

# WATER POLLUTION

WEDNESDAY, FEBRUARY 17





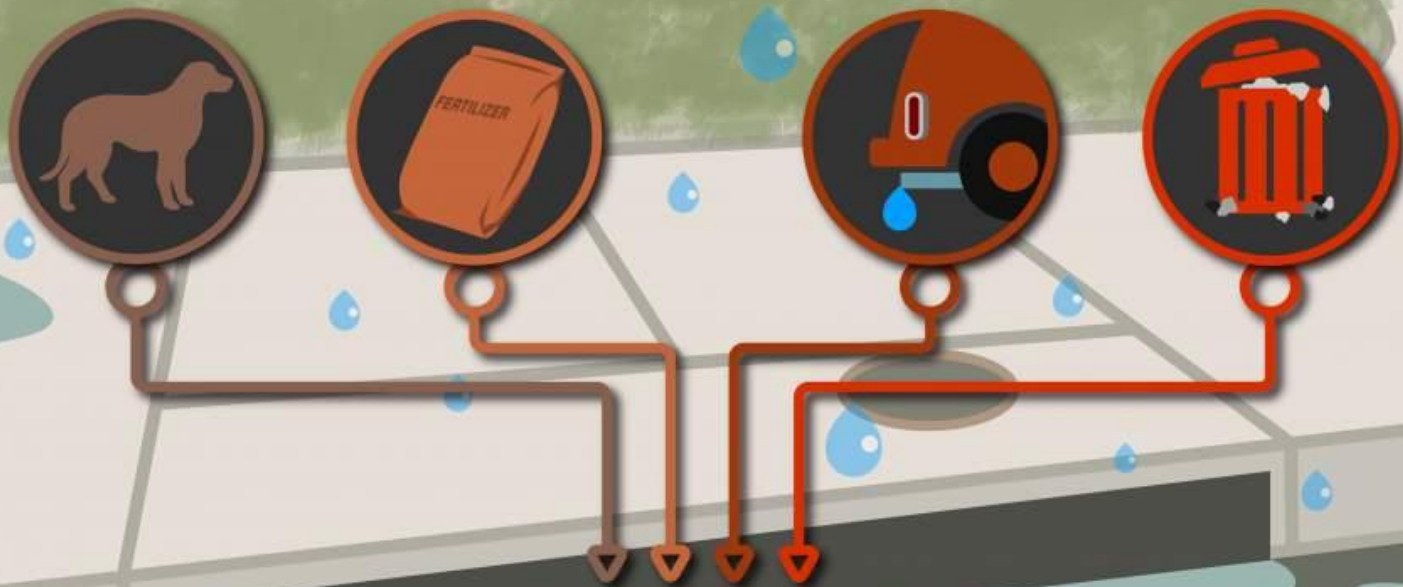
WATERSHED:  
AN AREA OF  
LAND THAT  
DRAINS INTO  
A COMMON  
BODY OF  
WATER

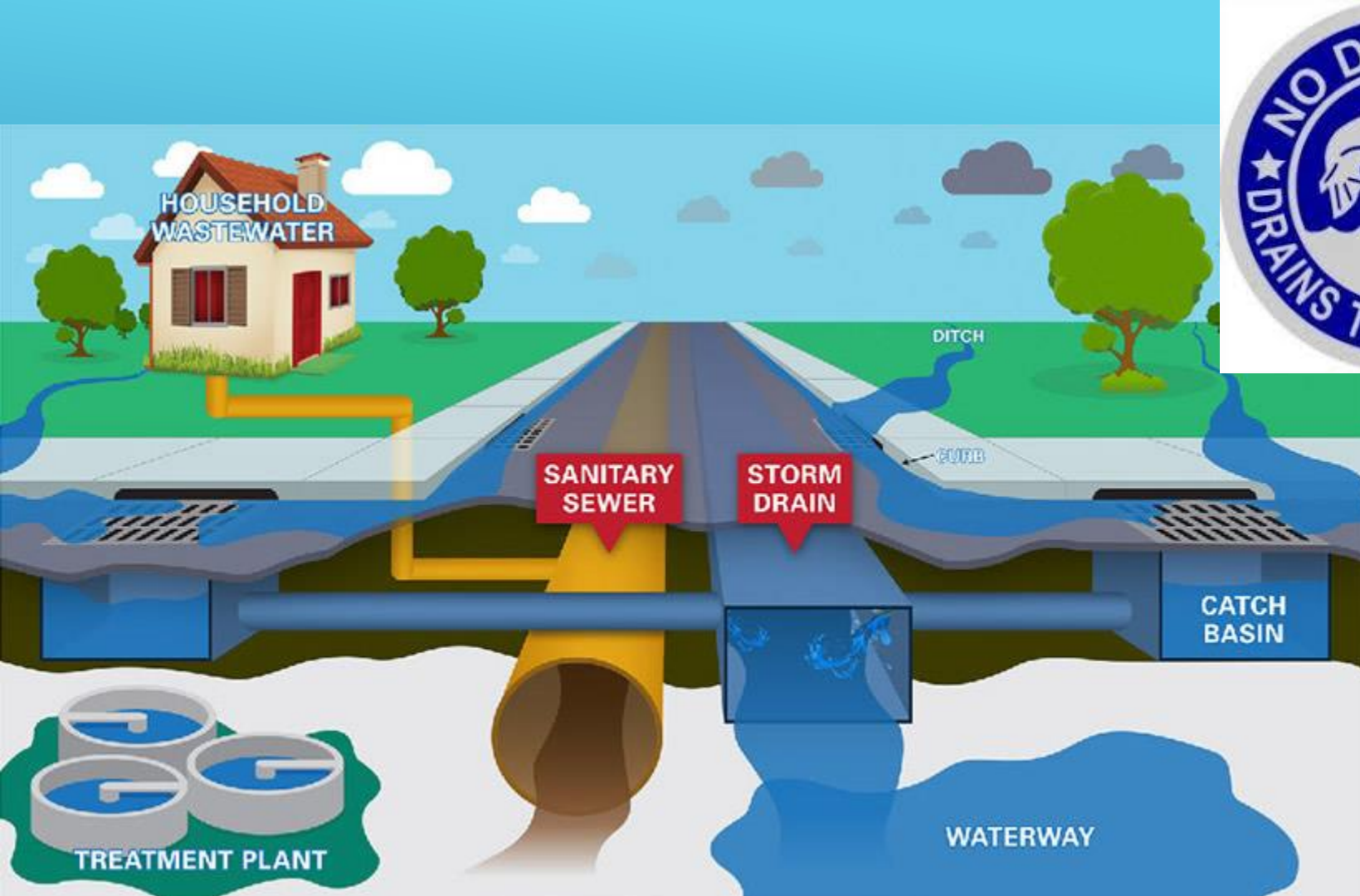
Image: Lake County



Image: Lake County

