

# Water Pollution

#22- What is water pollution, how is it measured and what problems does it cause?

# What happened in Flint, MI?

- <http://www.cnn.com/2016/01/11/health/toxic-tap-water-flint-michigan/>
- Watch the film clip.
- Answer the Q's in your INB after.
- Pair share your thoughts/answers.

# What is Environmental Racism?

- Is the disproportionate impact of toxic air and water pollution on poor, largely minority communities (Black, Latino, Native American).
- **Why does it affect these communities more?**
  - Because they cannot easily move from these areas of toxic waste due to poverty.
  - Because these communities often don't have as much political power and privilege.
  - Because polluting businesses get too much push back from wealthy communities, so they locate in poor areas

# What is Environmental Justice?

- Is the movement to end the disproportionate pollution facing poor communities—especially communities of color.
- Activity- Film Q's & Data Sets

# ACTIVITY- LEFT SIDE INB

- FILM Q'S- Answer the questions.
- DATA SETS-
  - Look at the MAP and answer the Q's.
  - Look at the GRAPHS and answer the Q's.
- REFLECTION- Answer the prompts in a one-paragraph response

# What is Water Pollution?

- Is any chemical, physical or biological change in the quality of water that has a harmful effect on living organisms that drink or use it
- Water pollution occurs naturally but is mostly due to human activity
- **For Example:**
  - Sediments, metals, liquid, waste, heat, chemicals

# Water Pollution

## So What?

- All fresh and salt water sources in Oregon have traces of dioxin and mercury in them
  - Many pharmaceutical drugs can now be detected in fresh water sources
  - Waterways may never recover (on a human time scale) from damage.
- Awareness grew in the 1970's



# Two Categories of Water Pollution

- Point source (PS)
- Non-point source (NPS)



# Point Source (PS) Pollution

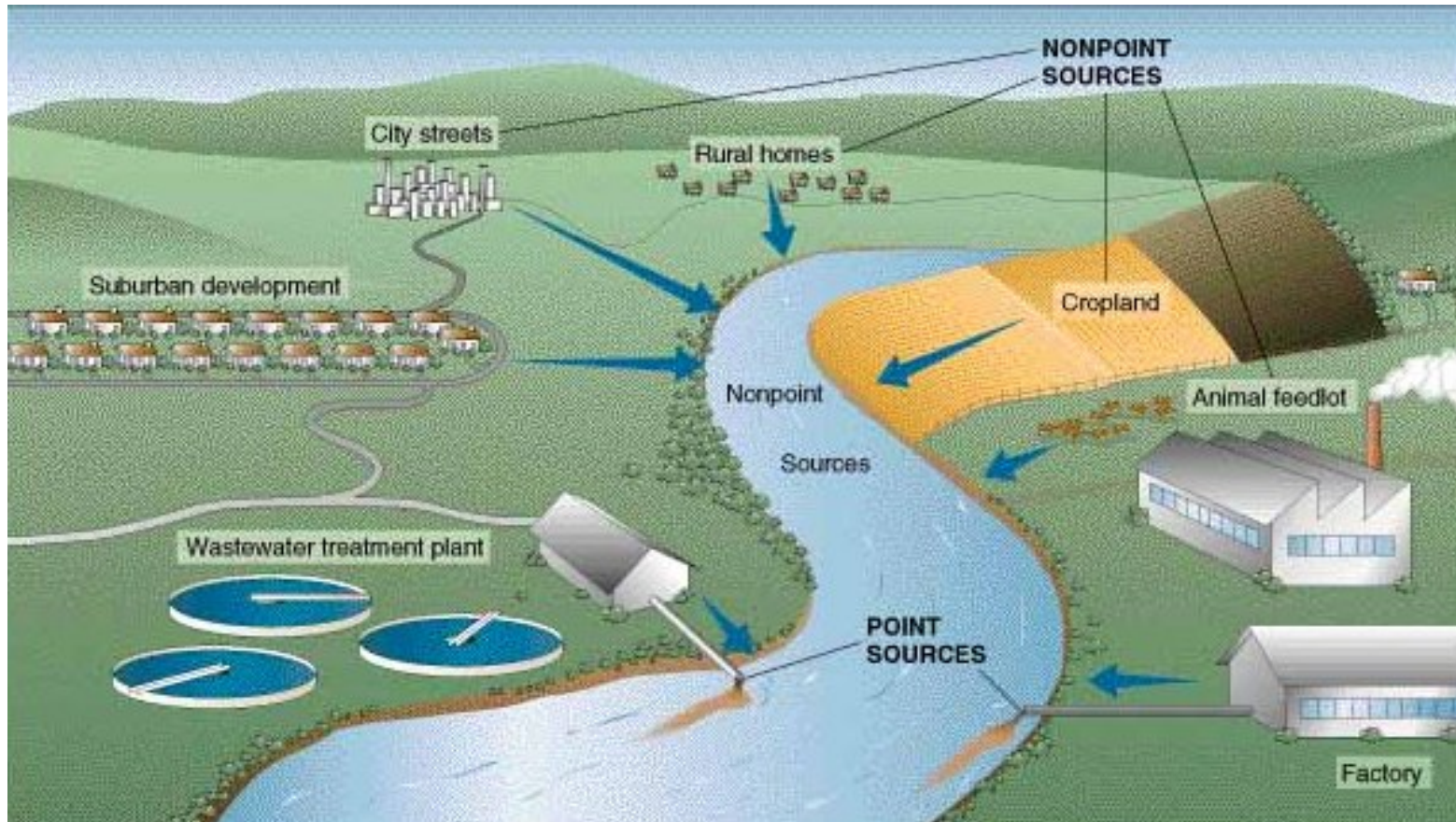
- Any water pollution that is identified as coming from one clearly established source
- From one identified source
- For example, from a factory, or a specific farm.
- It is easier to control because it's easier to address the cause or source. Fix the source and the pollution ends.



