

254 Ways to go APES!!! ~ APES Review

Definitions

1. *Average residence time*: time it takes for a given part of the total reservoir of a particular material to be cycled through the system
2. *Gaia*: Greek goddess Mother Earth
3. *Sustainability*: the ability to meet humanities current needs without compromising the ability of future generations to meet their needs
4. *Lag time*: time between a stimulus and he response of a system
5. *Volatile organic compounds*: a variety of organic compounds used as solvents in industrial processes (dry cleaning, degreasing, and graphic arts)
6. *Positive feedback*: when a change in some condition triggers a response that intensifies the changing condition (ex: warmer Earth- snow melts – less sunlight is reflected & more absorbed, therefore warmer Earth)
7. *Negative feedback*: when a changing in some condition triggers a response that counteracts the changed condition (Ex: warmer Earth- more ocean evaporation- more stratus clouds- less sunlight reaches ground- therefore cooler Earth)
8. *True cost/External costs*: harmful environmental side effects that are not reflected in a products cost
9. *First Law of Thermodynamics*: energy is neither created nor destroyed, but may be converted from one form to another.
10. *Second Law of Thermodynamics*: when energy is changed from one form to another, some useful energy is always degraded into lower quality energy (usually heat).
11. *Ionizing radiation*: radiation w/enough energy to free electrons from atoms forming ions, may cause cancer (ex. gamma, X-rays, UV).
12. *High Quality Energy*: organized & concentrated, can perform useful work (ex. fossil fuels & nuclear).
13. *Low Quality Energy*: disorganized, dispersed (ex. heat in ocean or air/wind, solar).
14. *Natural radioactive decay*: unstable radioisotopes decay releasing gamma rays, alpha & beta particles (ex. Radon).
15. *Half-life*: the time it takes for 1/2 of the mass of a radioisotope to decay. A radioactive isotope must be stored for approximately 10 half-lives until it decays to a safe level.
16. *Nuclear Fission*: nuclei of isotopes split apart when struck by neutrons.
17. *Nuclear Fusion*: 2 isotopes of light elements (H) forced together at high temperatures till they fuse to form a heavier nucleus. Happens in the Sun, very difficult to accomplish on Earth, prohibitively expensive.
18. *Estimate of how long a radioactive isotope must be stored until it decays to a safe level*: approximately 10 half-lives
19. *Ore*: a rock that contains a large enough concentration of a mineral making it profitable to mine.
20. *Mineral Reserve*: identified deposits currently profitable to extract.
21. *Surface mining*: cheaper, can remove more minerals, less hazardous to workers.
22. *Organic fertilizer*: slow acting long lasting because the organic remains need time to be decomposed
23. *Silviculture*: professional growing of trees
24. *Shelterwood-cutting*: cutting dead and less desirable trees first and alter cutting mature trees
25. *Seed-tree cutting*: removes all but a few seed trees to promote regeneration
26. *Selective cutting*: individual trees are marked and cut
27. *Humus*: organic, dark material remaining after decomposition by microorganisms.
28. *Leaching*: removal of dissolved materials from soil by water moving downwards through soil.
29. *Illuviation*: deposit of leached material in lower soil layers (B)
30. *Conservation*: allows the use of resources in a responsible manner
31. *Preservation*: setting aside areas & protecting them from human activities
32. *Loam*: perfect agricultural soil with equal portions of sand, silt, and clay.
33. *Soil Conservation Methods*: conservation tillage, crop rotation, contour plowing, organic fertilizers.
34. *Soil Salinization*: in arid regions, water evaporates leaving salts behind. (ex. Fertile crescent, southwestern US)
35. *Water Logging*: water completely saturates soil starves plant roots of oxygen, rots roots