When it rains, what goes down the storm drain?





# POINT SOURCE POLLUTION

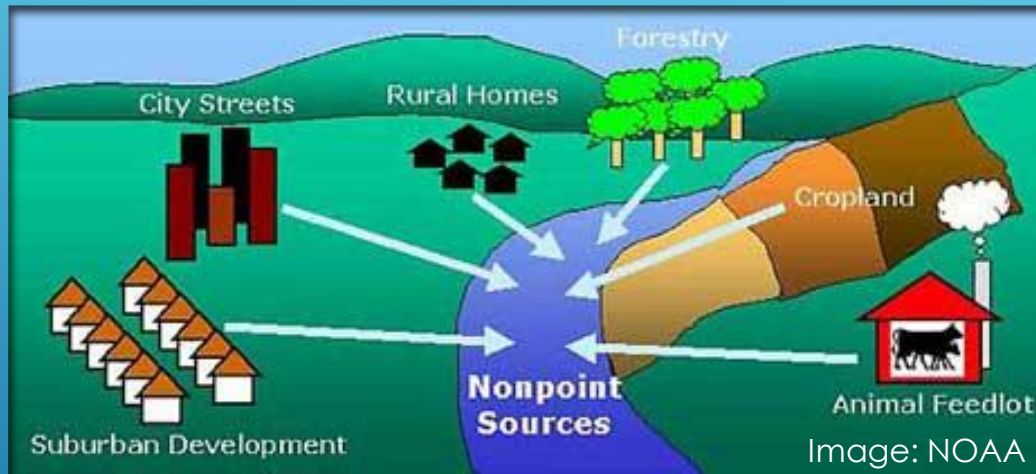
- ▶ A single, identifiable source of pollution, from which pollutants are discharged
- ▶ Smokestack, pipe, etc..



