**Chapter 1: Environmental Interrelationships**

1. **Environment:** everything that affects an organism during its lifetime.
2. **Science:** an approach to studying the natural world that involves formulating hypotheses and then testing them to see if the hypotheses are supported or refuted
3. **Ecosystem:** region in which the organisms and the physical environment form an interacting unit.
4. **Sustainability:** development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
5. **Ecosystem services**: beneficial effects of functioning ecosystems for people and society. (6. Provisioning: food, minerals, renewable energy, water, 7. Regulating: waste decomposition, pollination, purification of air or water, pest and disease control, 8. Cultural: spiritual, recreational, cultural, 9. Supporting: nutrient cycling, photosynthesis, and soil formation).

**Chapter 2: Environmental Ethics**

1. **Ethics:** a branch of philosophy that seeks to define what is right and what is wrong.
2. **Anthropocentrism:** human centered ethics where all environmental responsibility is derived from human interests alone
3. **Biocentrism:** Life-centered environmental ethics where all forms of life have an inherent right to exist.
4. **Ecocentrism:** Approach to environmental responsibility that maintains that the environment deserves direct moral consideration that is merely derived from human or animal interests. (the environment itself, not just the organisms that inhabit it, has moral worth).
5. **Development approach (to the environment)**: Assumes that the human race is and should be master of nature and that the Earth and its resources exist solely for our benefit and pleasure.
6. **Preservationist approach**: Preserve large portions of nature because nature has intrinsic value.
7. **Conservation approach:** Balance between unrestrained development and preservationism. Anthropocentric but considers a wider range of long-term human goods in their decisions about environmental management.
8. **Sustainable development:** Meeting the needs of the current generations without compromising the ability of future generations to meet theirs. (A middle ground)
9. **Environmental justice:** social justice expression of environmental ethics. It emerged to challenge the unfair distribution of toxic, hazardous, and dangerous waste facilities, which were disproportionately located in low-income areas of color.
10. **External costs:** the public or the environment, rather than the corporation, pays for the costs (examples, corporation releases waste into the air or water).
11. **Triple bottom line:** When companies consider financial, social and environmental factors
12. **Ecological footprint:** the area of Earth’s productive land and water required to supply the resources that an individual demands, as well as to absorb the wastes that the individual produces.

**Chapter 3: Risk, Economics, and Environmental Concerns**

1. **Risk:** The probability that a condition or action will lead to an injury, damage, or loss.
2. **Risk assessment**: Use of facts and assumptions to estimate the probability of harm to people or the environment from particular environmental factors or conditions.
3. **Risk management**: A decision making process that involves using the results of risk assessment, weighing possible responses to the risk, and selecting appropriate actions to minimize or eliminate the risk.
4. **Negligible risk:** no significant health or environmental risk (adequate safety margin to protect public health and the environment).
5. **Natural resources:** structures and processes that humans can use for their own purposes but cannot create (soil, rivers, minerals etc.)
6. **Renewable resources:** Can be formed or regenerated by natural processes. (Ex. soil, vegetation and water undergo processes that repair, regenerate or cleanse them).
7. **Nonrenewable resources:** Not replaced by natural processes, or the rate of replacement is so slow s to be ineffective (Ex. iron ore and fossil fuels).
8. **Deferred environmental costs:** ignored, not recognized, or whose effects accumulate over time, but that eventually must be paid (ex. Dams to provide electric power reduced habitat for endangered bird species).
9. **Opportunity costs**: Occur when a decision precludes other potential uses for a resource. (Ex. houses built in forest leads to loss of land for hunting).
10. **Pollution**: Any addition of matter or energy that degrades the environment for humans and other organisms.
11. **Subsidy**: a gift from government to individuals or private enterprise to encourage actions considered important to the public interest. (May include income tax rebates for purchases of energy efficient appliances, low -interest loans etc.)

