

Oil Spills: Bane for Aquatic Life

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Abstract

Man and environment are inter-related; they cannot be isolated from each other. The relationship between human being and environment is symbiotic; involving both resources (opportunities) and hazards (constraints).

However, this relationship was affected by the change in organization and attitude of society. In the present day one finds various manifestations of environmental stresses and changes which are linked to one another. Anthropogenic disasters are caused directly or indirectly by human action or inaction. One such hazard is oil spills which have grave environmental impact on Marine Biota. This paper focuses on the nature of oil spills, its causes, effects and remedies to avert it. Oil spills into bays, rivers and oceans through oil leakages, breakages of oil tankers, refineries, drilling ridges, etc. which impacts/ affects birds, fishes, mammals, coral reefs and also adversely affects the tourism and economy of the country. Clean-up options may evolve chemical dispersal, mechanical cleanup, flushing or burning. Oil spills are serious threat to environment and have to be dealt systematically.

Keywords: Hazards, Marine Biota, Breakages, Environmental stress, Clean-up.

Introduction

The present paper focuses on "What oil spills are", its causes, effects and suggested clean up options. Oil spills in various water bodies through natural and anthropogenic causes, affects marine life and stress the environment. Clean-up options are highly expensive and time consuming. Oil spills are threat to the environment and timely remedies have to be exercised to make environment clean and healthy.

Aim of the study

The aim of the study is to have an insight into the anthropogenic hazard—oil spills, caused by human negligence and inaction. The causes of oil spills and its effect on environment, ecosystem, tourism and economy is also dealt with in the paper.

Review of Literature

Broadly two types of analysis are available on the subject:

1. There are many articles and research papers published in books and journals which highlight the issue.
2. There are few online comments and reaction posted on the net by environmentalists after some disastrous oil spills, wherein the environmental hazards caused by spills have been discussed.

Research Design

1. To examine the causes of oil spills.
2. To analyze the effects of oil spills on environment, economy and tourism.
3. A peep into the world's worst oil spills.
4. Clean-up options.

Man and environment are inter-related and cannot be isolated from each other. The relationship between human beings and environment is symbiotic; involving both resources (opportunity) and hazards (constraints). This relationship has undergone a tremendous change with the passage of time. Early human beings considered environment to be all pervasive, dominant and pious. In the Vedic literature Mother Earth is personified as the 'Goddess Bhumi' or *Prithvi*. The resources were abundant and endless and could be exploited for human benefit. It is precisely the "benefit" that entered into the relationship between human beings and environment which changed the dynamics of the relationship.

This change in the relationship between man and environment was affected by the change in organization and attitude of society. Technological advancements in air, land and water; lighting of fire, agricultural production of food and industrial revolution, opened the flood

gates of anthropogenic pollution of air, land and water, to the extent that the very existence of life on mother earth is in jeopardy.

In the present day world, one finds various manifestations of environmental stresses and changes which are linked to one another. Anthropogenic disasters are caused directly or indirectly by human action or inaction, errors involving a failure of manmade system at times. They can be catastrophic, causing extensive damage to the environment, resulting in human loss and devastation. These hazards adversely affect humans, organisms, biomes and ecosystems. This paper will discuss the environmental hazards caused by oil spills and its impact on marine Biota and remedies for its cleaning.

For the last three decades, the issue of oil spills has taken an unprecedented importance because of the multitude of environmental problems generated by it. Oil spills can be categorized into two groups. Firstly, the earth has large reserves of oil and gas which is trapped beneath its surface. Occasionally, these reserves may develop cracks which results in the seepage of oil or gas into the water. This is a natural phenomenon causing no major damage. However, this becomes an anthropogenic hazard because of human interface causing colossal damage to marine ecosystem. Secondly, oil and mineral gases are often mined from the prospecting areas for human utilization. However, during the process of extraction, transportation, storage, drilling rigs, offshore oil platforms, a considerable amount is spilled in the water bodies causing damage to water bodies.

Causes of Oil Spills

Oil spills into bays, rivers and oceans mainly by accidents involving tankers, barges, drilling rigs, etc.

Oil Pipe Leakage

The most frequent cause of oil pollution is caused by leakage in the huge pipelines that are laid across the ocean. The leakage though small, still produces catastrophic results. Leakages may also occur from underground and above storage tanks and containers.

Breakage of oil tankers

Sudden Spill from oil tanker failure/breakage involves large amounts of oil spill (sometimes thousands or may be million of gallons). For example the remnants of the Exxon Valdeg Spill off the Alaskan Shoreline due to ship failure in the late 1980's can still be found affecting our environment.

Operational Oil Spills

This kind occurs during the cleaning of ships releasing oil into the navigable waters. Though per ship leak may be less but combined number of ships may indicate substantial release

a. Unskilled man power and Disaster at offshore productions are also the possible causes of oil spills.

