# INTRODUCTION TO FRESHWATER BIOLOGY

(Disclaimer: these are lecture outlines with some figures; these are not lecture notes)

Lake Tahoe http://www.ilec.or.jp/database/index/idx-lakes.html

## SCIENCE AT AN ECOSYSTEM LEVEL: STUDYING AQUATIC SYSTEMS


TWO TYPES OF EXPERIMENTS: both "experimental"

| Direct Manipulation | Indirect Manipulation (Observational) |
|---|---|
|  |  |

*Which type of experiment is more realistic? Which type is it easier to control other variables? Which type is it easier to determine cause and affect?*

**Why does science work?**

*i.e. If we can't have 100% confidence in any scientific study, why should we have confidence in the overall scientific process?*

Ecological systems large and complex, REAL DATA FRUSTRATING

**Bottom line for limnology: don't accept or reject data as absolute, but instead, as you write up each lab, make an argument based on available data and observation to build confidence in your hypotheses. Most likely you will have to use several independent sources of data to construct a convincing argument.**

## WHY STUDY FRESHWATER SYSTEMS?

The study of freshwater: limnology, aquatic ecology , freshwater oceanography, study of inland waters...

*What are the fundamental differences between lakes, streams, and wetlands?*

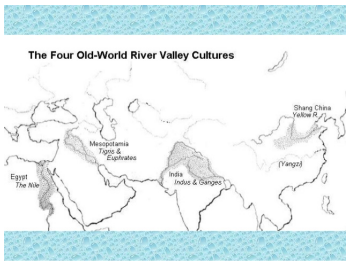
Water in the biosphere - 71% of earth's surface

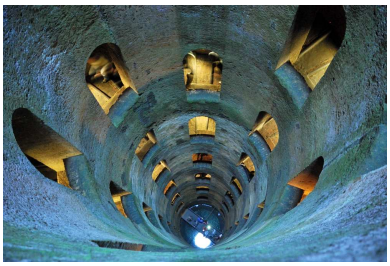
- Oceans 97.6%
- Polar ice 2.1%
- Groundwater 0.3%
- FW lakes and wetlands 0.009%
- Rivers and streams 0.00009%

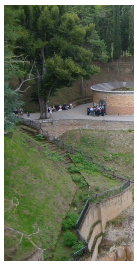
*Why is water important ecologically?*

*How is water important to humans?*

Human society is dependent on clean water. "[O]f the 31% of global runoff that is spatially and temporally accessible to society, more than half is withdrawn or maintained for instream uses."





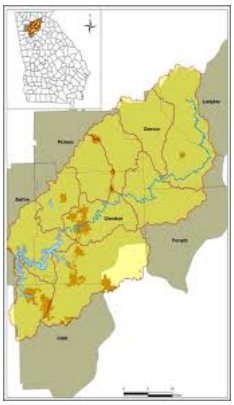
Control of water is important. *Is water quantity an issue in wetter climates?*

*What is non-consumptive vs. consumptive use?*

*If use is non-consumptive, does that necessarily mean that water returned to a stream can be used again?*

## SOME BASIC TERMINOLOGY

- **primary vs secondary productivity** (based on **trophic level**)
- **eutrophic** vs **oligotrophic**
- **benthic** (periphyton and macrophytes, infaunal, epifaunal, meiofaunal, and epiphytic animals (aufwuchs)) *vs*
- **planktonic** (zooplankton and phytoplankton) *vs*
- **nektonic** *vs*
- **neustonic**
- **lotic** vs **lentic**
- **drainage basin/watershed** (e.g. Georgia) *Where does your drinking water come from?*


Pickens
Gordon
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Floyd