36. *Hydrologic Cycle Components*: evaporation, transpiration, runoff, condensation, precipitation, and infiltration.
37. *Watershed*: all of the land that drains into a body of water.
38. *Aquifer*: underground layers of porous rock allow water to move slowly.
39. *Cone of Depression*: lowering of the water table around a pumping well.
40. *Salt Water Intrusion*: near the coast, overpumping of groundwater causes saltwater to move into the aquifer.
41. *Adaptive radiation*: occurs when a species enters a new habitat that has unoccupied niches and evolves into a group of new species, each adapted to one of these niches
42. *Alpha particle*: one of the major types of nuclear radiation, consisting of two protons and two neutrons
43. *Beta particle*: one of three kinds of nuclear radiation; electrons that are emitted when one of the protons or neutrons in the nucleus of an isotope spontaneously changes
44. *Gamma rays*, one of three kinds of nuclear radiation; type of EM radiation emitted from the isotope similar to X rays but more energetic and penetrating
45. *ENSO*: El Nino Southern Oscillation, trade winds weaken & warm surface water moves toward South America. Diminished fisheries off South America, drought in western Pacific, increased precipitation in southwestern North America, fewer Atlantic hurricanes. (see-sawing of air pressure over S. Pacific)
46. *During an El Nino year*: trade winds weaken & warm water sloshed back to SA
47. *During a Non El Nino year*: Easterly trade winds and ocean currents pool warm water in the western Pacific, allowing upwelling of nutrient rich water off the West coast of South America
48. *Effects of El Nino*: upwelling decreases disrupting food chains, N US has mild winters, SW US has increased rainfall, less Atlantic Hurricanes
49. *La Nina*: “Normal” year, easterly trade winds and ocean currents pool warm water in the western Pacific, allowing upwelling of nutrient rich water off the West coast of South America.
50. *Nitrogen Fixation*: because atmospheric N cannot be used directly by plants, it must first be converted into ammonia by bacteria.
51. *Ammonification*: decomposers covert organic waste into ammonia.
52. *Nitrification*: ammonia is converted to nitrate ions (NO_3^-).
53. *Assimilation*: inorganic N is converted into organic molecules such as DNA/amino acids & proteins.
54. *Denitrification*: bacteria convert ammonia back into N.
55. *Phosphorus*: does not exist as a gas; released by weathering of phosphate rocks, it is a major limiting factor for plant growth. Phosphorus cycle is slow, and not atmospheric.
56. *Excess phosphorous is added to aquatic ecosystems by: runoff of animal wastes, fertilizer discharge of sewage*
57. *Photosynthesis*: plants convert CO_2 (atmospheric carbon) into complex carbohydrates (glucose $\text{C}_6\text{H}_{12}\text{O}_6$).
58. *Aerobic Respiration*: oxygen consuming producers, consumers & decomposers break down complex organic compounds & convert C back into CO_2 .
59. *Largest reservoirs of C*: carbonate rocks first, oceans second
60. *Biotic*: the living components of an ecosystem.
61. *Abiotic*: the nonliving components of an ecosystem.
62. *Producer/Autotroph*: organisms that make their own food—photosynthetic life (plants).
63. *Fecal coliform*: indicator of sewage contamination
64. *Chlorine*: (good>disinfection of water) (bad> forms trihalomethanes)
65. *Obligate symbiont*: relationship between two organisms in which neither by themselves can exist without the other
66. *Rangeland*: provides food for grazing and browsing animals w/o plowing and planting
67. *Pasture*: plowed, planted, and harvested to provide forage for animals
68. *Igneous rock*: formed from solidification of magma
69. *Metamorphic rock*: formed by heat & pressure
70. *Sedimentary rock*: formed by weathering & erosion
71. *Soil horizon layers*: O, A, E, B, C, R