Image: National Geographic

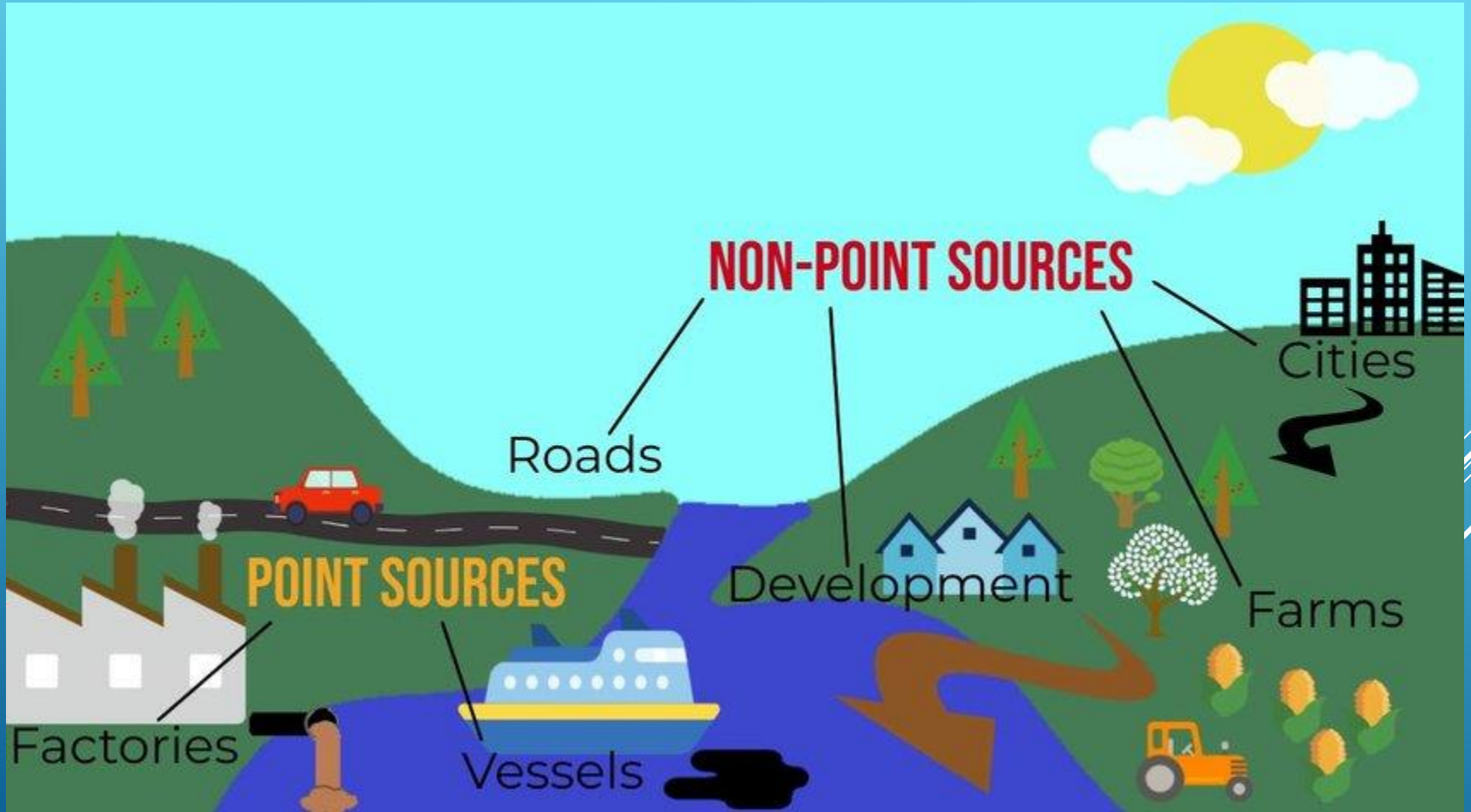


Image: NOAA



► Pollution resulting from many diffuse sources

# NON-POINT SOURCE POLLUTION





# TYPES OF POLLUTANTS

Questions before we move on?



# LITTER

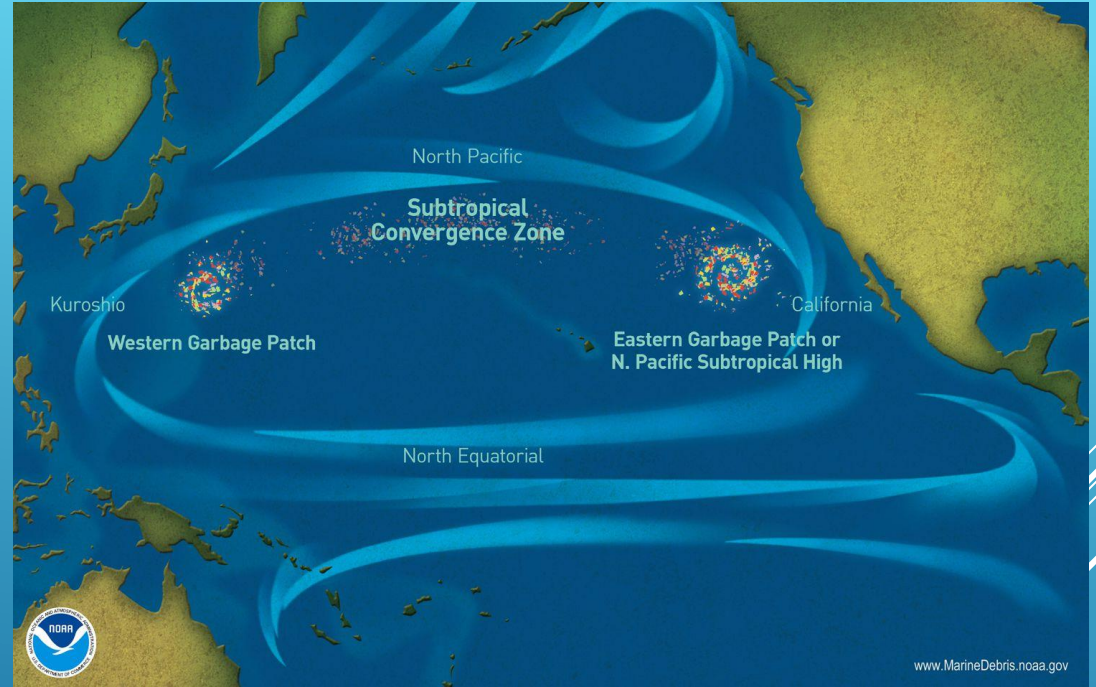
- ▶ Plastic, paper, glass, metals, rubber, wood, etc...
- ▶ Pollute and contaminate water for drinking and recreation
- ▶ Harm wildlife
- ▶ Can spread disease
- ▶ Waste of resources



Image: Chile Today



# GARBAGE PATCHES



Litter resulting from non-point solution flows down streams, into the ocean

# HOW LONG UNTIL IT'S GONE?

2 weeks



10-20 yrs

200-250 yrs

450 –  
1000yrs




6 months



500 yrs –  
never

- ▶ Cigarette butt
- ▶ Apple core
- ▶ Cardboard
- ▶ Soda can
- ▶ Plastic bottle
- ▶ Styrofoam

# SOLUTIONS

- ▶ Education and outreach
  - ▶ Community action
  - ▶ Normalizing reusable alternatives
  - ▶ Higher quality purchases
  - ▶ Engineering solutions
- 
- A decorative graphic consisting of several parallel white lines of varying lengths, slanted upwards from left to right, located in the bottom right corner of the slide.

# MICROPLASTICS

Image: Washington Post



Image: Awesome Ocean



Image: American Chemical Society

# Where Do the Oceans' Microplastics Come From?

Distribution of sources of microplastics in the world's oceans



Photo: Love your Clothes

Synthetic textiles



Photo: The Conversation

Car tires

28.0%



Photo: Deposit Photos

City dust

24.0%



Photo: The Constructor

7.0%



Photo: Globalspec



Photo: The News Minute



Photo: Dreamstime



@StatistaCharts

Source: International Union for Conservation of Nature

statista



Photo:



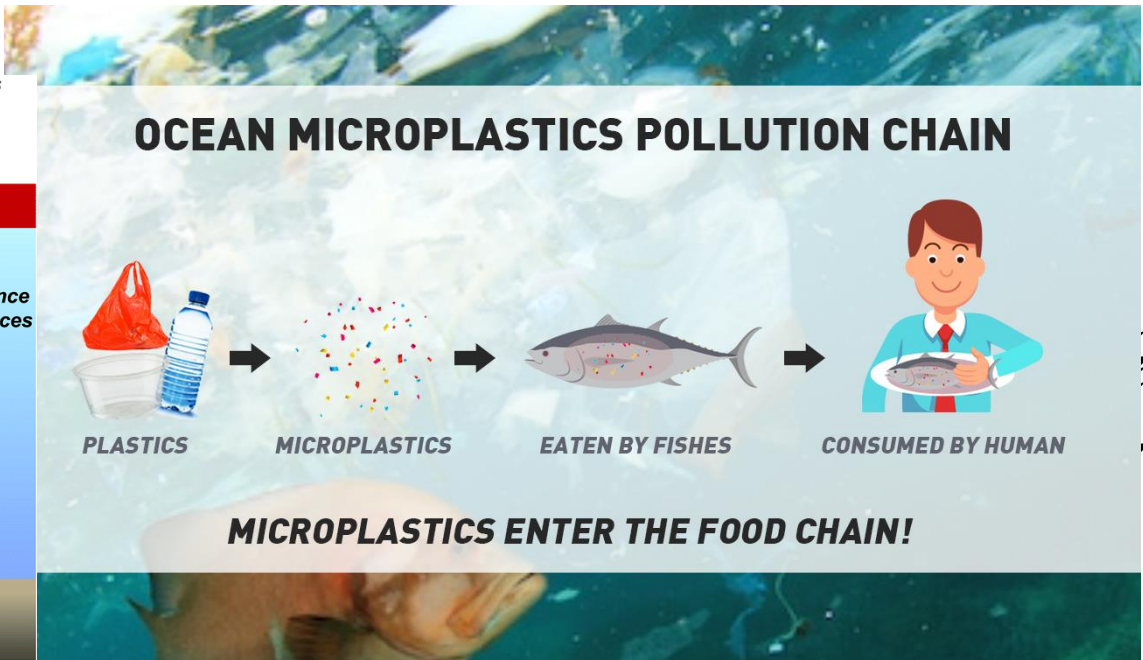
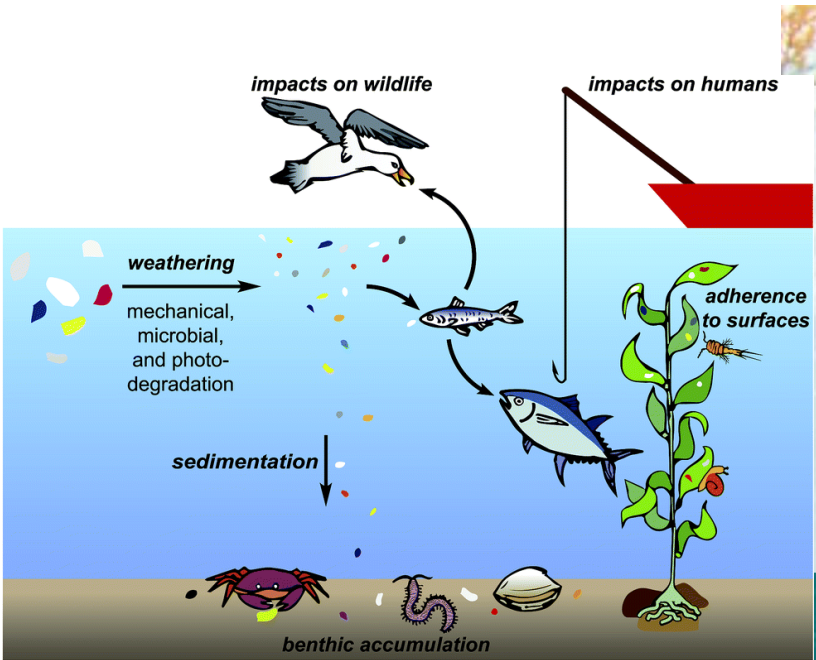


Photo: RSC Publishing

Photo: Java Biocolloid


The background of the central white rectangle is filled with a dense, scattered pattern of small, black-outlined circles, representing microbeads. The circles vary slightly in size and are distributed across the entire white area.

# THE STORY OF MICROBEADS

# SOLUTIONS SOCIETY NEEDS TO MAKE TO REDUCE MICROPLASTICS

- ▶ Use more eco-friendly materials
  - ▶ Outlaw microbeads in products
  - ▶ Find alternative materials to replace plastic and synthetic materials
  - ▶ REDUCE PLASTIC USE!!!
  - ▶ No way to clean microplastics out of the ocean yet
- 
- A decorative graphic consisting of several parallel white lines of varying lengths, slanted diagonally from the bottom right towards the top right, set against a blue gradient background.

# SOLUTIONS YOU CAN MAKE TO REDUCE MICROPLASTICS

- ▶ Laundry bags / Microfiber balls
  - ▶ Air dry and avoid dryer
  - ▶ Purchase cotton clothing and non-synthetic fibers
  - ▶ Do not purchase products with microbeads
  - ▶ REDUCE PLASTIC USE!!!
- 
- A decorative graphic consisting of several parallel white lines of varying lengths, slanted diagonally from the bottom right towards the top right, located in the lower right quadrant of the slide.

