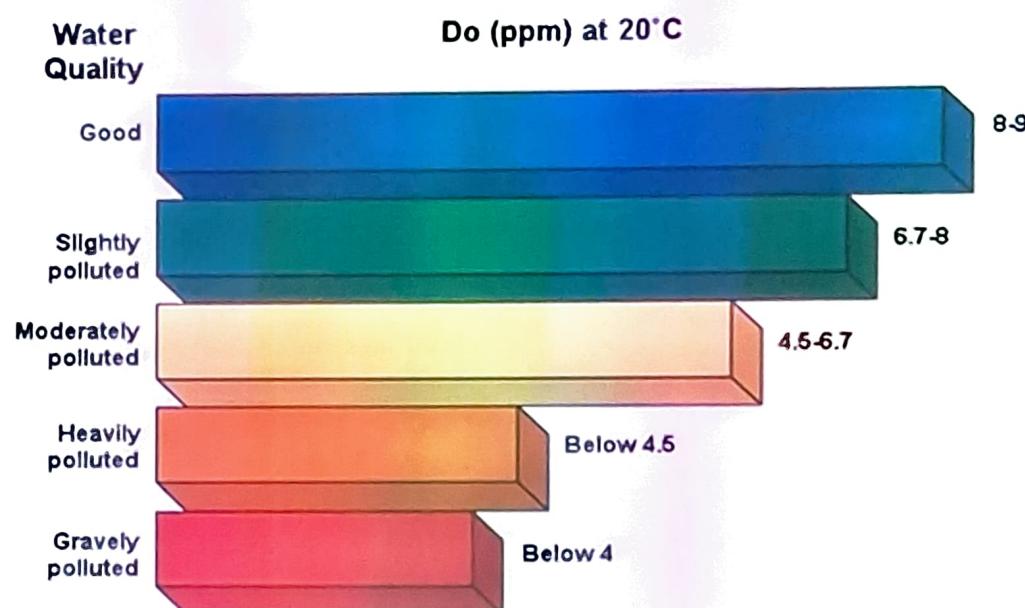


# How do we measure water quality

- ✓ Dissolved Oxygen: BOD Biological Oxygen Demand...  
the amount of oxygen consumed by aquatic decomposers
- ✓ Chemical Analysis: looking for presence of inorganic or organic chemicals
- ✓ Suspended Sediment  
water clarity



# How do we measure water quality

- ✓ Indicator Species: organisms that give an idea of the health of the water body.
  - Mussels, oysters and clams filter water



Oysters



Clams



Scallops



Mussels



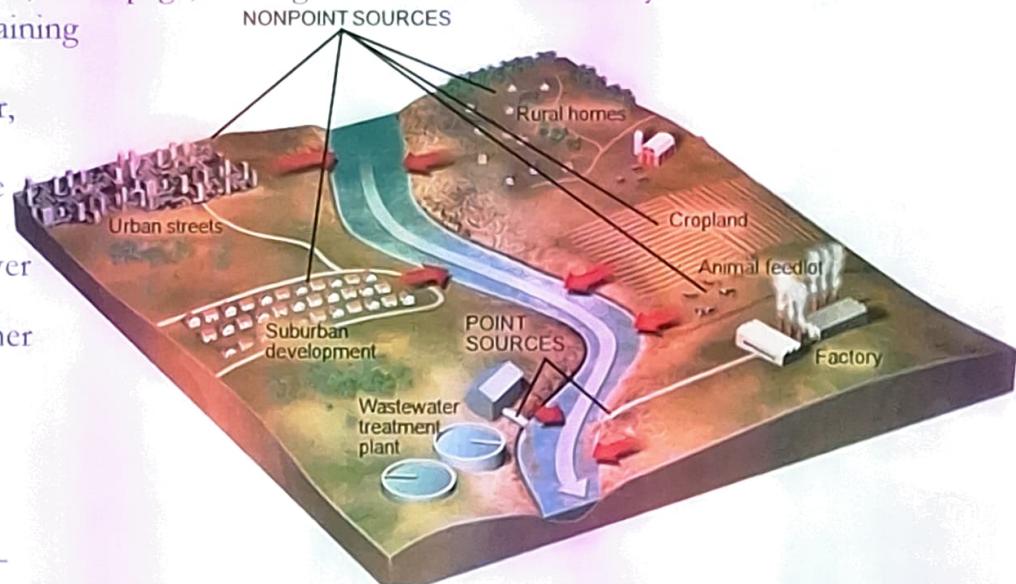
# Types, Effects and Sources of Water Pollution

## ✓ Point sources

- are specific, identifiable locations from which pollutants are discharged into the environment.
- The pollution originates from a single, fixed outlet or pipe, making it easier to monitor, measure, and control.
- Examples: Effluents from a factory outlet or sewage treatment plant pipe (water pollutants).
- Key feature: Easy to trace and regulate through treatment technologies or emission standards.