# Non-Point Source (NPS)

- Any pollution existing in water that cannot be traced to a specific location
- Examples: **Sediment** from rainwater, runoff from **fertilizers, animal waste, construction** sites, mines and landfills and acid rain from **atmospheric pollutants** that fall to earth in polluted precipitation
- It is more difficult to control because it cannot be traced to a specific location

# Point & Non-Point Source Pollution



# Is it PS or NPS?

- Lane County Regional Wastewater Treatment Plant
- Oil from roads
- Fertilizer and Pesticide runoff from yards and fields
- Weyerhaeuser Paper Mill in Spfld
- Animal manure
- Storm drains in Eugene
- Helen's leaking Septic Tank

# Film Clips: Poisoned Waters

- Show segment 2 (11 min at 11:56) and 10 (5 min at 1:18:00) from “Poisoned Waters”
- <http://www.pbs.org/video/frontline-poisoned-waters/> (42.40)



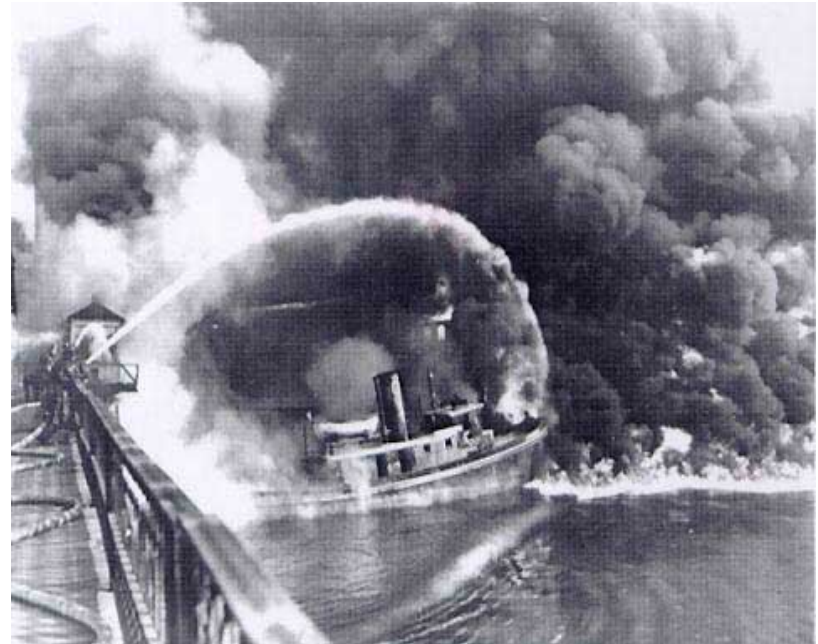
Show First Film Clip



# What is the Clean Water Act, 1971?

## What is it?

- A national law set up to restore and maintain the nation's waters.
- Its goals are to limit, reduce and eliminate the discharge of pollutants into navigable waters



# The Clean Water Act

## When was it passed?

- Enacted in 1972 and has been amended almost every year since.

• <https://www.wbur.org/hereandnow/2019/06/18/cuyahoga-river-fire-cleveland-environmental-movement>





# Clean Water Act

## Who carries out the Act?

- The Environmental Protection Agency (EPA) works with states to enforce the Act
- They are a federal government agency



# Clean Water Act, 1971

## What does the EPA do?

- Carries out and enforces laws to regulate pollutants discharged into waters in the U.S.
- The CWA Deals effectively with point-source (PS) pollution
- Sets levels of pollutants in water that are legally acceptable
- Mandated creation of wastewater treatment plants
- **TMDL:**
  - Total maximum daily load levels; amount of pollutants allowed to be re-released into waterways
  - The EPA sets these

# How does the Clean Water Act Work?

It gives the EPA the authority to control point source pollution by:

- Setting wastewater standards for industry
- Setting water quality standards for all surface water contaminants.
- Making it illegal to discharge any pollutant from a point source into navigable waters without a permit
- Fund the construction of sewage treatment plants in communities.