**Chapter 4: Interrelated Scientific Principles: Matter, Energy, and Environment**

1. **Scientific method**: A way of gaining information (facts) about the world by forming possible solutions to questions, followed by rigorous testing to determine if the proposed solutions are valid.
2. **Hypothesis:** A statement that provides a possible answer to a question or an explanation for an observation that can be tested.
3. **Controlled experiment**: Two groups differ in only one way.
4. **Reproducibility:** Independent investigators must be able to reproduce the experiment to see if they get the same results.
5. **Theory**: Widely accepted, plausible generalization about fundamental concepts in science that explains why things happen (result of year of observation, questioning, experimentation and data analysis).
6. **Pseudoscience**: A deceptive practice that uses the appearance or language of science to convince, confuse, or mislead people into thinking that something has scientific validity when it does not.
7. **pH**: Measure of hydrogen ion concentration (lower has higher number of hydrogen ions - more acidic and higher is basic. 7 is neutral).
8. **Enzymes**: Protein molecules that lower the activation energy needed to start reactions.
9. **Photosynthesis**: Process plants use to convert inorganic material into organic matter, using light energy.
10. **Respiration (cellular)**: Involves the use of atmospheric oxygen to break down large, organic molecules sugars, fats and proteins) into smaller, inorganic molecules (carbon dioxide and water).
11. **First law of thermodynamics:** Energy can neither be created nor destroyed.
12. **Second law of thermodynamics**: Whenever energy is converted from one form to another, some of the useful energy is lost.

**Chapter 5 (Part 1): Interactions: Environments and Organisms**

1. **Abiotic Factors**: Nonliving things that influence an organism (energy, physical characteristics etc. like sunlight and wind).
2. **Biotic Factors**: All forms of life with which an organism interacts (fungi that decompose, predators and prey etc.)
3. **Limiting factor**: A shortage or absence of a specific factor that restricts the success of the species. Can be abiotic or biotic (ex. Scarcity of water or food).
4. **Range of tolerance**: Degree to which a species is able to withstand environmental variation. (Narrow range = more likely to die if something in the environment changes).
5. **Habitat:** Space that the organism inhabits, the place where it lives.
6. **Niche**: Functional role an organism has in its surroundings (its profession or job). Includes all the ways it affects organisms with which it interacts as well as how it modifies its physical surroundings.
7. **Genes**: distinct pieces of DNA that determine the characteristics an individual displays.
8. **Population**: All of the organisms of the same kind found within a specific geographic region.
9. **Species**: Population of all of the organisms potentially capable of reproducing naturally among themselves and having offspring that also reproduce.
10. **Natural Selection:** Process that determines which individuals within a species will reproduce and pass their genes to the next generation. (Variation, produce more offspring than are needed to replace the parents, Competition, Those with favorable variations survive and reproduce).
11. **Evolution**: Changes in genes and characteristics displayed in successive generations of a population of organisms over time.
12. **Speciation**: Production of new species from previously existing species.
13. **Extinction**: loss of an entire species and is a common feature of evolution
14. **Coevolution**: two or more species of organisms can reciprocally influence the evolutionary direction of the other (organisms affect the evolution of other organisms).

**Chapter 5 (Part 2): Interactions: Environments and Organisms**

1. **Intraspecific competition**: competition between members of the same species.
2. **Interspecific competition**: competition between members of different species.
3. **Competitive exclusion principle:** no two species can occupy the same ecological niche in the same place at the same time.
4. **Symbiosis**: Close, long-lasting, physical relationship between two different species.
5. **Parasitism**: relationship in which one organism, known as a parasite, lives in or on another organism, known as the host, from which it derives nourishment.
6. **Commensalism**: relationship between organisms in which one organisms benefits while the other is not affected.
7. **Mutualism**: relationship between organisms which is beneficial to both species involved.
8. **Mycorrhizae**: root-fungus relationships where fungus obtains organic molecules from the roots and the branching of the fungus helps the plant obtain nutrients.
9. **Community**: Assemblage of all interacting populations of different species of organisms in an area.
10. **Producers**: Organisms that are able to use sources of energy to make complex, organic molecules from the simple inorganic substances in their environment.
11. **Consumers**: Organisms that require organic matter as a source of food.
12. **Decomposers**: Organisms that use nonliving organic matter as a source of energy and raw materials to build their bodies (recyclers).
13. **Keystone species**: Organisms that have a critical role to play in the maintenance of specific ecosystems.
14. **Trophic level**: Each step in the flow of energy through an ecosystem
15. **Biomass:** the weight of living material in a trophic level.
16. **Food chain**: series of organisms occupying different trophic levels through which energy passes as a result of one organism consuming another.
17. **Food web**: When several food chains overlap and intersect.
18. **Biogeochemical cycle**: The cycling of atoms between living and nonliving portions of an ecosystem that include biological, geological, and chemical processes.
19. **“Sinks”**: Processes or situations that remove atoms from active, short-term nutrient cycles (ex. Trees are carbon sinks).
20. **Nitrogen fixing bacteria**: able to convert nitrogen gas (N2) that enters the soil into ammonia that plants can use.