72. *Contour plowing*: land is plowed perpendicular to the slopes and as horizontally as possible
73. *No-till agriculture*: involves not plowing the land, using herbicides and integrated pest management to keep down weeds, and allowing some weeds to grow
74. *Eutrophication*: a body of water develops a high concentration of nutrients (N & P), causes increase in algae, organisms below deprived of light, large die off, decompose, DO lowers.
75. *Oligotrophic*: referring to bodies of water having low concentration of chemical elements required for life.
76. *Photodissociation*: solar radiation breaks down chemical bonds. Ex: $O_3 + UV \rightarrow O_2$
77. *Trophic Levels*: producers \rightarrow primary consumer \rightarrow secondary consumer \rightarrow tertiary consumer.
78. *Energy Flow through Food Webs*: 10% of the usable energy is transferred to the next trophic level. Reason: usable energy lost as heat (2nd law of Thermodynamics), not all biomass is digested & absorbed, predators expend energy to catch prey.
79. *Primary succession*: development of communities in a lifeless area not recently inhabited by life (ex. lava flow, retreating glacier).
80. *Secondary succession*: life progresses where soil remains (ex. clear-cut/burned forest, old farm, vacant lot).
81. *Mutualism*: symbiotic relationship where both organisms benefit.
82. *Commensalism*: symbiotic relationship where one organism benefits & the other is unaffected.
83. *Parasitism*: relationship in which one organism (the parasite) obtains nutrients at the expense of the host.
84. *Carrying Capacity*: the number of individuals that can be sustained in an area.
85. *r-strategist*: reproductive strategy in which organisms reproduce early, bear many small, unprotected offspring (ex. insects, mice).
86. *K-strategist*: reproductive strategy in which organisms reproduce late, bear few, cared for offspring (ex. humans, elephants).
87. *Wetland*: shallow depression that seasonally holds water (marshes, swamp, bog)
88. *Natural Selection*: organisms that possess favorable adaptations pass them onto the next generation.
89. *Thomas Malthus*: "human population cannot continue to increase. Consequences will be war, famine & pestilence (disease)."
90. *Doubling Time*: (rule of 70) doubling time equals 70 divided by percent growth rate. (ex. a population growing at 5% annually doubles in $70 \div 5 = 14$ years)
91. *Replacement Level Fertility*: the number of children a couple must have to replace themselves (averages 2.1 in more developed nations, 2.7 in less developed nations).
92. *World Population*: a little over 6 billion.
93. *US Population*: 290 million
94. *Kwashiorkor*: lack of sufficient protein in diet, leads to failure of neural development in infants and therefore learning disabilities
95. *Marasmus*: progressive emaciation caused by lack of protein and calories
96. *Malnourishment*: lack of specific components of food (proteins or vitamins)
97. *Undernourishment*: lack of calories
- Demographic Transition Model*:
98. *Preindustrial stage*: birth & death rates high, population grows slowly, infant mortality high.
99. *Transitional stage*: death rate (infant mortality) lower, birth rates remain high, better health care, population grows fast.
100. *Industrial stage*: decline in birth rate, population growth slows.
101. *Postindustrial stage*: low birth & death rates.
102. *General fertility rate*: number of live births expected in a year per 1,000 women aged 15 to 49 years
103. *Total fertility rate*: average number of children expected to be born to a woman throughout her childbearing years
104. *Incidence rate*: number of people contracting a disease during a time period
105. *Which cycle does not have a gaseous phase*: Phosphorous
106. *Genetic drift*: changes in the frequency of a gene in a population due not to mutation, selection, or migration but to chance
107. *Age Structure Diagrams*: broad base \rightarrow rapid growth; narrow base \rightarrow negative growth; uniform shape \rightarrow zero growth
108. *Most Populous Nations*: (1) China; (2) India; (3) U.S.; (4) Indonesia
109. *Low Status of Women*: Most important factor keeping population growth rates high.
110. *Methods to Decrease Birth Rates*: family planning, contraception, economic rewards & penalties.

