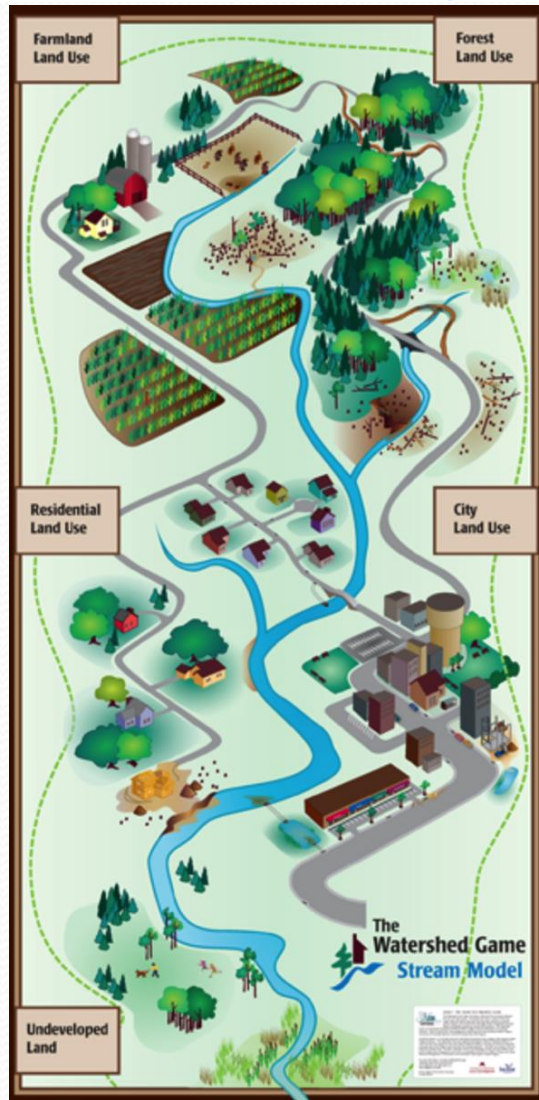




The Watershed Game: Classroom Version

How to Play!





Iron County Water Quality
A Watershed Approach

All these organizations work to improve water quality in Iron County



Iron County Watershed Coalition
Iron County Lakes & Streams Partnership
Baraga-Iron Conservation District
EGLE, USFS, MDNR
White Water Associates, Inc.

Fundamental Concepts

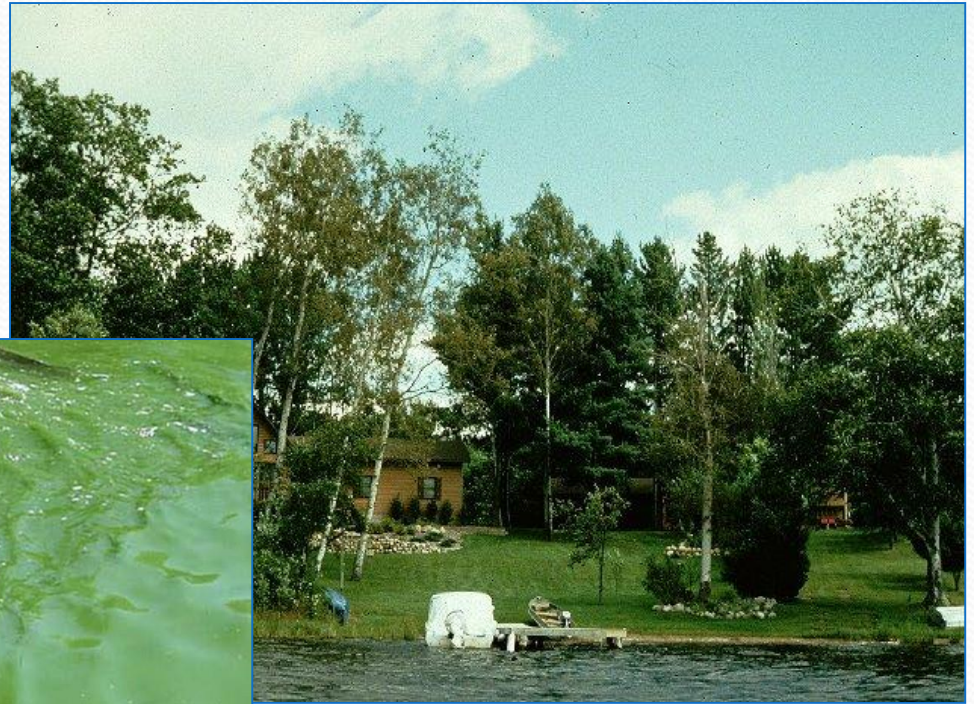
- **Why should we care about water quality?**
- **Definition of a watershed**
- **Common land uses**
- **Types and sources of pollutants**
- **Impacts of pollutants**
- **Pollution Units (PUs) and Pollutant Load**
- **Watershed Clean Water Goals**



