

A Commentary on Human Impacts of Marine Pollution and Climate Change in Marine Chemistry

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Commentary

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DESCRIPTION

Human activity and development result in pollution (such as point source, non-point source, and noise pollution) and physical changes (such as changes to beaches, shores, and rivers). Furthermore, humans have removed the majority of the ocean's large vertebrates.

Human activities such as overfishing, oil spills, plastic dumping, agricultural and industrial wastes, and other harmful practices kill trillions of marine animals each year. The carbon dioxide that humans emit into the atmosphere by burning fossil fuels is altering the ocean's chemistry by increasing its acidity. This phenomenon, known as ocean acidification, is already having an impact on us and our environment.

Marine pollution

Marine pollution occurs when human-made substances, such as industrial, agricultural, and residential waste, particles, noise, excess carbon dioxide, or invasive organisms, enter the ocean and cause harm. The majority of this waste (80%) is generated by land-based activity, though marine transportation also contributes significantly. Because the majority of inputs come from land, either through rivers, sewage, or the atmosphere, continental shelves are more vulnerable to pollution. Air pollution also plays a role by transporting iron, carbonic acid, nitrogen, silicon, sulphur, pesticides, and dust particles into the ocean. Nonpoint sources of pollution include agricultural runoff, wind-blown debris, and dust.

These nonpoint sources are primarily caused by river runoff, but wind-blown debris and dust can also play a role because these pollutants can settle into waterways and oceans. Direct discharge, land runoff, ship pollution, bilge pollution, atmospheric pollution, and, potentially, deep sea mining are all pollution pathways.

Marine pollution is classified as debris pollution, plastic pollution (including micro plastics), ocean acidification, nutrient pollution, toxins, and underwater

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noise. Plastic pollution in the ocean is a type of marine pollution caused by plastics that range in size from large original materials such as bottles and bags to micro plastics formed from plastic fragmentation.

Climate change

Increased carbon dioxide levels, primarily from the combustion of fossil fuels, are altering ocean chemistry. Global warming and salinity changes have serious implications for the ecology of marine environments.

Acidification: The term "ocean acidification" refers to the decrease in the pH of the Earth's oceans. The average pH of the ocean surface decreased from approximately 8.15 to 8.05. Human-caused carbon dioxide emissions are the primary cause of ocean acidification, with atmospheric CO₂ levels exceeding 410ppm (in 2020). The oceans absorb CO₂ from the atmosphere. Carbonic acid (H₂CO₃) is formed, which dissociates into a bicarbonate ion (HCO₃⁻) and a hydrogen ion (H⁺). The presence of free hydrogen ions (H⁺) lowers the pH of the ocean, increasing acidity (this does not mean that seawater is already acidic; it has a pH greater than 8).

Deoxygenation: Ocean deoxygenation is the reduction of oxygen content in the world's oceans and coastal zones caused by human activities as a result of anthropogenic carbon dioxide emissions and eutrophication-driven excess production. It can be seen in the growing number of coastal and estuarine hypoxic areas, also known as dead zones, as well as the expansion of Oxygen Minimum Zones (OMZs) in the world's oceans. The rapid decrease in the oxygen content of the oceans endangers all aerobic marine life as well as people who rely on marine life for nutrition or a living.