140. *Ozone Depletion caused by:* CFCs, methyl chloroform, carbon tetrachloride, halon, methyl bromide all of which attack stratospheric ozone.
141. *Effects of ozone depletion:* Negative effects include increased UV, skin cancer, cataracts, and decreased plant growth.
142. *Municipal Solid Waste is mostly:* paper and mostly put into landfills.
143. *Sanitary Landfill:* problems include leachate, which is solved using a liner with a collection system; methane gas, which may be collected and burned; and the volume of garbage, which may be compacted and/or reduced.
144. *Incineration advantages:* volume of waste reduced by 90% and waste heat can be used.
145. *Incineration disadvantages:* toxic emissions (polyvinyl chloride, dioxin), scrubbers and electrostatic precipitators needed, ash disposal.
146. *Best Solution for Waste Problem:* reduce the amount of waste at the source.
147. *Brownfield:* abandoned industrial sites.
148. *Keystone Species:* species whose role in an ecosystem is more important than others.
149. *Indicator Species:* species that serve as early warnings that an ecosystem is being damaged.
150. *In Natural Ecosystems:* 50-90% of pest species are kept under control by: predators, diseases, parasites.
151. *3 Major Insecticide Groups (+ example):* chlorinated hydrocarbons—ex. DDT; organophosphates—ex. malathion; carbamates—ex. aldicarb
152. *Integrated pest management:* uses a combination of methods, including biological control, certain chemical pesticides, and some methods of planting crops
153. *Pesticide Pros:* saves lives from insect transmitted disease, increases food supply, and increases profits for farmers.
154. *Pesticide Cons:* genetic resistance, ecosystem imbalance, pesticide treadmill, persistence, bioaccumulation, and biological magnification.
155. *Natural Pest Control:* better agricultural practices, genetically resistant plants, natural enemies, and biopesticides, sex attractants.
156. *Genetically Modified Organisms (GMOs):* new organisms created by altering the genetic material (DNA) of existing organisms; usually in an attempt to remove undesirable or create desirable characteristics in the new organism.
157. *Best solution to Energy shortage:* conservation and increase efficiency
158. *Electricity is generated by:* steam, from water boiled by fossil fuels or nuclear energy, or falling water is used to turn a generator.
159. *Petroleum (Crude Oil) Formation:* microscopic aquatic organisms in sediments converted by heat & pressure into a mixture of hydrocarbons.
160. *Petroleum Pros:* cheap, easily transported, high-quality energy.
161. *Petroleum Cons:* reserves depleted soon, pollution during drilling, transport and refining, land subsidence, burning oil produces CO₂.
162. *Coal Formation:* prehistoric plants buried un-decomposed in oxygen-depleted water of swamps/bogs converted by heat and pressure.
163. *Ranks of Coal:* peat, lignite, bituminous coal, anthracite coal.
164. *Cogeneration:* using waste heat to make electricity
165. *Nuclear Reactor parts:* consists of a core, control rods, moderator, steam generator, turbine, containment building.
166. *2 most serious nuclear accidents:* Chernobyl, Ukraine & Three Mile Island, PA
167. *Alternate Energy Sources:* wind, solar, waves, biomass, geothermal, fuel cells
168. *Remediation:* return a contaminated area to its original state.
169. *LD-50:* the amount of a chemical that kills 50% of the animals in a test population
170. *ED-50:* the amount of a chemical that causes an effect in 50% of the animals in a test population
171. *TD-50:* the dose that is toxic to 50% of a population
172. *Body burden:* amount of concentration of a toxic chemical in an individual
173. *Threshold:* level below which no effect occurs and above which effects begin to occur
174. *Acute effect:* occurs soon after exposure
175. *Chronic effect:* takes place over a long period, often as a result of exposure to low levels of a pollutant