**Why should we
care about water
quality?**

Our Water Quality is Changing Faster than Ever

- Groundwater pollution
- Destruction of shoreline habitat
- Lake and stream pollution and invasive species



Our county's fresh water is rare

- 71% Earth's surface covered by water
- <1% Water on earth is freshwater
- There are over 220 lakes and 200 miles of river on Iron County watersheds.
- All of Iron County depends on groundwater in our watersheds for drinking water

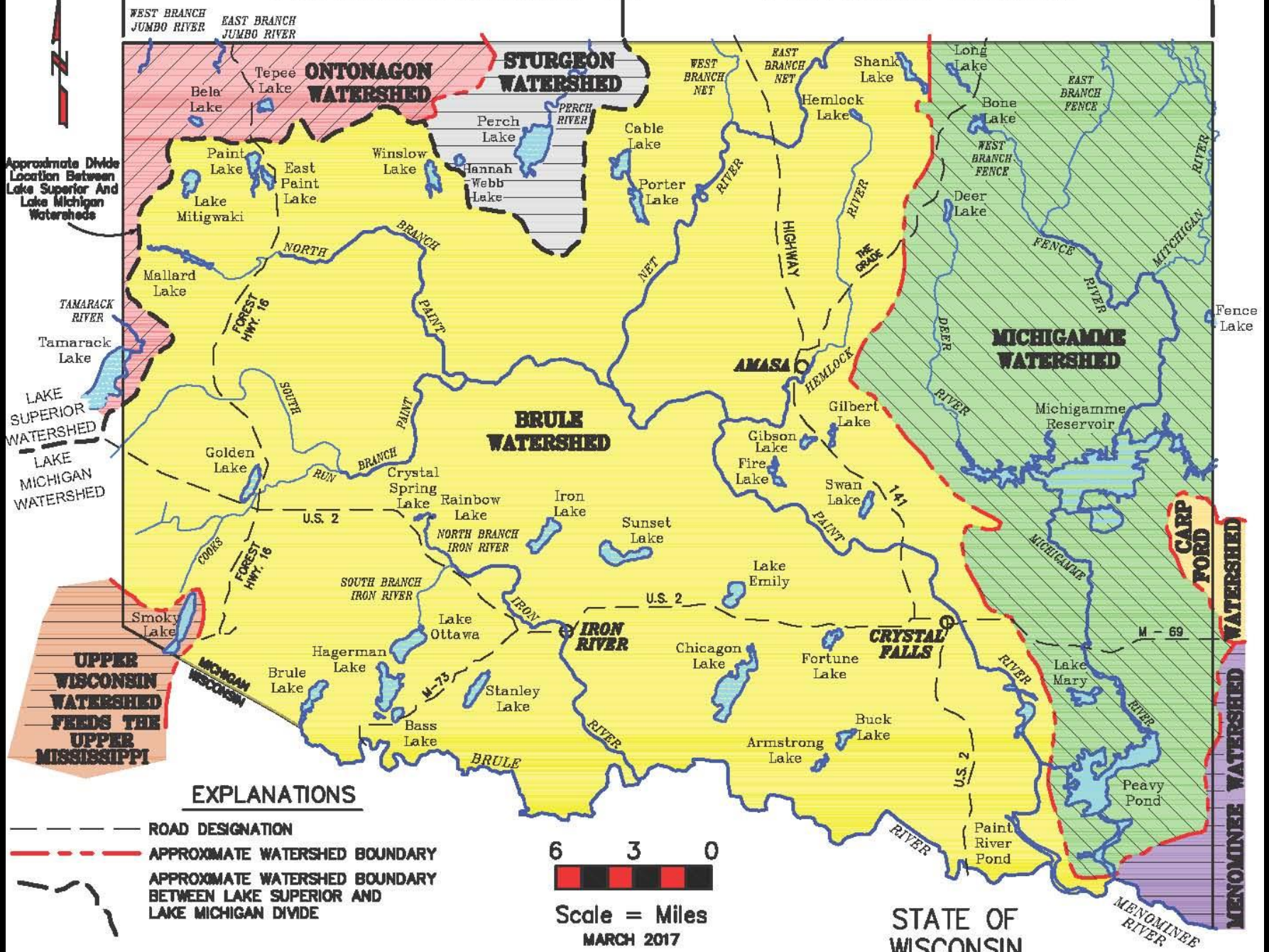


What is a Watershed?