**Chapter 6 (Part 1): Kinds of Ecosystems and Communities (Terrestrial)**

1. **Succession**: The concept that communities proceed through a series of recognizable, predictable changes in structure over time.
2. **Pioneer community (species)**: The collection of organisms that are first to colonize bare rock (lichen).
3. **Biomes**: Terrestrial climax communities with wide geographic distribution and determined primarily by climate.
4. **Deserts**: Areas that generally have less than 25 cm of precipitation a year, poor soil.
5. **Temperate grassland** (prairies, steppes): 25-75 cm of precipitation, rich soil, fire is important to release nutrients and keep invading trees out.
6. **Savannas**: Tropical, 50-150 cm precipitation but seasonally, fire is important.
7. **Chaparral** (mediterranean shrubland): Near oceans, shrubby plants, hot, dry summer and fire is important.
8. **Tropical rain forests**: Near equator, 200 cm. rain per year, poor soil (nutrients washed away), high biodiversity.
9. **Temperate deciduous forests**: Winter-summer seasons, trees lose leaves in winter, 75-100 cm precipitation, mild winters.
10. **Taiga, Northern Coniferous Forest, Boreal Forest**: In Southern Canada and Europe, Conifers (pine trees), Dry winters.
11. **Tundra**: North of Taiga - very cold, no trees, permafrost (permanently frozen soil).

**Chapter 6 (Part 2): Kinds of Ecosystems and Communities (aquatic)**

1. **Freshwater ecosystems**: Little dissolved salt
2. **Marine ecosystems**: High salt content
3. **Pelagic**: open ocean
4. **Plankton**: aquatic organisms that are small and weak swimmers (phyto = plant and zoo = animal).
5. **Euphotic zone**: The zone near the surface of water where photosynthesis can take place.
6. **Benthic:** On the bottom of an ocean or lake
7. **Coral reef ecosystems**: produced by corals that build cup-shaped external skeletons around themselves. Mutual relationship with algae that do photosynthesis in them. Many organisms live within the reefs (coral skeletons).
8. **Mangrove swamp ecosystems**: Tropical forests that occupy shallow water near the shore. Dominant trees can tolerate high salt and provide nursery areas for organisms and flood breaks.
9. **Estuary**: Shallow, partially enclosed areas where freshwater enters the ocean. Productive areas because of high nutrients from sediments and shallow water (photosynthesis). Important nursery sites for fish and crustaceans.
10. **Littoral zone**: lake or pond edges with rooted vegetation.
11. **Limnetic zone**: zone of lake or pond without rooted vegetation.
12. **Oligotrophic lake**: Deep, clear, cold, nutrient-poor lake low in productivity.
13. **Eutrophic lake:** Shallow, murky, warm, nutrient-rich lake
14. **Biological oxygen demand (BOD)**: The amount of oxygen used by decomposers to break down a specific amount of organic matter.

**Chapter 7: Populations: Characteristics and Issues**

1. **Invasive species**: Not native to a specific location and which has a tendency to spread to a degree believed to cause damage to the environment, human economy or human health.
2. **Natality**: Number of individuals added to the population through reproduction
3. **Birth rate**: In humans, the number of individuals born per 1,000 individuals per year.
4. **Mortality**: Number of deaths in a population over a particular time period.
5. **Death rate**: Number of people who die per 1,000 individuals per year.
6. **Sex ratio**: refers to the relative numbers of males and females.
7. **Biotic potential**: Inherent reproductive capacity, which is the biological ability to produce offspring.
8. **Exponential growth**: The population will continue to grow as long as the birth rate exceeds the death rate.
9. **Density-dependent limiting factors**: Become more effective as the density of the population increases (ex. Diseases spread more easily in crowded areas).
10. **Density-independent limiting factors**: Population controlling influences that are not related to the density of the population (ex. Frost that kills plants).
11. **Carrying capacity**: Maximum sustainable population for a species in an area (determined by limiting factors).
12. **K-strategists**: Organisms that typically reach a stable population as the population reaches carrying capacity (usually large, long-lived, few offspring, provide care for offspring).
13. **R-strategists**: Typically small organisms that have a short life, produce many offspring, exploit unstable environments, and do not reach a carrying capacity.
14. **More-developed countries**: Per capita income exceeding $25,000, relatively stable populations (Europe, Canada, US, Australia, New Zealand and Japan).
15. **Less-developed countries**: Per capita income less than $15,000, high growth rates.
16. **Replacement fertility**: The number of children that it takes to replace the parents (about 2)
17. **Zero population growth**: When a population is not growing and the number of births equals the number of deaths.
18. **Demographic transition model:** 1. High birth/High death rates 2. Improved economic and social conditions, Rapid population growth as death rates fall and birth rates still high 3. Develop an industrial economy, birth rates begin to drop (contraceptive use and women working). 4. Low birth and death rates.