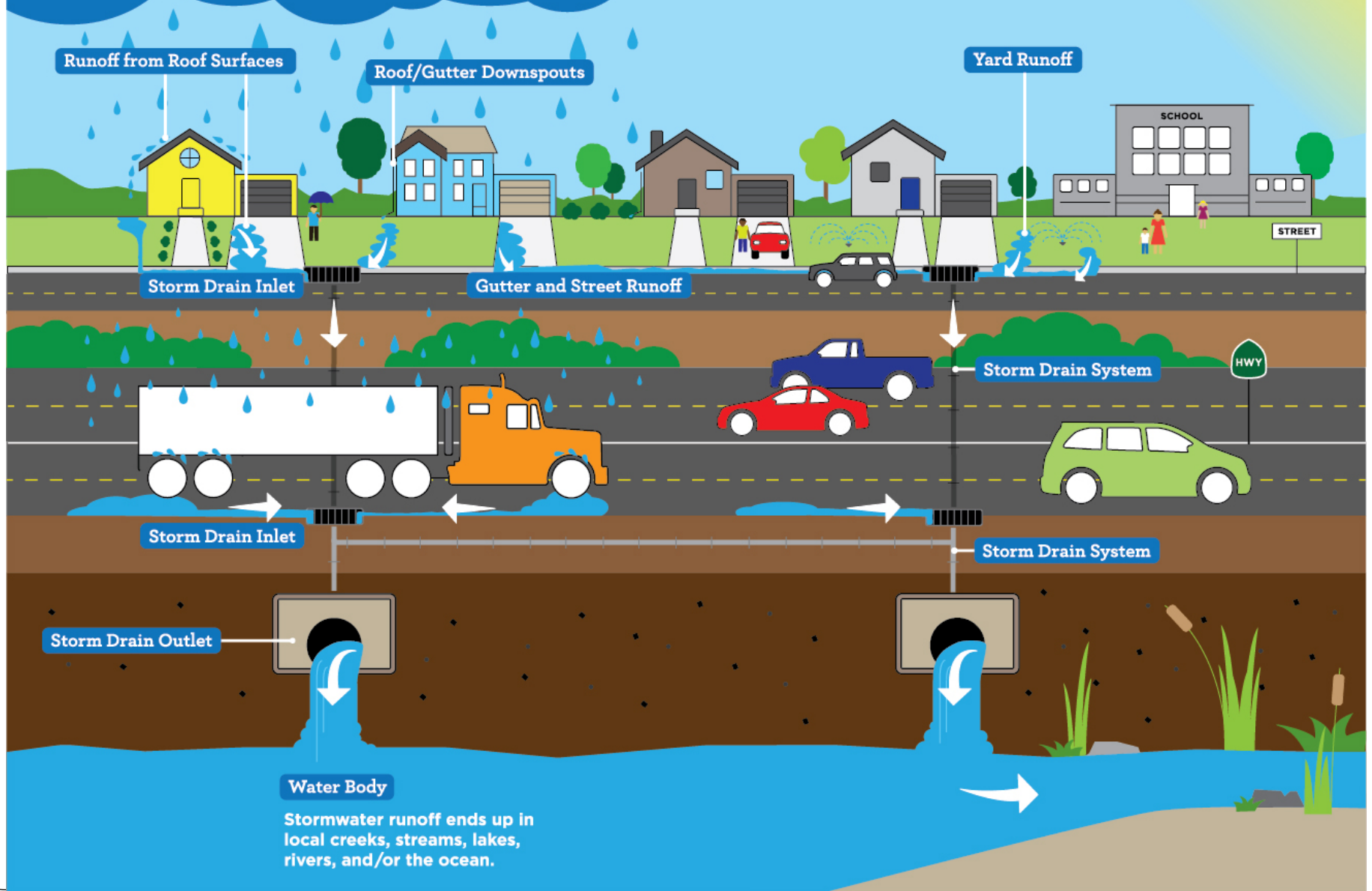
**Show Second Film Clip**

# What is Stormwater Runoff?

- Is rainfall that flows over the ground surface.
- Worse in urban areas where rain falls on roads, driveways, parking lots and other paved surfaces that don't allow water soak into ground.
- Is the #1 cause of stream impairment in urban areas
- Mostly NPS pollution.
- Is largely unregulated.