- A watershed is an area of land that contains a common set of streams, rivers and lakes that all drain into a single larger body of water.
- Iron County has seven major watersheds
- These watersheds drain into Lake Superior, Lake Michigan or the Mississippi River
- A person in Iron County is never more than 2-1/2 miles from a lake, river, stream, creek or pond.

LAKE SUPERIOR WATERSHED

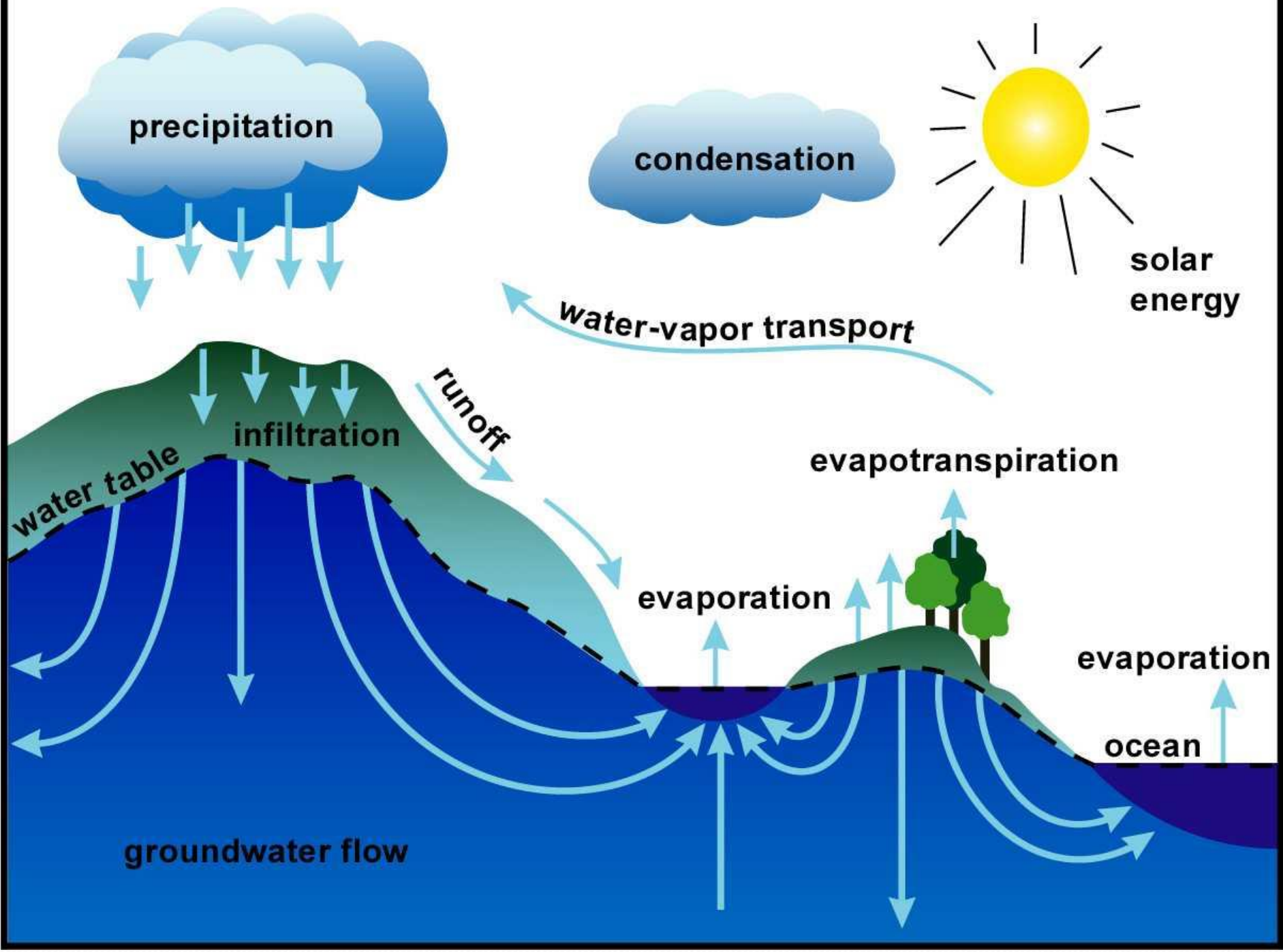
