

Oceans, Water, Extreme Weather

I. Health Impacts

Marine Natural Disasters/Extreme Weather – e.g. tropical cyclones & hurricanes, tsunamis, floods

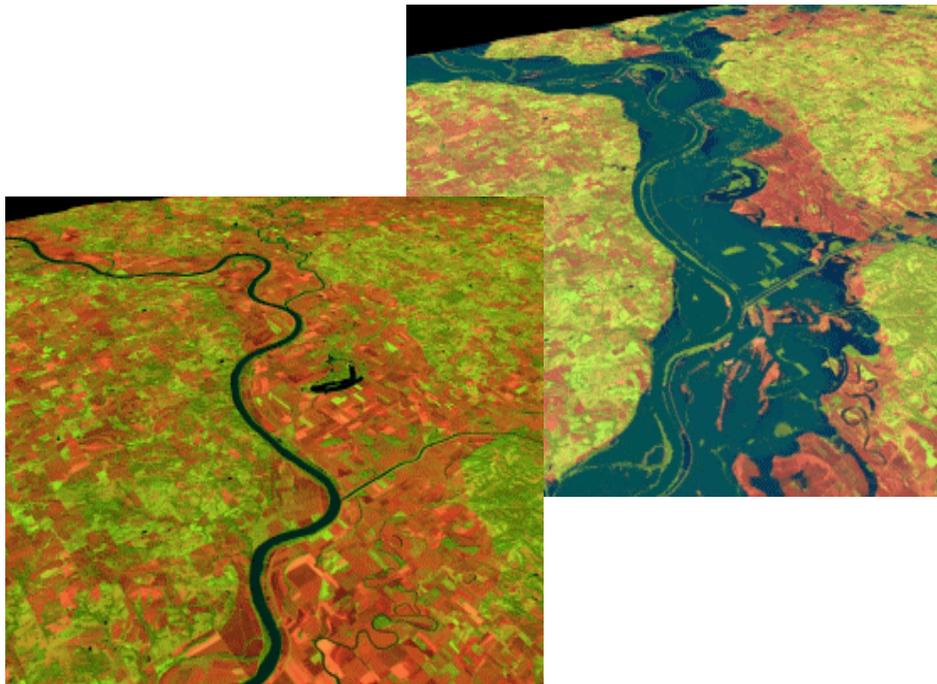
Infectious Diseases

- From human or animal waste
 - Viruses – hepatitis A and poliovirus
 - Bacteria – E. coli & Salmonella
- Marine pathogenic bacteria
 - Vibrio cholera
 - Harmful algal species

Harmful Algal Blooms (Blooms = excessive growth of microscopic algae, sometimes known as “red tides”)

- Neurotoxins - Interfere with metabolism and central nervous system

Contaminants – e.g., pesticides, fertilizers, metals, oil, PCB, PolyChlorinated Biphenyls (PCB), Persistent Organic Pollutants (POPs).



Before and after the flood of 1993: Landsat images of the Mississippi River, near the confluence of the Mississippi and Missouri Rivers, showing inundated land

II. Mechanisms

Marine Natural Disasters/Extreme Weather – e.g. Flooding

- Contamination of drinking water
- Infectious diseases spread
- Biological contamination of homes (mildew, mold, fungi)
- Loss of life and limb
- Flushing of sediment, animal wastes, agricultural products

Infectious/Waterborne Diseases/Contaminants

- Seafood = primary source of illness
- Sea spray
- Transportation – crew consumption, bilge water, discharges
- Recreation, daily activity
- Human waste disposal
- Storm sewers and runoff
- Agricultural runoff