# Stormwater Runoff



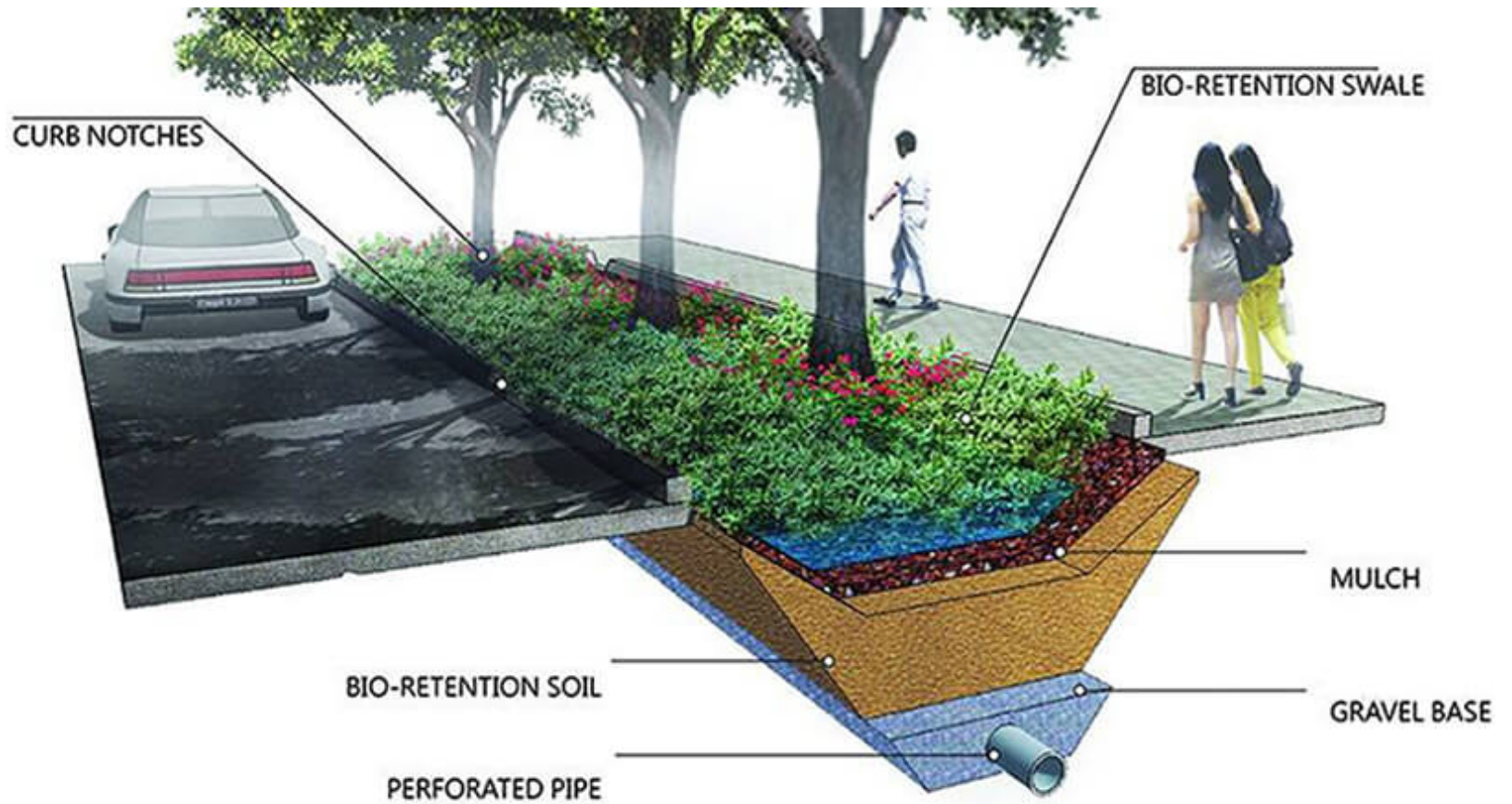
# What is a bioswale?

- Bioswales are landscape elements designed to remove debris and pollution out of surface runoff water.
- They consist of a swaled drainage course with gently sloped sides and filled with vegetation and or layers to trap or filter pollutants.





# Bioswales





# Warm-Up #6: Water Pollution

1. What is PS Pollution?
2. What is NPS pollution.
3. Which is it harder to control? Why?
4. What is Urban Stormwater Runoff pollution?
5. Is stormwater runoff PS or NPS pollution?
6. When did we start caring by passing federal laws about water pollution? Why?

# Six Major Types of Pollutants in Water

- Biodegradable waste
  - Plant nutrients
  - Heat
  - Sediments
  - Hazardous and toxic chemicals
  - Radioactive waste
- 
- **RESOURCES**- Read the Overview Packet intro and the paragraph(s) about your pollutant. Then read the handout specific to your pollutant.

# Presentation or Poster Requirements

\*Posters MUST have a **picture**.

- Definition of your pollutant. What is it? List examples.
- What are the sources of this pollutant? Where is it coming from?
- What are the problems this pollutant causes
- What's being done to help address the problems from these pollutants?

