

Density independent
population controls
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Helen Koo AP Environmental Science Period 3, Velarde 100 TERMS &

CONCEPTS (CHAPTER 5) BIOLOGICAL EVOLUTION: Biological evolution is the change in a population's genetic makeup through successive generations, and is the major driving force behind adaptations to changes in

environmental conditions. (extension): According to the theory of evolution, all species descended from earlier, ancestral species; this theory attempts to explain how life has changed over the past 3.7 billion years, and why it is so diverse today. MICROEVOLUTION: Microevolution are small genetic changes that occur in a population. (extension): An example of microevolution by natural selection is the camouflage coloration in the peppered moth.

Although the species existed in both dark and light colors, when the industrial revolution brought about much soot to darken trees, the dark form of the moth became better-adapted to camouflage. As a result, the dark breed flourished, and the light form was highly visible to predators. Through natural selection, the dark form began to survive and reproduce at a greater rate than its light-colored kin. MACROEVOLUTION: Macroevolution is used to describe long-term, large-scale evolutionary changes, which can lead to the formation of new species, as well as the loss of old species. NATURAL

SELECTION: The process of natural selection occurs when some individuals of a population have genetically based traits that increase their chances of survival and their ability to produce offspring. (extension): There are three conditions necessary to incur natural selection: there must be a natural variability for a trait in a population, the trait must be heritable, and the trait must somehow lead to differential reproduction (it must enable individuals with the trait to leave more offspring than others of the population).

ECOLOGICAL NICHE: An ecological niche is a species' way of life or functional <https://assignbuster.com/density-independent-population-controls-environmental-sciences-essay/>

role in an ecosystem, and involves everything that affects its survival and reproduction.(extension): Generalist species have broad niches, and can: live in many different places, eat a variety of foods, and tolerate a wide range of environmental conditions. Examples are flies, cockroaches, rats, deer, raccoons, coyotes and humans. Specialist species have narrow niches, and may be able to only tolerate a narrow range of climatic conditions, use only one or few types of food, and live in only one type of habitat. Examples are tiger salamanders, spotted owls and giant pandas. SPECIATION: A process in which two species arise from one, wherein a new species is borne from another through natural selection.(extension): Speciation often takes place in two phases: geographic isolation and reproductive isolation. GEOGRAPHIC ISOLATION: Geographic isolation occurs when groups of the same population of a species become physically separated for long periods.(extension): An early fox population spread north and south; different environmental conditions lead to different selective pressures and an evolution into two different species. The northern foxes adapted to cold through heavier fur, short ears and legs, and white fur - the Arctic Fox. The southern foxes adapted to heat through lightweight fur and long ears, legs and nose, which give off more heat - the Gray Fox. REPRODUCTIVE ISOLATION: This process occurs when mutation and natural selection operate independently in two geographically isolated populations, and change the allele frequencies in different ways. Members of the geographically and reproductively isolated populations may become so different in genetic makeup that they cannot interbreed, or cannot produce live, fertile offspring.(CHAPTER 6)WEATHER: Short-term properties of the troposphere at a particular place and time are called weather. Examples include temperature, pressure, humidity, <https://assignbuster.com/density-independent-population-controls-environmental-sciences-essay/>

precipitation, sunshine, cloud cover and wind direction and speed.

(extension): Meteorologists use weather balloons, aircraft, ships, radar, satellites and other devices to obtain data on atmospheric pressures, precipitation, temperatures, wind speeds and locations of air masses and fronts. **FRONTS:** The most dramatic changes in weather occur along a front, which is the boundary between two air masses with different temperatures and densities.(extension): A warm front is the boundary between an advancing warm air mass and the cooler one it is replacing. Because warm air is less dense than cool air, an advancing warm front will rise up over a mass of cool air. A cold front is the leading edge of an advancing mass of cold air. Because cold air is denser than warm air, an advancing cold front stays close to the ground, and slides underneath less dense warmer air. An approaching cold front can produce thunderheads. **CLIMATE:** Climate is a region's general pattern of atmospheric or weather conditions over a long period. Average temperature and average precipitation are the two main factors in determining a region's climate and its effects on people.

UPWELLING: An upwelling is cold, nutrient-rich bottom water, which rises up to replace outgoing surface water; they bring plant nutrients from the deeper parts of the ocean to the surface, and support large populations of phytoplankton, zooplankton, fish and fish-eating seabirds.(extension): The El Niño-Southern Oscillation is a climate pattern that affects normal shore upwellings. In El Niño, the prevailing westerly winds weaken or cease, surface water along the South and North American coasts becomes warmer, and the normal upwellings of cold, nutrient-rich water are suppressed, which reduces primary productivity and causes a decline in some fish population.

