



## AP Environmental Science Summer Assignment

Congratulations on your enrollment in AP Environmental Science (APES)! We are excited to work with you this upcoming year as we explore the environment and how human actions impact it.

APES is unique in that, although it is a “science” course, it is truly an interdisciplinary study that requires the ability to take on a variety of perspectives to thoroughly explore the issues we will encounter. In preparation for this course, you will need to build your background knowledge not only about environmental issues, but also about politics, economics, history, and ethics.

The summer assignment consists of twenty-two videos (ranging in length from 2 minutes to 53 minutes). For each video, there are some key vocabulary terms and definitions listed below. As you watch the videos, think about the terms and how they apply to the situations described in the videos. Once you have watched each video, you will hand write (type-written notes will not be accepted) a short summary (at least one paragraph, 3-7 sentences) using the vocabulary terms provided.

You may watch the videos and complete this assignment in any order. However, we recommend that you organize your paragraphs by Topic. Be prepared to turn in your 22 summaries (at the direction of your teacher) on the first day of school in the Fall. You also can expect (during the first few days of classes) to have an open-note assessment, so you’ll want these summaries to be neat and organized for easy reference!

### Links to Videos

#### Topic 1: Evolution & Ecology

- [Serengeti Rules](#)
- [Running with the Herd](#)
- [Running with the Herd: The Recovery](#)

#### Topic 2: Biodiversity & Conservation

- [Retro Report: Med Fly](#)
- [Rise of the Mesopredators](#) and the [Explanation](#)
- [Retro Report: Pets Gone Wild](#)

#### Topic 3: Human Population

- [Retro Report: Population Bomb Revisited](#)
- [Paying for Babies](#)

#### Topic 4: Politics & Economics

- [Environmental Justice and Racism](#)
- [Full Cost Accounting](#)
- [Retro Report: GEO Tomatoes](#)
- [Retro Report: Rachel Carson, DDT, and Mosquitos](#)
- [Retro Report: Thalidomide](#)
- [Retro Report: Yellowstone 1988 Fires](#)
- [Retro Report: Yellowstone Wolves](#)

#### Topic 5: Water Pollution

- [Retro Report: Love Canal](#)
- [CBSN Dead Zones](#)

#### Topic 6: Air Pollution

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#### Topic 7: Energy

- [Retro Report: 3 Mile Island](#)
- [Vice News: Coal Country](#)
- [Wall Street Journal: Green Energy Boom](#)

# Vocabulary Terms

## Topic 1: Evolution and Ecology (3 Videos, 74 minutes)

- Serengeti Rules** (53 minutes)
  - *Keystone Species*: A species on which other species in an ecosystem largely depend, such that if it were removed the ecosystem would change drastically.
  - *Trophic Cascade*: A drastic change in an ecosystem caused by the removal of a trophic level (often predators) that fundamentally alters the composition of an ecosystem.
  - *Ecosystem Engineer*: An ecosystem engineer is any animal that creates, significantly modifies, maintains or destroys a habitat.
  
- Running with the Herd** (14 minutes)
  - *Extirpation*: Local extinction; the condition of a species that ceases to exist in a chosen geographic area of study, though it still exists elsewhere
  - *Extinction*: Global extinction; the condition of a species (or other taxonomic group) that ceases to exist globally.
  
- Running with the Herd: The Recovery** (7:30 minutes)
  - *Genetic Drift*: A mechanism of evolution in which allele frequencies of a population change over generations due to random chance. Genetic drift occurs in all populations of non-infinite size, but its effects are strongest in small populations
  - *Genetic Bottleneck*: A genetic bottleneck occurs when a population is greatly reduced in size, limiting the genetic diversity of the species. This reduction in population leads to a greater chance of losing genetic material through genetic drift.

## Topic 2: Biodiversity and Conservation (3 Videos, 35 minutes)

- Retro Report: The Med Fly** (10:30 minutes)
  - *Invasive Species*: An invasive species can be any kind of living organism that is not native to an ecosystem and causes harm. They can harm the environment, the economy, or even human health.
  - *Pesticide Drift*: Pesticide drift is the airborne movement of pesticides from an area of application to any unintended site. Drift can happen during pesticide application, when droplets or dust travel away from the target site. It can also happen after the application, when some chemicals become vapors that can move off-site.
  - *Biocontrol*: Biological control or biocontrol is a method of controlling pests such as insects, mites, weeds and plant diseases using other organisms. It relies on predation, parasitism, herbivory, or other natural mechanisms, but typically also involves an active human management role.
  
- Rise of the Mesopredators and Rise of the Mesopredators Explained** (4:30 & 8 minutes)
  - *Apex Predator*: An apex predator, also known as an alpha predator or top predator, is a predator at the top of a food chain, without natural predators. Apex predators are usually defined in terms of trophic dynamics, meaning that they occupy the highest trophic levels.
  - *Mesopredators*: A mesopredator is a mid-ranking predator in the middle of a trophic level, which typically preys on smaller animals.