# Biodegradable waste

- From sewers, food scraps, human and animal waste/sewage, other organic material (like compost)
- The nutrients make bacteria grow rapidly.
- Bacteria consume oxygen and lower DO levels.
- Can spread disease from bacteria, too (typhoid, cholera)



# Biodegradable Waste- Solutions

- Create buffers to capture and clean waste before it reaches streams
- Keep cows out of streams
- Repair leaky sewage pipes



# Plant nutrients

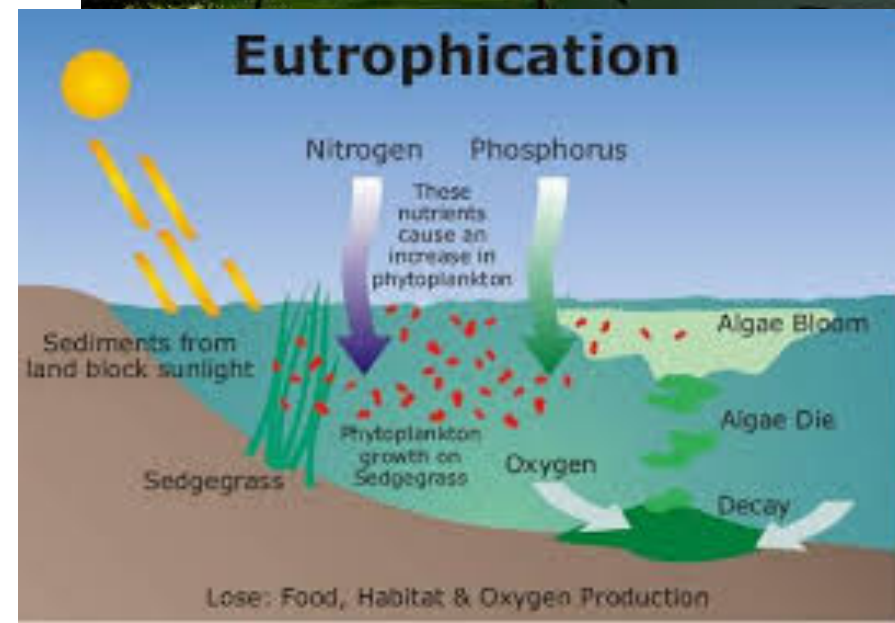
- From fertilizer run-off, detergents, livestock and industrial waste (nitrates and phosphorus)
- Promotes plant growth in lakes and rivers (often algae blooms) which takes oxygen away from aquatic life when it decomposes
- This process is called **eutrophication**- Leads to death of aquatic organisms due to loss of oxygen





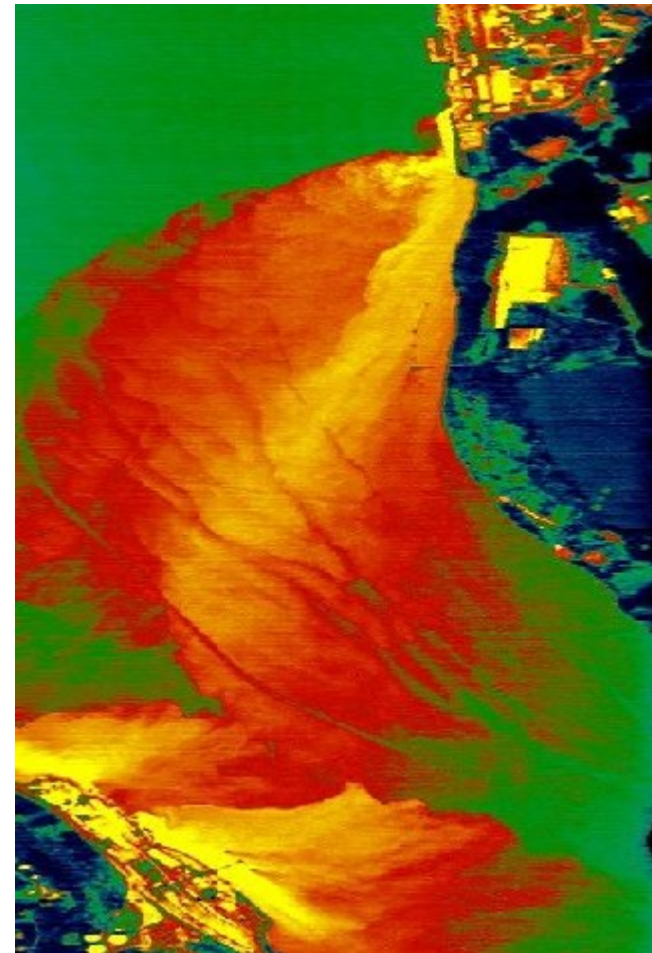
# Plant Nutrient Pollution

- **Solutions**
- **Reduce the amount of phosphorus used in everyday products** (dish soap; use less fertilizer) **and in agriculture.**