LAKE MICHIGAN WATERSHED



STATE OF WISCONSIN

We live on
and influence
the watershed





precipitation

condensation

solar energy

water-vapor transport

infiltration

runoff

water table

evapotranspiration

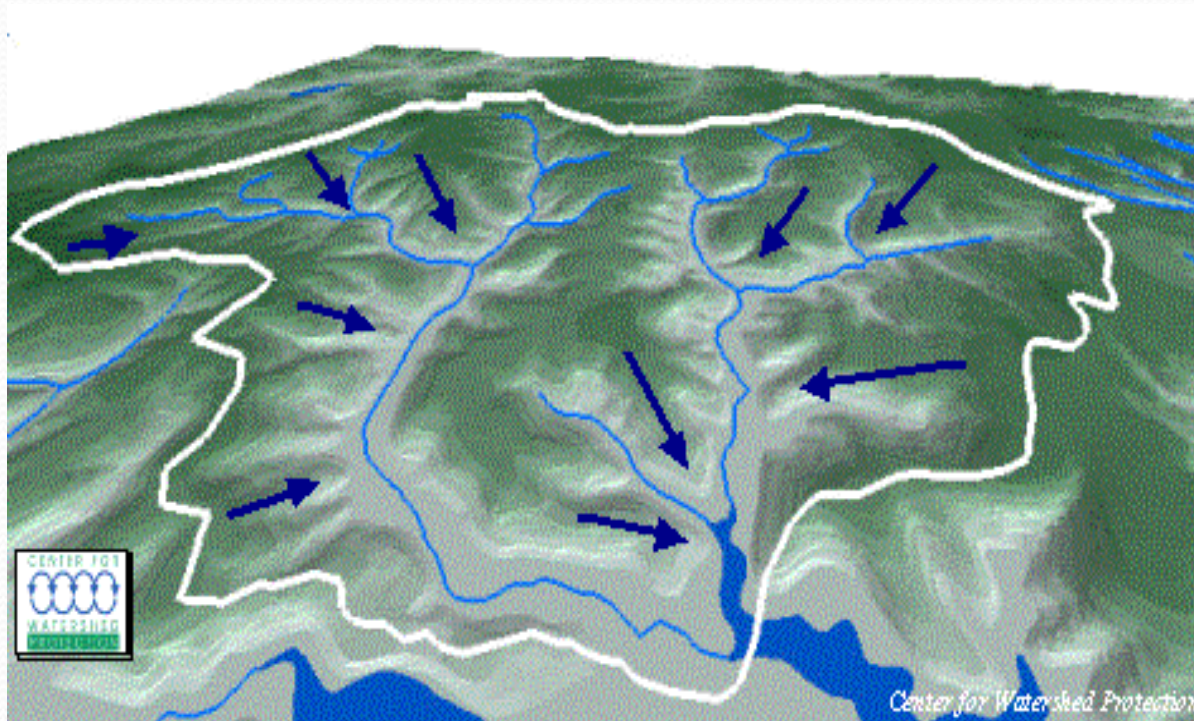
evaporation

evaporation

ocean

groundwater flow

- A watershed is the area of land that drains to a particular lake, wetland or stream.

