**AP Exam Review**

1. **Earth Systems and Resources (10–15%)**
	1. **Earth Science Concepts (Geologic time scale; plate tectonics, earthquakes, volcanism; seasons; solar intensity and latitude)**
	2. **The Atmosphere (Composition; structure; weather and climate; atmospheric circulation and the Coriolis Effect; atmosphere–ocean interactions; ENSO)**
	3. **Global Water Resources and Use (Freshwater/saltwater; ocean circulation; agricultural, industrial, and domestic use; surface and groundwater issues; global problems; conservation)**
	4. **Soil and Soil Dynamics (Rock cycle; formation; composition; physical and chemical properties; main soil types; erosion and other soil problems; soil conservation)**
2. What are the three types of plate boundaries? Describe what happens at each.
3. What causes the seasons?
4. How does solar intensity change with latitude?
5. Describe the layers of the atmosphere.
6. What is the Coriolis effect? How does it affect atmospheric and oceanic circulation?
7. What is ENSO? What are its effects?
8. What is the number one use of freshwater resources?
9. What are some of the negative effects of surface water diversions? Give an example of a NAMED diversion project.
10. Describe the following soil properties: porosity, permeability, texture, nutrients, pH
11. Describe the soil horizons.
12. **The Living World (10–15%)**
	1. **Ecosystem Structure (Biological populations and communities; ecological niches; interactions among species; keystone species; species diversity and edge effects; major terrestrial and aquatic biomes)**
	2. **Energy Flow (Photosynthesis and cellular respiration; food webs and trophic levels; ecological pyramids)**
	3. **Ecosystem Diversity (Biodiversity; natural selection; evolution; ecosystem services)**
	4. **Natural Ecosystem Change (Climate shifts; species movement; ecological succession)**
	5. **Natural Biogeochemical Cycles (Carbon, nitrogen, phosphorus, sulfur, water, conservation of matter)**
13. Define niche.
14. Describe the types of symbiotic relationships and give an example of each.
15. What is a keystone species?
16. Describe the temperature, precipitation, flora and fauna of the following biomes:
	1. Tropical Rainforest, Deciduous Forest, Coniferous Forest (Taiga)
	2. Tropical Grassland (Savanna), Temperate Grassland (Prairie), Tundra
	3. Desert
17. Describe the energy flow in a food web.
18. What are the inputs and outputs of photosynthesis and respiration?
19. What is natural selection?
20. How is evolution/diversity affected by island biogeography?
21. Describe the two types of ecological succession
22. What are the major carbon sinks?
23. How are humans affecting the carbon cycle? Nitrogen cycle? Phosphorus cycle? Sulfur cycle?
24. **Population (10–15%)**
	1. **Population Biology Concepts (Population ecology; carrying capacity; reproductive strategies; survivorship)**
	2. **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)**
25. What is carrying capacity?
26. What is the difference between a R- and K- strategist? Give an example of each.
27. Draw a survivorship curve for each of the following: early loss, late loss, constant loss. Be sure to label the axes!
28. How has human population change over time?
29. How do you calculate annual growth rate? Population change? Doubling time?
30. Draw a simple age-structure diagram for a developed and a developing country.
31. Describe the following graph: What does each line represent? What does each stage represent?



1. **Land and Water Use (10–15%)**
	1. **Agriculture**
		1. **Feeding a growing population (Human nutritional requirements; types of agriculture; Green Revolution; genetic engineering and crop production; deforestation; irrigation; sustainable agriculture)**
		2. **Controlling pests (Types of pesticides; costs and benefits of pesticide use; integrated pest management; relevant laws)**
	2. **Forestry (Tree plantations; old growth forests; forest fires; forest management; national forests)**
	3. **Rangelands (Overgrazing; deforestation; desertification; rangeland management; federal rangelands)**
	4. **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**
	5. **Mining (Mineral formation; extraction; global reserves; relevant laws and treaties)**
	6. **Fishing (Fishing techniques; overfishing; aquaculture; relevant laws and treaties)**
	7. **Global Economics (Globalization; World Bank; Tragedy of the Commons; relevant laws and treaties)**
