Oil Spills

Human Impact on the Marine Environment

By Raphae Posner
Sources of Impact

Overview

- 29 million gallons of oil enter North American oceans yearly as a result of human activities.

- “Nearly 85 percent of the 29 million gallons of petroleum that enter North American ocean waters each year as a result of human activities comes from land-based runoff, polluted rivers, airplanes, and small boats and jet skis, while less than 8 percent comes from tanker or pipeline spills.” (Stewart).
Sources of Impact
Consumption

- Accounts for the second largest source of oil in marine environments
- Vehicles dripping oil on pavement when in motion are one example of a human activity that contributes to oil in the oceans because rainfall washes oil on pavement towards bodies of water, such as the ocean
Sources of Impacts
Spills

- Oil spills are one of the greatest ways that humans impact the marine environment.
- The BP oil spill of 2010 is a prime example of the media communicating about such events.
- “The kind of oil spill we usually think about is the accidental or intentional release of petroleum products into the environment as result of human activity (drilling, manufacturing, storing, transporting, waste management)” (Global Marine Oil Pollution Information Gateway Â Facts Â Sources of Oil).
Why Is This Happening?

Human dependence on oil has led to an increase in offshore wells, posing a heightened risk for incidents such as the BP oil spill to recur.
Affects on the Abiotic Environment

- The abiotic factors of the marine environment are altered as a result of both the oil spill and the ensuing oil cleanup.

- Studies have shown that water temperature increases over a long period of time as a result of oil in the ocean.
  - This was illustrated in a study of a Texas stream where an oil spill led to an increase in the water temperature. In addition, the stream flow stopped.
  - There was a decrease in dissolved oxygen and an increase in carbon dioxide in the ecosystem.
Affects on the Abiotic Environment Continued

- Salinity levels do play a role in the effectiveness of cleanup efforts.

- “The impact of salinity on dispersant effectiveness is more pronounced at higher temperature than at lower temperature, i.e. the significance of salinity on dispersant effectiveness increased with increase in temperature” (Chandrasekar).

- An increase in salinity leads to an increase in the dispersion of oil, making it easier for the oil to spread at a higher salinity level.
Affect on the Abiotic Environment (Again)

- Harmful chemicals called Polycyclic Aromatic Hydrocarbons are in the substances used to clean up oil spills.

- Scientists are concerned about Polycyclic Aromatic Hydrocarbons (PAHs) because they are often carcinogenic and are present in many toxic pollutants.

- Chemicals such as PAHs alter the water quality, making the water harmful to the surrounding environment.
Affects on the Biotic Environment

- Oil spills affect tertiary consumers such as marine mammals because the harmful toxins and oil contaminate the mammals’ tissues.
- When an animal is in an area affected by the oil spill, it will attempt to clean itself and in the process it will ingest the oil.
- Oil in a mammal’s system is detrimental to internal organs and also damages the reproductive process.
- Sea turtles are affected by oil in a way similar to mammals; the sea turtle breathes in air and ingests oil into its system.
Affects on the Biotic Environment Continued

- Fish larvae are the most susceptible to the harmful effects of oil.

- Chemicals in crude oil, according to a study conducted by the National Oceanic and Atmospheric Administration, target the heart of fish and can also lead to heart failure in fish larvae.

- Additionally, oil clogs fish gills, making it so that the fish are unable to breathe.
Affects on the Biotic Environment (Again)

- The breeding and reproduction of marine organisms is greatly impacted by oil spills.

- If oil spills occur during the spawning season for fish, a large percentage of the larvae will die.

- As a result it will take years for the population of these fish to return to normal levels.

- Other organisms, such as marine mammals and sea turtles will also have depleted numbers due to a decrease in reproduction.
Recent Example: 2010 BP Deepwater Horizon

- Oil spilled into the Gulf for 86 days
- The final amount of oil released into the Gulf of Mexico as a result of the Deepwater Horizon spill was 206 million gallons of crude oil
- During the Deepwater Horizon spill, disaster plans were disorganized as it was unclear which department was handling the planning.
Laws Governing Oil Spills

- Oil Spill Prevention and Return to Yesterday Act of 2010 (OPSPREY Act)
  - Requires that applicants for a permit to drill for oil and gas on the outer Continental Shelf must submit and have an approved oil spill response and restoration plan.
  - The plan that is submitted must have the capability for a fast response and cleanup of any oil spilt.
  - The plan must include all equipment needed to implement this response.
  - There must be an environmental restoration plan that will restore the environment to the condition it was in prior to the spill.
Laws Governing Oil Spills
Continued

- Oil Pollution Act
- Clean Air Act
- Clean Water Act
Can It Be Fixed?

- Total prevention of oil spills is impossible, as accidents are always an inherent risk if humans’ use of oil continues.
- Efforts towards reducing the frequency and extent of these disasters are in action.
- The possibility of solving the issue of oil spills lies with the creators of the issue – humans.
How?

- Oil spills can be prevented due to:
  - Increased regulation from the government
  - Monitoring of offshore wells

- The House of Representatives has made plans to facilitate the cleanup and management of oil spills and offshore wells/rigs.


Thanks for Listening!