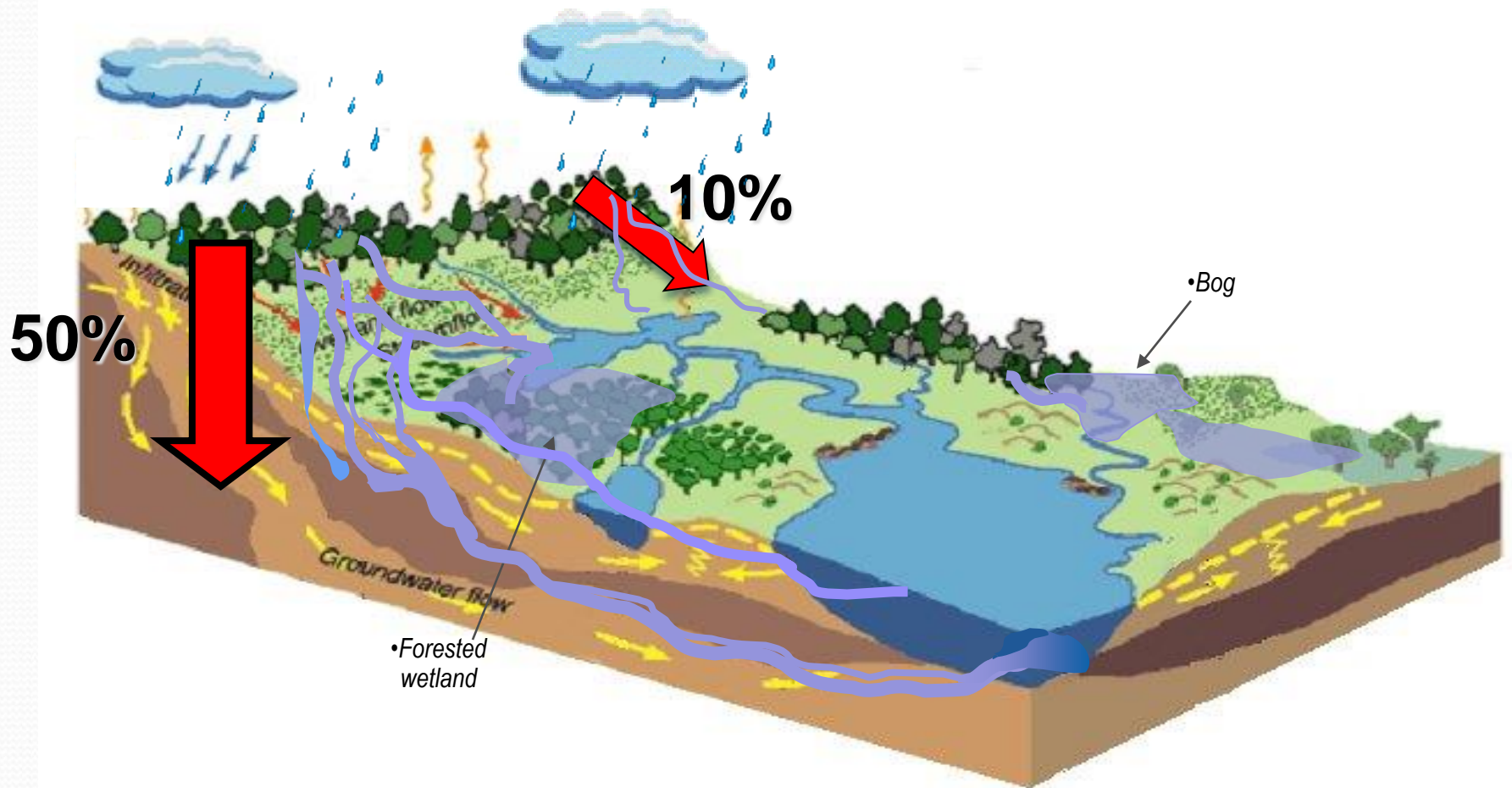


A landscape perspective of Great Lakes coastal margins

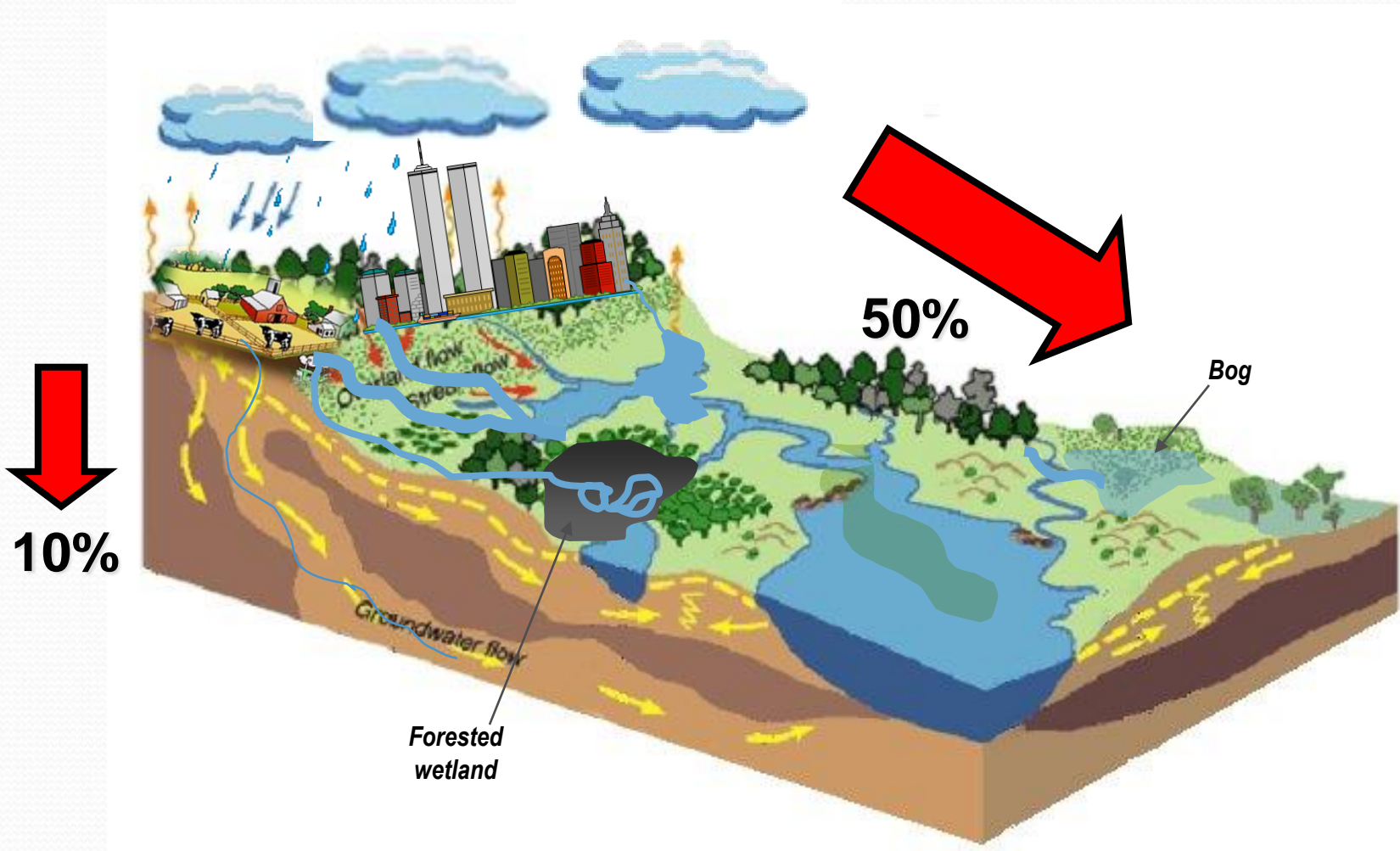


<http://glei.nrri.umn.edu/default/landscape.htm>

Undeveloped Watershed: What happens when it rains?



Developed Land: What happens when it rains?



