Fact Sheet Produced by The Pelagic Plastic Task Force for release on Earth Day, 2001

Plastics. We drink out of them, eat off of them, sit on them, and even drive in them. They’re durable, lightweight, and can be made into virtually anything. But it is these useful properties of plastics which make them so harmful when they end up in the environment. Plastics, like diamonds, are forever!

➢ Only 3.5% of plastics are recycled in any way.
➢ 63 pounds of plastic packaging goes to landfills in the US per person/per year.
➢ Broken, degraded plastic pieces outweigh surface zooplankton in the Central North Pacific 6 to 1.

Q. Why is plastic in the ocean a problem?
A. Because it doesn’t biodegrade.

When something biodegrades, naturally occurring organisms break down natural materials into their simple chemical components. Paper, when it breaks down, becomes carbon dioxide, nitrogen and water. But plastic, a synthetic material, never biodegrades. Instead, plastic goes through a process called photodegradation, where it is broken down by sunlight into smaller and smaller pieces, all of which are still plastic polymers. Even this degradation process can take a very long time, 500 years for a disposable diaper, 400 years for a plastic six-pack ring and 450 years for a plastic bottle. The more plastic we produce, the more we have to live with… forever!

The ocean is especially susceptible to plastic pollution.
1. It takes longer for the sun to break apart a piece of plastic in the ocean than a piece of plastic on land. This is because the ocean water cools the plastic piece and prevents heat build-up.
2. Plastics are carried by currents, which can concentrate the plastic in certain areas and prevent it from washing onshore. Circulating currents in the ocean caused by stable weather patterns are called “gyres.” When plastic is flushed out of a gyre by storms and washes ashore, or when rain sends plastics down rivers to the sea, much of it is mixed with sand and can never be recovered.

Q. Okay, so what?
A. Plastic litter in the ocean doesn’t just look bad, it is bad for the billions of animals that inhabit our ocean waters and for the people who fish, swim and recreate there.

Many marine birds and animals mistakenly eat pelagic (free floating) plastic.

➢ Often these animals can’t distinguish plastic from food. Plastic, because of its high molecular weight and the nature of its chemical bonds, can never be digested. It provides no nutrients to animals. Eating plastic can cause animals to feel full even though they are not actually consuming food. In birds, it has been shown that ingestion of plastics can prevent migration, reproduction and eventually cause starvation and death. In turtles, it has been shown to block intestines and make the animals float so that they cannot dive for food.
➢ Toxic chemicals in plastics can make marine birds and animals sick. Over 80 species of seabirds have been found to ingest plastic. Seabird chicks are especially vulnerable as they receive high levels of pollutants from the yolk sac and subsequent doses in their food.
➢ 90% of Laysan Albatross chick carcasses contain plastic.

Marine birds and animals can become entangled in plastic nets and fishing line. An estimate of 100,000 marine mammal deaths per year in the North Pacific has been made.
Chemicals used to make plastics can escape into the atmosphere during the manufacturing process. Fourteen percent of the toxic airborne chemicals nationally are from “plastics sector” releases. These chemicals can be toxic or carcinogenic, and harm both people and animals.

Q. But don’t we recycle plastics?
A. The magnitude of our plastic problem is enormous.
   • The American people as a whole weigh approximately 50 billion pounds, but 100 billion pounds of plastic resin pellets (the raw material for consumer plastics) are produced in the US annually.
   • 63 pounds of plastic packaging goes to landfills in the US per person, per year.
   • Only 3.5% of plastic is recycled in any way. Reheating plastic gives it a “heat history” which reduces its flexibility. Therefore, very few plastics are recycled into the same type of container or product that they were originally.
   • Almost invariably, “Recycled” merely means “collected,” not reprocessed into useful products.
   • The “chasing arrows” symbol only denotes type of plastic. Otherwise it is meaningless. Plastics manufacturers adopted the symbol over the protests of environmentalists and are now being challenged by several cities in court over its implications.

Q. How are plastics getting in the ocean?
A. About 100 million containers are shipped annually over the world ocean. Shipping across the North Pacific Ocean from Asia to North America is along great circle routes in the West Wind Drift current at the northern edge of the Central Pacific Gyre. Frequent severe storms along this route cause the loss of hundreds of containers overboard each year contributing among other plastics: 10’s of thousands of shoes and millions of plastic shopping bags made in Asia.
   • Only about 20% of ocean pollution is due to activities at sea, however. Activities on land contribute most of the remaining 80%.
   • Because of their buoyancy and persistence, plastic items contribute disproportionately to the overall impact of marine debris. Most of the debris that either entangles animals or is found in their stomachs is made of plastic.
   • Most plastic that ends up in the Central Pacific Gyre (an area the size of Africa) has been shown to circulate there for at least 12 years, and debris lost in the Bering Sea or the western portion of the Subarctic Gyre will end up there in 3 to 6 years.
   • Not all plastic floats on the surface. About half of plastics are negatively buoyant. They therefore do not receive sunlight to facilitate their breakdown (photodegradation.) Such debris accumulate on the bottom of the ocean or “benthos.” There the particulates are used by polychaete worms to make their dwelling tubes and are eaten by flounders. The nets, traps and lines continue to “ghost fish” (catch fish without a fisherman) and entangle fish and mammals.