MICROCLIMATES: Various topographic features of the earth's surface create
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local climatic conditions, which are called microclimates.(extension):

Mountains interrupt the flow of prevailing surface winds and the movement of storms. When moist air blowing inland from an ocean reaches a mountain range, it cools as it is forced to rise and expand, and causes the air to lose most of its moisture as rain and snow on the windward slopes. As drier air flows down the leeward slopes, it draws moisture out of the plants and soil beneath. The lower precipitation and resulting semiarid to arid conditions on the leeward side can be called a rain shadow effect. **DESERT:** A desert is an area where evaporation exceeds precipitation, and deserts often have sparse, widely spaced, mostly low vegetation.(extension): Tropical deserts have little rain, high temperatures year round, and are the driest places on earth. Temperate deserts have high daytime temperatures in the summer and low in the winter, have more precipitation than tropical deserts, and have sparse vegetation, which consist of drought-resistant shrubs and cacti or other succulents. Cold deserts have cold winters, hot summers, and low precipitation. **GRASSLANDS:** Grasslands are regions with enough average annual precipitation to allow grass to prosper, but with erratic precipitation and frequent fires that prevent large populations of trees from growing.

(extension): Tropical grasslands have high average temperatures, low to moderate precipitation, and a prolonged dry season. Temperate grasslands have cold winters, hot and dry summers, and sparse, uneven precipitation.

Temperate grasslands include tall-grass prairies and short-grass prairies.

Polar grasslands, also known as the arctic tundra, have bitter cold temperatures, are swept by frigid winds, and are covered with ice and snow.

ALPINE TUNDRA: The alpine tundra is above the limit of tree growth, but exists below the permanent snow line on high mountains. It has a vegetation
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pattern similar to that of the arctic tundra, but gets more sunlight than the arctic and has no permafrost. CHAPARRAL: Also known as temperate shrubland, this biome occurs along coastal areas with a Mediterranean climate (mild, moderately rainy winters, with long, hot and dry summers). (extension): The chaparral is adapted to, and maintained, by periodic fires. Many shrubs store food reserves in fire-resistant roots, and have seeds that sprout only after a hot fire. FOREST: A forest contains various species of trees and smaller forms of vegetation, and is found in undisturbed areas with moderate to high average precipitation.(extension): Tropical rainforests are found near the equator; they have a warm annual temperature with little variation, high humidity, and heavy rainfall, and possess incredible biodiversity. Tropical deciduous forests are a little farther from the equator, and are warm year round, and get most of their plentiful rainfall during a wet monsoon season that is followed by a long dry season. Temperate deciduous forests grow in areas with moderate average temperatures; they have long, warm summers, cold winters, and abundant, evenly-spaced precipitation. (CHAPTER 7)COASTAL ZONE: The coastal zone is the warm, nutrient-rich, shallow water that extends from the high-tide mark on land to the edge of the continental shelf.(extension): The coastal zone makes up less than 10% of the world's ocean area, but contains 90% of all marine species, and most ecosystems found in the coastal zone have high net primary productivity. The zone supplies plentiful sunlight and plant nutrients, which flow in from land and are distributed by wind and ocean currents. ESTUARY: An estuary is a highly productive area in the coastal zone, a partially enclosed area where seawater mixes with freshwater and nutrients from rivers, streams and runoffs from land.(extension): An estuary serves as an ecotone between the <https://assignbuster.com/density-independent-population-controls-environmental-sciences-essay/>

marine environment, and the land where large volumes of fresh water mix.

Estuaries include river mouths, inlets, bays, sounds, mangrove forest swamps in tropical waters, and salt marshes in temperate zones. INTERTIDAL

ZONE: The area of shoreline between low and high tides is called the

intertidal zone.(extension): Organisms living in this zone must be able to

avoid being swept away or crushed by waves, immersed during high tides,

and left high and dry at low tides. They must also cope with changing salinity

levels. To deal with such conditions, most intertidal organisms use protective

shells, dig in, or hold on to something. CORAL REEFS: Coral reefs form in

clear, warm coastal waters of the tropics and subtropics. The health and

survival of coral reefs are connected to global warming caused by increases

in atmospheric concentrations of gasses such as carbon dioxide.(extension):

