Marine Pollution

Marine Pollution refers to trash and pollutants that come from land sources to end up in the ocean. This pollution causes widespread damage to ocean life as well as to economic structures that rely on marine infrastructure.

Marine Pollution happens when entry of industrial, agricultural, residential wastes etc enter the ocean. Air pollution is also a contributing factor when nitrogen, silicon, sulphur or pesticides are blown into the ocean.

Although it's land pollution that contributes 80% of marine pollutants, both the air and land variants are the primary contributors to marine pollution.

Marine pollution comes under the Environment and Ecology segment of the IAS Exam.

To know more about this segment, be sure to visit the UPSC Syllabus.

Causes of Marine Pollution

The inputs and causes of marine pollution can be categorized as the following:

1. Direct discharge: Pollutants are directly discharged from urban centres or factories into rivers and provided those rivers have outlets into the sea, the hazardous or toxic wastes will find their way into the oceans. Plastics constitute a major component of the hazardous wastes directly discharged into the oceans.

As per environmental studies, China, Indonesia, Sri Lanka, Vietnam, Egypt, Thailand, Nigeria are major contributors of ocean plastic pollution.

Mining for minerals such as iron, copper, and zinc is also a major source of marine pollution. Usually, uprooted soil ends up in rivers flowing to the oceans. That itself is not a problem, but minerals that are mined will be a cause for concern as their effects can be poisonous for marine life.

2. Land run-off: Surface run-off from farming, industrial, urban activities can carry silt and particles laden with carbon, nitrogen, phosphorus and minerals.

Polluted run-off from roads and highways can be a significant source of water pollution in coastal areas.

3. Ship pollution: Ship pollution can take many forms. One of the well known varieties are those of oil spills. Oil spills are toxic to marine life and are even more difficult to clean up, taking years to dispose of the sediments that have accumulated.

While oil spills make the headlines of environmental accidents, discharges from ballast tanks of big oil ships are other sources of pollution from ships. The ballast tanks contain waste waters which can harm marine life.

4. Atmospheric pollution: Atmospheric pollution is also the result of marine pollution. Winds blow dust and debris like plastic bags from landfill near ocean bodies.

Dust from the Sahara, for example, moving around the southern periphery of the subtropical ridge, moves into the Caribbean and Florida during the warm season as the ridge builds and moves northward through the subtropical Atlantic.

Climate change is increasing ocean temperatures as the years go by, leading to carbon dioxide levels rising and altering marine ecosystems and modifying fish distributions. This has impacted communities that depend on fisheries in the process.

5. Deep Sea Mining: Deep sea mining is a new mineral retrieval process where the ocean follow is mined for minerals. Precious metals such as silver, gold, copper, cobalt, zinc etc are mined. Like the land variant, deep sea mining releases many pollutants onto the ocean floor, albeit directly.

Since it's a relatively new form of mining, its environmental concerns are yet to be fully ascertained. But what is certain is that deep sea mining is just as harmful as its land counterpart.

Leakages, spills and corrosion will alter the mining areas ecological makeup.

Types of Marine Pollution

1. Acidification: Oceans are a natural carbon sink, as in it absorbs carbon dioxide from the ocean atmosphere. Since the levels of carbon dioxide are increasing, oceans as a result are becoming more acidic.

Although the long term effects of ocean acidification are yet to be known, it is assumed that corals will be affected, with marine wildlife also suffering in the process.

2. Eutrophication: Eutrophication is an increase in chemical nutrients, typically compounds containing nitrogen or phosphorus, in an ecosystem. It can result in an increase in the ecosystem's primary productivity (excessive plant growth and decay), and further effects including lack of oxygen and severe reductions in water quality, fish, and other animal populations.

The biggest culprit are rivers that empty into the ocean, and with it the many chemicals used as fertilizers in agriculture, as well as waste from livestock and humans. An excess of oxygen-depleting chemicals in the water can lead to hypoxia and the creation of a dead zone.

3. Plastic Debris: Out of all the debris that float on the surface of oceans, 80% of it is plastic. Since the end of World War II, it has been rapidly accumulating. It is estimated that at least 100,000,000 tonnes may have been accumulated in the ocean ecosystem.

Plastic debris, when bulky or tangled, is difficult to pass, and may become permanently lodged in the digestive tracts of these animals. Plastic debris also suffocates marine animals fatally. Many marine animals have lost their lives as a result of coming in contact with plastic debris.

4. Toxins: Apart from plastics, there are particular problems with other toxins that do not disintegrate rapidly in the marine environment. Examples of persistent toxins are PCBs, DDT, TBT, pesticides, furans, dioxins, phenols, and radioactive waste.

Heavy metals are metallic chemical elements that have a relatively high density and are toxic or poisonous at low concentrations. Examples are mercury, lead, nickel, arsenic, and cadmium. Such toxins can accumulate in the tissues of many species of aquatic life in a process called bioaccumulation. They are also known to accumulate in benthic environments, such as estuaries and bay muds: a geological record of human activities of the last century.