Activity: Go Fishing in the Great Pacific Garbage Patch!

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**Introduction:** Go Fishing in the Great Pacific Garbage Patch! Is an interactive activity where plastic pollution in the world’s oceans is simulated by an aquarium filled with plastic trash. The objectives of this activity are:

**Objectives:**

1) Explain what the Great Pacific Garbage Patch is and how it is created.
2) Teach the effects of plastic pollution on marine ecosystems and humans, and
3) Empower UO Community members with information about how they can reduce their plastic consumption and pollution.

**Materials:**

- 1 Aquarium
- Many bits of small plastic trash (bottle caps, torn up pieces of plastic bags, chopped up plastic utensils/straws, pieces of plastic bottles, condiment packets, snack bags/wrappers)
- 1 gallon bucket for filling up aquarium/emptying water
- 1-2 plastic nets for participants to use to “fish”
- Plastic fish, size 3” or less
- A banner or poster reading “Go Fishing in the Great Pacific Garbage Patch!” to attract attention.

**Optional:** Another posterboard could be made that has simple, easy to read answers to questions like: “What is the great pacific garbage patch?” “How does trash get there” “Are there other trash gyres in the world?” “Why does this matter to me?” “More resources...”. These questions could be superimposed on a map of the world and located in the areas where the five major ocean gyres exist.

**OR**

An iPad or computer displaying a website such as [www.5gyres.org](http://www.5gyres.org) or other that explains the issue in detail.

**Methods:** Set up an aquarium on a table. Fill the aquarium with water using the 1-gallon bucket, (about 3 gallons seems to be the right amount) and then fill it with the plastic trash. The key is to make sure the plastic pieces are very small because the activity wants to simulate the size of real plastic pollution in our oceans after it photodegrades. Place the plastic fish into the aquarium to simulate the real fish living in our oceans.
Encourage participants to pick up a hand-held net (like the ones used to clean aquariums) and try to catch a fish. There’s a trick, however. Enough plastic trash should be in the tank to make it impossible to net a fish without also catching bits of small plastic.

After participants see their fish in a net full of plastic trash start a dialogue that relates to the objectives of this activity.

1) How did this trash get here?

2) How does this affect the health of marine life? Of humans?

3) Do you generate plastic trash? If so, is there anything you could do to generate less?

When it is time to pack up the activity, use the net to scoop the plastic trash back into the bucket. Next, dump the water out by picking up the aquarium and tilting it so that water flows out of the hole in the aquarium (The hole has a screen over it to prevent the remaining trash from flowing out). Ideally you can empty the majority of the water this way. Get rid of the remaining water by letting the aquarium and plastic trash sit in the sun or air dry (failing to do this will leave the stuff smelling of mildew). It’s easy to pour the water out of the aquarium if you are outside and have a patch of grass nearby. If you are doing this activity inside, you might want to try putting less water in from the beginning or scooping it out with a cup or bucket as the aquarium can get quite heavy and carrying it a ways to the bathroom might be a bit strenuous.

Talking Points:

- **Introduction**: “So what we have here is the Great Pacific Garbage Patch. Would you like to try to go fishing?” *Allow participants to pick up a net and try to catch a fish if they like. You can also explain to them that the point of the activity is to try to catch a fish without catching any trash as well.*

- **Discussion**: After they catch a fish, or try to, engage them in a conversation about the implications of the activity. If nothing else they should walk away from the activity with the understanding that plastic pollution is hurting our ocean ecosystems and by reducing their plastic consumption and only buying recyclable plastic items they can help reduce their contribution to the Great Pacific Garbage Patch.

- **Explanations of Activity**: When products are improperly disposed of (not recycled, littered) they find their way to oceans through storm drains, waterways, wind, or other methods. In oceans, water and wind currents, as well
as the Earth’s rotation create gyres, slow moving whirlpools where trash is now accumulating.³

You’ll notice that the gyre is full of trash, but more specifically plastic trash. That’s because nobody really knows how long plastic takes to biodegrade. Some items, like Styrofoam, may never biodegrade.

• **Inquiry- Q:** “Do you recognize any of the items in the gyre?”

  **A:** Of course they do. The tank is full of shredded plastic, like bags, caps, bottles, Styrofoam, chip bags, and snack wrappers. The trash should be comprised of items that a lot of people use on a daily basis.

**Questions:**

**Q:** So how do you think all that plastic got here?

**A:** Improper disposal, large amount generated by packaging/overconsumption. Throw-away culture. Reusable alternatives not utilized. Explain ocean gyre effect. Facts like: “Worldwide humans produce over 300 million tons of plastic a year.” or “There is more plastic mass in the Pacific trash gyre than that of phytoplankton.” Describe how this activity simulates actual plastic pollution in our oceans.