- *R-Strategist*: Also known as r-selected species, r-strategists are species that are relatively small in size; have high biotic potential and fecundity; and have short life spans. Their populations change rapidly as environmental conditions allow.
- *K-Strategist*: Also known as k-selected species, k-strategists are species that are usually large in size; have low biotic potential and fecundity; and have long life spans. Their populations typically do not change rapidly as their population stays close to the carrying capacity (k) of their ecosystem.

□ **Pets Gone Wild** (12 minutes)

- *Convention on the International Trade in Endangered Species (CITES)*: An international agreement that bans the transport or sale of endangered species (and products made from endangered species) across international borders.
- *Lacey Act*: A United States law that allows congress to ban the import and interstate transportation of species deemed to be injurious to agricultural, horticultural, or environmental interests. This is the most heavily utilized law in regulating the pet trade.

**Topic 3: Human Population (2 Videos, 28 minutes)**

□ **The Population Bomb Revisited** (13 minutes)

- *Population Growth Rate*: The rate at which a population is changing. It is calculated by dividing the change in population (births-deaths) by the total population.
- *Green Revolution*: A movement in the 1950s-60s to bring industrial farming to the developing world. This movement drastically reduced hunger in the developing world.

□ **Paying For Babies** (15 minutes)

- *Replacement Level Fertility*: "Replacement level fertility" is the total fertility rate—the average number of children born per woman—at which a population exactly replaces itself from one generation to the next, without migration. This rate is roughly 2.1 children per woman for most countries, although it may modestly vary with mortality rates.
- *Antinatalist*: A factor that discourages individuals to have children
- *Pronatalist*: A factor that encourages individuals to have children

**Topic 4: Politics and Economics (7 Videos, 78 minutes)**

□ **Environmental Justice and Racism** (18 minutes)

- *Environmental Justice*: Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.
- *Environmental Racism*: A form of systemic racism whereby communities of color are disproportionately burdened with health hazards through policies and practices that force them to live in proximity to sources of toxic waste. As a result, these communities suffer greater rates of health problems attendant on hazardous pollutants.
- *14th Amendment (Equal Protection)*: The Equal Protection Clause is part of the Fourteenth Amendment to the United States Constitution. The clause provides that no state shall deny to any person within its jurisdiction "the equal protection of the laws regardless of biological sex, race, religion, marital status, or age".

□ **Full Cost Accounting** (3 minutes)

- *Tragedy of the Commons*: The tragedy of the commons is an economic problem in which every individual has an incentive to consume a resource, but at the expense of every other individual -- with no way to exclude anyone from consuming.
- *Triple Bottom Line*: Triple bottom line (TBL), in economics, believes that companies should commit to focusing as much on social and environmental concerns as they do on profits. TBL theory posits that instead of one bottom line, there should be three: profit, people, and the planet.

□ **Retro Report: Rachel Carson, DDT, and Mosquitos** (12:30 minutes)

- *Silent Spring* by Rachel Carson: This book is considered by many to be one of the catalysts for the modern environmental movement.
- *Biomagnification*: Biomagnification, also known as bioamplification or biological magnification, is any concentration of a toxin, such as pesticides, in the tissues of tolerant organisms at successively higher levels in a food chain.
- *Pesticide Treadmill*: The process of pests building up a resistance to pesticides, forcing the use of more potent and higher concentrations of pesticides.

□ **Retro Report: Thalidomide** (12 minutes)

- *Teratogen*: A toxin that crosses the placental barrier of pregnant women and affects child development.
- *Toxic Substance Control Act (TSCA)*: The TSCA is a United States law that regulates the introduction of new or already existing chemicals.
- *Precautionary Principle*: a broad epistemological, philosophical and legal approach to innovations with potential for causing harm when extensive scientific knowledge on the matter is lacking. It emphasizes caution, pausing and review before leaping into new innovations that may prove disastrous.

□ **Retro Report: GEO Tomatoes** (11 minutes)

- *Transgenic*: An organism that contains genes from a sufficiently different species with which it may not breed naturally.
- *Cisgenic*: An organism that contains genes from a closely-related species or subspecies with which it may breed naturally.
- *Monsanto*: The major agricultural corporation that controls the majority of the United States food supply.

