# Oil Spills

**Source: TH**

## Why in News?

A Liberian-flagged cargo vessel carrying hazardous materials, including **calcium carbide** and **diesel**, sank off the Kerala coast, raising serious concerns over **oil spills.**

- **Calcium carbide (CaC2)** is a chemical that **reacts with seawate**r to release **acetylene gas**, which is **highly flammable** and hazardous.

## What are Oil Spills?

- **About: Oil Spills** refer to the release of **liquid petroleum hydrocarbons** into the environment, particularly into **oceans, rivers, or coastal waters** as a result of human activities.
- **Impact: Diesel, petroleum, crude oil, and other hydrocarbons** may be released from sources such as **tankers, offshore platforms, drilling rigs, or wells** which have **harmful** effects on **marine ecosystems, coastal livelihoods**, and **human health.**
    - **Marine Ecosystem:** Oil **coats the feathers of seabirds and fur of marine mammals,** leading to **hypothermia and death**. It **clogs fish gills, impairs reproduction**, and becomes toxic when ingested by marine life..
        - Oil films **block sunlight**, affecting **phytoplankton** and reducing oxygen levels. Coral reefs, mangroves, estuaries (e.g., Sunderbans) get smothered, disrupting ecosystems.
    - **Coastal Livelihood:** Oil spills **disrupt fishing, aquaculture, and coastal industries,** causing **economic hardship** for local communities.
        - Contaminated beaches and dead marine life **reduce tourism,** affecting livelihoods and regional economies.
        - **Cleanup and restoration efforts** lead to significant **financial burdens** on governments and industries.
    - **Human Health: Health and livelihood risks for indigenous communities** due to seafood contamination and reduced fish catches.

## What are the Measures to Clean Oil Spills?

| Method | Description |
|---|---|
| **Bioremediation** | Uses **oil-degrading bacteria** (e.g., *Cycloclasticus*, *Oleispira*) to **break down hydrocarbons**; eco-friendly and accelerates natural detoxification. |
| **Containment Booms** | **Floating barriers** that **restrict oil spread**, aiding in containment, recovery, and minimizing environmental impact. |
| **Skimmers** | **Mechanical devices** that **collect oil from the water surface** for safe disposal or recycling; effective when deployed quickly. |
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| **Sorbents** | They **absorb or adsorb** oil from water and are particularly u**seful for small spills or residual oil** after primary cleanup.<br><br>Natural sorbents (Straw, Volcanic ash), Synthetic (Polyester-derived plastic shavings). |
| **Dispersing Agents** | **Surfactant-based chemical**s that **break oil into droplets** for **faster biodegradation**. It is effective but may harm marine life due to its **potential toxicity.** |

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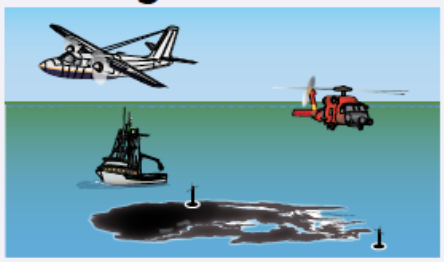
| **Mechanical Recovery**<br>  | Vessels maneuver containment boom to capture and concentrate spilled oil. Oil is then removed from the water's surface with a skimmer. Recovered oil is stored and disposed of. | + Oil is removed from the environment.<br>- Oil and water/debris must be stored.<br>- Resource intensive (vessels, people, equipment). |
| **Chemical Dispersants**<br>  | Chemicals are applied to the oil spill that break the slick into smaller droplets that mix into the water, avoiding contamination of areas like beaches or tide flats. | + Oil removed from the surface of the water.<br>- Oil is not actually removed from the environment.<br>- Impact of oil spill is shifted to below the ocean surface.<br>- Dispersants themselves may be toxic. |
| **In-Situ Burning**<br>  | Vessels maneuver containment boom to contain and thicken the slick. Oil is then burned off the water's surface in a controlled fashion. Oil contained by ice may be able to be burned as well. | + Oil removed from the surface of the water.<br>- Potential for air quality impacts due to smoke.<br>- Residue sinks if not collected and may be toxic. |
| **Tracking & Surveillance**<br>  | Spill observation and mapping via aircraft or marine vessel, tracking buoys, or infrared technology may be used to find the spill. | + Critical for determining the extent and trajectory of an oil slick.<br>- Method and effectiveness can be very limited by visibility. |
| **Shoreline Cleanup**<br>  | Spilled oil which reaches the shore can be collected through a variety of methods, including spraying down with hoses, soaking up with absorbent materials or digging (manually or with heavy equipment). | + Oil is removed from shoreline or displaced into the water for removal.<br>- Labor and time intensive.<br>- Impacts may have already occurred, or could be worsened. |