176. *Persistent organic pollutants (POPs)*: are now banned, DDT, PCBs (liquid insulators in electric transformers), and dioxins (byproduct of herbicide production)
177. *Troposphere*: first layer of atmosphere 0-10 miles above the Earth's surface. Contains weather, greenhouse gases (bad ozone).
178. *Stratosphere*: second layer of atmosphere 10-30 miles above the Earth's surface. Contains protective ozone layer (good ozone).
179. *Inversion Layer (Temperature Inversion)*: a warm layer of air above a cooler layer traps pollutants close to the Earth's surface.
180. *Mutagen*: substances that cause changes in DNA; may result in hereditary changes.
181. *Teratogen*: substances that cause fetus deformities (birth defects).
182. *Carcinogen*: substances that cause cancer.
183. *Dioxin*: one of the most toxic human-made chemicals. Stable, long-lived, by-product of herbicide production enters environment as fallout from the incineration of municipal and medical waste and persists for many years.
184. *PCBs (Polychlorinated Biphenyls)*: Stable, long-lived, carcinogenic chlorinated hydrocarbons. Produced by the electronics industry.
185. *Multiple Use Public Lands*: National Forest & National Resource lands.
186. *Moderately Restricted Use Public Lands*: National Wildlife Refuges
187. *Restricted Use Public Lands*: National Parks & National Wilderness Preservation System
188. *Divergent Plate Boundaries*: tectonic plates spreading apart, new crust being formed (ex. mid-ocean ridges, rift valleys).
189. *Convergent Plate Boundaries*: tectonic plates with the oldest crustal material on Earth moving together, one moving under another (ex. mid-ocean trenches). Mineral deposits and volcanoes are most abundant at convergent plate boundaries
190. *Transform Fault*: tectonic plates sliding past one another (ex. San Andreas Fault).

Endangered Species

191. *Most Endangered Species*: have a small range, require large territory, have long generations, have a very specialized niche, or live on an island.
192. *Atlantic Salmon*: interbreeding with and competition from escaped farm-raised salmon from the aquaculture industry threaten the wild salmon population.
193. *California Condor*: reasons for decline include shootings, poisoning, lead poisoning, collisions with power lines, egg collecting, pesticides, habitat loss, and the decline of large and medium-size native mammals due to encroachments of agriculture and urbanization.
194. *Delhi Sands Flower-Loving Fly*: a 1-inch long insect currently restricted to only 12 known populations in San Bernardino and Riverside counties. An estimated 98% of its habitat has been converted to residential, agricultural, and commercial use.
195. *Florida Panther*: hunting and development that resulted in habitat loss and fragmentation.
196. *Gray Wolf*: subject of predator eradication programs sponsored by the Federal government. Prior to Endangered Species Act (1973), exterminated from the lower 48 states except for a few hundred inhabiting extreme northeastern Minnesota and a small number on Isle Royale, Michigan
197. *Grizzly Bear*: conflict with humans and development that resulted in habitat loss and fragmentation
198. *Piping Plover*: predation and human disturbance are thought to be the main causes of the plover's decline. It is listed as endangered in the Great Lakes region and as threatened in the Great Plains and on the Atlantic coast
199. *Manatee*: initial population decreases resulted from overharvesting for meat, oil, and leather. Today, heavy mortality occurs from accidental collisions with boats and barges, and from canal lock operations.
200. *Whooping Crane*: drainage of wetlands, conversion of grasslands to agriculture, and hunting for feathers.

NOT Endangered Species

201. *American Alligator*: overhunting and destruction of habitat caused original listing, removed from the list of endangered species by the Fish and Wildlife Service in 1987.
202. *Bald Eagle*: ingested DDT by eating contaminated fish. The pesticide caused the shells of the bird's eggs to thin and resulted in nesting failures. Loss of nesting habitat and hunting for feathers also contributed to the population decline. Reclassified from endangered to threatened (1995).
203. *Peregrine Falcon*: ingested DDT by eating smaller birds, which had eaten contaminated prey. The pesticide caused the shells of the bird's eggs to thin and resulted in nesting failures. Removed from the list of endangered species by the Fish and Wildlife Service in August 1999.

204. *Gray Whale*: the eastern North Pacific stock of gray whale has the distinction of being the first population of a marine mammal species to be removed from the List of Endangered and Threatened Species.

Biomes

205. *Biome*: large distinct terrestrial region having similar climate, soil, plants & animals.

206. *Tropical Rain Forests*: characterized by the greatest diversity of species, believed to include many undiscovered species. Occur near the equator. Soils tend to be low in nutrients. Distinct seasonality: winter is absent, and only two seasons are present (rainy and dry).

207. *Temperate Forests*: occur in eastern North America, Japan, northeastern Asia, and western and central Europe. Dominated by tall deciduous trees. Well-defined seasons include a distinct winter. Logged extensively, only scattered remnants of original temperate forests remain.

