

# Water Quality

Chemical and Biological Indicators

# Dissolved Oxygen

- The presence of oxygen gas molecules ( $O_2$ ) in the water.
- Why is it important?
- The oxygen in  $H_2O$  is not dissolved oxygen.



What's coming out of the diffuser?

# Dissolved Oxygen

Oxygen enters a river by

- diffusion from the surrounding air

- during the process of photosynthesis

**On sunny days the oxygen released by aquatic plants may sometimes be visible as bubbles.**



# DO levels are affected by:

- Altitude
- Temperature
- Speed of water movement (dams as well as natural differences and tides)
- Addition of wastes
- Vegetation



Which do you think has more DO: the stream on the left or the stream on the right? Why?

# Different Organisms Require Different Amounts of DO

- Trout and salmon require high amounts of dissolved oxygen



- Carp and catfish can survive with much less.

# How do Humans Affect the Amount of DO in the Water?

- Addition of oxygen-consuming organic wastes



# Addition of Nutrients



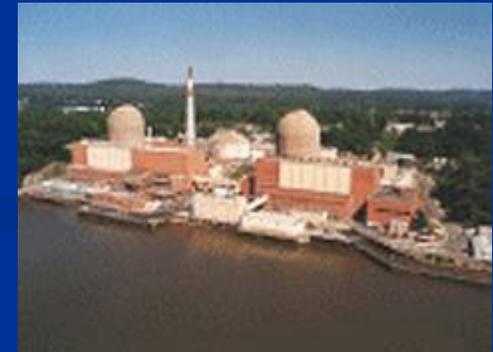
# Changing the Flow of the Water



Which dam is  
this?