**Chapter 8: Energy and Civilization: Patterns of Consumption/**

**Chapter 9: Nonrenewable Energy Sources**

1. **Industrial Revolution**: Early 18th century cultural change from invention of machines that replaced human power. Started in England and driven by the use of coal.
2. **(OPEC): The Organization of Petroleum Exporting Countries**: Oil Cartel that includes 13 countries (Saudi Arabia, Kuwait, Libya, Algeria, Iraq, Venezuela etc.) and drive oil prices.
3. **Hydraulic Fracturing (Fracking):** The forcing open of fissures in subterranean rocks by introducing liquid at high pressure, especially to extract oil or gas.
4. **Nonrenewable Energy Sources**: Come from sources that will run out or not be replenished in our lifetimes. Most are fossil fuels (coal, petroleum and natural gas).
5. **Renewable Energy Sources**: Generated from natural resources such as sunlight, wind, tides that can be naturally replenished.
6. **Reserves**: Known deposits from which materials can be extracted profitably with existing technology.
7. **Fossil fuels**: The remains of once-living organisms that were preserved and altered as a result of geologic forces.
8. **Coal**: Formed from plant material that has been buried and subjected to pressure and heat. Anthracite has the least water and highest carbon content and is the “cleanest” form to burn.
9. **Oil and Natural Gas:** Naturally occurring chemicals made of carbon and hydrogen (hydrocarbons) originating from microscopic marine organisms.
10. **Surface Mining (strip mining)**: Removing the material on the top of a vein of coal to get to the coal beneath.
11. **Black-lung disease**: A respiratory condition that results from the accumulation of fine coal-dust particles in the miners’ lungs.
12. **Acid mine drainage:** Outflow of acidic water from metal mines or coal mines. Occurs when the combined action of oxygen, water, and certain bacteria causes the sulfur in coal to form sulfuric acid.
13. **Nuclear energy:** Reactor splits uranium atoms and the heat from fission is used to produce steam, which spins a turbine to generate electricity.
14. **Radioactive half-life:** The time it takes for one-half of any radioactive material to spontaneously decompose.
15. **Three-mile Island**: Nuclear accident 1979, where the main pump that supplied cooling water to a nuclear reactor broke down, a control valve got stuck and plant operators were confused (human error). Most significant US nuclear accident that caused slowing of nuclear power use.
16. **Chernobyl**: 1986 Nuclear accident in Ukraine during a test. Operators violated 6 safety rules that lead to an uncontrolled chain reaction that resulted in a series of explosions and fires. World’s worst nuclear disaster.
17. **Fukushima Dai-ichi**: 2011 nuclear disaster in Japan started by an earthquake and then tsunami that caused explosions, fires, and leaks. 4 of the 6 reactors too badly damaged to fix.
18. **Decommissioning**: When nuclear power plants are shut down they need to have the fuel removed, surfaces cleaned and people are permanently prevented from coming in contact.

**Chapter 10: Renewable Energy**

1**. Renewable Energy:** Provided by processes that replenish themselves or are continuously present as a feature of the solar system.

2. **Biomass:** Organic matter used as a fuel, especially in a power station for the generation of electricity.

3. **Hydroelectric Power**: Water released from a reservoir (from a dam or river) flows through a turbine, spinning it, which in turn activates a generator to produce electricity.

4. **Passive Solar System**: Light energy is transformed to heat energy when it is absorbed by a surface (Includes building designs where windows, walls and floors collect sun’s energy).

5. **Active Solar System:** Requires a solar collector, a pump, and a system of pipes to transfer the heat from the site of production to the area to be heated.

6. **Conventional Solar-generated electricity:** Energy from the sun is collected and concentrated to heat water to make steam. Either mirrors focus the sunlight or oil is heated in pipes and transferred to water which turns a turbine and creates electricity.

7. **Photovoltaics:** Solid-state semiconductor devices that convert sunlight directly into electricity. Usually made of silicon with traces of other elements.

