

Marine pollution: The Hidden Costs of Human Activity on Our Marine Ecosystems

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Opinion Article

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DESCRIPTION

Marine pollution occurs when substances used or spread by humans, such as industrial, agricultural and residential waste, particles, noise, excess carbon dioxide or invasive organisms enter the ocean and cause harmful effects there. The majority of this waste (80%) comes from land-based activity, although marine transportation significantly contributes as well. Since most inputs come from land, either via the rivers, sewage or the atmosphere, it means that continental shelves are more vulnerable to pollution. Air pollution is also a contributing factor by carrying off iron, carbonic acid, nitrogen, silicon, sulfur, pesticides or dust particles into the ocean. The pollution often comes from nonpoint sources such as agricultural runoff, wind-blown debris, and dust. These nonpoint sources are largely due to runoff that enters the ocean through rivers, but wind-blown debris and dust can also play a role, as these pollutants can settle into waterways and oceans. Pathways of pollution include direct discharge, land runoff, ship pollution, bilge pollution, atmospheric pollution and, potentially, deep sea mining.

The types of marine pollution can be grouped as pollution from marine debris, plastic pollution, including microplastics, ocean acidification, nutrient pollution, toxins and underwater noise. Plastic pollution in the ocean is a type of marine pollution by plastics, ranging in size from large original material such as bottles and bags, down to microplastics formed from the fragmentation of plastic material. Marine debris is mainly discarded human rubbish which floats on, or is suspended in the ocean. Plastic pollution is harmful to marine life.

Another concern is the runoff of nutrients (nitrogen and phosphorus) from intensive agriculture, and the disposal of untreated or partially treated sewage to rivers and subsequently oceans. These nitrogen and phosphorus nutrients (which are also contained in fertilizers) stimulate phytoplankton and macroalgal growth, which can lead to harmful

algal blooms (eutrophication) which can be harmful to humans as well as marine creatures. Excessive algal growth can also smother sensitive coral reefs and lead to loss of biodiversity and coral health.

A second major concern is that the degradation of algal blooms can lead to consumption of oxygen in coastal waters, a situation that may worsen with climate change as warming reduces vertical mixing of the water column.

Many potentially toxic chemicals adhere to tiny particles which are then taken up by plankton and benthic animals, most of which are either deposit feeders or filter feeders. In this way, the toxins are concentrated upward within ocean food chains. When pesticides are incorporated into the marine ecosystem, they quickly become absorbed into marine food webs. Once in the food webs, these pesticides can cause mutations, as well as diseases, which can be harmful to humans as well as the entire food web. Toxic metals can also be introduced into marine food webs. These can cause a change to tissue matter, biochemistry, behavior, reproduction, and suppress growth in marine life. Also, many animal feeds have a high fish meal or fish hydrolysate content. In this way, marine toxins can be transferred to land animals, and appear later in meat and dairy products. Ships can pollute waterways and oceans in many ways including through their ballast, bilge, and fuel tanks. Oil spills can have devastating effects. In addition to being toxic to marine life, polycyclic aromatic hydrocarbons (PAHs), found in crude oil, are very difficult to clean up, and last for years in the sediment and marine environment. Additionally, bilge pollution can be toxic to the surrounding environment when bilge water is released from a ship's bilge.

Oil spills are one of the most emotive of marine pollution events. However, while a tanker wreck may result in extensive newspaper headlines, much of the oil in the world's seas comes from other smaller sources, such as tankers discharging ballast water from oil tanks used on return ships, leaking pipelines or engine oil disposed of down sewers.

Discharge of cargo residues from bulk carriers can pollute ports, waterways, and oceans. In many instances vessels intentionally discharge illegal wastes despite foreign and domestic regulation prohibiting such actions. An absence of national standards provides an incentive for some cruise liners to dump waste in places where the penalties are inadequate. It has been estimated that container ships lose over 10,000 containers at sea each year (usually during storms). Ships also create noise pollution that disturbs natural wildlife, and water from ballast tanks can spread harmful algae and other invasive species.