# OTHER TYPES OF NONPOINT SOURCE POLLUTION



# OTHER NONPOINT SOURCE POLLUTANTS

## Road Salt



Image: Norwegian SciTech News

## Pesticides and Herbicides



Image: Great Lakes Now



Image: The Nation



Image: Home Depot

# OTHER NONPOINT SOURCE POLLUTANTS

## Oil



Image: AC Pavement

## Animal Waste

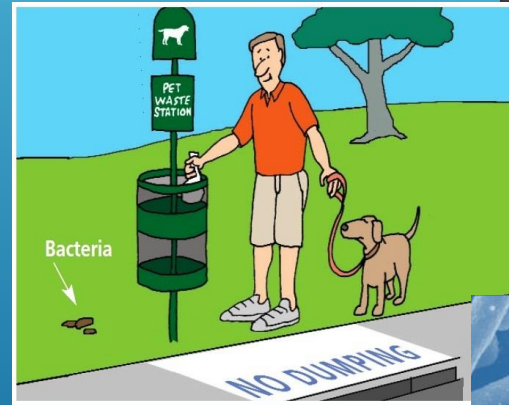


Image: Public Health Matters



Image: US EPA



Image: Montgomery County, MA

# SEDIMENT AND FERTILIZER



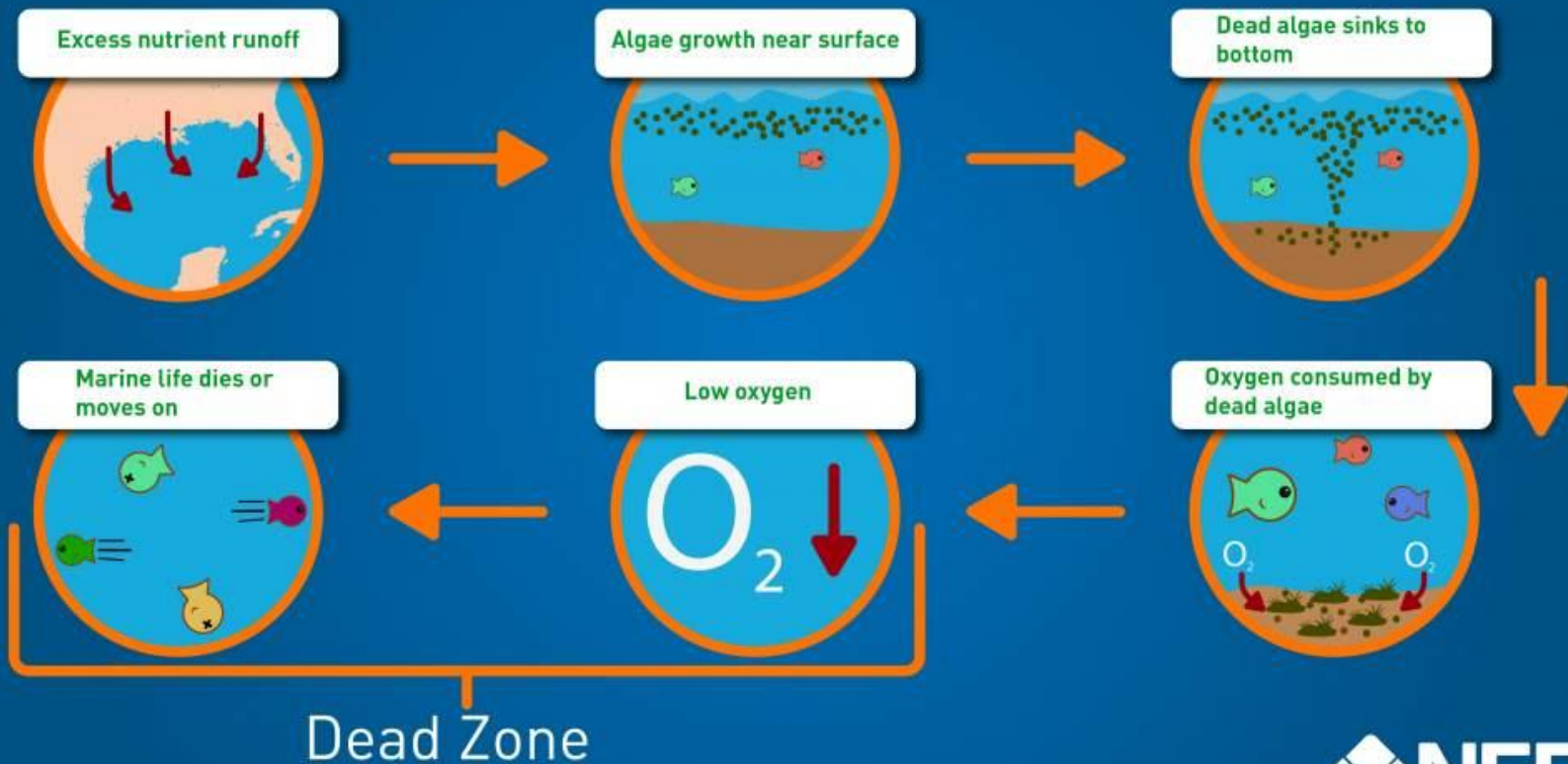
Image: NASA

20 km





# What is a Dead Zone?

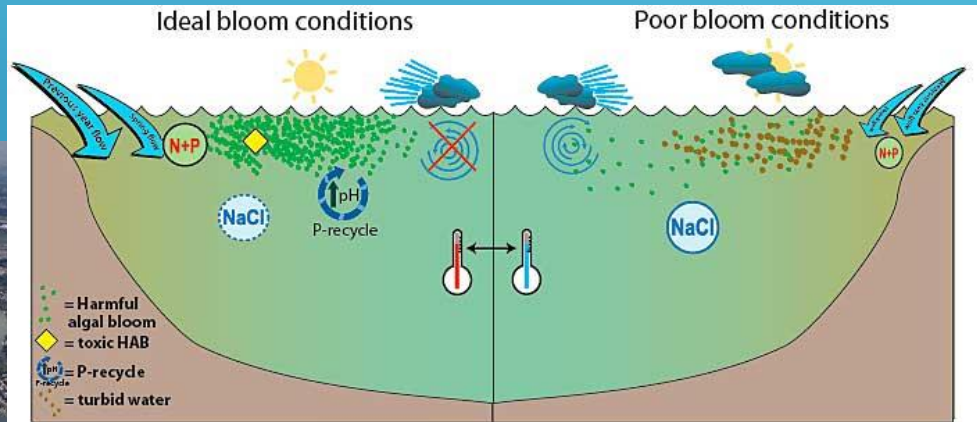


# HARMFUL ALGAL BLOOMS



Image: NRDC

Image: Rhode Island Environmental Monitoring Collaborative




	Flow	Water Temp	Mixing	Sunlight	Salinity
<b>Intense blooms:</b>	High flow (Blue arrows)	Warm water (>15°C) (Thermometer)	Still water (little wind) (Crossed-out wind icon)	High light (little cloud) (Sun icon)	Low salinity (NaCl: 0-5%) (NaCl icon)
<b>No/weak blooms:</b>	Low flow (Few blue arrows)	Cooler water (<15°C) (Thermometer)	Mixed water (Winds) (Wind icon)	Lower light (cloudy) (Sun behind cloud icon)	Higher salinity (NaCl: >5%) (NaCl icon)