8. **Geothermal Energy**: Where hot magma approaches the surface and the heat from underlying rock can be used to heat water.

9. **Tidal Energy**: Form of hydropower that converts energy obtained from tides into useful forms of power.

**Chapter 11: Biodiversity Issues**

1. **Biodiversity**: The diversity of genes and species and ecosystems in a region. Lost when populations are greatly reduced in size, when a species goes extinct, or when ecosystems are destroyed.
2. **Most likely to become extinct:** Organisms with low population density, found in small areas, with specialized niches and low reproductive rates.
3. **Least likely to become extinct**: Organisms with high population density, found over large areas, Generalized niches and high reproductive rates.
4. **Genetic diversity**: The number of different kinds of genes present in a population or a species.
5. **Species diversity**: A measure of the number of different species present in an area.
6. **Ecosystem diversity**: A measure of the number of kinds of ecosystems present in an area.
7. **Deforestation**: Clearance of forest or stands of trees to convert into a non-forest use like farmland or urban use.
8. **Selective harvesting**: Taking of individual mature trees without completely disturbing the ecosystem.
9. **Desertification:** Process of converting arid and semiarid land to desert because of improper use by humans.
10. **Overexploitation**: Occurs when humans harvest organisms faster than the organisms are able to reproduce.
11. **Bush meat**: Meat from wild animals
12. **Globalization**: The process by which businesses or other organizations develop international influence or start operating on an international scale.
13. **IUCN (International Union for Conservation of Nature)**: A global authority on the status of the natural world and the measures needed to safeguard it. (Creates and monitors the endangered species list).
14. **Tragedy of the Commons**: An economic theory or a situation within a shared-resource system where individual users acting independently according to their own self interest behave contrary to the common good of all users by depleting or spoiling that resource through their collective action (ex. Overexploitation of ocean fish)

**Chapter 12: Land-Use Planning**

1. **Urban Sprawl**: The spread of low density, auto-dependent development on rural land outside compact urban centers. Typically characterized by excessive land consumption, dependence on autos, fragmented open space, lack of housing choices, branching patterns, segregation of commercial, single-family and multi-family housing, commercial buildings with large parking lots and lack of public spaces and community centers.
2. **Tract development**: Similar residential units over large areas.
3. **Ribbon sprawl**: Roads that link new housing to the central city stimulating urban sprawl along transportation routes.
4. **Leapfrog development**: Housing tracts that are relatively isolated from one another.
5. **Megalopolis**: When cities merge and it’s difficult to tell where one ends and the other begins (Eastern US etc.)
6. **Floodplains:** Low areas near rivers and are subject to periodic flooding.
7. **Wetlands**: Areas that periodically are covered with water including swamps, tidal marshes, coastal areas and estuaries.
8. **Urban Growth Limit**: Can be set by cities and establishes a boundary within which development can occur and is severely restricted outside the boundary.
9. **Zoning**: Common type of land-use regulation that designates specific areas within a community for certain kinds of land use (Agriculture, Commercial, Residential etc.)
10. **Brownfields**: Buildings that have remained empty because of the cost of cleanup and renovation (much of time contaminated).
11. **Brownfields Development:** Doesn’t require complete clean-up but matches the intended use of the site. (Ex. Industrial site to parking).
12. **Smart-growth planning**: Preserve open space, Develop in existing urban areas, Compact building design, Range of housing opportunities, Attention to design, Mixed land use, Walkable neighborhoods, Transportation choices, Encourage stakeholder collaboration and Fairness.

**Chapter 13: Soil and Its Uses (Part I)**

1. **Crust**: Extremely thin, less dense, solid covering over the underlying mantle
2. **Mantle**: A layer that makes up the majority of the Earth and surrounds a small core made up primarily of iron.
3. **Lithosphere**: The crust and solid outer mantle
4. **Plate tectonics**: Concept that the outer surface of the Earth consists of large plates composed of the crust and the outer portion of the mantle and that these plates are slowly moving over the surface of the liquid outer mantle.
5. **Weathering**: Processes that break down rocks, soil and minerals as well as wood and artificial materials through contact with the earth’s atmosphere, waters and biological organisms.
6. **Mechanical weathering**: Results for physical forces that reduce the size of rock particles without changing the chemical nature of the rock. (Ex. Temp. changes, plant and animal action).
7. **Chemical weathering**: Chemical alteration of the rock i such a manner that it is more likely to fragment or to be dissolved (Ex. oxidation, hydrolysis).
8. **Erosion**: Process of loosening and redistributing particles (Mostly from high to low elevation due to gravity).
9. **Soil**: Thin covering over the land consisting of a mixture of minerals, organic material, living organisms, air, and water that together support the growth of plant life.
10. **Parent material**: The material from which soils form.
11. **Humus**: The organic material resulting from the decay of plant and animal remains.
12. **Loam**: Ideal soil for agricultural use. Has good aeration and drainage properties of large particles with the nutrient-retention and water-holding ability of clay particles (has roughly equal proportions of sand, silt, and clay).

