Overview of Bio 111
Spring 2009

Cumulative portion:

Scientific Method-p. 23-26

Components of a good investigation (replicates, level of treatment, dependent, independent variables, control, control variables)

range of tolerance, effect of Temp on fish, abiotic and biotic components, limiting factor principle

Scientific Theory vs. Law

3 types of research in Environmental Science

2 themes of ES-Chpt. 1

1. Tragedy of the commons-article by G. Hardin and chpt. 1, commons, tragedy of the commons, population, pollution, natural resources, examples and solutions

2. Sustainability- Sustainability, sustainable yield, sustainable living means….., Natural Capital, Natural Services, Natural Resources, fair trade, organic farming,

5 Basic Causes of Environmental Problems- Chpt. 1

Causes of Environmental Problems, know each one and info about each, full cost pricing, policy, green taxes, green government subsidies

Ecosystems – Chpt. 3

Structure: food chains, food webs ("vores"), species, populations, communities, ecosystems

photosynthesis, chemosynthesis, aerobic respiration, anaerobic resp., cellulosic ethanol production (know balanced equations for photosynthesis and aerobic respiration), bioaccumulation, biomagnification. DDT p. 188

Abiotic factors for aquatic and terrestrial systems,

Functions: 1.One way flow of energy

2.Biogeochemical cycles: Water,C, N, P (you do not know need to know each of the steps in the nitrogen cycle, just the overall info and that many steps involve the action of bacteria) human impact on these cycles

Energy Pyramid and 10% Principle, # pyramid, Biomass pyramid,

Productivity: NPP, GPP, R, SP, Ecotones

Human Population – Chpt. 7 – p. 123-137 only

Animal populations-p.118-120, population curves, environmental resistance, carrying capacity, biotic potential, etc.

3 most populous countries, in order 1-3

Births, deaths, immigration, emigration

Growth rate, TFR, RLF, Pop growth= (immigration + birth rate) – (emigration + death rate)

Life expectancy, infant mortality and what affects these

Baby boomers,

Age structure diagrams-pre-reproductive, reproductive and post-reproductive groups

Demographic transition model- Birth rate, death rate and total population rate

Solutions to reduce human population growth rates

Logging Case Study Lab
Objectives:
-Be able to distinguish between the different types of sampling (Random, stratified random, systematic) and when you might choose one method over another.
-Be familiar with the different sampling parameters such as size of plots, shape of plots, number of plots, distribution of plots, etc.
-Be familiar with the three patterns of population distribution across a landscape (random, uniform and clumped)

Wetlands Lab- See lab objectives
From the video, text, case study, notes, time in the wetland, etc.
-Identify the major threats to wetlands.
-Identify the functions of wetlands.
-Note the wetland protection provisions which include the following: Section 404 of the Clean Water Act, 1972, GA Coastal Marshland Protection Act (1970), 404 Permit, EPA, Army Corps of Engineers, and delineation.
-Be familiar with other wetland terms such as: channelization, hydrophytes, buttressed trunks, lateral roots, OBL, FACW, FAC, hydric soils, anaerobic conditions, hydrology, inundation, arenchymousd tissue, etc.
-Be able to look at specific wetland data such as we collected at the GWF site and determine whether or not a wetland is present and to be able to delineate where it begins using the tree and herbaceous plant, soil and hydrology.

Wetland Mitigation and restoration and stream buffer lab
detention pond, engineered soils, forebays, silt fencing,
What is a buffer? Handouts on this
State buffer .....25ft for warm water streams , 50ft.for trout streams, this means not disturbing the ground in any way so no big machinery in the buffer.
Newton Co. ....150 ft buffer with the last 50 ft. as an area without septic tanks or impervious surfaces but may disturb the ground to create things like trails etc. The first 100 ft. is an area where there can be no ground disturbance of any kind.

