Plastics Mini PBL

AP Environmental Science

2.2 Ecosystem Services Ecosystems have structure and diversity that change over time. Anthropogenic activities can disrupt ecosystem services, potentially resulting in economic and ecological consequences

6.8 Solar Energy Passive solar energy systems absorb heat directly from the sun without the use of mechanical and electric equipment, and energy cannot be collected or stored.

Human activities, including the use of resources, have physical, chemical, and biological consequences for ecosystems. 8.1 Sources of Pollution - Nonpoint sources of pollution are diffused and can therefore be difficult to identify, such as pesticide spraying or urban runoff. 8.2 Human Impacts on Ecosystems - Litter that reaches aquatic ecosystems, besides being unsightly, can create intestinal blockage and choking hazards for wildlife and introduce toxic substances to the food chain. 8.9 Solid Waste Disposal - Some countries dispose of their waste by dumping it in the ocean. This practice, along with other sources of plastic, has led to large floating islands of trash in the oceans. Additionally, wildlife can become entangled in the waste, as well as ingest it. 8.10 Waste Reduction Methods - Recycling is a process by which certain solid waste materials are processed and converted into new products. Recycling is one way to reduce the current global demand on minerals, but this process is energy-intensive and can be costly. Composting is the process of organic matter such as food scraps, paper, and yard waste decomposing. The product of this decomposition can be used as fertilizer. Drawbacks to composting include odor and rodents.

Honors Algebra 1 Standards:

MGSE9-12.A.SSE.1 Interpret expressions that represent a quantity in terms of its context.

MGSE9-12.A.SSE.1b Given situations which utilize formulas or expressions with multiple terms and/or factors, interpret the meaning (in context) of individual terms or factors

Mathematical Processes:

Make sense of problems and persevere in solving them.

Attend to precision.

**Plastic in Our Oceans**

Most of the plastic in our oceans comes from land-based sources: by weight, **70% to 80%** is plastic that is transported from land to the sea via rivers or coastlines. The other 20% to 30% comes from marine sources such as fishing nets, lines, ropes, and abandoned vessels.

Plastic pollution has become one of the most [pressing environmental issues](https://www.nationalgeographic.com/magazine/article/plastic-planet-waste-pollution-trash-crisis), as rapidly increasing production of disposable plastic products overwhelms the world’s ability to deal with them. Plastic pollution is most visible in developing Asian and African nations, where garbage collection systems are often inefficient or nonexistent. But the developed world, especially in countries with [low recycling rates](https://news.nationalgeographic.com/2017/07/plastic-produced-recycling-waste-ocean-trash-debris-environment/), also has trouble properly collecting discarded plastics. Plastic trash has become so ubiquitous it has prompted efforts to [write a global treaty](https://www.nationalgeographic.com/environment/article/un-environment-plastic-pollution-negotiations) negotiated by the United Nations.

Plastics made from fossil fuels are just over a century old. Production and development of thousands of new plastic products accelerated after World War II, so transforming the modern age that life without plastics would be unrecognizable today. Plastics revolutionized medicine with life-saving devices, made space travel possible, lightened cars and jets—saving fuel and pollution—and saved lives with helmets, incubators, and equipment for clean drinking water.

The conveniences plastics offer, however, led to a throw-away culture that reveals the material’s dark side: today, single-use plastics account for 40 percent of the plastic produced every year. Many of these products, such as [plastic bags](https://www.nationalgeographic.com/environment/article/plastic-bag-bans-kenya-to-us-reduce-pollution) and food wrappers, have a lifespan of mere minutes to hours, yet they may persist in the environment for hundreds of years.

It is estimated that 8.5 million metric tons of plastic is currently in our oceans. 1 metric ton is equal to 1000 Kg.

A new company is recycling plastic in the ocean by converting the plastic to bracelets. One bracelet reduces ocean plastic by 1 pound. 1 pound is approximately 454 grams.

1. Explain two ways that plastic pollution negatively impacts marine ecosystems?
2. How many bracelets can be manufactured with the current amount of ocean plastic? Show all work.
3. If one bracelet costs $20, how much money will it take to remove the 8.5 million metric tons of plastic in the ocean? Show all work.
4. If it takes 22 gallons of freshwater to produce 1 pound of plastic, how much freshwater was used to all the plastic in the ocean? Show all work.
5. Provide two ways in which the number of plastic products ending up in the oceans can be reduced?

PBL Activity -

Ask – With the purpose of using the STEM Garden sustainably, how can we use plastic bottles collected on campus to create miniature greenhouses, thus reducing the amount of plastic waste generated by school?