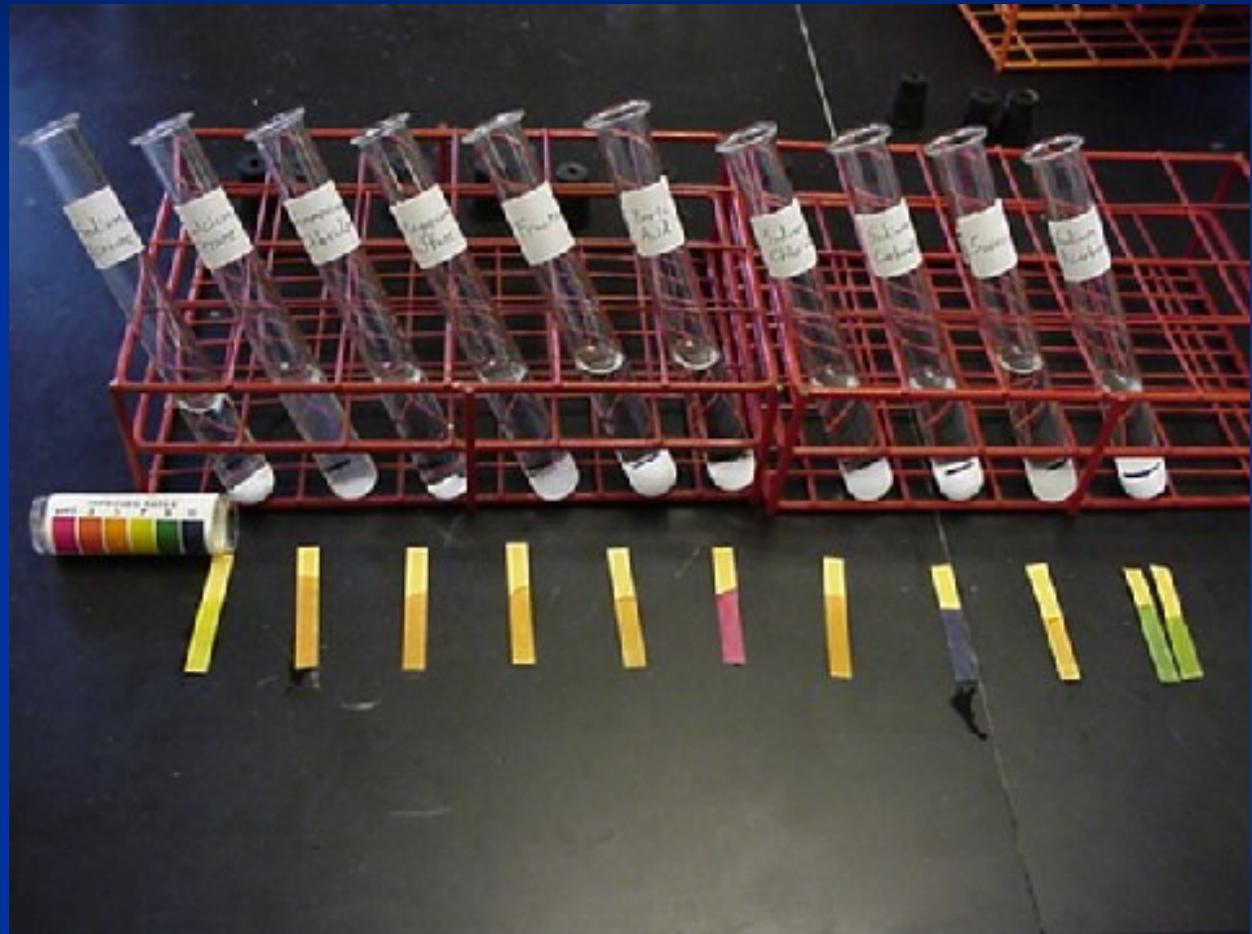
The Croton Dam

# Activities That Raise the Water Temperature



# pH

- The measure of the acidity of a solution
- Acids produce  $H^+$  (hydrogen ions)
- Bases produce  $OH^-$  (hydroxide ions)



# Why is pH important?

- The pH is critical to an aquatic ecosystem because pH affects many chemical and biological processes in water.



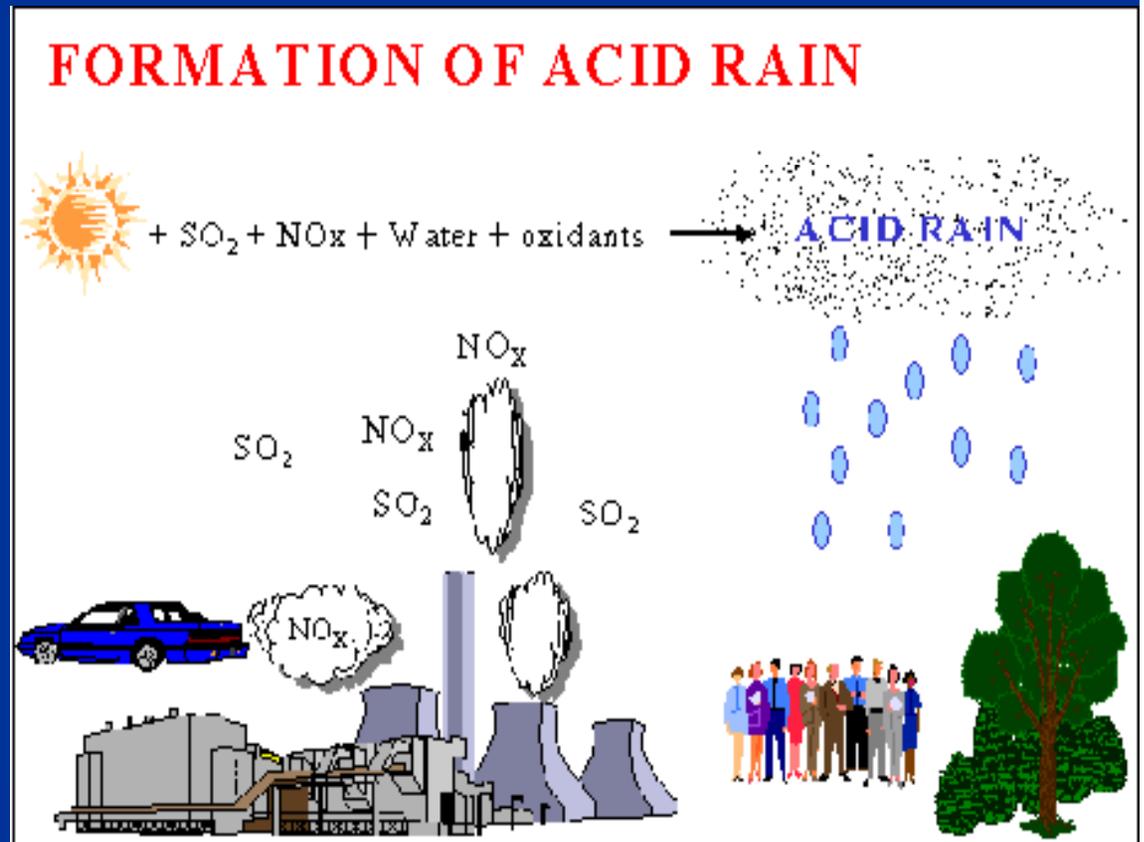
# How is pH measured?