## ✓ Nonpoint sources

- are diffuse and widespread sources of pollution with no single point of origin.
- Pollutants are carried by runoff, wind, or seepage, making them difficult to identify and control.
- Examples: Agricultural runoff containing fertilizers and pesticides.
- Urban stormwater carrying oil, litter, and heavy metals.
- Soil erosion and sediment discharge into rivers.
- Key feature: Cumulative impact over large areas; requires preventive and management-based approaches rather than direct treatment.



# Major Sources of Water Pollution

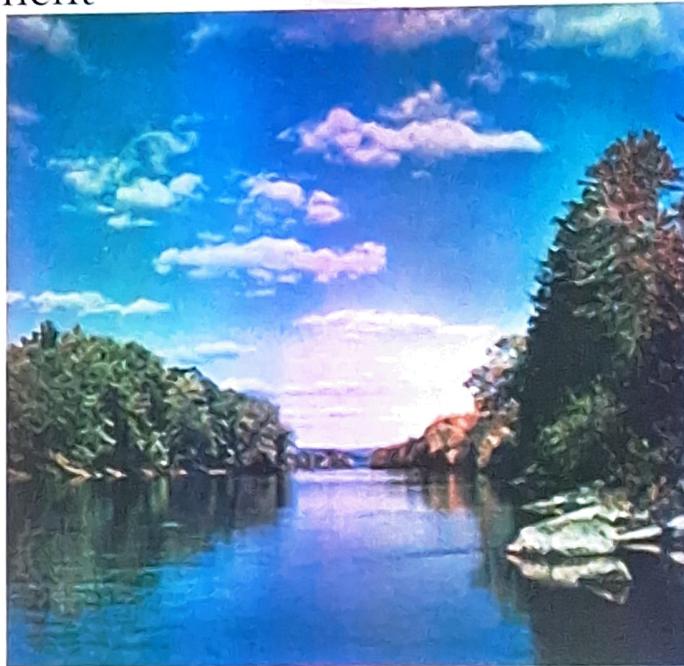
✓ Agriculture: by far the leader

- Sediment, fertilizers, bacteria from **livestock**, food processing, salt from soil irrigation

✓ Industrial: factories and powerplants

✓ Mining: surface mining toxics, acids, sediment

- Freshwater pollution: What are major problems in streams?
- Developed **versus** Developing Countries
- Lake Pollution: Why are lakes and **reservoirs** more vulnerable?
- What is **Eutrophication**?



# Major Sources of Water Pollution

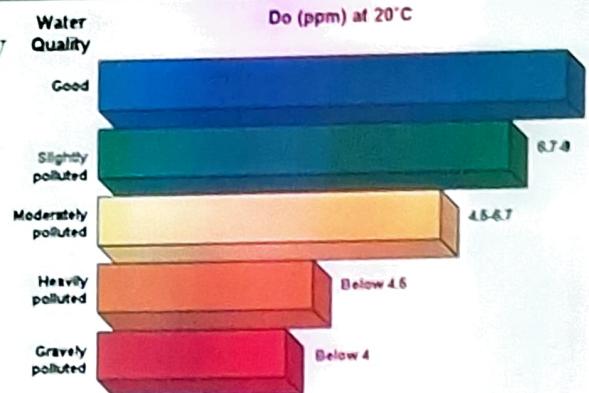
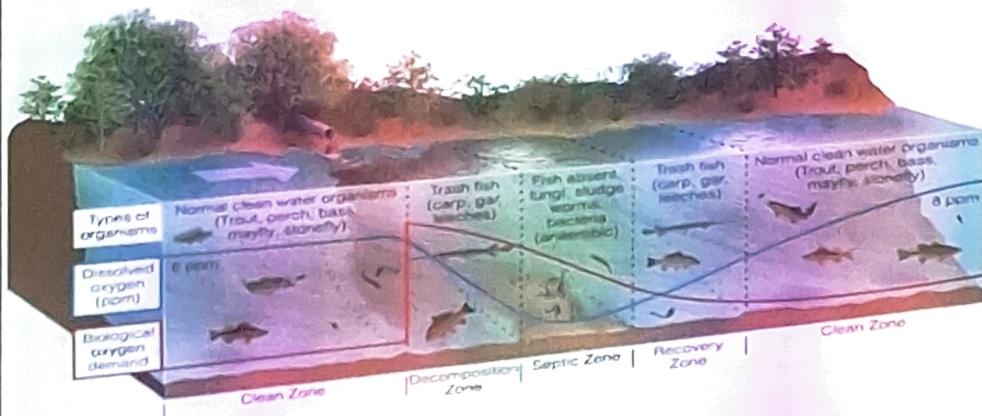
## ✓ Freshwater Stream Pollution