# Heat / Thermal

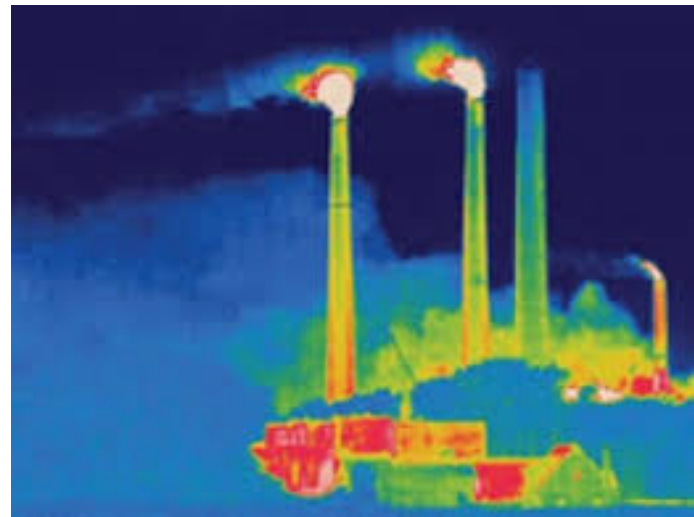
- From industrial cooling, dams and removal of trees/forests—
- It increases water temperatures that exceed natural temperature ranges
- More heat results in lower oxygen levels for aquatic life





# Thermal Pollution- Solutions

- Grow a healthy **riparian area** with trees that provide shade to cool rivers
- Make industries cool water before releasing it back to streams
- Have dams keep water levels as high as possible



# Sediments

- From erosion, human activity, logging and construction, farming
- Causes minerals, rocks and soil to get into water
- Creates thermal pollution by darkening water so it absorbs more sun/heat and lowers oxygen levels for fish and aquatic organisms.