Evolution- Chpt. 4 definition from our class, gene pool, change, mutation, population, community, species, artificial selection, natural selection, adaptation, speciation, geographic isolation and reproductive isolation

Biodiversity- species approach and ecosystem approach- Chapt. 9-and certain pages in Chapt. 8

Extinctions background and mass, 6th greatest extinction, causes and why so bad?
How bad is it? Why should we care?
Eight causes of the Loss of Biodiversity – Fig. 9-7, p. 183

Info on all of this in your notes

Native species, invasive species, keystone species, keystone predators, keystone modifiers, indicator species,

Solutions….Invasive species council, ESA, CITIES, etc.

Test 4 portion:

Water Resources Chpt. 11 and FLOW video

Watersheds, water wars

Surface and groundwater confined or fossil, unconfined aquifers, water table

Discharge, recharge

Aquifers, subsidence, saltwater intrusion, water mining (groundwater overdraft)

Water uses: agricultural, domestic and industrial

Inter basin transfers, Dams(+and -), aqueducts, desalination, distillation, reverse osmosis, cloud seeding, iceberg towing, water towing, water conservation

Green revolution, types of irrigation world wide,

Irrigation problems- Salinization, evaporation and waterlogging p. 207

Water conservation- irrigation improvements, Fig. 11-16 and notes

Water Conservation- domestic and industrial Fig. 11-17 and notes

Water Pollution Chpt. 11

Clean Water Act, point and non-point source pollution

Table 11-1 p. 246….list of 5. major water pollutants and their sources

1.Thermal pollution

2. Erosion and Sediment-problems of DIRT

Mining coal, Kaolin and granite), agriculture

3. Phosphorus and Nitrogen-sources, link to eutrophication p. 101, 220, domino effects of N and P in the water, algal blooms, fish kills, dead zones, HABs, Red Tides, Pfisteria, green revolution p.209-210

Human sewage/ livestock manure(hog farms, chicken houses)- link to eutrophication –, BOD, DO, aerobic bact., anaerobic bact. Fish kills, recovery of the stream, fertilizer, septic tank systems

4. Waterborne Pathogens, diseases-E. coli and the coliform test, Giardia, and Cryptosporidium,

5. Chemicals-POPs, DDT, Dioxins, BPA, bioaccumulation, biomagnification Health problems from exposure to these, medicines in our water

Atmospheric resources and pollution- Chpt. 15

6 Primary pollutants: CO_2 (covered in Climate Change) EPA sued so that it now must control CO_2, CO, SOx, NOx, VOCs, and SPM-sources of each and health effects,

Lead as a neurotoxin and where it comes from and what we have done to reduce lead in the US,

Mercury as a neurotoxin, where it comes from
3 Secondary pollutants: HNO_3, H_2SO_4 and O_3-sources of each
Photochemical smog, Industrial Pollution, thermal inversions
Acid rain and low level O_3
Solutions to the Air Quality Problems

Global warming - Chpt. 15 Global Warming - natural GH effect and enhanced GH effect
GH gases: CO_2, Methane, Nitrous Oxide, natural water vapor
Evidence and consequences of Global warming (whole list of these)

Stream Survey- See the Lab Objectives for this information

-Be able to make an assessment of the health of any stream based on the biological, chemical and visual data.
-Understand and be able to explain terms related to the stream study such as: tolerant, intolerant, pioneer species,
-Be able to interpret chemical data for pH, DO, Nitrate-Nitrogen, Phosphate, Temperature, etc. in such a way that you demonstrate your understanding of the normal value, range, and possible causes for values being too high or too low.
-Be able to interpret results of the coliform test. What is coliform bacteria and where does it come from? What does a positive coliform test look like? What does a positive coliform test indicate for the stream quality?
-Be able to calculate the EPT index for the benthic macroinvertebrates of a stream and identify what the values of this index indicate for the health of a stream.
-Be able to identify specific indicator fish that might help determine if a steam is healthy or not.
-Demonstrate your understanding of stream protection policy and regulation including such concepts as: Clean Water Act and amendments, stream buffers, state and local controls, detention ponds, silt fencing, etc.
-Identify major threats to streams in the U.S.