**Chapter 13: Soil and Its Uses (Part II)**

1. **Friable**: Crumbles easily (good for agriculture and doesn’t have too much clay).
2. **Soil Profile**: Series of horizontal layers in the soil that differ in chemical composition, physical properties, particle size, and amount of organic material.
3. **Horizon:** Each recognizable layer of a soil profile (Uppermost layer has more nutrients and organic matter - A).
4. **Leaching**: As water moves through the A horizon, it carries dissolved organic matter and minerals to lower layers).
5. **Contour Farming**: Tilling at right angles to the slope of the land is one of the simplest methods for preventing soil erosion (Best on land with gentle slopes).
6. **Strip Farming**: Alternating strips of closely sown crops (Ex. Hay or wheat with Corn or Soybeans).
7. **Terraces**: Level areas constructed at right angles of the slope to retain water and reduce erosion (Used on steep land).
8. **Waterways**: Depressions on sloping land where water collects and flows off of the land to reduce erosion.
9. **Windbreaks**: Plantings of trees or other plants that protect bare soil from the full force of the wind. They decrease soil erosion from wind.
10. **Reduced Tillage**: Method that uses less cultivation to control weeds and to prepare the soil. Leaves 15-30% of soil.
11. **Conservation Tillage**: Leaves 30% or more of the soil surface covered with crop residue following planting. Selective herbicides used before planning to control weeds.
12. **Phytoremediation**: Use of specialized plants to clean up polluted soil.

**Chapter 14: Agricultural Methods and Pest Management**

1. **Shifting Agriculture (Slash-and-Burn)**: Cutting down and burning the vegetation in a small area of forest. It releases nutrients and allows for a few crops to be raised until nutrients run out. Then a new area is burned. (Used a lot in the rain forest where soil nutrients are low).
2. **Polyculture:** Planting with a mixture of types of plants.
3. **Monoculture**: Large tracts of land planted with the same crop for efficiency.
4. **Macronutrients**: Primary soil nutrients that are often in short supply (limiting factor). (Nitrogen, phosphorus and Potassium).
5. **Micronutrients**: Elements needed in very small amounts (boron, zinc, manganese etc.).
6. **Pesticide**: Any chemical used to kill or control populations of unwanted fungi, animals, or plants (pests).
7. **Nontarget organisms**: Organisms that are killed by pesticides but were not the intended targets.
8. **Persistent pesticides:** Stable and remain active for long periods of time (ex. Chlorinated Hydrocarbons like DDT)
9. **Nonpersistent pesticides**: Break down quickly so don’t remain in the environment.
10. **Bioaccumulation:** Build up in the fat tissues of animals and when eaten, the toxins are further concentrated in the body of the carnivore.
11. **Biomagnification**: The phenomenon of acquiring increasing levels of a substance in the bodies of higher-trophic-level organisms. (Ex. DDT -> Insects -> Fish -> Sea Bird)
12. **Sustainable agriculture**: Involves modifications to conventional farming practices to reduce reliance on fertilizers and pesticides and protect agricultural and natural systems while producing adequate, safe food in an economically viable manner.
13. **Precision Agriculture**: The use of computer technology and geographic information systems to automatically vary the chemicals applied to a crop at different places within a field.
14. **Integrated Pest Management (IPM)**: Uses a variety of methods to control pests rather than relying on pesticides alone. Takes biology into account.
15. **Pheromone:** In some species, a chemical that is released by females to attract males.
16. **Genetically modified organisms (GMOs)**: An organisms in which DNA is altered, usually by inserting specific DNA from one organism into another. (With crops - main goal is virus or pest resistance).