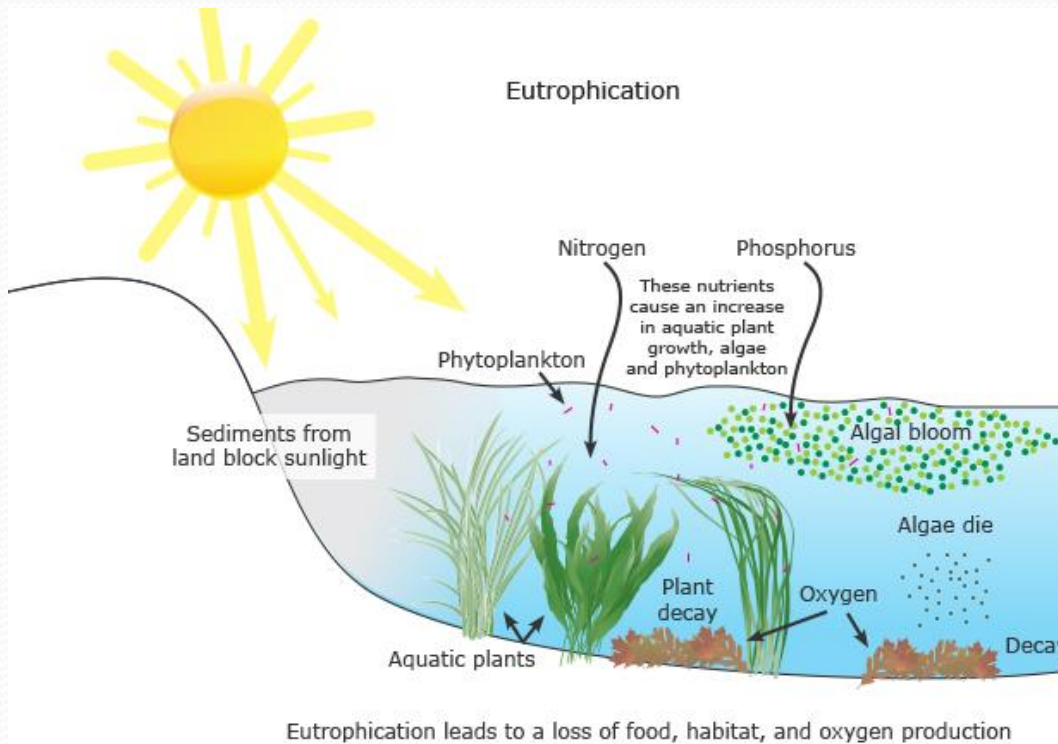
Types and Sources of Pollutants

Developed Land: Many Impacts



Types and Sources of Pollutants

Sediment and phosphorus are important and natural parts of a healthy environment!



They are only pollutants when way too much enters our lakes, streams, and wetlands.

Types and Sources of Pollutants

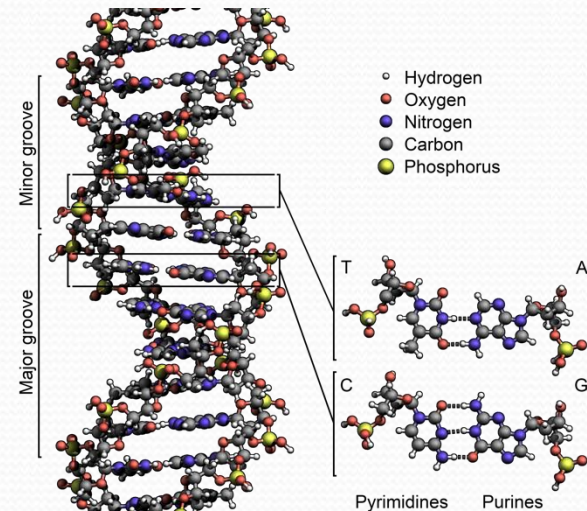
Part of a healthy environment

Sediment

- Some erosion is natural and important – enriches surrounding soil with nutrients.
- Sediment-rich areas often have high biodiversity.
- Deltas and river banks where sediment is deposited are often fertile agricultural areas.

Nutrients

- Essential for all life.
- Continuously cycling through plants, animals, and the environment to support life.



DNA

[http://upload.wikimedia.org/wikipedia/commons/4/4c/DNA_S.d
tructure%2BKey%2BLabelled.pn_NoBB.png](http://upload.wikimedia.org/wikipedia/commons/4/4c/DNA_S.d%20structure%2BKey%2BLabelled.pn_NoBB.png)

Types and Sources of Pollutants

Sediment

- Eroded soil



Phosphorus

- Fertilizer
- Human and animal waste



Too Much Phosphorus

Phosphorus

- Sticks to dirt and sediment particles
- Usually key nutrient for triggering excess algae and aquatic plant growth
- 1 pound of phosphorus can yield **500** pounds of algae



- **Some impacts**

- Too much plant and algae growth
 - Algae sometimes toxic
- Loss of water clarity
- Low dissolved oxygen
- Loss of habitat and aquatic life
- Water not swimmable, drinkable, or fishable



Impacts of Pollutants

Phosphorus

- “Eutrophic” lakes and rivers (green and scummy)
 - About 200 parts per billion*
- Fertilizer and manure
 - We add parts per million to land
 - (1,000 times more concentrated)

*One Part Per Billion:

One sheet in a roll of toilet paper stretching from New York to London

Phosphorus: What do the numbers mean?