Conceptual diagram detailing the main factors that determine HAB occurrence and characteristics in the Potomac River

- ▶ NOT algae
  - ▶ A Cyanobacteria
- ▶ Can be harmful
- ▶ Long term health effects unclear
- ▶ No swimming or recreational activities
- ▶ Harmful to local economy
- ▶ Appears differently



# SOLUTIONS

- ▶ Prevention
    - ▶ Reducing use of fertilizers
    - ▶ Native vegetation
  - ▶ Green Infrastructure
    - ▶ Rain barrels
  - ▶ Experimental methods of remediation
  - ▶ <https://coastalscience.noaa.gov/research/stressor-impacts-mitigation/pcmhab/>
- 

# GREEN INFRASTRUCTURES IN CITIES

## Riparian Buffer

Benefits of healthy stream buffers:

- Protects streambanks from erosion
- Filters pollutants from stormwater runoff
- Reduces flood damage
- Creates wildlife habitat
- Provides shade to streams
- Improves aesthetic value of landscapes



Image: Quizlet

## Rain Garden



ensia

# GREEN INFRASTRUCTURES IN CITIES

## Street Trees



Image: Arbor 1 Tree Service

## Green Roof/Wall

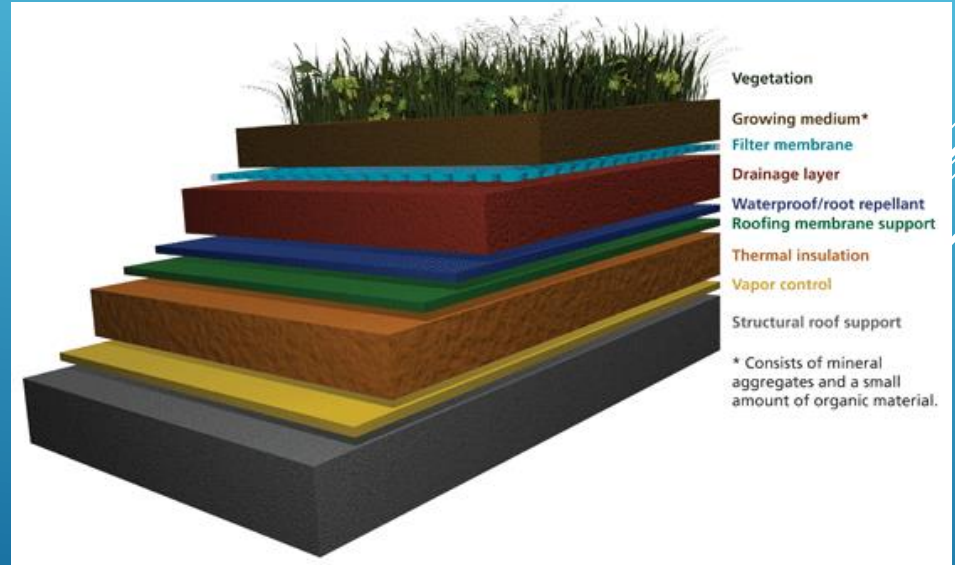


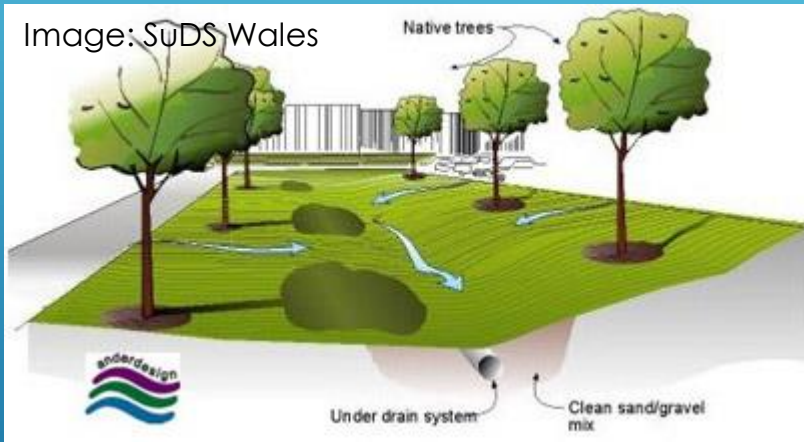
Image: National Park Service

# GREEN INFRASTRUCTURE

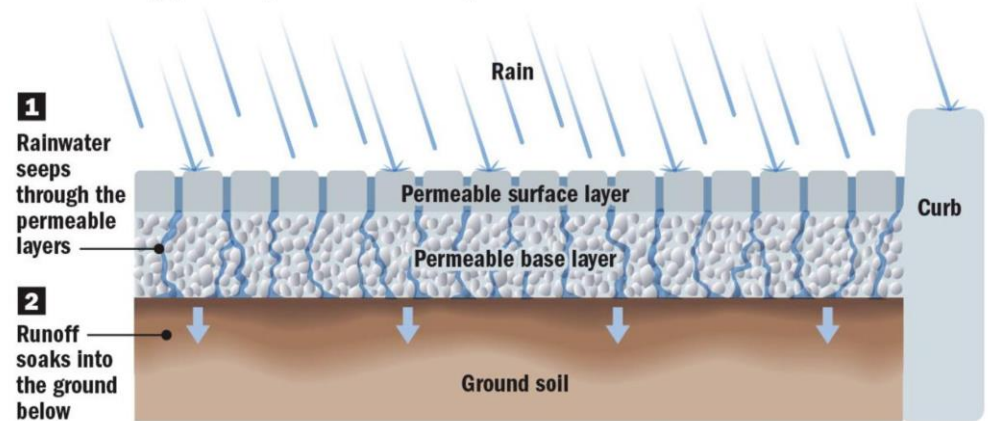
Swales and Retention Ponds

Permeable Pavement

Image: SuDS Wales



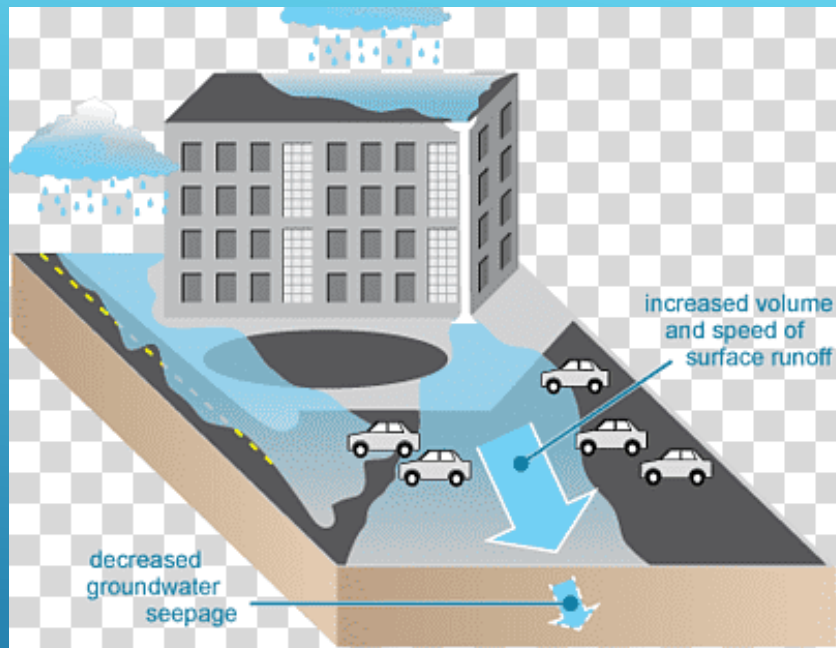
## How a typical permeable pavement works



Staff graphic by DAN SWENSON

Image: Sus Drain





Impervious 'hard' surfaces (roofs, roads, large areas of pavement, and asphalt parking lots) increase the volume and speed of stormwater runoff. This swift surge of water erodes streambeds, reduces groundwater infiltration, and delivers many pollutants and sediment to downstream waters.



Pervious 'soft' surfaces (green roofs, rain gardens, grass paver parking lots, and infiltration trenches) decrease volume and speed of stormwater runoff. The slowed water seeps into the ground, recharges the water table, and filters out many pollutants and sediment before they arrive in downstream waters.