Coral reefs form 0. 1% of the world's ocean area, but are among the world's

oldest, most diverse and productive ecosystems, and provide homes for

about a fourth of all marine species. OPEN SEA: The open sea is the vast

volume of the ocean, from where the sharp increase in water depth at the

edge of the continental shelf starts.(extension): The open sea is divided into

three levels: the euphotic zone, the lighted upper zone where photosynthesis

occurs from phytoplankton, and nutrient levels are low; the bathyal zone, a

dimly lit middle zone that has no photosynthesis; and the abyssal zone, a

dark lower zone that is very cold, little dissolved oxygen, and enough

nutrients to support 98% of oceanic species. OLIGOTROPHIC LAKE: A newly

formed lake has a small supply of plant nutrients, and is called an

oligotrophic lake. This sort of lake is often deep with steep banks, and has

low NPP with crystal-clear blue or green water.(extension): Over time,

sediment washes into an oligotrophic lake, and plants grow and decompose

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to form bottom sediments. A lake with a large or excessive supply of nutrients is called a eutrophic lake. FRESHWATER LIFE ZONES: Freshwater life zones are where water with a dissolved salt concentration of less than 1% accumulates.(extension): Examples are standing (lentic) bodies of fresh water such as lakes, ponds and inland wetlands, flowing (lotic) systems such as streams and rivers. Runoff from nearby land provides freshwater life zones with constant input of organic material, inorganic nutrients, and pollutants. WATERSHED: A watershed, also known as a drainage basin, is an area that accumulates runoff, sediment and dissolved substances from a stream. INLAND WETLANDS: Lands covered with fresh water all or part of the time, excluding lakes, reservoirs and streams.(extension): Inland wetlands include marshes with few trees, swamps dominated by trees and shrubs, prairie potholes, floodplains, bogs and fens, and wet arctic tundra. SURFACE WATER: Surface water is precipitation that does not sink into the ground or evaporate.(CHAPTER 8)31. COMMUNITY STRUCTURE: Community structure is the structure or spatial distribution of an ecosystem's individuals and populations. A community structure is defined by physical appearance, species diversity / richness, species abundance, and niche structure. 32. EDGE EFFECTS: Edge effects are differences in the physical structure and properties (ex. Sunlight, temperature, wind, and humidity) at boundaries and in transition zones between two ecosystems (called ecotones). 33. THEORY OF ISLAND BIOGEOGRAPHY: Produced by MacArthur and Wilson, this model indicates that the number of species found on an island is determined by a balance between two factors: the rate at which new species immigrate to the island, and the rate at which species become extinct on the island. At some point, the two rates will reach an equilibrium point. 34. NONNATIVE SPECIES: <https://assignbuster.com/density-independent-population-controls-environmental-sciences-essay/>

Nonnative species are ones that migrate into an ecosystem, or are deliberately or accidentally introduced into an ecosystem by humans. They are also called exotic or alien species. Some are beneficial to the ecosystem and humans, but others thrive and crowd out the native species of the area.

(extension): In 1957, Brazil imported wild African bees to help increase honey production. Instead, these bees displaced domestic honeybees and actually decreased the honey production levels.

35. INDICATOR SPECIES:

Indicator species are species that serve as early warnings of damage to a community or an ecosystem.(extension): Birds make great indicator species, due to their abundance and ability to respond quickly to environmental change. The presence or absence of trout species in water at certain

temperatures is an indicator of water quality.

36. KEYSTONE SPECIES:

Keystone species are species with roles in an ecosystem that are much more important than their abundance or biomass may suggest. They play pivotal roles in the structure and function of an ecosystem, because their strong interactions with other species affect the health and survival of these species, and they process material out of proportion to their numbers or biomass.

(extension): Some examples of keystone species are: the pollination of flowering plant species by bees, hummingbirds, bats and other species, the dispersion of seeds by fruit-eating animals such as bats, habitat modification, predation by top carnivores that helps control the populations of various species, improving the ability of plant species to obtain soil minerals and water, and the efficient recycling of animal wastes. An example of habitat modification is when elephants push over, break or uproot trees, creating forest openings in the savanna grasslands and woodlands of Africa.

This promotes the growth of grasses and other forage plants that benefit

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smaller grazing species such as antelope, and accelerates nutrient cycling rates.

37. **INTRA-SPECIFIC COMPETITION:** Intraspecific competition is competition between members of the same species for the same resources, and can be intense because members of a particular species compete directly for the same resources.(extension): For example, some plants can gain a competitive edge by secreting chemicals that inhibit the growth the seedlings of their own and other species. Other plants, such as dandelions, can compete with other members of their species for living space and soil nutrients by dispersing their seeds to other areas by wind, water and animals

38. **TERRITORIALITY:** A manner in which members of the same species compete, in which organisms patrol or mark an area around their home, nesting or major feeding site, and defend it against members of their own species.(extension): A territory is essentially a set of resources a species needs for successful breeding. Factors contributing to a good territory are an abundant food supply, a good nesting site, an absence or low population of predators, and an absence of environmental factors that would reduce breeding success.

39. **INTERSPECIFIC COMPETITION:** Competition between members of two or more different species for food, space, or any other limited resource is called interspecific competition.(extension): When commonly used resources are abundant, different species can share them. This allows each species to come closer to occupying the fundamental niche, which is the potential niche if there were no competition from other species.

40. **RESOURCE PARTITIONING:** Resource partitioning is the method of dividing up scarce resources in order to allow species with similar needs to use them at different times, in different ways, or in different places. This method allows species to evolve traits that will enable them to share the

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same resource.(extension): An example is when leopards and lions live in the same area; lions take the larger animals as their prey, and leopards take the smaller ones. Another example is that birds partition their resources by each hunting in different areas of the same tree for insects. 41. SYMBIOSIS:

Symbiosis is a relationship in which species interact and exist with one another in close association. The three types of symbiosis are parasitism, mutualism, and commensalism.(extension): Parasitism occurs when one

species feeds on part of another organism, by living on or in the host. Mutualism allows both species involved to interact in a way with positive

benefits for both.(CHAPTER 9)42. POPULATION DYNAMICS: Populations are not stagnant, and tend to change in size, density, dispersion, and age

distribution; these changes are called population dynamics, and occur in response to environmental stress and/or changes in environmental

conditions. 43. ENVIRONMENTAL RESISTANCE: Environmental resistance is the sum of all the factors that act against the growth of a population, and ultimately affects the population size of a species in a certain area.