**Chapter 15: Water Management**

1. **Potable water**: Unpolluted fresh water suitable for drinking.
2. **Evapotranspiration**: The part of the hydrologic cycle where water evaporates through the leaves of plants.
3. **Runoff**: Surface water that moves across the land and enters streams or rivers.
4. **Groundwater**: The water that fills the spaces in the substrate.
5. **Aquifer**: Porous underground layer of gravel, sand, or permeable rock that that becomes saturated groundwater.
6. **Porosity**: A measure of the size and number of the spaces in the substrate.
7. **Domestic water**: Used for drinking, air conditioning, bathing, washing clothes, washing dishes, flushing toilets and watering lawns and gardens.
8. **Eutrophication:** The excessive growth of algae and aquatic plants due to added nutrients (like phosphorus and nitrogen as fertilizer run-off).
9. **Point source:** When a source of pollution can be readily identified because it has a definite source and place where it enters the water.
10. **Nonpoint source**: Diffuse pollutants, such as from agricultural land and urban paved surfaces, acid rain, and runoff that are much more difficult to identify and control.
11. **Fecal coliform bacteria**: Bacteria that normally grow in the large intestine of humans and other animals are are present in high numbers in feces and are used as an indicator of water health.
12. **Thermal pollution**: Occurs when an industry removes water from a source, uses the water for cooling purposes, and then returns the heated water to its source.
13. **Water diversion**: The physical process of transferring water from one area to another.
14. **Primary Sewage treatment**: Mostly a physical process that removes larger particles by filtering water through large screens and then allowing smaller particles to settle in ponds or lagoons.
15. **Secondary Sewage treatment**: A biological process that usually involves oxygenating the wastewater and holding it until the organic material has been degraded by the bacteria and other microorganisms (can also be called activated-sludge sewage treatment).
16. **Tertiary Sewage Treatment:** Involves a variety of techniques to remove inorganic nutrients and sometimes it requires chemical processes.
17. **Salinization**: An increase in salinity caused by growing salt concentrations in soil. Especially happens from over irrigation.
18. **Saltwater Intrusion**: As groundwater mining pumps water from coastal wells, the saline groundwater moves inland, replacing fresh groundwater with unusable saltwater.

**Chapter 16: Air Quality**

1. **Troposphere**: Closest to earth and is where weather takes place
2. **Stratosphere**: Above the Troposphere and contains the protective ozone layer.
3. **Primary Air Pollutants**: Carbon monoxide, volatile organic compounds, particulate matter, sulfur dioxide, and oxides of nitrogen that may interact with one another in the presence of sunlight.
4. **Secondary Air Pollutants**: The compounds that are formed from the reaction of primary pollutants in the presence of sunlight and also form from reactions with substances that occur naturally in the atmosphere.
5. **Criteria Air Pollutants**: Chosen to establish air quality standards and are monitored by the EPA (CO, PM, SO2, NO2, Pb, and O3).
6. **Particulate Matter**: Tiny solid particles and liquid droplets dispersed into the atmosphere.
7. **Sulfur Dioxide (SO2)**: Produced when sulfur-containing fossil fuels (esp. Coal and Oil) are burned.
8. **Nitrogen Oxides (NOx)**: Formed because nitrogen and oxygen molecules in the air combine with one another when subjected to the high temperatures experienced during combustion.
9. **Volatile Organic Compounds (VOCs)**: Readily evaporate and become pollutants in the air. Also called hydrocarbons. Internal combustion engines produce 44%.
10. **Photochemical Smog**: A mixture of pollutants including ozone, aldehydes, and peroxyacetyl nitrates that result from the interaction of nitrogen dioxide, nitrogen monoxide, and VOCs with sunlight in a warm environment.
11. **Ozone (O3)**: Ground-level ozone is a pollutant in the stratosphere it blocks out UV rays.
12. **Thermal Inversion**: When a layer of warmer air is above a layer of cooler air at the Earth’s surface instead of the normal warm layer at the surface and cool air above. This can trap in pollutants and occurs in valleys.
13. **Acid deposition (Acid Rain or Precipitation)**: Accumulation of acid-forming particles on a surface. The particles can be dissolved in rain, snow, or fog or can be deposited as dry particles. Natural causes like volcanoes but also burning coal and internal combustion engines releasing SO2 and NOx.
14. **Clean Air Act**: Establishes air quality standards, develops strategies for meeting them and monitoring pollutants.
15. **Noise Pollution:** Exposure to noise can cause physical, as well as mental, harm.