**Q:** Would you want to eat this fish? Do you think that all this plastic the fish is swimming in has any negative health effects for the fish? What if you ate the fish, would there be any negative health impacts for you?

**A:** There is significant scientific debate as to the negative health effects for humans and for fish. Certain plasticizers and other chemicals are known to be endocrine-disrupters in humans. What does this mean for us? Children and pregnant women are especially at risk. Teach principle of bio accumulation in food chain-it would take us 14 years to breathe in the amount of dioxin a cow absorbs through grass in one day. Hormone disrupter in humans, cancer, kills fish, harms sea life. Killer whales having a hard time reproducing, will humans too?¹

**Q:** Do you recognize any of these pieces of trash? Is this a piece of trash you might throw away at some point? How do you think you can reduce your contribution to the Great Pacific Garbage Patch?

**A:**

- Reduce your consumption of all plastic.
- Replace disposable products with reusable ones.
- Buy only recyclable plastic and make sure that plastic is recyclable in your area.
Tell your friends about the issue of plastic trash in our oceans and challenge them to change their consumption habits as well.

At this point, pass out any additional materials your program might have such as a recycling sorting guide, information on future events, or other waste reduction information.

References:

Some sections from Reference #1:

PLASTIC POLLUTION

Looking beyond the essential services that plastics provide to humanity (3) and their associated human health risks (64), evidence abounds for plastics' potential to pollute and disrupt important natural processes and quality of life (reviewed in 109, 110). Plastic fragments, varying in size from macrodebris (>20 mm), to mesodebris (2–20 mm), to microdebris (<2 mm) are polluting the world's oceans (64). Using surface net tows, 334,000 plastic items were collected in 1999 per square kilometer in the North Pacific Subtropical Gyre, a mass equivalent to 5.1 kg (76). Although plankton abundance was about five times higher than that of plastic, the mass of plastic exceeded that of plankton sixfold. Commonly observed plastic debris included thin films, PP/monofilament line, and miscellaneous fragments of unidentified plastics. A similar count performed a decade earlier suggested a tenfold increase in debris over this time period (reviewed in 90). The list of affected wildlife suffering from exposures to plastic debris is long and includes seabirds, seals, whales, and turtles (reviewed in 40). In terrestrial environments, on seashores, and in open marine waters, plastics debris of extreme persistence is accumulating at increasing rates, owing to its environmental longevity, which is estimated to be on the order of centuries to millennia (reviewed in 8). Waste incineration, the single most effective way for removing nonbiodegradable plastics from the chemosphere, is known to produce carcinogenic polychlorinated dibenzo-p-dioxins/furans (PCDD/Fs) and additional toxic, persistent organohalogens. Principal precursors of dioxin formation during incineration are in order of decreasing importance: PVC, PET, PE, and PP (108).

SUSTAINABILITY

Human health risks aside, the ongoing, increased production of extremely durable plastics of limited recyclability for disposable, short-lived consumer products is unsustainable (45, 102, 109). Plastics production is petroleum based and accounts for 8% of the world oil production, with 4% accounting for
feedstock and 3%–4% for energy requirements in manufacturing (109). More than one-third of the production volume of plastics is for disposable items (45). Packaging with extremely durable synthetic plastics is widespread, unnecessary, and unsustainable. Furthermore, many plastic articles have a very short useful life span, measured in timescales of seconds, minutes, or hours (e.g., throwaway cups, utensils, plastic bags). However, upon release into the environment, these products are known to persist and pollute for decades, centuries, or even millennia (reviewed in 8). This mismatch by design has fatal consequences for many plastics-exposed biota. In 2007, Americans produced 254 million tons of trash and an additional 85 million tons of household waste, which was recycled and composted (112). About 4.6 pounds of solid waste are produced per person per day in the United States (112), and plastics represent ~10% of this mass (110). Recycling of present-day synthetic plastics is challenging, however, as illustrated by the fact that many municipalities in the United States accept only plastics from the SPI #1 and #2 categories (21). To address the problem, the widely accepted concept of the 3 Rs, reduce, reuse, recycle, will not suffice. Building on previously proposed efforts (45, 109), a forth R to rethink at the systems level is desirable, as well as a fifth R to encourage measures at the policy and governance level: restrain.

CONCLUSIONS

Exposures to plastics, plasticizers, and other additives to polymers are ubiquitous in modern society. Whereas these are often estimated to occur below critical threshold values, exceedances in certain susceptible populations, such as pregnant women and children, are known to occur in some instances. Of principal concern from a human health perspective are endocrine-disrupting properties of plastic components, such as BPA and DEHP (Figure 1). Another issue that may drive changes in production and consumption are the undesirable effects of plastics on the environment and wildlife. The quantity of plastics produced worldwide in the first decade of this century is equivalent to the total world production in the century prior (109). Because many of today's plastics are not biodegradable, continued use at accelerating rates is unsustainable and will cause a significant burden for future generations.