(Extension): The biotic potential and environmental resistance combined determine the carrying capacity (K), which is the number of individuals of a given species that can be sustained in a given area. 44. SEXUAL

REPRODUCTION: Sexual reproduction is the process in which organisms produce offspring by combining gametes or sex cells from both parents; this allows the offspring to have a combination of traits from each parent.

Approximately 97% of the known species on earth use sexual reproduction.

(extension): The ecological costs of sexual reproduction are: females have to produce twice as many offspring in order to maintain the population

numbers; the chances of genetic errors and defects increase; mating
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requires things such as time-consuming courtship and mating rituals; the possibility of disease transmission; and the possibility of injury inflicted by males during mating. 45. R-SELECTED SPECIES: An R-selected species reproduces early and places the remainder of their energy into reproduction.

(extension): Examples of R-selected species are algae, bacteria, rodents, annual plants and most insects. These species usually have many, usually small offspring, reach reproductive age rapidly, and have short generation times. 46. BIOINFORMATICS: Bioinformatics develops new methods of storing, gathering, organizing and analyzing data. A large part of bioinformatics is to develop new technology to accommodate new methods.

(extension): In areas such as molecular biology, bioinformatics has developed techniques such as image and signal processing, which allow the extraction of large amounts of raw data in a shorter span of time. 47.

CARRYING CAPACITY: The carrying capacity of a species is the maximum population size of the species that the environment can sustain indefinitely, given all the required necessities in the environment.(extension): In the human population, birth rate often decreases, and death rate increases, as the population density increases. The carrying capacity can also be defined as the number of individuals the environment could sustain without having negative impacts / results on the environment and or its organisms. 48. K-

SELECTED SPECIES: K-selected species are species whose populations fluctuate near the carrying capacity (K) of their environment. These are species that are controlled and governed by their maximum reproductive capacity.(extension): K-selected species have stable populations and low offspring numbers, and are often of the mammal categorization. However,

the offspring are often larger than R-Selected species (ex: a bear and an <https://assignbuster.com/density-independent-population-controls-environmental-sciences-essay/>

insect). They have long gestation periods, slow maturation, and long life spans. 49. DENSITY-INDEPENDENT POPULATION CONTROLS: These are factors of the environment, separate from population numbers and carrying capacity, that affect population numbers of species and organisms. (extension): Climates, including droughts, floods and fire, can cause massive destruction to environments. Pesticide use, pollutant release, and over-hunting and fishing can deplete the population. Some species seasonally migrate, or hibernate, in order to avoid certain population controls. 50. SURVIVORSHIP CURVES: A survivorship curve is a graph demonstrating the proportion of individuals surviving at certain age brackets for a given species.(extension): There are three different survivorship curves. Type I curves display high survival rates in early and middle life, which are followed by a sharp decline in later stages. Humans are of the Type I curve. Type II curves have a constant death rate, regardless of age (ex. Birds). Type III curves have the highest death rates in early life, with low death rates for those who survive past this age.(CHAPTER 10)51. MANTLE: The mantle is in the interior of the earth, and the layer that takes up between the crust and the outer core. It is solid, a rocky shell, and makes up around 84% of the earth's volume; it has had a history of melting and volcano activity at the thinner parts of the mantle.(extension): The mantle is made up of two zones: the inner asthenosphere, which is made of flowing plastic rock, and the upper part of the lower lithosphere, which is made of rigid, solid rock. 52. PLATE TECTONICS: Plate tectonics is a theory that follows the movement of Earth's lithosphere, based on the concept of continental drift - that all the continents were once one, Pangea, and later split off.(extension): The lithosphere is broken up into tectonic plates, and there are eight major

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plates on Earth. There are different kinds of boundaries, classified and determined by the motion of the plates when they meet: convergent, divergent, and transform. 53. MINERAL: A mineral is a naturally occurring substance that is solid and stable at room temperature, has a chemical formula and an ordered atomic structure, and is usually abiogenic. Minerals do not have a specific chemical composition.(extension): Minerals are classified by chemical and physical properties; common characteristics are crystal structure and habit, hardness, lustre, diaphaneity, color, streak, tenacity, cleavage, fracture, parting, and specific radioactivity. 54.

SEDIMENTARY ROCK: Sedimentary is a type of rock wherein particles accumulate, over time, to layer itself and form one larger rock. Sediments were formed by weathering and erosion, and transported by water, wind, ice, mass movement and glaciers, to be accumulated and layered together.

(extension): By studying and tracking sedimentary rock strata, one can gain knowledge about earth's history, and it has aided in palaeogeography, paleoclimatology, and the history of life. Sedimentology is the study of properties and origins of sedimentary rocks. 55. WEATHERING: Weathering is the breakdown of rocks, soils and minerals, through agents such as water, ice, snow, wind, waves and gravity.(extension): There are two types of weathering: physical, and chemical. Physical breaks down rocks and soil through direct contact with an agent. Chemical is the direct effect of chemicals (either atmospheric or produced) in the breakdown of rocks, soils and minerals. 56. TRANSFORM FAULTS: A transform fault is also known as conservative plate boundary. They neither create nor destroy lithosphere, and has relative motion that is predominantly horizontal. Transform faults

end abruptly and are connected on both ends to other faults, ridges, or <https://assignbuster.com/density-independent-population-controls-environmental-sciences-essay/>

subduction zones.(extension): 57. SOIL HORIZONS: A soil horizon is a layer parallel to the soil surface, where physical characteristics differ from layers above and below. Soils usually have three to four different horizons, which are classified usually by color and texture, as well as particle size.