Q. What do we know about our ocean, the North Pacific?
A. Scientists have known about the floating plastic problem since the 1970’s. Some of their findings:
   • In a recent study, the North Pacific Central gyre was found to contain 6 pounds of plastic for each pound of zooplankton at the surface.
   • The results of studies in the 1980’s indicate that the quantity of plastic has tripled in the last 10 years from 320,000 particles per square kilometer to 1 million particles per sq. kilometer
• The filter feeding animals in this area, siphonophores and salps, were found to be heavily impacted by plastic bits. The smaller the bits, the fewer of them were found to be free floating, indicating that filter feeders had caught them.
• Filter feeders are at the lower end of the food chain, and fifty species of fish and many turtles are known to eat them, thus accumulating plastic in their stomachs.
• Plastic materials accumulate and concentrate organic chemicals and environmental pollutants up to one million times their concentration in the surrounding sea water. Many of these chemicals are called “endocrine disruptors,” and can be released when the plastics are ingested. The endocrine system produces hormones in humans and animals.
  1. Hormones are amazingly potent. Estradiol, the body’s key estrogen hormone, operates at a concentration in the part per trillion range. One part per trillion is equivalent to one drop of water in 660 rail tank cars-a train 6 miles long.
  2. Effects of hormone disruption on humans run the gamut from enlarged prostates and cancer to early puberty in young girls, even mental retardation and propensity to violence. In fish it can cause males to become females or fail to produce sperm.

Q. What about the future.
A. It is not bright.

• There are seven misconceptions about plastics which are promoted by the spokesmen for this powerful industry, The American Plastics Council and The Society of the Plastics Industry.
  1. Plastics that go into curbside recycling bins get recycled – they don’t.
  2. Curbside collection reduces the amount of plastic landfilled– it doesn’t.
  3. A chasing arrows symbol means a plastic container is recyclable – it only indicates type.
  4. Packaging resins are made from petroleum refinery waste–nearly all are from natural gas.
  5. Plastic recyclers promote plastics’ recyclability– no, virgin pellet producers pay for recycling ads to promote sales to consumers who believe plastic is being recycled .
  6. Using plastic containers conserves energy– most of the energy and environmental costs of plastics are hidden because they are incurred in the plastic factory. Only 3 companies produce 94% of virgin PET resin pellets. Virgin glass uses an equal amount of energy, and recycled glass uses far less energy than either virgin material.
  7. Our choice is limited to recycling or wasting–source reduction is better and not hard to do
• Virgin Plastic Pellets are released into the environment by thousands of consumer plastics manufacturers and are the most common contaminant on some beaches.
• A 10 fold increase in ocean plastics by the year 2010 has been predicted which would make the surface plastic to zooplankton ratio in the North Pacific Central gyre 60:1 by weight

1869: John Wesley Hyatt invents Celluloid, the first plastic product given a trade name.
1909: Bakelite introduces to the Chemist Club in New York as the “first thermoset plastic.” Which meant that once it was set, it was set for life… Bakelite was the first truly synthetic material.
1939: Nylon stockings debut at the World’s Fair.
1946: Earl S. Tupper produces a 7-ounce polyethylene tumbler, the first of many items later available from Tupperware Home Parties, Inc.
1955: The Corvette is first car to use plastic for body panels.
1957 Monsanto’s House of Tomorrow opens in Disneyland with walls, roof, floors, rugs, and furniture made of plastics. The Hula Hoop creates a surge in demand for polyethylene.
1983: Microwave ovens open a new market for plastic packaging
2000: In the U.S., manufacturing of pre-production plastics reaches 100 billion pounds of virgin resin pellets per year. That is double the weight of the entire population of the U.S.

Remember! Plastics are NOT biodegradable. While plastics do break down into smaller pieces, these smaller and smaller pieces are still plastic! They remain in the environment forever!

**Individual references for the above facts and copies of this fact sheet are available from:**
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We also have available a video on this subject called “Synthetic Sea” for $10

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