-pH is measured on a scale of 0 to 14.

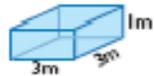
-A solution with equal hydrogen and hydroxide ions would have a pH of 7

-What would the pH of a solution be that had more hydrogen than hydroxide ions?

-A decrease of one unit on the pH scale is the result of a 10 fold increase in hydrogen ions.



Amount of hydrogen ion  
in a small pond



1 mg

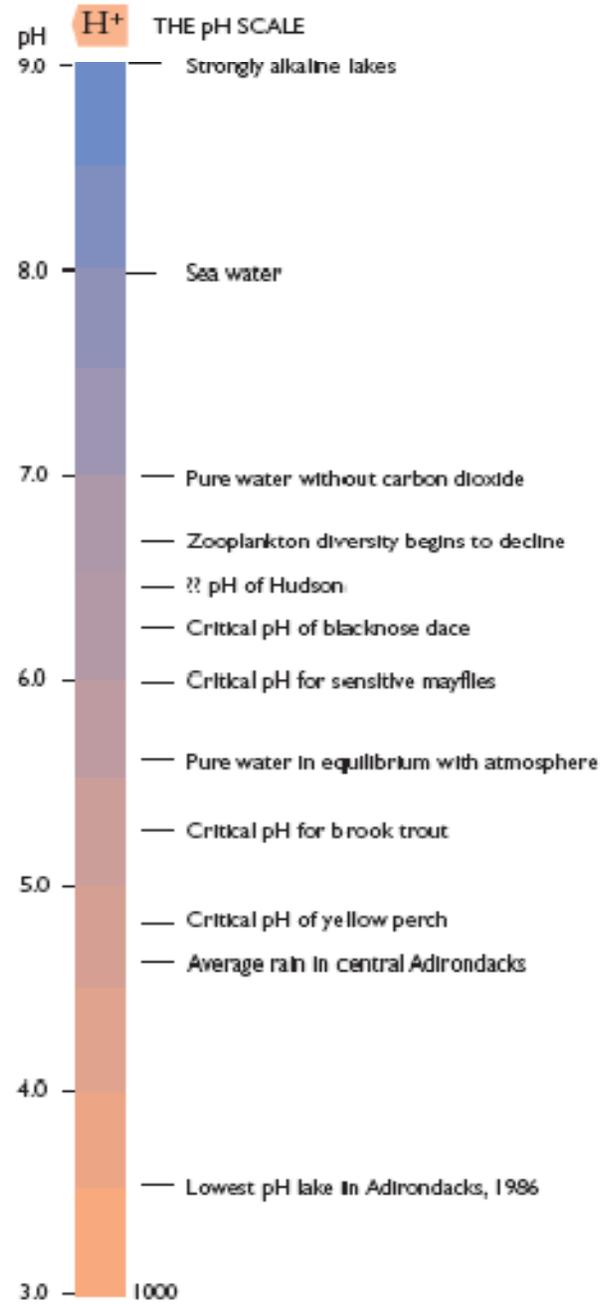
10 mg

100 mg

1 g

10 g

Illustrations  
of  
animals  
go  
here



# How Does pH Affect a River?

- It changes the availability of different nutrients and metals in the water.
- Metals that leech from the soils when pH changes especially affect immature stages of aquatic insects and fish.



# Macroinvertebrates

- A way to measure the health of an ecosystem's aquatic life
- Scientists usually take several samples, looking at diversity and abundance, as well as species evenness



# Aquatic Ecosystem Biodiversity



# Species Diversity



- Diversity differs depending on: time of year, habitat, ecosystem, sampling location, and water quality
- Macroinvertebrates are one way to assess water quality, but other measurements should be taken to ensure accuracy