(extension): Each horizon is classified as a specific letter, and most soils have a general sequence of O, A, B, C, and R. Around the world, different definitions of main horizons are used to classify soil horizons. 58: HUMUS: Humus is a type of soil that has reached a point of stability, and will no longer break down further if conditions do not change. It is mature type of soil, a topsoil horizon, that contains organic matter. 59. LOAM: Loam is a type of soil that is made of sand, silt, and clay, in even proportions. They are nutritious, moist, and have better drainage and infiltration of water and air than other soils, and are easier to till.(extension): Loam is considered an ideal type of soil for gardening and agriculture, because it retains nutrients and water well, while still allowing excess to filter out. Loam can lose its benefits, however, if it is compacted in a small space. 60: LEACHING:

Leaching is the loss of plant nutrients from the soil due to rain and irrigation. To avoid nutrient loss, soil structure, crop planting, type and application rates of fertilizers can be employed. Leaching can also be used to add a small amount of excess irrigation to avoid salts from building up in the soil.

(extension): Leaching has become an environmental concern, as it can contribute to groundwater contamination. As water seeps into the ground, it can dissolve chemicals and carry them to underground water supplies. 61.

SOIL EROSION: Erosion is the process by which soil and rock are removed from the Earth's surface by processes such as wind or water flow, to be

transported and deposited in other locations.(extension): Erosion is a natural
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process, that has been increased by ten to forty times by human activity.

Excessive erosion causes problems such as desertification, decreases in agricultural productivity due to land degradation, sedimentation of waterways, and ecological collapse due to loss of the nutrient rich upper soil layers. Water and wind erosion are the two primary causes of land

degradation. 62. CONTOUR FARMING: Contour farming is the idea ploughing across a slope following its elevation contour lines. The rows, as a result,

slow water run-off during rain and help prevent soil erosion, as well as allow

time for the water to settle into the soil.(extension): The US Soil Conservation Service promoted contour farming during the 1930s, and the US Department of Agriculture established the Soil Conservation Service in 1935 when soil

erosion problems occurred in the Dust Bowl. 63. WATERLOGGING:

Waterlogging is the saturation of soil with water. When the water table of the groundwater is too high to allow agriculture, it can be classified as

waterlogged soil; waterlogging prevents air from getting into the soil, which

can be vital for many plants.(extension): For irrigated, agricultural land,

waterlogging is often accompanied by soil salinity, as waterlogged soils

prevent leaching of the salts imported by the irrigation water. It is a process

where the soil blocks off water, and is extremely hard to stop air from getting

in.(CHAPTER 11)64. BIOACCUMULATION: Bioaccumulation is the

accumulation of substances, such as pesticides, or other organic chemicals

in an organism. Substances are taken it at lower levels, but as it transfers up

the foodchain, the quantity and lethality is increased.(extension): Some

animals allow bioaccumulation as a mode of defense, by accumulating toxins

within their body to deter predators. An example is the tobacco hornworm,

which concentrates nicotine to a toxic level in its body as it consumes

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tobacco plants. Poisoning of small consumers can be passed along the food chain to affect the consumers later on. 65. RISK: is the potential that an action will lead to a loss or danger.(extension): Risk Management is the identification, assessment, and prioritization of risks, as well as the process to minimize, monitor, and control the probability and/or impact of losses or to maximize the realization of opportunities. 66. LD50: The LD50 is an abbreviation for Lethal Dose, 50%. 67. MEDIAN LETHAL DOSE: The median lethal dose of a substance is the dose required to kill half the members of a tested population after an experiment.(extension): The median lethal dose is usually measured as milligrams of substance per kilogram of body mass, but has also used nanograms, micrograms, milligrams or grams. This allows for variety within species, as different individuals within the same species can be different sizes. 68. METASTASIS: Metastasis is the spread of a cancer from one organ or part to another non-adjacent organ or part.(extension): Cancer occurs when a single cell in a tissue is genetically damaged, and produces cells with uncontrolled proliferation, which is called mitosis. This causes a primary tumor, and when malignant, can undergo metastasis and spread to other parts of the body. 69. TRANSMISSIBLE DISEASE: Transmissible are illnesses that can be transferred from one host to another through contact. (extension): Transmissible disease pathogens include some viruses, bacteria, fungi, protozoa, multicellular parasites, and aberrant proteins known as prions. They have been the cause of disease epidemics. Infectivity is the organism's ability to enter, survive and multiply in the host. 70: CARCINOGENS: A carcinogen is any substance that causes cancer, due to its ability to damage the genome and or disrupt cellular metabolic processes(extension): Cooking food at high temperatures (ex. Grilling) can <https://assignbuster.com/density-independent-population-controls-environmental-sciences-essay/>

lead to the formation of small, but potent, carcinogens, comparable to those found in cigarette smoke. Charring food can result in similar carcinogens⁷¹:

TERATOGENS: A teratogen is a type of virus that causes diseases of children from the embryo or fetus. ⁷². **CANCER:** Cancer, also known as a malignant

neoplasm, is a group of various diseases which involve unregulated cell growth. Cells divide and grow uncontrollably, and form malignant tumors, as well as invade nearby parts of the body.(extension): Not all tumors are

malignant, however. Benign tumors do not grow uncontrollably, do not invade neighboring tissues, and do not spread throughout the body. Some cancers are hereditary; others can be made vulnerable to by the use of

tobacco, certain infections, radiation, etc. ⁷³. **GAMMA RAYS:** Gamma radiation is an electromagnetic radiation of high frequency, with a large

amount of energy per photon. They are ionizing radiation, and biologically hazardous.(extension): Gamma rays have been known to cause cancer in

some individuals and cases. However, they are also used to treat cancer, as gamma rays can also kill them. In ' gamma-knife surgery,' multiple lasers / beams of gamma rays are directed on tumors, effectively killing the

cancerous cells.(CHAPTER 12)⁷⁴. **INFANT MORTALITY RATE:** Infant mortality

is the rate of children who die before reaching a year old.(extension): The most common cause worldwide has been a result of dehydration and

diarrhea, mainly in underdeveloped countries. Third world countries are characterized by high infant mortality rates, as conditions are too harsh for young babies to tolerate. ⁷⁵. **AGE STRUCTURE:** An age structure is a graph

that displays the distribution of various ages in a population, and is used as an indicator of reproductive capabilities and likelihood of continuation of a

species. ⁷⁶. **LIFE EXPECTANCY:** The life expectancy is the expected number
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of years of survival and life after the current age. The life expectancy is an average, and as thus, an individual may survive for much longer or much less than the predicted life expectancy.(extension): In countries with high infant mortality rates, the life expectancy can fluctuate wildly dependent upon the mortality rate. Life expectancy rates at birth, therefore, can often be off the mark in some populations. 77. BABY BOOM GENERATION: A baby boom is a period of great increase in birth rate. Conventional baby booms have occurred in times of great prosperity, such as in the US, following a period of war. 78. CRUDE DEATH RATE: The crude death rate is the rate at which people die, in a population. The mortality rate is typically expressed as deaths per 1000 individuals in a year. 79. REPLACEMENT LEVEL FERTILITY: Replacement level fertility is the amount of children a mother should produce to 'replace the population,' and take she and her spouse's place in the population later on. 80. TOTAL FERTILITY RATE: The total fertility rate of a population is the average number of children that would be had by a woman, given that she survives through birth, and were to experience the same fertility rates.(CHAPTER 13)82. TRADITIONAL INTENSIVE AGRICULTURE: Traditional intensive agriculture is a system that has been used since the first development of agriculture, using high levels of capital, labor, and the heavy use of pesticides and chemical fertilizers.(extension): Intensive animal farming takes large numbers of animals on small, limited amounts of land, and require large amounts of food, water and medicine. Animals are often kept in abusive conditions. 83. INDUSTRIALIZED AGRICULTURE: Industrialized agriculture is a form of farming that is the industrialized production of livestock, crops, poultry and fish. They are highly economical, reducing prices and maximizing profit. 84. UNDERNUTRITION: Undernutrition is the <https://assignbuster.com/density-independent-population-controls-environmental-sciences-essay/>

taking of an unbalanced diet that lacks in certain nutrients, or has them in too-high excess.(extension): Undernutrition can lead to a number of different disorders, and is often categorized by a lack of calories and protein. It is more common in developing countries; wealthier nations are often subject to unhealthy diet by way of excess, not lack. 85. MARASMUS: Marasmus is a severe form of malnutrition, that leads to a severe energy deficiency; it often gives its owners the look of emaciation, and body weight is reduced to below 60 percent of the expected / average body weight. 86. INTERCROPPING: Intercropping is the type of agriculture that grows multiple varieties of crops close together, planned so that all varieties use different resources, so as to not intrude upon the other crop's needs. 87. VITAMIN A DEFICIENCY: Vitamin A is a group of nutritionally unsaturated hydrocarbons, and has multiple functions in growth and development, the maintenance of the immune system, and good vision.(extension): Vitamin A is necessary for the retina in the eye, wherein it takes nutrients from vitamin A to form rhodopsin, which is necessary for low-light and color vision. 88. OVERNUTRITION: Overnutrition is a form of malnutrition where nutrients are in excess compared to the amounts required for normal growth, development, and metabolism. 89. GMOs: A GMO is a genetically modified organism: an organism that has had its genetic material altered, and include micro-organisms, as well as the food industry. 90. OVERGRAZING: Overgrazing is when plants are left to be eaten and grazed upon by animals without being given sufficient time to regrow and replenish. 91. SUSTAINABLE YIELD: The sustainable yield of a natural capital is the amount that can be extracted and used, without reducing it to the point where it cannot recover and replenish itself.(example): The yield isn't a set number, and often varies as the needs of the ecosystem changes.

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An example is a forest that has recently suffered a fire – it will require more of its yield to sustain, and re-establish, a mature forest.(CHAPTER 20)92.