- Coca Cola
 - 173,000 parts per billion

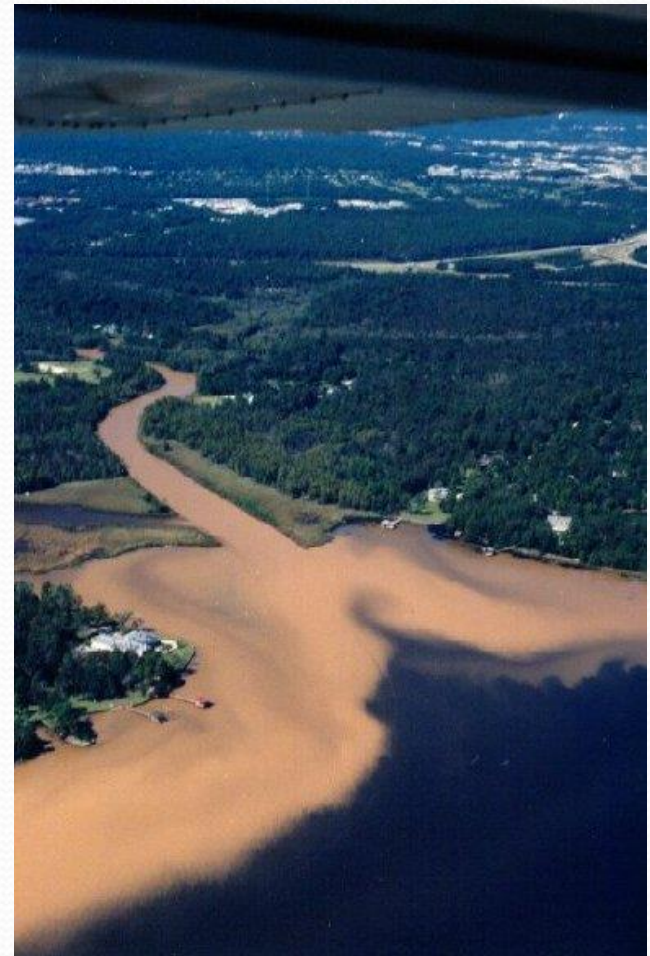


[lowes.com/projects/images/buying-guides/Lawn-Landscaping/fert-label.jpg](https://www.lowes.com/projects/images/buying-guides/Lawn-Landscaping/fert-label.jpg)

Impacts of Pollutants

- Brings phosphorus with it, increasing algae and aquatic plants
- Reduces water clarity, making it hard for visual feeders like fish to find food
- Reduces habitat near shore for fish and “fish food” like aquatic insects

Too Much Sediment



Impacts of Pollution

Sediment: What do the numbers mean?

TURBIDITY OF SUSPENDED CLAY



0 NTU's



2 NTU's



10 NTU's



40 NTU's



80 NTU's



400 NTU's

Fish act stressed

Fish:

- ✧ Abandon cover
- ✧ Avoid turbid water
- ✧ Increase respiration
- ✧ Feed less
- ✧ Cough more

- ✧ Fish grow more slowly
- ✧ Eggs hatch more slowly

Within days

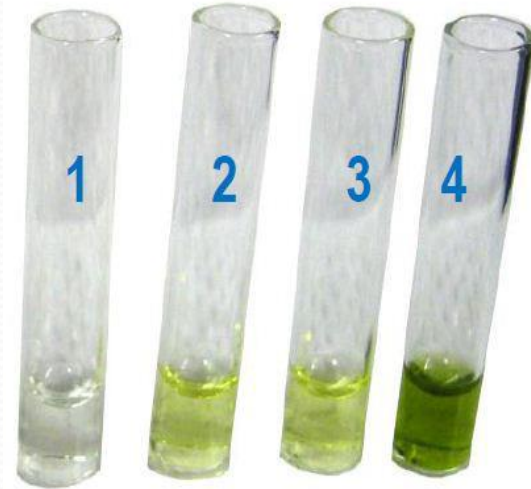
A few weeks



The Watershed Game: Classroom Version

Pollution Units (PUs) and Pollutant Load

- Pollutant concentration
 - How strong is it?
 - Teaspoons sugar per cup of tea
 - [Micrograms per liter of phosphorus in waters]
- Total pollutant “load”
 - How much over time?
 - Average calories consumed per person per day
 - [Average tons of sediment transported per year to a lake or stream]



http://www.ecy.wa.gov/programs/wq/plants/management/joys_manual/streampollution.html



Watershed Clean Water Goal

The Clean Water Act

- The Clean Water Act: Fishable and Swimmable water for all:
 - Pollutants from the watershed must be kept at or below the Clean Water Goal
- The Clean Water Goal for a watershed is set through scientific study and water quality monitoring to
 - Protect human health
 - Protect and restore aquatic ecosystems and their watersheds