Effects of Oil Spills on Marine Biota

Fish and Fisheries

There is much evidence that fishes are affected both by spilled petroleum and chronic pollution by refined petroleum products. Though the

slimy mucus on the gills of the fish makes them somewhat resistance to oil but a lot of oil spilled on the ocean causes a decrease in photosynthesis and consequently, a lowering of oxygen levels in the water. The greatest harm from spillage and chronic pollution has effects on the eggs larvae and fry.

Birds and Mammals

Oil destroys the insulating ability of fur-bearing mammals and results in death from pneumonia or it can cause a loss in buoyancy upthrust and subsequent drowning. Birds, walrus and sea lions get oil deposited on their feathers which causes non water repellency without the ability to repel water, birds die of hypothermia.

Coral Reefs

These are marine ecosystems generally formed in tropical oceans and are an abundant source of biological diversity with thousands of species. Oil deposits on the corals when the water level drops at low tide or probably when heavy oil gets mixed with sand or sediment and becomes dense to sink below to smother the corals. Oil deposition can kill them and impede their growth, reproduction and development. The entire coral reef can be affected by oil spills, resulting in death of many species of fish, crabs and other marine invertebrates that live in and around coral reefs.

Benthic and Inter-tidal Organisms

These organisms like molluscs, crustaceans, echinoderms, polychaetes, coelenterates and hydroids spend a large chunk of their lives at the bottom of the sea. Out of these, many like lobsters, oysters, scallops and clams, not only constitute an important fisheries resources but also are amenable to mariculture. These creatures are very susceptible to oil pollution because most of them inhabit the inter-tidal zone where they are likely to be coated with oil, resulting into heavy mortalities.

Mangroves

Mangrove forests are most vulnerable to oil spills. The spill coats the exposed roots of the mangrove trees and plugs the air-breathing pores and suffocate the trees. The entire mangrove environment can be peeled by an oil spill with impacts and calamities not only to the marine life but also to humans living near these protective ecosystems.

Sea-Grass Beds

Sea grass beds along the coasts are sites which provide food and shelter to a multitude of marine life including numerous fishes and manaties. Critics assert that, "oil can smother sea grass, robbing these gentle giants of their food sources... oil gets into manaties eyes and sensory hairs on their noses when they surface to breathe, causing inflammation and infection... impairing their ability to breed and feed"

Effects on Economy

Other than environmental damages, oil spills have a tremendous impact on the economy of a country. When precious refined petroleum or crude oil is spilled, it results in its less availability thereby taxing the economy where government has to import more barrels from other countries. The cost gets multiplied manifold because, first clearing the oil spills is expensive and secondly the human labour involved is

at risk with health problems which in turn is compensated through government funds.

Effects on Tourism

The stink, dirt, sticky and huge tar balls, dead birds and animals present a very gory sight which prohibit the tourist influx to those areas which witness oil spills. Due to spills various water activities like rafting, sailing, swimming, fishery, etc. are hampered which indirectly affect the economy of the country.

Deadly- Toll

Worst Oil Spills

(Courtesy : wikipedia & Hindustan Times)

Center for Biological Diversity Report mentions BP Deepwater Horizon catastrophe in 2010 as the worst environmental disaster in U.S. in which 205.8 million gallons of oil and 225,000 tons of methane were leaked into the Gulf of Mexico. A year after in April 2011, "the number of birds, sea turtles, dolphins and other animals sickened or killed and tallied as part of Govt. official count represents a small fraction of total animals harmed by this disastrous spill... Dolphins are miscarrying, and pelicans are attempting to nest on beaches polluted with tar balls and surface oil. The disaster killed approximately 82000 birds of 102 species, 6,165 sea turtles and upto 25900 marine mammals... unknown number of fish including tuna and crabs, oysters, corals etc. have been found dead.

(<http://en.m.wikipedia.org>)

Chennai Oil Spill of Feb. 2017

Around 40 tonnes of oil sludge and 27 tonnes of oil and water mixture was recovered. The sludge washed ashore 800m of shoreline North of Chennai Harbor and a 2-3 km stretch at the popular Marina Beach. A large number of turtles, fish and prawns coated in oil were found dead

Conclusion

Clean-up operations depend upon the location of the spill, potential hazards and the intensity and current of sea waves. The recommended methods are as follows:

Dispersants to break down the oil

This method employs the use of chemical dispersants which help in breaking down the slick into droplets of oil which makes it easier for oil to mix with water and get absorbed in the aquatic system. This method is effective where there is less marine life.

Biodegradation

In this method bacteria and other microorganisms break down the oil into harmless substances, such as fatty acids and carbon dioxide. Fertilizing nutrients like Nitrogen and phosphorus are added to expedite the growth of micro-organism.

Use of Skimmers

Oil spills can be contained with the help of booms and collected from the water surface using skimmer equipments. Spill oil floats on water and forms a slick which is thereafter removed using booms.

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