PESTICIDES: Pesticides are chemical substances that aim to prevent, destroy and mitigate pests, especially in agriculture.(extension): Pesticides can cause both acute and delayed health effects in workers who are exposed while working in close quarters to the chemicals. They can result in a wide range of effects, from skin irritation, to cancer. 93. DDT: DDT is short for dichlorodiphenyltrichloroethane, which is a colorless, crystalline solid sort of insecticide (pesticide). 94. AIRPLANE SPRAYING OF PESTICIDES: Some large agriculture fields employ airplanes to spray large quantities of pesticides over large areas of land quickly – however, this method is haphazard, wasteful, and not very accurate. 95. FIFRA: The FIFRA is the Federal Insecticide, Fungicide, and Rodenticide Act. It's the federal law that set up pesticide regulation to protect applicators, consumers, and the environment, and is administered and overseen by the EPA. 97. PHEREMONES: Pheromones are chemical factors that trigger a social response in members of the same species. 98. BIOLOGICAL PEST CONTROL: Biological pest control is the method of controlling pests without the use of pesticides, and instead, using other living organisms. It utilizes predation, parasitism, herbivory and other natural mechanisms, but with a large human management role. 99. GENETIC RESISTANCE: Genetic resistance is an illness or predisposition that is a result of hereditary genetics, that alternatively, allows resistance towards another type of illness.(extension): For example, people with sickle-cell anemia have been known to have a resistance against the malaria parasite. 100. INTEGRATED PEST MANAGEMENT: Integrated Pest

Management eliminates pests without the use of pesticides or chemicals.

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Instead, it employs other pests, which aren't harmful to the plants, but are predators of the plants' natural predators, to eliminate pests.

5 MAJOR PIECES OF LEGISLATION

NATIONAL ENVIRONMENTAL POLICY ACT

The National Environmental Policy Act was established in 1970, and established a national policy in the US that promoted the enhancement of the environment, and established the President's Council on Environmental Quality. When an increased appreciation and concern for the environment closely associated with the late sixties occurred, NEPA was called into existence. It followed Eisenhower's era of outdoor recreations, clean water acts, as well as Rachel Carson's Silent Spring. Court decisions throughout the years have since then expanded grounds for NEPA, to include permit requirements for certain activity in the environment. The NEPA's perhaps largest environmental impact was the establishment of the Environmental Impact Statements, which are statements of environmental effects of proposed federal actions. This has helped prevent many major damaging acts to the environment.

RESOURCE CONSERVATION AND RECOVERY ACT

The Resource Conservation and Recovery Act (RCRA) is the primary act that governs waste disposal throughout the US. It was enacted by Congress in 1976 to address growing volumes of municipal and industrial waste, with goals to protect human health and the natural environment from potential hazards of waste disposal. It also aims for energy conservation, reducing waste, and ensuring the management of waste in an environmentally sound manner. In 1980, the problem of remediating abandoned waste sites was

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picked up by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), which was also known as the Superfund. The CERCLA was used in addition to the RCRA to take care of contaminated waste sites, while the RCRA focuses on controlling current and ongoing management of waste problems.

TOXIC SUBSTANCES CONTROL ACT

The Toxic Substances Control Act (TSCA) regulates the introduction of new, and already existing, chemicals. It prohibits the manufacture and importation of chemicals that have not been approved for the TSCA inventory or its exemptions. This prevents harmful chemicals from coming into play as much as possible. In 1976, the TSCA mandated the EPA to protect the public by regulating the manufacture and sale of chemicals, but does not address wastes produced as byproducts of manufacturing, as the Clean Water and Air Acts often did.

NUCLEAR WASTE POLICY ACT

The first 40 years of nuclear waste creation had no program or legislation to control its disposal, despite the fact that nuclear waste is the most dangerous substance, and liable to cause cancer, among a host of other problems. Most existing nuclear waste was a result of creating nuclear weapons, and in 1982, there existed almost 77 million gallons of military nuclear waste, stored in steel tanks in liquid form. The Nuclear Waste Policy Act formed a timetable and process to establish a permanent, underground storage for radioactive waste, and provided a temporary respite for the waste. Generators and owners of nuclear fuel and radioactive wastes were then required to pay for the costs of disposal. Although the waste program <https://assignbuster.com/density-independent-population-controls-environmental-sciences-essay/>

was projected to cost billions of dollars, it was all funded freely by an electric utilities on nuclear-generated electricity. An Office of Civilian Radioactive Waste Management was established to form the Nuclear Waste Policy Act within the US Department of Energy.