208. *Boreal Forests or Taiga*: represent the largest terrestrial biome. Dominated by needleleaf, coniferous trees. Found in the cold climates of Eurasia and North America: two-thirds in Siberia with the rest in Scandinavia, Alaska, and Canada. Seasons are divided into short, moist, and moderately warm summers and long, cold, and dry winters. Extensive logging may soon cause their disappearance.

209. *Temperate Shrub Lands*: occurs along the coast of Southern California and the Mediterranean region. Characterized by areas of Chaparral—miniature woodlands dominated by dense stands of shrubs.

210. *Savannas*: grassland with scattered individual trees. Cover almost half the surface of Africa and large areas of Australia, South America, and India. Warm or hot climates where the annual rainfall is 20-50 inches per year. The rainfall is concentrated in six or eight months of the year, followed by a long period of drought when fires can occur.

211. *Temperate Grasslands*: dominated by grasses, trees and large shrubs are absent. Temperatures vary more from summer to winter, and the amount of rainfall is less than in savannas. Temperate grasslands have hot summers and cold winters. Occur in South Africa, Hungary, Argentina, the steppes of the former Soviet Union, and the plains and prairies of central North America.

212. *Deserts*: covers about one fifth of the Earth's surface and occur where rainfall is less than 50 cm/year. Most deserts occur at low latitudes, have a considerable amount of specialized vegetation, as well as specialized animals. Soils have abundant nutrients, need only water to become productive, and have little or no organic matter. Common disturbances include occasional fires or cold weather, and sudden, infrequent, but intense rains that cause flooding.

213. *Tundra*: treeless plains that are the coldest of all the biomes. Occur in the arctic and Antarctica. Dominated by lichens, mosses, sedges, and dwarfed shrubs. Characterized by extremely cold climate, permanently frozen ground (permafrost) low biotic diversity, simple vegetation structure, limitation of drainage, short season of growth and reproduction.

214. *Wetlands*: areas of standing water wet all or most of the year that support aquatic plants including marshes, swamps, and bogs. Species diversity is very high. Includes bogs, swamps, sloughs, marshes

215. *Fresh Water*: defined as having a low salt concentration (less than 1%). Plants and animals are adjusted to the low salt content and would not be able to survive in areas of high salt concentration (i.e., ocean). There are different types of freshwater regions: ponds and lakes, streams and rivers, and estuaries.

216. *Oceans*: the largest of all the ecosystems. The ocean regions are separated into separate zones: intertidal, pelagic, abyssal, and benthic. All four zones have a great diversity of species.

Places to Know

217. *Chernobyl, Ukraine*: April 26, 1986, unauthorized safety test (irony), leads to fire and explosion at nuclear power plant—millions exposed to unsafe levels of radiation.

218. *Three-Mile Island, Pennsylvania*: March 29, 1979, nuclear power plant loses cooling water 50% of core melts, radioactive materials escape into atmosphere, near meltdown (disaster).

219. *Yucca Mountain, Nevada*: controversial as proposed site for permanent storage of high-level nuclear waste, 70-miles northwest of Las Vegas, near volcano and earthquake faults.

220. *Aral Sea, Uzbekistan/Kazakhstan (former Soviet Union)*: large inland sea is drying up as a result of water diversion.

221. *Love Canal, NY*: chemicals buried in old canal, school and homes built over it led to birth defects and cancers.

222. *Aswan High Dam, Egypt*: the silt that made the Nile region fertile fills the reservoir. Lack of irrigation controls causes waterlogging and salinization. The parasitic disease schistosomiasis thrives in the stagnant water of the reservoir.

223. *Three Gorges Dam, China*: world's largest dam on Yangtze River will drown ecosystems, cities, archeological sites, fragment habitats, and displace 2 million people.

