14** What we want you to do when it comes to your plastic habits

### Down

- 1** 80% of marine litter is made up of this
- 2** Single Use Plastics have an average lifetime of just 12 of these
- 3** We are creating "a wave of"
- 5** A turtle's favorite food
- 7** A significant source of injury to marine life
- 9** Name of the raw pre-production plastic pellets made from oil
- 10** We want to be part of this and not the problem

# Glossary

## Glossary of Terms

### **Bioaccumulation**

The gradual build up over time of one or more chemicals in a living organism.

### **Bio-plastic**

Plastics derived from renewable biomass sources, such as vegetable fats and oils, cornstarch, or microbiota.

### **Booms**

A barrier placed in a river, designed to collect and or contain flooding waste.

### **Bridge Solutions**

A solution that works to remove only some petrol-plastic products, leaving behind some plastic product and their negative by-products to remain in the environment.

### **Closed-loop System**

A production process in which waste is collected, recycled and used to make new products.

### **Downcycle**

The process where the destruction or recycling of waste materials is created into something of lesser quality. (Some waste will go on to be reused over and over again, but not all materials are created equal, where some will be gradually destroyed by the recycling process.)

### **Entanglement**

The process when an animals mobility is impaired due to being tangled in marine debris, predominantly plastic fishing nets, ropes, sheeting and bags. Entanglement leads to drowning, cuts, infections and starvation.

### **Gyre**

A large rotating ocean current that collect marine debris and break down plastic into microplastic.

### **Long-term Solution**

A solution that works to remove all petrol-plastic products and their by-products from the environment.

### **Microbeads**

Tiny bits of plastic (particles of less than one millimeter) found in hundreds of personal care products such as toothpaste and soaps.

## Glossary of Terms (continued)

### **Microfibers**

Tiny synthetic fibers that are used in synthetic fabrics such as polyester. 60% of all clothing on earth is made of synthetic fiber and each time clothes are washed they release microfibers that flow down our drains, through water treatment plants, and out into our rivers, lakes and oceans by the billions.

### **Microplastic**

Small plastic particles in the environment (less than 5 mm in diameter) that are harmful to our oceans and aquatic life. Microplastics can come from a variety of sources, including cosmetics (microbeads), clothing (microfibers), and industrial processes (nurdles).

### **Nurdles**

A very small pellet of plastic that serves as raw material in the manufacture of plastic products.

### **Open-loop System**

A production process in which waste is not indefinitely collected or recycled and is eventually excluded from the utilization loop and becomes waste.

### **Petro-plastic (or Petroleum-based Plastic)**

Plastics derived from natural gas, feedstocks derived from natural gas processing, and feedstocks derived from crude oil refining, and synthetic polymers such as polyethylene, PVC, nylon, and styrene.

### **Plastic**

A synthetic material made from a wide range of polymers that can be molded into shape while soft and then set into a rigid or slightly elastic form.

### **Recycle**

The process of converting waste into reusable material or the return of material to a previous stage in a cyclic process. (*See Downcycle and Upcycle*)

### **Trawl**

A method of fishing that involves pulling a fishing net through the water behind one or more boats. Trawling can be contrasted with trolling, where baited fishing lines instead of trawls are drawn through the water.

### **Upcycle**

The process where the destruction or recycling of waste materials is created into something of higher quality or value than the original.

# Take Action



PLASTIC™  
OCEANS

How You Can Help

# 9 Things You Can Do

to Reduce Plastic Pollution



**1** Stop using plastic straws.

In the US and UK, Over  
**500 Million**  
Thrown Away Every Day



Drink beverages from reusable bottles or mugs.

**2**

Worldwide, Over  
**500 Million**  
Plastic Bottles Used Every Year



3

Take your groceries home in reusable bags, not plastic.