CONVENTION ON INTERNATIONAL TRADE OF ENDANGERED SPECIES

CITES was a multilateral treaty drafted in 1963, at a meeting of the IUCN. It gears towards ensuring that international trades of wild animals and plants do not intrude and threaten the survival of endangered species, and CITES has conjured a list of classified endangered species, which cannot be touched by trades. The act is one of the largest, and oldest, conservation use agreements around at the moment. Convention by nation is voluntary, where each country agrees to a framework created by CITES, and those countries then implement their own domestic legislations based off of the framework. Although it is a multinational treaty, it is more domestic than international, as policies are overseen by each individual nation. 5 CASE STUDIES

COAL BED METHANE

Problem & Environmental Significance: Large deposits of coal, oil and gas are available underground in the West mountain range if North America, estimated at 346 trillion feet of recoverable natural gas, and 62 billion barrels of petroleum. The coal-bed methane is held in place by using pressure from aquifers, where the pumped water releases the gas - however, this also creates large quantities of effluent that is contaminated with salt and other minerals; a typical coal-bed well produces 75, 000 liters of water per day. In effect, these poison fields and pastures, erode stream

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banks, contaminate rivers, and harm aquatic and land wildlife. What is being done: Because the coal-bed is worth so much – a projected income of billions – it was intended to be extracted. However, a coalition of ranchers, hunters, anglers, conservationists, water users and renewable energy activists banded together to fight against the extraction and called upon Congress to protect private property rights, preserve water quality, and conserve sensitive public lands. Biologists worry for the 60, 000 antelope and elk that migrate through between summer and winter, because the noise, traffic and polluted water from the extraction may harm them. In addition, the land is a habitat for the near-endangered sage-grouse bird. However, it is also argued that the oil is needed to preserve an American way of life, to avoid being so overly dependent on other nations for energy.

OGALLALA AQUIFIER

Problem & Environmental Significance: The Ogallala Aquifer is one of the largest providers of water – and because it is so vital, too much water is being pumped out, without giving it time to replenish and recover. At this point, it is exhausted to the point where many farmers have had to give up farming their land due to a lack of water from the aquifer. Irrigated land amounts have jumped up, as well as a need for fresh water – the aquifer is quickly diminishing, while the need increases. **What is being done:** When the aquifer runs dry, farmers may have to return to dry land farming – which only yields a third of what an irrigated field could do. Farmers, with subsidized water costs, have often used more water than is necessary – with concentrated (albeit, a bit more expensive) irrigation methods, water use can be vastly decreased. Alternative sources, at the moment, do not exist,

and cities may easily become ghost towns unless other water sources can be found. Pressures can rise for water to be transferred from the Great Lakes, or the Mississippi River, and these projects could potentially cost billions. The government would have to bear some of these costs, and areas with more and plenty water may have to end up sharing with the water-stricken areas.

OFFSHORE WINDPOWER

Problem & Environmental Significance: The United Kingdom and Sweden are promoting windmills, fuel cells, wave power, solar energy, and cogeneration, with the goal of producing clean energy at reasonable costs. Offshore wind power will ultimately end up being the largest for the countries involved, in lieu with the British's government's aims to reduce their greenhouse gases. The UK could then easily become a net energy exporter soon, as offshore wind projects are already underway, welcome alternatives to present energy sources. **What is being done:** The first large offshore wind farm for the United States has been proposed to be placed on the Massachusetts coastline, where the Cape Wind project would build 170 wind turbines. The towers would rise 83 m from the water line to the turbine housing, and it could potentially create 420 megawatts of electricity, which can power half a million homes and businesses. This would, in effect, avoid emissions of a million metric tons of carbon every year. There are those who oppose the project, though, claiming that it could wreck property values, hamper fishing, and destroy the idea behind Cape Cod - of its wild coasts, as well as disturb marine life. However, it has been proposed that the adoption of a new attitude towards cleaner energy could say many of these opinions.

KILLER SMOG

Problem & Environmental Significance: In 1952 England, the smoke mixed with the fog to form a harmful, dark smog. Visibility soon dropped to the point where cars stopped, and pedestrians were unable to find their ways home – and in four days, over 4, 700 people had died due to the toxic smoke. The government first blamed it on the influenza epidemic, afraid that civilians may demand compensation. **What is being done:** The smog occurred because of the large amounts of smoke in the air, from industrial buildings and cars, that had a bad reaction with the fog and sunlight. Soon, in 1956, Parliament enacted a Clean Air Act, which restricted the use of coal and requiring filters and scrubs on industrial smokestacks. Since then, through efforts of the government and similar legislations, London has dramatically decreased its air pollution, hopefully to avoid another incident like that of 1952. Many other industrial nations subsequently passed similar legislations, which helped reduce pollution levels globally and world-wide.

ORGANIC FARMING IN CUBA

Problem & Environmental Significance: The sudden collapse of the socialist regime left Cuba in trouble, as they had been highly dependent on food and trade. They were forced, uncomfortably, to shift from traditional to organic farming to help support their nation. Farmers were faced with the challenge of creating twice as much the supply as they had previously farmed, with less of an input. **What is being done:** With the crisis, Cuba developed a new method of agriculture, where they adopted sustainable, organic farming methods that relied on indigenous resources. They rely on large community volunteering and participation, and they have developed a system that uses

diverse varieties of crops that are suitable to local microclimates, soil types and human nutritional needs. The tractors that have lost their source of fuel were replaced with oxen and mule, and organic, cheaper fertilizers replaced the synthetic chemicals they used to use. They used the method of biopesticides to control pests, instead of using chemical pesticides. Workers from the community - from schools and factories - helped with the farm labor during harvest system, and community gardens are plentiful in Cuba. The country has now developed itself into a leader in sustainable agriculture, and led the path for others to follow in their footsteps.