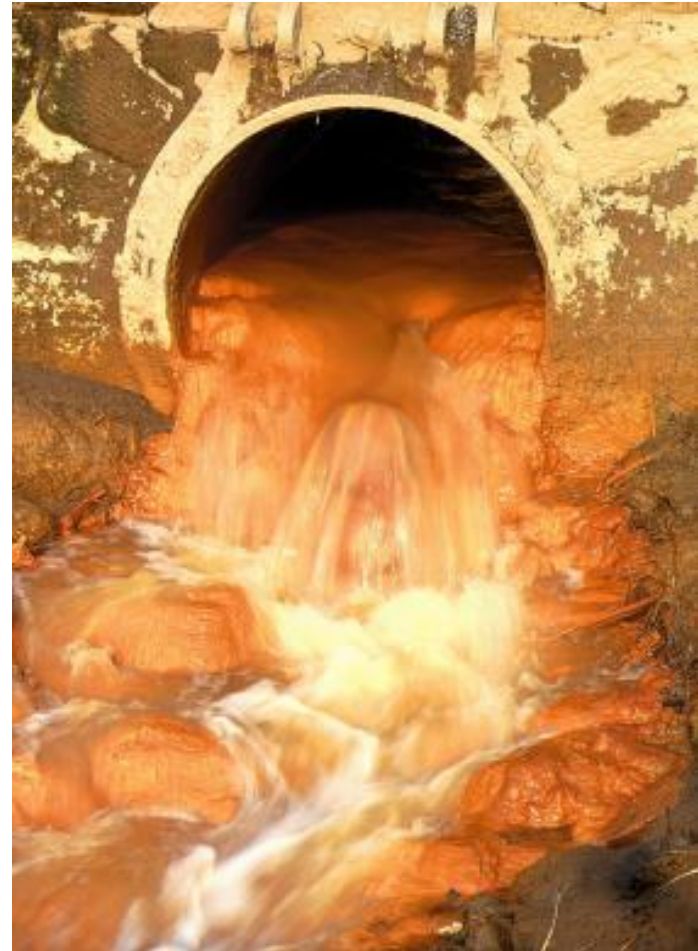
# Sediments- Solutions

- Filter stormwater runoff
- Contain spills
- Protect construction projects and road building with a barrier
- Place buffers and swales along farmland



# Hazardous and toxic chemicals

- From homes and industry and storm water runoff from roads.
- Many people dispose of chemicals in homes incorrectly—pour down sink and industry dumps into water.
- Many are toxic to living organisms; exposure kills organisms



# Hazardous Chemicals- Solutions

- Disposing chemical waste properly!!
- Using chemicals as directed only

# Radioactive Waste

- Natural and human made
- From wastewater discharge from nuclear power plants and other industry and hospitals
- Also occurs naturally too (radon)
- Causes cancer and death in high concentrations; Persists in environment.





# Radioactive Waste- Solutions

- Store and dispose of it as directed.
- Be sure its use is carefully regulated.
- Be sure Nuclear plants are earthquake safe.



# Gallery Walk- Major Water Pollutants

- Review the FIVE other common water pollutants that you did NOT research (**Biodegradable Waste**, **Hazardous Chemicals**, **Sediment**, **Heat**, **Plant Nutrients & Radioactive**)
  1. Definition/  
Sources
  2. Problems (include key terms)
  3. Solutions
  4. A symbol for it



# Debrief Q's - Water Pollution

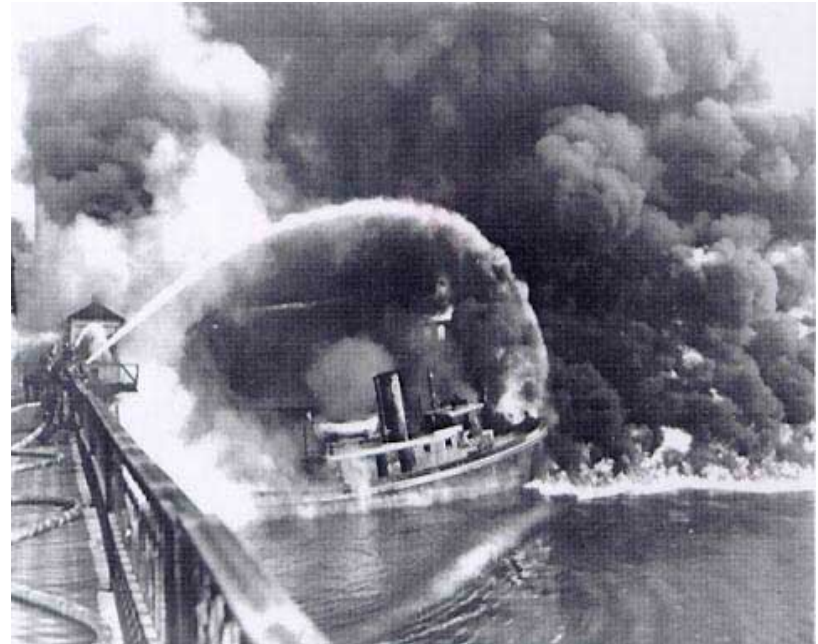
## (INB) LEFT SIDE INB

1. Which TWO pollutants are the most harmful for human health? Why?
2. Which pollutants are bad for fish as they lower the amount of dissolved oxygen in water? List ALL that apply.
3. Which pollutant should be the easiest to control? Why?
4. Which are most likely to be PS? NPS?
5. If you could recommend **TWO** actions that would most effectively address these six water pollutants, what would they be?

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