

APES STUDY GUIDE

Topic Outline and Review for AP EXAM

I. Earth Systems and Resources (10-15%)

a. Earth Science Concepts

i. Geologic time scales

ii. plate tectonics

iii. earthquakes

iv. volcanism

v. Seasons

vi. Solar intensity & latitude

b. The Atmosphere

i. Composition

ii. Structure

iii. Weather & climate

iv. Atmospheric circulation & Coriolis Effect

v. Atmosphere – ocean interactions; ENSO

c. Global Water resources & Use

i. Freshwater/saltwater

ii. Ocean circulation; agricultural, industrial & domestic use

iii. Surface & groundwater issues

iv. Global problems; conservation

d. Soil & Soil Dynamics

i. Rock cycle

ii. Formation;

1. Composition; physical & chemical properties

iii. Main soil types

iv. Erosion and other soil problems

v. Soil conservation

II. Living World (10-15%)

a. Ecosystem Structure

i. Biological populations & communities

ii. ecological niches

iii. interactions among species

iv. keystone species

v. species diversity and edge effect

vi. major terrestrial & aquatic biomes

b. Energy Flow

- i. Photosynthesis & cellular respiration
- ii. Food webs and trophic levels
- iii. Ecological pyramids

c. Ecosystem Diversity

- i. Biodiversity
- ii. Natural selection
- iii. Evolution
- iv. Ecosystem services

d. Natural Ecosystem Change

- i. Climate shifts
- ii. Species movement
- iii. Ecological succession, primary & secondary

e. Natural Biogeochemical cycles

- i. Carbon
- ii. Nitrogen
- iii. phosphorus
- iv. sulfur

v. water

vi. conservation of matter

III. Population (10-15%)

a. Population Biology Concepts

i. Population ecology

ii. carrying capacity

iii. reproductive strategies

iv. survivorship

b. Human Population

i. Human population dynamics

1. historic population size

2. distribution

3. fertility rates

4. growth rates and doubling times

5. demographic transition

a. preindustrial

b. transition

c. industrialization

d. postindustrial

6. age-structure diagrams

b. Population size

i. Strategies for sustainability

ii. case studies

iii. national policies

IV. Land and Water Use (10-15%)

a. Agriculture

i. Feeding a growing population

a. human nutritional requirements

b. types of agriculture

c. Green Revolution

d. genetic engineering and crop production

e. deforestation

f. irrigation

g. sustainable agriculture

ii Controlling pests

a. types of pesticides

b. Costs & Benefits of pesticide use

c. Integrated Pest Management (IPM)

d. Laws

B Forestry

a. Tree plantations

b. Old Growth forests

c. forest fires

d. forest management

e., National Forests

c. Rangelands

a. Overgrazing

b. deforestation

c. rangeland management

d. federal rangelands

d. Other land use

a. Urban land development

i. Planned development

ii. suburban sprawl

iii. urbanization

b. Transportation infrastructure

i. federal highway system

ii. canals and channels

iii. roadless areas

iv. ecosystem impact

c. Public and Federal Lands

i. Management

ii. wilderness areas

iii. national parks

v. wildlife refuges

vi. forests

vii. wetlands

- d. Land Conservation options
 - i. Preservation
 - ii. remediation
 - iii. mitigation
 - iv. restoration
 - v. sustainable land-use strategies
- f. mining
 - i. mineral formation
 - ii. extraction
 - iii. global reserves
 - iv. relevant laws and treaties
- g. Fishing
 - i. fishing techniques
 - ii. overfishing
 - iii. aquaculture
 - iv. relevant laws and treaties
- h. global Economics

- i. Globalization
- ii. World bank
- iii. Tragedy of the commons
- iv. relevant laws and treaties

V. Energy Resources and Consumption

A. Energy Concepts

- i. energy forms
- ii. power
- iii. unit
- v. Laws of Thermodynamics

B. Energy Consumption

- i. History
 - Industrial Revolution
 - Exponential Growth
 - Energy crisis
- ii. Present global energy use
- iii. Future energy needs

C. Fossil Fuel Resources and Use

- i. formation of coal, oil and natural gas
- ii. extraction/ purification methods
- iii. world reserves and global demand
- iv. synthetic fuels
- v. environmental advantages/disadvantages of sources

D. Nuclear Energy

- i. Nuclear fission process
- ii. nuclear fuel
- iii. electricity production
- iv. nuclear reactor types
- vi. environmental advantages/disadvantages
- vii. safety issues
- viii. radiation and human health
- ix. radioactive wastes
- x. nuclear fusion

e. Hydroelectric power

- i. Dams
- ii. Flood control
- iii. Salmon
- iv. Silting
- v. other impacts

F. Energy Conservation

- i. Energy Efficiency
- ii. CAFÉ standards
- iii. hybrid electric vehicles
- iv. mass transit

G. Renewable Energy

- i. Solar Energy
- ii. Solar electricity
- ii. Hydrogen fuel cell
- iii. biomass

iv. wind energy

v. small-scale hydroelectric

vi. ocean waves and tidal energy

vii. geothermal energy

viii. environmental advantages/disadvantages

VI. Pollution (25-30%)

A. Pollution Types

a. Air Pollution

i. Sources, primary and secondary

ii. major air pollutants

iii. measurement units

iv. smog: acid deposition – causes and effects

v. Heat Islands and temperature inversions

vi. indoor pollutants; sick building syndrome, types of pollutants. Health effects etc.

vii. remediation and reduction strategies

viii. Clean Air Act and other relevant laws

b. Noise Pollution

- i. Sources
- ii. Effects
- iii. control measures

c. Water pollution

i. Types

li. sources

iii. causes and effects

iv. cultural eutrophication

v. ground-water pollution

vi. maintaining water quality

vii. water purification

viii. sewage treatment/septic systems

ix. Clean Water Act and other Relevant laws

d. Solid waste

i. Types

ii. disposal

iii. reduction

B. Impacts on the Environment and Human Health

A. Hazards to Human health

i. Environmental risk analysis

ii. acute and chronic effects

iii. dose-response relationships: LD50 and Threshold

iv. air pollutants

v. smoking and other risks

b. Hazardous chemicals in the Environment

i. Types of hazardous waste

ii. treatment/ disposal of hazardous waste

iii. cleanup of contaminated sites

iv. biomagnification

v. Relevant laws

B. Economic Impacts

- i. Cost- Benefit analysis
- ii. externalities
- iii. marginal costs
- iv. sustainability

VI. Global Change (10-15%)

A.Stratospheric Ozone

- I. formation of stratospheric ozone
- ii. ultraviolet radiation
- iii. causes and effects of ozone depletion
- v. strategies for reducing ozone depletion
- vi. relevant laws and treaties

C. Global Warming

- i. Greenhouse gases and the greenhouse effect
- ii. impacts and consequences of global warming
- iii. reducing climate change
- iv relevant laws and treaties

D. Loss of Biodiversity

- i. Habitat Loss
- 1. Overuse

2. pollution
3. introduced species
4. endangered and extinct species

iii. Relevant Laws and Treaties