**Chapter 17: Climate Change**

1. **Greenhouse effect**: The process by which radiation from a planet’s atmosphere warms the planet’s surface to a temperature above what it would be without its atmosphere. If a planet’s atmosphere contains radiatively active gases (greenhouse gases) they will radiate energy in all directions.
2. **Greenhouse gases**: Gases such as carbon dioxide, methane, chlorofluorocarbons and nitrogen oxides that let sunlight enter the atmosphere but slow the loss of heat from the Earth’s surface (trap the heat).
3. **Carbon dioxide (CO2)**: Most abundant of the greenhouse gases and is responsible for about 64% of global warming. Produced by natural respiration and energy production (burning fossil fuels exacerbated by deforestation that normally would remove it from the atmosphere).
4. **Methane (CH4)**: Second most abundant greenhouse gas responsible for about 18% of global warming. Comes from oil drilling, coal mining, rice paddy and wetland microorganisms, animal belching and defrosting of permafrost.
5. **Nitrous Oxide (N2O)**: Minor greenhouse gas entering the atmosphere primarily through the use of fertilizers and fossil fuels.
6. **Chlorofluorocarbons (CFC’s):** Synthetic compounds that are a minor greenhouse gas. Were used in refrigerators, air-conditioners, solvents, cleaners, foam expanders and propellants in aerosols like hairspray.
7. **Ocean acidification**: Ongoing decrease in the pH of the oceans caused by the uptake of carbon dioxide from the atmosphere.

**Chapter 18: Solid waste management and disposal**

1. **Solid waste:** Generally made up of objects or particles that accumulate on the site where they are produced, as opposed to water-and airborne wastes that are carried away from the site of production.
2. **Mining waste**: Generated during mining operations (rock and soil moved), generated during milling operations (grinding, sorting or chemical procedures), or the water that drains or is pumped from mines that often contains hazardous materials.
3. **Agricultural waste**: Second most common form and includes waste from raising animals and harvesting and processing of crops and trees.
4. **Municipal solid waste (MSW)**: All of the materials that people in a region no longer want because they are broken, spoiled, or have no further use. Waste from households, commercial establishments, institutions and some industrial sources.
5. **Municipal solid waste landfill**: Typically constructed above an impermeable clay layer and is self-contained and sealed when filled. The area surrounding the landfill will be monitored for methane gas and groundwater contamination.
6. **Incineration**: Process of burning refuse in a controlled manner.
7. **Composting**: The process of allowing natural processes of decomposition to transform discarded organic materials like grass clippings, leaves, food waste, or soiled paper into compost (a humus-like material that can be used for nutrients and to improve porosity).
8. **e-Waste (electronic waste)**: Describes discarded electronics that can be reused, resold or recycled but can contaminate the environment from cadmium etc. and can cause health issues.
9. **Source Reduction:** The practice of designing, manufacturing, purchasing, using, and reusing materials so that the amount of waste or its toxicity is reduced.
10. **Recycling:** Converting wastes into reusable materials which conserves, reduces pollutants, saves energy and reduces need for landfills and incinerators.

**Chapter 19: Environmental Regulations: Hazardous Substances and Wastes**

1. **Hazardous Materials**: Those that can cause harm to humans or the environment (broader group) .
2. **Toxic Materials**: A narrow group of substances that are poisonous and cause death or serious injury to humans and other organisms by interfering with normal body physiology.
3. **Hazardous Wastes**: By-products of industrial, business, or household activities for which there is no immediate use.
4. **Resource Conservation and Recovery Act (RCRA)** 1976: Regulates hazardous waste from production through transportation to final disposal (Cradle-to-Grave).
5. **Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)** 1947: Requires registration of pesticides and required certification for applicators of restricted use pesticides.
6. **Occupational Safety and Health Act (OSHA)** 1970: Addresses workplace safety including worker exposure to toxic and hazardous materials.
7. **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)** 1980: Goal of cleaning up abandoned contaminated sites (deemed Superfund sites) and provides funding.
8. **Acute Toxicity**: Occurs when a person is exposed to one massive dose of a substance and becomes ill.
9. **Chronic Toxicity**: Occurs when a person is exposed to small doses over long periods.
10. **Synergism**: Materials may be relatively harmless as separate compounds but become highly toxic when mixed (combined effect greater than the sum of their separate effects).
11. **Threshold level**: The level of exposure at which none of the test animals is affected.
12. **LD50**: Measure of toxicity - the dosage of a substance that will kill 50% of a test population.
13. **Transuranic nuclear waste**: Highly radioactive and contains large numbers of atoms that are larger than uranium with half-lives greater than 20 years. Mostly from production of nuclear weapons.