## What are the Legal and Institutional Frameworks on Oil Pollution Control?

- **Indian Legal Framework:**
  - **Merchant Shipping Act, 1958:** Serves as the **primary maritime legislation**. Incorporates provisions of the **International Convention for the Prevention of Pollution from Ships (MARPOL) Convention** to **regulate ship-borne pollution,** including oil discharges.
  - **National Oil Spill Disaster Contingency Plan (NOS-DCP), 1993:** Implemented by the I**ndian Coast Guard,** as a key **framework for coordinated oil spill response**.
    - Though **not legally binding**, it ensures **timely and integrated action** among stakeholders.
  - **National Green Tribunal (NGT) Act, 2010:** **NGT** provides a judicial mechanism for swift adjudication of environmental disputes, including marine pollution, and awards compensation for damages.
- **International Frameworks:**
  - **Bunker Oil Convention (2001): Ratified by India in 2015** under the **IMO**, this convention **ensures prompt and adequate compensation** for **damage caused by fuel oil spills from ships' bunkers,** protecting those affected by such pollution incidents.
  - **MARPOL 73/78 (Annex I)**: India is a party to this **key international convention** aimed at **preventing marine pollution from ship**s, covering both **operational discharges and accidental oil spills**.
  - **Civil Liability Convention (CLC), 1969 & International Oil Pollution Compensation Fund (IOPC), 1992:** Establish **liability and compensation mechanisms for oil spill damage**. Facilitate **financial recovery and legal recourse for victims** and governments in the event of tanker spills.

## UPSC Civil Services Examination Previous Year Question (PYQ)

### ***Prelims***

**Q. With reference to the United Nations Convention on the Law of Sea, consider the following statements:**

1. A coastal state has the right to establish the breadth of its territorial sea up to a limit not exceeding 12 nautical miles, measured from baseline determined in accordance with the convention.
2. Ships of all states, whether coastal or land-locked, enjoy the right of innocent passage through the territorial sea.
3. The Exclusive Economic Zone shall not extend beyond 200 nautical miles from the baseline from which the breadth of the territorial sea is measured.

**Which of the statements given above are correct?**

(a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1, 2 and 3

**Ans: (d)**

**Q. Which of the following can be threats to the biodiversity of a geographical area? (2012)**

1. Global warming
2. Fragmentation of habitat
3. Invasion of alien species
4. Promotion of vegetarianism

**Select the correct answer using the codes given below:**

(a) 1, 2 and 3 only

(b) 2 and 3 only

(c) 1 and 4 only

(d) 1, 2, 3 and 4

**Ans: (a)**

**Q. Biodiversity forms the basis for human existence in the following ways: (2011)**

1. Soil formation
2. Prevention of soil erosion
3. Recycling of waste
4. Pollination of crops

**Select the correct answer using the codes given below:**

(a) 1, 2 and 3 only

(b) 2, 3 and 4 only

(c) 1 and 4 only

(d) 1, 2, 3 and 4

**Ans: (d)**