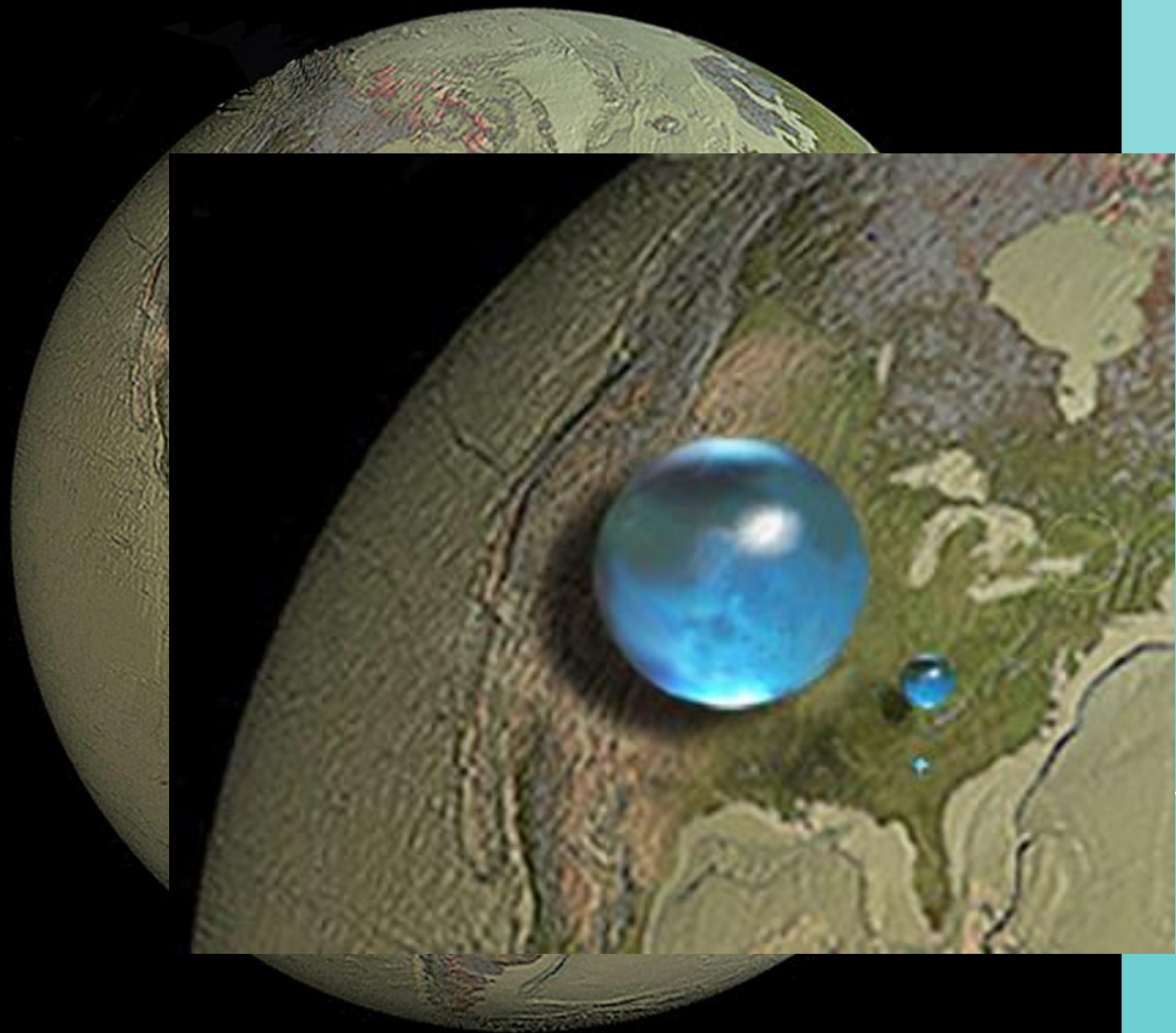
# SOLUTIONS

- ▶ Education
- ▶ Public Outreach
- ▶ Changing behaviors




# DISCUSSION

- ▶ What changes can you/have you implemented in your lives?
  - ▶ Why is it important to reduce pollutants in our watersheds?
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# CAREER HIGHLIGHT: POLLUTION PREVENTION TECHNICIAN

- ▶ Specialize in hazardous material
  - ▶ Assess areas at risk to pollution
  - ▶ Take samples in the field
  - ▶ Health and Safety Manager, Engineers, etc...
- 
- A decorative graphic consisting of several parallel white lines of varying lengths, slanted upwards from left to right, located in the bottom right corner of the slide.

# CAREER HIGHLIGHT: SUSTAINABILITY ARCHITECT/ENGINEER

- ▶ Design and implement sustainable infrastructure
- ▶ Incorporate green infrastructure
- ▶ Retrofit sustainable solutions
- ▶ Work at a sustainable architecture firm



Image: KC Engineering

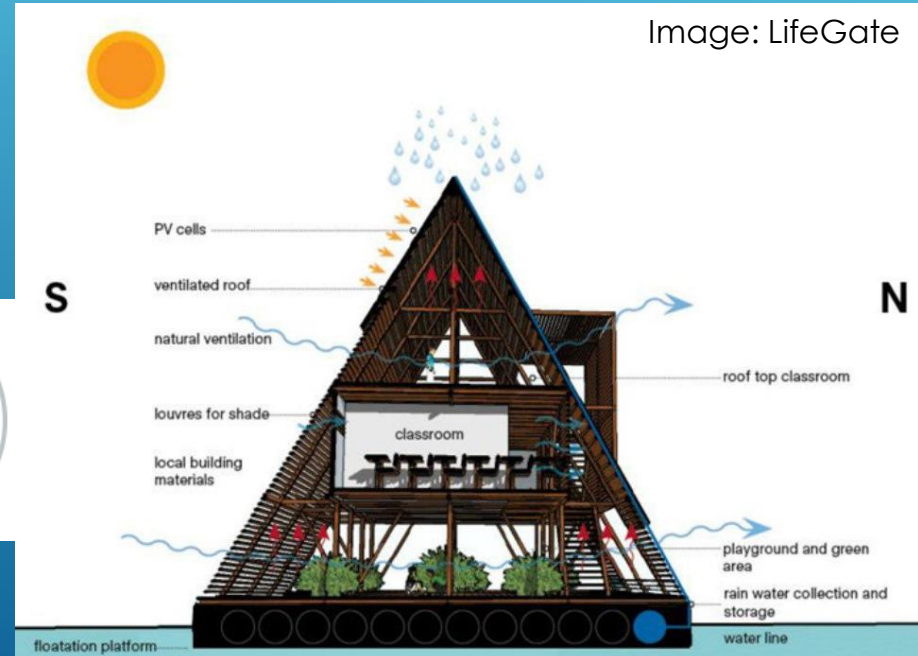



Image: LifeGate

# CAREER HIGHLIGHT: WATER QUALITY SPECIALIST

- ▶ Understand properties of water and pollutants
- ▶ Field work, academia, decision making and standards



# RUTGERS GREEN INFRASTRUCTURE CHAMPION PROGRAM

- ▶ Learn about implementing green infrastructure in NJ
  - “Training on green infrastructure planning and implementation
  - “Technical support to develop a design for a green infrastructure demonstration project
  - “Networking opportunities with other Green Infrastructure Champions for mutual support
  - “Assistance with grant writing and submission”
  - ▶ <https://envirostewards.rutgers.edu/about.html>
  - ▶ Fee to the course