2. Why is industrial monoculture high input?
3. What is the Green Revolution?
4. What are GMOs?
5. What are the issues with irrigation? Which type is the most efficient?
6. Give examples of practices in sustainable agriculture.
7. What is integrated pest management?
8. What are the relevant laws of pesticide use in the U.S.?
9. What is urban sprawl? Smartgrowth?
10. What is mitigation? Give an example.
11. Describe the following: strip mining, contour mining, mountain top removal, subsurface mining
12. Where are the most abundant global reserves of the following: coal, oil, natural gas
13. What are the relevant laws dealing with mining and reclamation?
14. What is reclamation?
15. What is globalization?
16. What is tragedy of the commons?
17. **Energy Resources and Consumption (10–15%)**
	1. **Energy Concepts (Energy forms; power; units; conversions; Laws of Thermodynamics)**
	2. **Energy Consumption**
		1. **History (Industrial Revolution; exponential growth; energy crisis)**
		2. **Present global energy use**
		3. **Future energy needs**
	3. **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)**
	4. **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)**
	5. **Hydroelectric Power (Dams; flood control; salmon; silting; other impacts)**
	6. **Energy Conservation (Energy efficiency; CAFE standards; hybrid electric vehicles; mass transit)**
	7. **Renewable Energy (Solar energy; solar electricity; hydrogen fuel cells; biomass; wind energy; small-scale hydroelectric; ocean waves and tidal energy; geothermal; environmental advantages/disadvantages)**
18. Describe the 1st and 2nd laws of thermodynamics
19. Describe the stages of coal formation
20. How is oil extracted?
21. Describe fracking.
22. Describe the nuclear fission process. How is it used to produce electricity? How do we deal with the wastes?
23. What are the advantages and disadvantages to hydroelectric power?
24. What are the advantages and disadvantages of the following power sources: solar, hydrogen fuel cells, biomass, wind, waves and tides, geothermal
25. What is the difference between active and passive solar energy
26. **Pollution (25–30%)**
	1. **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)**
	2. **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)**
	3. **Economic Impacts (Cost-benefit analysis; externalities; marginal costs; sustainability)**
27. What is the difference between primary and secondary air pollutants? Give an example of each.
28. List the 6 criteria air pollutants (NAAQS). What is the source and effect of each.
29. Describe the formation of photochemical smog.
30. What is acid deposition? What are the causes? Effects?
31. What is the heat island effect?
32. What is a temperature inversion? How does it affect air pollution?
33. What are the most dangerous indoor air pollutants in a developed country? Developing country?
34. What is sick building syndrome?
35. Describe the Clean Air Act
36. What are the sources of water pollution.
37. What are the effects of organic pollutants? (relate to DO and BOD)
38. What is cultural eutrophication? Causes? Effects?
39. Describe water treatment and waste water treatment processes.
40. What and how does each of the following target in waste water treatment: primary, secondary, advanced treatment
41. Describe the Clean Water and Safe Drinking Water Acts
42. How do we dispose of solid waste? What are the advantages and disadvantages to each?
43. How do we dispose of hazardous waste?
44. Describe CERCLA(Superfund) and RCRA
45. What is LD50?
46. What is bioaccumulation? Biomagnifications? Give an example.
47. **Global Change (10–15%)**
	1. **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)**
	2. **Global Warming (Greenhouse gases and the greenhouse effect; impacts and consequences of global warming; reducing climate change; relevant laws and treaties)**
	3. **Loss of Biodiversity**
		1. **Habitat loss; overuse; pollution; introduced species; endangered and extinct species**
		2. **Maintenance through conservation**
		3. **Relevant laws and treaties**
48. How does stratospheric ozone form?
49. What are the causes/sources of ozone depletion? Describe the process.
50. Describe the Montreal Protocol.
51. What is the greenhouse effect? What are the major greenhouse gases?
52. What are some impacts of global warming?
53. Describe the Kyoto Protocol
54. What are the major causes of habitat loss?
55. What is a nonnative/alien/introduced species? Give an example and describe its effects.
56. How can we conserve our endangered species? What is the best approach? What are the relevant laws and treaties?