Worldwide, Up To

**1 Trillion**

Plastic Bags Discarded  
Every Year

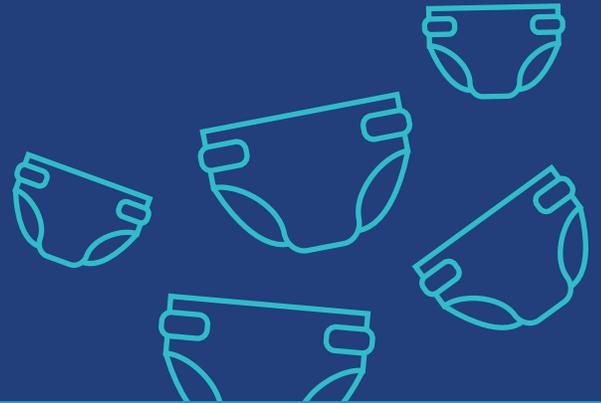
Use cloth diapers instead of disposables.

4

In the US

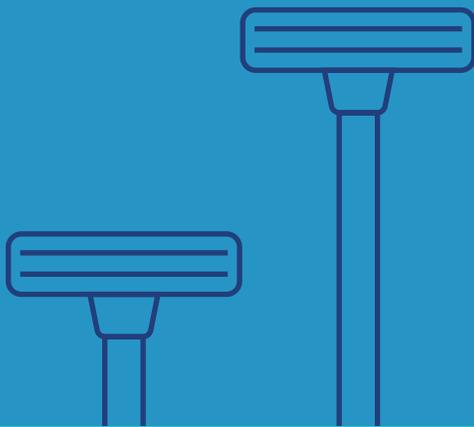
**27.4 Billion**

Disposables Thrown  
Away Every Year



5

Ditch the disposable razor.



In the US, over

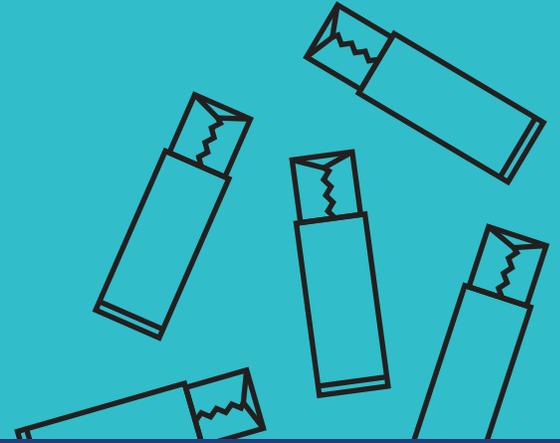
**2 Billion**

Thrown Away Every Year

Give up gum. It's made of synthetic rubber, which is a plastic.

6

Worldwide, Over  
**100,000 Tons**  
Discarded Every Year



7 Get the plastic off your face.

Over

**300,000**

Plastic Beads In A Tube of  
Facewash



Start using bamboo toothbrushes.

8

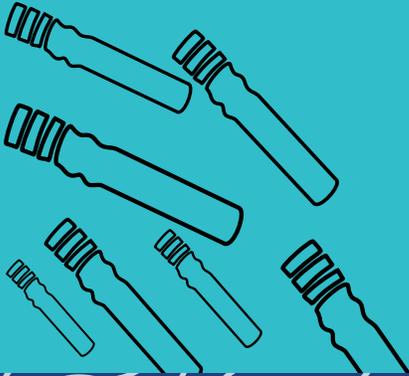
In the US, Over  
**1 Billion**

Plastic Toothbrushes Discarded  
Every Year



# 9 Stop smoking.

In 2018, Over  
**2.4 Million**  
Cigarette Filters Found On  
International Coastal  
Cleanup Day



With your help, we can create a wave of change and protect the planet for future generations.

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\*Every effort has been made to provide accurate information. These are commonly cited figures, with some coming from organized studies, while others are based on general assumptions made from related facts. If you find any information to be inaccurate, please contact us via our website.



PlasticOceans.org

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