  - ▶ Best if you are very interested in green infrastructure
- 

# RUTGERS ENVIRONMENTAL STEWARD PROGRAM


- ▶ “Our program focuses on science and public policy based on that science. Stewards learn about the techniques and tools used to monitor and assess the health of the environment. They gain an understanding of the research and regulatory agencies operating in New Jersey that focus on environmental issues. Stewards are introduced to a network of expert individuals and organizations who can be of service to them in the future as they wrestle with solving local environmental problems.”
- ▶ <https://envirostewards.rutgers.edu/about.html>



# OPEN FULL-TIME POSITIONS AT THE WATERSHED INSTITUTE

- ▶ Digital Marketing Specialist
  - ▶ River-Friendly Program Coordinator
  - ▶ Delaware River Advocate
  
  - ▶ Check them out at [thewatershed.org/employment](https://thewatershed.org/employment)
- 
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# SRG 2021 FELLOWSHIP

- ▶ 12-week paid summer job opportunity
  - ▶ **Accepting applications now through April**
  - ▶ 3-day overnight training at Pocono Environmental Education Center
  - ▶ Lead programs and activities for public
  - ▶ Create social media and online education content
  - ▶ Assist in educational programming along Schuylkill River Trail
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- A decorative graphic consisting of several parallel white lines of varying lengths, slanted diagonally from the bottom right towards the top right, set against the blue background.

# ASSIGNMENT

- ▶ Pollution exercise

NEXT WEEK: CAREER AND EDUCATION  
OPPORTUNITIES, WEDNESDAY FEBRUARY 24<sup>TH</sup> AT  
6:00PM