

Status of Oil Pollution in Indian Coastal Waters

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Focal Points at a Glance

In this contribution, the authors keep us informed and bring to our attention the various adverse aspects of oil pollution on marine organisms. They explain that marine ecosystems of India are already stressed by overfishing and destructive fishing practices, toxic pollution, and climate change. These are now facing additional threats from large oil spills. Every year, millions of litres of oil enter the ocean from routine ship and car maintenance, off shore oil drilling operations and ship spills. Effective oil spill management policy and efforts are needed to be in place to reduce the menace of oil spill incidents in our country.

Introduction

India's 8118 km long coastline is noted by the presence of a vast network of backwaters, estuaries, creeks, lagoons, mangrove and coral reefs. The total area of mangroves in India is estimated to be 4827 km² that includes the Indian side of Sunderbans, the world's largest mangroves centre. More than 5,000 species of marine flora and fauna have been recorded so far from the coastal and marine waters of the country. In this background, there is an urge to protect and conserve the coastal and marine habitats by making all man-made production activities sustainable. The beaches and the adjoining land area are the most affected as these are extensively used for recreation, relaxation and amusement.

Among various sources of pollution, the oil pollution in various dimensions, impacting the flora and fauna, is the most devastating. Oil spills occur through accidents of ships and tankers, grounding of ships, rupture of seabed, onshore oil pipelines, and offshore oil production and exploration platforms. Such oil spills severely affect habitats including beaches and their adjoining land, causing irreversible damage to biodiversity as well as creating an un-aesthetic appearance. India produced roughly 880 thousand barrels per day of oil in 2009 from over 3600 operating wells. According to the Oil and Gas Journal (Petzet, 2010), India has approximately 5.6 billion barrels of proven oil reserve and approximately 38 trillion cubic feet of proven natural gas reserves, the second largest amount in the Asia-Pacific region after China.

Sources of oil Spill

Sources of oil spill are offshore, within territorial regions, the EEZ or in the international waters.

Natural seepage from sea bed

Seepage can occur either through a fault zone extending to the seabed, or

because of the absence of an impervious cap rock. Seepage from small shallow oil sources below the seabed can also contribute to leak of oil into the sea. Most of the total oil coming to the sea surface is through natural seepages.

Ship-borne oil spills

Oil spills from the ships can be prevented by following International Maritime Organization (IMO) conventions as well as the International Convention for Prevention of Marine Pollution from Ships Conventions 1973 as modified by the Protocol of 1978 (MARPOL 73/78) requirements. These should be strictly followed by all sea going marine craft, including drilling rigs. Oil spills can be (1) operational (occurring due to the malfunctions of oil water separators and other shipyard systems), (2) due to contraventions of conventions and rules, and (3) accidental.

Upstream exploration and production

This covers a wide range of activities in the offshore region. Major oil spills may occur in the event of blowouts,

failure of structure/equipment or rupture of risers and pipelines. During operations, minor spills may occur due to valve or equipment leakages.

Ports and terminals

Accidents such as collisions between ships or groundings in ports or navigation channels may lead to major oil spills in ports and oil terminals. In India, there are twelve major ports, which come under the administrative control of the Ministry of Shipping, Government of India. A large number of other minor ports are governed by the Indian Ports Act, but administered by the State Governments. As India is a signatory to the Oil Pollution Prevention Conventions (OPRC), certain minimum facilities and equipment are required to be maintained at ports to deal with operational and accidental oil leakages as well as to receive contaminated ballast from tankers.

Refineries and processing plants near the coast

These include all industries located on the coast such as refineries, chemical and petrochemical plants dealing with a wide range of hydrocarbons and other derivative chemicals. Barring accidents and other exceptional events, there is little risk of operational leakages to the marine environment from well-managed processing plants.

Oil spill incidents in India

Oil spill incidents have occurred in various parts and at different times along Indian coasts and some of the major events from 1970-2011 are summarised in Table I. During the period between 1970s and 2011, there were about 79 major and minor oil spill incidents in Indian waters spilling quintals of oil into coastal ecosystem.

Several factors are responsible for a major oil spill in Indian waters, mainly occurring during the transport

of oil across the oceans. Oil is mainly transported by barges, tankers, pipelines and trucks, each having its own risk that can lead to an accident. A very recent accident occurred in August 2010 involving MSC Chitra and MV Khalijia, which resulted in about 800 tonnes of oil spill in the Arabian Sea. This oil spill adversely impacted the regeneration of 1,273 ha of mangroves (CNN IBN, 2010). Likewise, pipelines which transport oil can develop leaks or cracks, allowing oil to seep into the environment. For example, a leakage in the Mumbai Urban Trunk (MUT) pipeline operated by the Oil and Natural Gas Corporation (ONGC) caused a 1.6 kilometre spill off the coast of India on 21 January, 2011, resulting in about 30,000 barrels of crude leaking into the ocean (*Business Line*, 2011).

Effects of oil pollution on marine organisms

The extent of damage caused by an oil spill depends upon the quantity of the oil spilled, the type of oil, and the prevailing oceanographic and meteorological conditions of the area where the spill occurs. The first to be affected in the ecosystem are the primary producers, such as phytoplankton, which is at the base of the marine food chain. Other free swimming organisms such as fish larvae, and fish, are also affected, when they come in contact with the oil. The gills of the fish are clogged by the oil, preventing and leading to their death. When the oil eventually sinks, it affects the benthic organisms such as clams, and mussels, as tar particles are deposited in the mantles of these organisms, arresting their physiological activities including respiration.

The oil spill also affects mangroves, coral reef ecosystems and the nursery grounds of many marine aquatic animals. Oil kills plants and animals in the estuarine zone and the oil that settles on beaches kills organisms that


live there. Oil poisons algae, disrupts major food chains and decreases the yield of edible crustaceans. Oil endangers fish hatcheries in coastal waters and contaminates the flesh of commercially valuable fish. Because of recent oil spill due to collision between MSC Chitra and MV Khalijia oil there was a killing of near about 150 sting rays (*Himantura uarnak*) and a dolphin along the beaches at Uran and Mandva respectively. Although oil as such may not be highly toxic, the spill with other chemicals and pesticides is likely to produce synergistically far more hazardous, long-lasting impacts on the marine ecosystems.

Conclusions

Marine ecosystems of India are already stressed by overfishing and destructive fishing practices, toxic pollution, and climate change. These are now facing additional threats from large oil spills. Every year, millions of litres of oil enter the ocean from routine ship and car maintenance, off shore oil drilling operations and ship spills. Effective oil spill management policy and efforts are needed to be in place to reduce the menace of oil spill incidents in our country.

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CMFRI gets 19.75 m long Research Vessel

Fisheries Research Institutes in the country are facing various challenges, Dr. B. Meenakumari, Deputy Director General (Fisheries) of ICAR is learnt to have said at a function organised at the Central Marine Fisheries Research Institute (CMFRI) in connection with handing over a new research vessel for CMFRI. She also said, according to a report that "Research institute are often

forced to outsource personnel for operation of their research vessels as institutes are not able to pay a heavy salary for the captain and crew".

The research vessel F V Silver Pompano, which was built at Goa shipyard was handed over to the CMFRI authorities at a function held at the National Institute of Fisheries Post Harvest Technology and Training jetty.

The vessel was built under the National Initiative on Climate Resilient Agriculture. FV Silver Pompano, which is 19.75m long, will be used for carrying out fisheries-related research in territorial waters. The vessel will be used for experimental trawl fishing - bottom and mid-water trawling using mid water trawl system and collection of oceanographic parameters and marine samples from the sea. 