

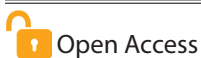


Potential Impact of Oil Spills on Aquatic Ecosystem and Public Health

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Abstract

The ecosystem and marine life are both severely harmed by oil spills in the water. When it coats plants and animals, removes their insulating qualities, and contaminates them when they try to clean themselves or consume oiled prey, oil can cause bodily harm to them. Moreover, oil can disrupt breeding and reproduction by fouling bird or turtle nests on the coast, reducing viability, and suffocating eggs before they hatch. Oil-affected females may produce eggs with brittle, thinner shells. Moreover, dispersants have been shown to increase the bioavailability of oil components, such as polycyclic aromatic hydrocarbons (PAHs) in fish. The amount and kind of oil that spills, the location, the weather, the time of year, and many other variables all affect how much damage is done. Massive spills have broad-ranging immediate effects and may harm certain impacted ecosystems in long-term. Chronic discharges, such as those from improper oil disposal and roadway runoff, can also be harmful.

Keywords: Chronic discharge, Ecosystem, Oil spill, Prevention

Introduction

Crude oil, the liquid residue of dead plants and animals, is a fossil fuel used to make varieties of products and fuels. The consequences on the animals and the environment are those of oil pollution that are most obvious and often observed, especially after severe oil spills (Chilvers *et al.*, 2021). Oil companies extract crude oil, then use pipelines, ships, trucks or trains to transport it to refineries for further processing. There, it was refined to make many petroleum products, including gasoline and other fuels, and products such as asphalt, plastics, soaps, paints, *etc.*

Via direct and indirect physical interaction, ingestion, inhalation, and absorption, oil harms animals. All forms of oil, including light (such as petrol and diesel), moderate, and heavy (such as crude and bunker), interfere with the ability of animal feathers and hair to resist water. When exposed to oil, birds and mammals become unable to fly, dive, swim, or float as well as their capacity to thermoregulation (manage their body temperature). This results in hypothermia, drowning, and death (Burger and Fry, 1993).

Oil spills at sea are typically significantly more harmful than

those on land because they can cover coastlines with a thin layer of oil and spread for hundreds of nautical miles. They are able to kill other species they coat as well as seabirds, animals, and shellfish. We use oil, a prehistoric fossil fuel, to heat our homes, generate energy, and manage a major part of our economy. But oil accidentally spilled into the ocean can have serious consequences. Oil spills can ruin a day at the beach, harm marine life and make seafood dangerous to eat. Strong research is needed to extract the oil, measure the effects of pollution, and help the oceans recover. The current type of oil spill is the unintentional or intentional release of petroleum products into the environment as a result of human activities (drilling, manufacturing, storage, transportation, waste management), floating activities (drilling, manufacturing, storage, transportation, waste management), floating on the surface of water bodies as a discrete mass, and are carried by the wind, currents, and tides.

How do Oil Spills Happen?

There are many different kinds of oil spills, and the majority of them are small. One sort is when oil leaks off a ship while it is being returned to service. Nonetheless, major

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occurrences, like the Mauritius oil leak in 2020, might have long-lasting effects. Major oil spills often occur when a pipeline bursts, a ship sinks or runs aground, or an offshore drilling operation goes awry.

Oil Spill Variables

Oil spills can happen for a number of causes, such as the natural seepage of oil from the ocean floor, the transfer of oil by ships, and oil drilling operations. The world's marine and terrestrial ecosystems may be significantly harmed by petroleum, which can also contribute to pollution. Due to mishaps, collisions, or equipment failure, the transportation of oil by ships may result in oil leaks.

Oil spills may additionally result from oil drilling efforts, as confirmed by way of the Deepwater Horizon oil catastrophe in 2010, which turned delivered on by using a natural gas rush that tore through a concrete center that had just been installed area to seal an oil well for destiny usage. Since the oil on ocean surfaces prevents sufficient daylight from having access to the surface and lowers the quantity of dissolved oxygen, it's far riskier for many sorts of aquatic lifeit's far risky to many sorts of aquatic life. Oil may physically injure plants and animals by covering them, removing their insulating qualities, and placing them in danger of hypothermia. Fishing is one of the businesses that may be significantly impacted by oil spills.

Effects of Oil Spill on Coastal Habitat

Marine life and coastal habitats are severely harmed by oil spills. Adult fish may have slow growth, large hearts, altered heart and breathing, worn fins and reproductive difficulties when exposed to oil. Fish eggs and larvae may be particularly susceptible to lethal and non-lethal effects. Oil can render fish and shellfish dangerous for human consumption even when no fatal effects are seen. Oil reduces a bird's capacity to resist water and the insulation that fur-bearing mammals like sea otters provide, leaving these animals vulnerable to the weather. If birds and animals cannot withstand water and protect themselves from the cold, they will die from hypothermia. Also, young sea turtles can mix the oil with food and get stuck in it. When dolphins and whales inhale the oil, it can affect the lungs, immune system and reproductive system.

Effects of Oil Spill on Marine Life

Corals, fish and shellfish will not come into contact with the oil, but the oil may be diluted in water if they may come into touch with it. Adult fish exposed to oil can cause growth retardation, enlarged liver, heart and respiratory changes, fin erosion, and impaired reproduction. Fish eggs and larvae can be particularly vulnerable to harmful effects, both fatal and nonfatal. Young sea turtles may be caught in oil after mistaking it for food (Rout and Sharma, 2013).

The oil can be inhaled by fish and shellfish and can affect the lungs, immune system and reproduction. When animals and birds try to clean themselves, they often drink oils that are toxic to them.