224. *Ogallala Aquifer*: world's largest aquifer; under parts of Wyoming, South Dakota, Nebraska, Kansas, Colorado, Oklahoma, New Mexico, and Texas (the Midwest). Holds enough water to cover the U.S. with 1.5 feet of water. Being depleted for agricultural and urban use.
225. *Minamata, Japan*: mental impairments, birth defects, and deaths were caused by mercury dumped in Minamata Bay by factory. Mercury entered humans through their diet (fish).
226. *Bhopal, India*: December 2, 1984, methyl isocyanate released accidentally by Union Carbide pesticide plant kills over 5,000.
227. *Valdez, Alaska*: March 24, 1989, tanker Exxon Valdez hits submerged rocks in Prince William Sound—worst oil spill in US waters.

Environmental Laws and Treaties

MINING

228. *Surface Mining Control & Reclamation Act*: requires coal strip mines to reclaim the land
229. *Madrid Protocol*: Moratorium on mineral exploration for 50 years in Antarctica
230. *Safe Drinking Water Act*: set maximum contaminant levels for pollutants that may have adverse effects on human health

WATER

231. *Clean Water Act*: set maximum permissible amounts of water pollutants that can be discharged into waterways..aim to make surface waters swimmable and fishable
232. *Water Quality Act*: attempt to reduce non-point source pollution
233. *Ocean Dumping Ban Act*: bans ocean dumping of sewage sludge & industrial waste in the ocean

AIR

234. *Clean Air Act*: Set emission standards for cars, and limits for release of air pollutants
235. *Kyoto Protocol*: controlling global warming by setting greenhouse gas emissions targets for developed countries
236. *Montreal Protocol*: phaseout of ozone depleting substances

WASTE

237. *Resource Conservation & Recovery Act*: controls hazardous waste with a cradle to grave system
238. *Comprehensive Environmental Response, Compensation & Liability Act*: designed to identify and clean up abandoned hazardous waste dump sites
239. *Low Level Radioactive Policy Act*: all states must have facilities to handle low level radioactive wastes
240. *Nuclear Waste Policy Act*: US government must develop a high level nuclear waste site by 2015 (see Yucca Mountain)

LIFE

241. *Endangered Species Act*: identifies threatened and endangered species in the US, and puts their protection ahead of economic considerations (flora and fauna)
242. *Convention on International Trade in Endangered Species (CITES)*: lists species that cannot be commercially traded as live specimens or wildlife products
243. *Federal Insecticide, Fungicide, Rodenticide Act*: regulates the effectiveness of pesticides
244. *Food Quality Protection Act*: set pesticide limits in food, & all active and inactive ingredients must be screened for estrogenic/endocrine effects
245. *National Environmental Policy Act*: Environmental Impact Statements must be done before any project affecting federal lands can be started
246. *National Wild and Scenic Rivers Act*: protects rivers with due to aesthetic, recreational, wildlife, historical, or cultural reasons.
20. *Lacey Act*: prohibits interstate transport of wild animals dead or alive without federal permit.
247. *U.S. Marine Mammal Protection Act*: prohibits taking marine mammals in U.S. waters and by U.S. citizens, and the importing marine mammals and marine mammal products into the U.S.
248. *Federal Insecticide, Fungicide, and Rodenticide Act*: regulates the effectiveness of pesticides.

People to Know

249. *Rachel Carson*: published *Silent Spring* in 1962; documented the environmental damage done by DDT and other pesticides. Which heightened public awareness at the start of the modern environmental movement.
250. *John Muir*: founded Sierra Club in 1892; fought unsuccessfully to prevent the damming of the Hetch Hetchy Valley in Yosemite National Park.
251. *Gifford Pinchot*: first chief of the US Forest Service; advocated managing resources for multiple use using principles of sustainable yield.

252. *Garrett Hardin*: published "The Tragedy of the Commons" in the journal *Science* in 1968; argued that rational people will exploit shared resources (commons).
253. *Aldo Leopold*: wrote *A Sand County Almanac* published a year after his death in 1948; promoted a "Land Ethic" in which humans are ethically responsible for serving as the protectors of nature.
254. *Sherwood Rowland & Mario Molina*: in 1974, determine that CFCs destroy stratospheric (good) ozone.