

Outline of Topics for AP Environmental Science 2008-2009

I. **Earth Systems and Resources**

A. Earth Science Concepts

(Geologic time scale, plate tectonics, earthquakes, volcanism; seasons; solar intensity and latitude.)

B. The Atmosphere

(Composition; structure; weather and climate; atmospheric circulation and the Coriolis Effect; atmosphere-ocean interactions; ENSO)

C. Global Water Resources and Use

(Freshwater/saltwater; ocean circulation; agricultural, industrial, and domestic use; surface and groundwater issues; global problems; conservation)

D. Soil and Soil Dynamics

(Rock cycle; formation; composition; physical and chemical properties; main soil types; erosion and other soil problems; soil conservation)

II. **The Living World**

A. Ecosystem Structure

(Biological population and communities; ecological niches; interactions among species; keystone species; species diversity and edge effects; major terrestrial and aquatic biomes)

B. Energy Flow

(Photosynthesis and cellular respiration; food webs and trophic levels; ecological pyramids)

C. Ecosystem Diversity

(Biodiversity; natural selection; evolution; ecosystem services)

D. Natural Ecosystem Change

(Climate shifts; species movement; ecological succession)

E. Natural Biogeochemical Cycles

(Carbon, nitrogen, phosphorus, sulfur, water, conservation of matter)

III. **Population**

A. Population Biology Concepts

(Population ecology; carrying capacity; reproductive strategies; survivorship)

B. Human Population

1. Human population dynamics

(Historical population sizes; distribution; fertility rates; growth rates and doubling times; demographic transition; age-structure diagrams)

2. Population size

(Strategies for sustainability; case studies; national policies)

3. Impacts of population growth

(Hunger; disease; economic effects; resource use; habitat destruction)

IV. Land and Water Use

A. Agriculture

1. Feeding a growing population

(Human nutritional requirements; types of agriculture; Green Revolution; genetic engineering and crop production; deforestations; irrigation; sustainable agriculture)

2. Controlling pests

(Types of pesticides; costs and benefits of pesticide use; integrated pest management; relevant laws)

B. Forestry

(Tree plantations; old growth forests; forest fires; forest management; national forests)

C. Rangelands

(Overgrazing; deforestation; desertification; rangeland management; federal rangelands)

D. Other Land Use

1. Urban land development

(Planned development; suburban sprawl; urbanization)

2. Transportation infrastructure

(Federal highway system; canals and channels; roadless areas; ecosystem impacts)

3. Public and federal lands

(Management; wilderness areas; national parks; wildlife refuges; forests; wetlands)

4. Land conservation options

(Preservation; remediation; mitigation; restoration)

5. Sustainable land use strategies

E. Mining

(Mineral formation; extraction; global reserves; relevant laws and treaties)

F. Fishing

(Fishing techniques; overfishing; aquaculture; relevant laws and treaties)

G. Global Economics

(Globalization; World Bank; Tragedy of the Commons; relevant laws and treaties)

V. Energy Resources and Consumption

A. Energy Concepts

(Energy forms; power; units; conversions; Laws of Thermodynamics)

B. Energy Consumption

1. History

(Industrial Revolutions; exponential growth; energy crisis)

2. Present global energy use

3. Future energy needs

C. Fossil Fuel Resources and Use

(Formation of coal, oil, and natural gas; extraction/purification methods; world reserves and global demand; synfuels; environmental advantages/disadvantages of sources)

D. Nuclear Energy

(Nuclear fission process; nuclear fuel; electricity production; nuclear reactor types; environmental advantages/disadvantages; safety issues; radiation and human health; radioactive wastes; nuclear fusion)

E. Hydroelectric Power

(Dams; flood control; salmon; silting; other impacts)

F. Energy Conservation

(Energy efficiency; CAFE standards; hybrid electric vehicles; mass transit)

G. Renewable Energy

(Solar energy; solar electricity; hydrogen fuel cells; biomass; wind energy; small-scale hydroelectric; ocean waves and tidal energy; geothermal; environmental advantages/disadvantages)

VI. Pollution

A. Pollution Types

1. Air pollution

(Sources -- primary and secondary; major air pollutants; measurement units; smog; acid deposition--causes and effects; heat islands and temperature inversions; indoor air pollution; remediation and reduction strategies;

Clean Air Act and other relevant laws)

2. Noise pollution

(Sources; effects; control measures)

3. Water pollution

(Types; sources, causes, and effects; cultural eutrophication; groundwater pollution; maintaining water quality; water purification; sewage treatment/septic

systems; Clean Water Act and other relevant laws)

4. Solid waste

(Types; disposal; reduction)

B. Impacts on the Environment and Human Health

1. Hazards to human health

(Environmental risk analysis; acute and chronic effects; dose-response relationships; air pollutants; smoking and other risks)

2. Hazardous chemicals in the environment

(Types of hazardous waste; treatment/disposal of hazardous waste; cleanup of contaminated sites; biomagnification; relevant laws)

C. Economic Impacts

(Cost-benefit analysis; externalities; marginal costs; sustainability)

VII. Global Change

A. Stratospheric Ozone

(Formation of stratospheric ozone; ultraviolet radiation; causes of ozone depletion; effects of ozone depletion; strategies for reducing ozone depletion; relevant laws and treaties)

B. Global Warming

(Greenhouse gases and the greenhouse effect; impacts and consequences of global warming; reducing climate change; relevant laws and treaties)

C. Loss of Biodiversity

1. Habitat loss; overuse; pollution; introduced species; endangered and extinct species
2. Maintenance through conservation
3. Relevant laws and treaties