- Flowing streams can recover from moderate level of degradable water pollution
- Natural biodegradation process
- Does not work if overloaded or stream flow reduced
- Does not work against non-biodegradable pollutants



# Pollution of Streams

- ✓ Oxygen sag curve → Factors influencing recovery



- ✓ Two Worlds
- ✓ Developed Countries
  - ✓ U.S. and other developed countries sharply reduced point sources even with population and economic growth
    - Nonpoint still a problem
    - Toxic chemicals still problem
    - Success Cuyahoga River, Thames River

# Two Worlds

✓ Developing Countries:

✓ Serious and growing problem

- Half of world's 500 major rivers heavily polluted
- Sewage treatment minimal
- Law enforcement difficult
- Economic growth with little to clean up

✓ India's Ganges River

- Holy River (1 million take daily holy dip)
- 350 million (1/3rd of pop) live in watershed
- Little sewage treatment
- Used for bathing, drinking etc.
- Bodies (cremated or not) thrown in river
- Good news is the Indian government is work on problem



# Freshwater Lake Pollution

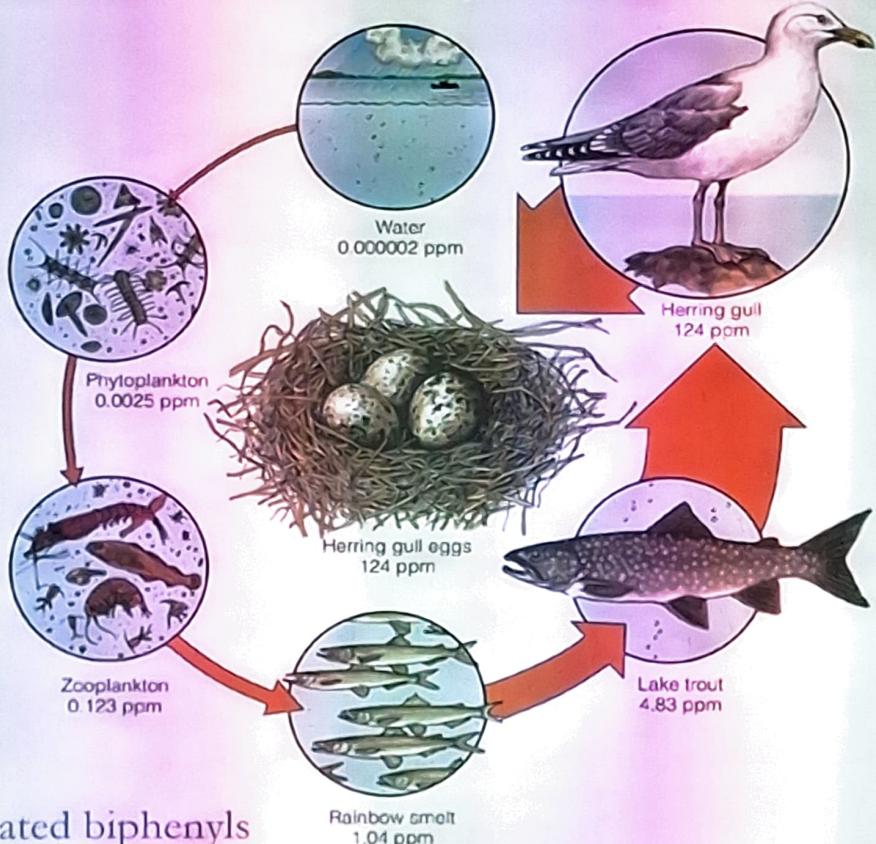
✓ Dilution as a solution in lakes less effective

- Little vertical mixing
- Little water flow (flushing)

✓ Makes them more vulnerable

- Toxins settle
- Kill bottom life
- Atmospheric deposition
- Food chain disruptions

- ✓ Biomagnifications of PCBs in an aquatic food chain from the Great Lakes.



PCB = Polychlorinated biphenyls