OIL SPILLS - GS III MAINS

Q. Oil spills erode the marine ecosystems and its diversity. Discuss the impacts of oil spills on the coastal environment and suggest measures to reduce the same. (15 marks, 250 words)

News: *Aiming to control oil spill within two days: TN govt*

What's in the news?
- The Tamil Nadu government hopes to bring the oil spill in Ennore under control in the next two days, officials familiar with the matter said.

Oil Pollution:
- Oil pollution refers to the introduction of oil substances, primarily from anthropogenic activities, into the oceans, where it has detrimental impacts on the marine ecosystem.
- This type of pollution can come from a variety of sources and causes a range of negative effects, some of which are long-lasting and severe.

Key takeaways:
- There was an average of 1.8 large oil spills from tanker incidents every year in the decade from 2010 to 2019.
- In 2022, four oil spills were reported in which more than 700 metric tons of oil was leaked.

Sources of Oil Pollution:
Natural Sources:
1. Seepages:
- While oil seepages are more commonly noted in locations such as the Coal Oil Point Seep in the US, India too faces challenges from natural seepages in its coastal regions.
- The continuous release of oil through these processes can have adverse environmental effects

2. Volcanic Eruptions:
- While significant oil pollution from volcanic eruptions remains rare, there are significant risks involved, especially in regions prone to volcanic activities.
- Eg: The Indian Ocean which is home to several underwater volcanoes, is one such region.

3. Erosion:
- Erosion can sometimes contribute to oil pollution.

- In India, regions rich in geological formations, such as the Assam Basin, can potentially lead to oil substances being washed into the surrounding water bodies, presenting a notable environmental risk.

Anthropogenic Sources:

1. Oil Spills:
- Globally, incidents like the Deepwater Horizon spill and 2017 off the coast of Chennai when two merchant vessels collided resulted in a significant oil spill affecting marine life and local ecosystems.

2. Industrial Runoff:
- Across the world and in India, industrial activities near water bodies have led to pollution incidents.
- For instance, the recent oil spill in the Sundarbans, a UNESCO World Heritage Site, resulted from an oil tanker sinking.

3. Marine Transportation:
- The transportation of oil via maritime routes presents a consistent risk of oil spills.
- Globally, the 1989 Exxon Valdez oil spill and in 2010, the MSC Chitra collision off the Mumbai coast led to an oil spill are examples in this regard.

Impacts on the Marine Ecosystem:

1. Physical Smothering:
- In events such as the Exxon Valdez oil spill in Alaska (1989), numerous marine creatures got enveloped in oil, severely impeding their movement and ability to hunt, essentially strangling the vibrant life in those aquatic realms.

2. Toxic Effects:
- The Deepwater Horizon accident in 2010 highlighted the toxicological impacts of oil pollution, where marine fauna suffered due to the poisonous substances in oil, which can lead to hormonal imbalances and other health issues.

3. Human Health:
- Reports from various global regions post-major oil spills have indicated a rise in health issues owing to the consumption of seafood contaminated by oil, portraying the direct health risks posed to humans through the disruption of marine life's purity and health.

4. Reproductive Issues:
- Various research post-oil spills globally have recorded marine organisms experiencing reproductive issues due to exposure to oil pollutants, underlining the grave danger posed to the reproductive viability of marine species.

5. Food Chain Disruption:
- The Chennai oil spill in 2017, where the oil interfered with the natural diet of many marine species, inducing a domino effect that disturbed the entire marine food web, thus revealing the intricate interdependent relationships in marine ecosystems.

Impacts on India:

1. Threat to Biodiversity:

- India's marine biodiversity, including the vibrant coral reefs of the Andaman and Nicobar Islands, faces serious threats from oil pollution.
- For instance, the Mumbai oil spill in 2011 severely affected marine life, putting endangered species at even more risk.

2. Impact on Fisheries:

- The fishery industry is vital for India, both economically and for sustenance.
- Sadly, incidents like the oil spill from the ship MV Rak near Mumbai have shown a drastic decrease in the fish catch, affecting the livelihoods of the fishing communities gravely.

3. Tourism:

- Tourist paradises like Goa and other coastal regions can lose their allure with beaches getting polluted from oil spills. This not only tarnishes the beauty of these places but can severely affect the tourism industry, which is a substantial revenue earner for states with coastal belts.

4. Community Livelihoods:

- Coastal communities in regions like Kerala and Tamil Nadu rely heavily on the marine ecosystem for their livelihoods.
- Oil pollution jeopardizes their living, affecting not just their income but also their cultural and social fabric, as witnessed during the Ennore oil spill in 2017.

5. Air and Water Quality:

- The Mumbai oil spill in 2010 shed light on the deterioration of air and water quality, with locals experiencing adverse health effects, pinpointing the deeper environmental repercussions that extend to affecting the quality of basic natural resources essential for life.

WAY FORWARD

1. Strict Regulations:

- Need to leverage blockchain technology for better transparency. Just as the diamond industry uses blockchain for ensuring the ethical sourcing of diamonds, a similar strategy could be employed to ensure responsible shipping operations, minimizing risks of oil spills.

2. Virtual Reality (VR) Workshops:

- Taking inspiration from the success of VR in education sectors, communities near coastal areas can be sensitized through a series of VR workshops illustrating the catastrophic effects of oil spills, potentially spearheaded by organizations like UNESCO.

3. AI for Predictive Analysis:

- Leveraging AI, similar to IBM's PAIRS Geoscope which facilitates fast geospatial analytics, a tool can be developed to help in the predictive analysis of potential spill incidents based on various parameters, including weather patterns and shipping routes.

4. International Collaboration:
- The 'Global Maritime Forum' annual summit is a commendable initiative, encouraging dialogue and collaboration among maritime industry stakeholders to address sectoral challenges, including those pertaining to oil pollution.

5. Nano-Technology in Cleanup:
- Research projects like those undertaken by MIT on nanowire meshes to separate oil from water represent promising frontiers in advancing cleanup technologies, illustrating the potential effectiveness of nanotechnology in combating oil spills.

6. Solar and Wind Propelled Ships:
- Companies like Eco Marine Power in Japan are working on renewable energy solutions for shipping, establishing that a transition to cleaner energy sources in maritime transport is both feasible and beneficial.

7. Effective use of international mechanism:
- MARPOL Annex I clearly established the guidelines for oil pollution and ecological conservation.

To safeguard its rich marine biodiversity and the health and livelihood of its coastal communities, India must spearhead initiatives to curb oil pollution. The pathway forward should entail a harmonized effort to preserve the marine ecosystem, enhancing India's resilience against the devastating effects of oil pollution.