□ **Retro Report: Yellowstone Fires 1988** (11 minutes)

- *Ecological Succession*: The steady and gradual change in an ecosystem with respect to a change or disruption. It is a predictable change and is an inevitable process of nature as all the biotic components move towards a stable climax community
- *Prescribed Burn*: A planned fire, sometimes called a controlled burn, is used to meet forest/prairie management objectives. Prescribed burns have been ignited to reduce hazardous fuel loads near developed areas, manage landscapes, restore natural woodlands, and for research purposes

□ **Retro Report: Yellowstone Wolves** (11 minutes)

- *Endangered Species Act (ESA)*: A United States law that protects endangered species and their habitat.
- *Anthropocentrism*: the belief that human beings are the most important entity in the universe. Anthropocentrism interprets or regards the world in terms of human values and experiences.

- *Ecocentrism*: a term used in ecological political philosophy to denote a nature-centered, as opposed to human-centered (i.e. anthropocentric), system of values.

## **Topic 5: Water and Land Pollution (2 Videos, 16 minutes)**

### **Retro Report Love Canal** (11 minutes)

- *Superfund*: Superfund is a United States law, officially known as the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 or CERCLA. It established the federal Superfund program, designed to identify and clean up toxic waste sites, by placing a tax on certain industries (petroleum, chemical manufacturing, and mining)
- *Brownfield*: A former/abandoned industrial or commercial site where future use is affected by real or perceived environmental contamination.
- *Environmental Protection Agency (EPA)*: The Environmental Protection Agency is an independent executive agency of the United States federal government tasked with environmental protection matters. President Richard Nixon proposed the establishment of EPA on July, 1970.

### **CBS News Dead Zones** (5 minutes)

- *Watershed*: A watershed is an area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel.
- *Nutrient Pollution*: Nutrient pollution, a form of water pollution, refers to contamination by excessive inputs of nutrients, usually nitrogen or phosphorus caused by runoff from agricultural operations.
- *Cultural Eutrophication*: Cultural eutrophication is when a flux of excess nutrients from human activity are added into a local run-off. This is caused by human activity. This sudden increase in nutrients causes an explosion in the population of primary producers. Eventually the excess nutrients are consumed and primary producers die off. As they sink to the bottom, they are consumed by bacteria who, in turn, consume dissolved oxygen from the water. This causes oxygen levels in the water to decrease sharply and become uninhabitable by many organisms.

## **Topic 6: Air Pollution (2 Videos, 10 minutes)**

### **Sci Show: London Smog** (5 minutes)

- *Industrial Smog*: Industrial smog typically exists in urban areas where factories burn fossil fuels such as coal, which creates smoke and sulfur dioxide that mix with fog droplets to create a thick blanket of haze close to the ground. Industrial smog contains two primary components: sulfur dioxide and particulates, which include dust and soot from burning coal for heat and fuel.
- *Thermal Inversion*: A deviation from the normal change of an atmospheric property with altitude. Normally, air temperature decreases with an increase in altitude. During an inversion, warmer air is held above cooler air; the normal temperature profile with altitude is inverted. An inversion traps air pollution, such as smog, close to the ground. An inversion can also suppress convection by acting as a "cap".

**PBS: Ozone Depletion** (5 minutes)

- *Ozone Layer*: The ozone layer is a thin part of the Earth's stratosphere that absorbs almost all of the sun's harmful ultraviolet light.
- *CFCs*: Chlorofluorocarbons (CFCs) are nontoxic, nonflammable chemicals containing atoms of carbon, chlorine, and fluorine. They are used in the manufacture of aerosol sprays, blowing agents for foams and packing materials, as solvents, and as refrigerants.
- *Montreal Protocol*: The Montreal Protocol on Substances that Deplete the Ozone Layer, also known simply as the Montreal Protocol, is an international treaty designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion.

**Topic 7: Energy (3 Videos, 34 minutes)**

**Retro Report: Three Mile Island** (13 minutes)

- *Nuclear Fission Reactor*: A nuclear fission reactor contains and controls a nuclear fission reaction. The reactor utilizes water, graphite control rods, and uranium fuel rods to keep the reaction hot enough to boil water, but cool enough not to melt through the reactor vessel.
- *Meltdown*: A nuclear meltdown (core meltdown, core melt accident, meltdown or partial core melt) is a severe nuclear reactor accident that results in core damage from overheating.

**Vice News: Coal Country** (16 minutes)

- *Subsurface Mining*: Subsurface mines are probably what you envision when you think of mining: systems of tunnels and vertical shafts with elevators to take miners underground where they can retrieve the valuable resources.

**Wall Street Journal: Green Energy Boom** (5 minutes)

- *Green Collar Jobs*: Jobs in the sustainability industry. This may include technical jobs such as engineers, researchers, and management as well as practical jobs such as construction, maintenance, and manual labor.
- *Greenhouse Gas Emissions (GHG)*: Greenhouse gases are a wide variety of gases that contribute to the warming of the atmosphere. The gas of most interest is carbon dioxide as its concentration has changed rapidly over the past 150 years.