Harmful Algal Blooms

- Seafood: shellfish, finfish
- Sea spray



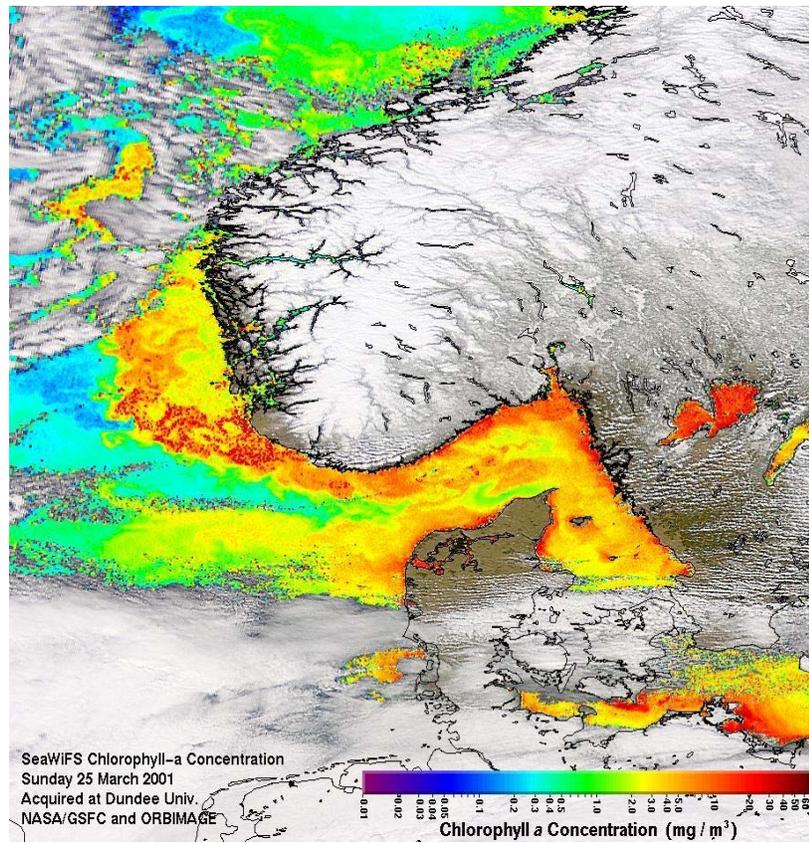
Sea-viewing Wide Field of View Sensors (SeaWiFS) image on September 23, 1999: Flood runoff in the aftermath of Hurricane Floyd carried an immense load of sediment – including soil, sand, sewage, fertilizer and pesticides, into the sea.

<http://earthobservatory.nasa.gov/Study/FloydFear/>

For further information on Harmful Algal Blooms:

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March 25, 2001: SeaWiFS Chlorophyll-a imagery is being used to monitor and predict the development of harmful algal bloom along the Norwegian coast where it has already killed over 1,000 tons of salmon in fish farms during previous week.

III. Satellite Sensors and Data Availability

- **ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer)**: Free of charge to scientists, educators and the community at large. <http://edcdaac.usgs.gov/dataproducts.html>
- **Landsat 7/Enhanced Thematic Mapper Plus on Landsat 7:** <http://landsat7.usgs.gov/>
- **MODIS (Moderate Resolution Imaging Spectroradiometer)**: For most MODIS data products produced after November 25, 2000, browse images are available. <http://edcdaac.usgs.gov/dataproducts.html>
- **NOAA AVHRR (Advanced Very High Resolution Radiometer):** <http://daac.gsfc.nasa.gov/data/>
- **RadarSAT/Synthetic Aperture Radar (SAR)**: <http://www.rsi.ca/>
- **QuikSCAT (Quick Scatterometer)**: (*access restricted*) http://podaac.jpl.nasa.gov/quikscat/qscat_data.html
- **SeaWiFS (Sea-viewing Wide Field-of-view Sensor):** <http://daac.gsfc.nasa.gov/data/dataset/SEAWIFS/> (*access restricted*)
- **TRMM (Tropical Rainfall Measuring Mission)**: The entire TRMM data set starting October 5, 1995 to present can be accessed free of charge online at <http://daac.gsfc.nasa.gov/>
- **TOPEX/Poseidon** – <http://topex-www.jpl.nasa.gov/>

For Additional information on Oceans, Water, and Extreme Weather:

National Research Council (2001). Under the weather: climate, ecosystems, and infectious disease. Washington, D.C., National Academy Press.

Committee on Environment and Natural Resources (CENR) (2000). National Assessment of Harmful Algal Blooms in US waters. Washington, DC, National Science and Technology Council Committee on Environment and Natural Resources.

National Research Council (1999). From monsoons to microbes: Understanding the ocean's role in human health. Washington, D.C., National Academy Press.

Epstein, P. R., B. H. Sherman, et al. (1998). Marine Ecosystems: Emerging Diseases as Indicators of Change. Boston, MA, Health, Ecological and Economic Dimensions (HEED), Harvard Medical School.