Due to their inability to break down the components of crude oil, primarily PAH, mussels gather oil during the filter

feeding mostly through their gills, which subsequently exposes their tissues to very high amounts of PAH relative to the surrounding environment. Moreover, oil spills have the potential to negatively impact breeding and reproduction, such as by polluting shoreline nests of birds or turtles, reducing their viability, or smothering eggs before they hatch. Females exposed to oil may produce eggs with brittle, thinner shells.

Destruction of Habitats

Coral reefs, marshes, and mangroves are a few examples of maritime environments that can suffer considerable harm from oil spills. The destruction of these habitats might result in a cascading impact that would affect the whole ecosystem, including the environment's ability to support life.

Water Contamination

Coral reefs, marshes, and mangroves are a few examples of maritime environments that can suffer considerable harm from oil spills. The destruction of these habitats might result in a cascading impact that would affect the whole ecosystem, including the environment's ability to support life.

Long-Term Effects

Even decades after the initial spill, the impacts of oil spills can still be felt. The noxious chemicals may stay in the ecosystem even after the outward indications of pollution have vanished, continuing to endanger both animals and people.

Economic Impacts

Communities that depend on marine-related sectors like fishing, tourism, and others may suffer serious economic effects as a result of oil spills. These industries can be required to shut down for good or for worse, costing people their jobs and money.

Disruption of the Food Chain

By making less food available to higher-level predators, oil spills can upset the balance of the food chain. The populations of fish that eat plants and plankton as well as other creatures that rely on them can be affected by the loss of plants and plankton. This might start a domino effect that eventually affects larger predators like dolphins and whales.

Effects of Oil Spill on Public Health

On the public's health, oil spills can have a big impact. Lowered immunity, heart difficulties, and lung problems can all be brought on by exposure to dangerous substances discharged during an oil spill. Indirect effects on public health are another possibility for oil spills. Hospitals and other important services may be shut down if gasoline imports are disrupted as a result of an oil spill, especially in regions that are already experiencing war and fuel shortages. Fine particulate matter increases the likelihood that patients with these illnesses may need to be hospitalized, and pollution from oil spills can affect cardiovascular and respiratory health.

Maritime Oil Spill Response Strategies

Prevention based on "safety culture" and optimal recoveries

focused on scientific and technological knowledge is the guiding concepts of responding to maritime oil spills. Damage to the economy, society, and environment is now solely the responsibility of the polluter. As a result, the marine sector must now prioritize safety culture on both a technical as well as political level. Cross-disciplinary oil spill management is a very difficult and demanding task. The nature of the substance spilled, changes in its chemical and physical properties (weathering) and bioremediation, local environmental circumstances, the sensitivity of impacted natural resources, and potency of response/ clean-up technologies are just a few of the many issues and activities that are combined in the decision-making process under emergency conditions (Ornitz and Champ, 2002).

Increasing Oil Spill Prevention in Aquatic Ecosystem

The best method to minimize the harm that oil spills do to aquatic environments is to prevent them from happening in the first place. In order to limit the harm done to the ecosystem, it is crucial to act swiftly to contain and clean up an oil spill. The following actions are possible:

- **Prevention:** Preventing oil spills from occurring in the first place is one of the most effective strategies to manage them. This may be achieved by keeping the equipment in good condition, educating the staff, and putting safety measures into practice.
- **Early detection:** By detecting an oil leak quickly, the harm it causes can be reduced. Satellite images and remote sensing technology can be used to discover things early.
- **Containment:** It is the next action to take once an oil leak has been discovered. Booms, floating barriers intended to confine the oil and stop it from spreading, can be utilized to do this.
- **Cleanup:** Cleaning up the oil spill is the following step once the oil leak has been stopped. A number of techniques may be used to do this, such as the employment of skimmers, which are tools that can gather oil from the water's surface, and dispersants, which can disperse the oil into smaller droplets.
- **Restoration:** Following the cleanup of the oil spill, efforts should be undertaken to restore the environment that was

harmed. Reintroducing indigenous species, maintaining the ecology, and taking action to stop more oil spills are all ways to do this.

Conclusion

Spills in aquatic habitats can affect fish, plants, and other animals, resulting in a reduction in biodiversity and the stability of the ecosystem. Oil spills, for instance, can leave a coating on the water's surface that prevents sunlight from accessing the bottom layers, interfering with photosynthesis and harming the growth of plants, algae, Fish and other animals that depend on these organisms for food may also decline as a result of this. Spills can have a substantial negative impact on aquatic ecosystems as well as human health (lung problems, heart problems, and an increased risk of cancer), emphasizing the significance of spill prevention and prompt, effective spill response.

References

- Burger, A.E., Fry, D.M., 1993. Effects of oil pollution on seabirds in the Northeast Pacific. In: *The Status, Ecology, and Conservation of Marine Birds of the North Pacific*. (Eds.) Vermeer, K., Briggs, K.T., Morgan, K.H., Siegel-Causey, D. Ottawa (Canada): Canadian Wildlife Service. pp. 254-263.
- Chilvers, B.L., Morgan, K.J., White, B.J., 2021. Sources and reporting of oil spills and impacts on wildlife 1970-2018. *Environmental Science and Pollution Research* 28(1), 754-762. DOI: <https://doi.org/10.1007/s11356-020-10538-0>.
- Ornitz, B.E., Champ, M.A., 2002. Preface. In: *Oil Spills First Principles: Prevention and Best Response*. Ornitz, B.E. and Champ, M.A. Elsevier Science, Netherlands. pp. 9-22.
- Rout, C., Sharma, A., 2013. Oil Spill in Marine Environment: Fate and Effects. In: *2nd International Conference on Evolution in Science & Technology & Eyne on Educational Methodologies*. March 3-4, ESTEEM-2013, PPIMT, Hisar, India. pp. 326-329.