

Chapter 1 Review Sheet

Friedland – Environmental Science for AP

Studying the State of Our Earth

Case Study- Pfisteria

An organism is found that kills fish in large numbers. It only kills when its population is very large, and that happens when there are lots of nutrients, and lots of fish. Research showed that human activities – hog farming – led to the bloom of pfisteria and that it can cause serious and complex results. Also shows that environmental studies can be controversial and not always clear cut.

Math Formulas - Introduces the use of *dimensional analysis* to convert units:

$$\text{Miles}^2 \text{ to feet}^2 \quad \text{mile} = 5,280 \text{ feet}$$

$$1 \text{ mile}^2 = (5,280 \text{ ft})^2 = 27,878,400\text{ft}^2$$

Square feet to acres 1 mile² = 640 acres

$$\frac{1\text{mile}^2}{640\text{acres}} \times \frac{27,878,400 \text{ ft}^2}{1 \text{ mile}^2} = \frac{43,560\text{ft}^2}{\text{acre}}$$

There are 100 ha (hectares) per km² and
1km= 0.6214 miles so:

$$1\text{km}^2 = (0.6214\text{mi})^2 \times \frac{27,878,400\text{ft}^2}{\text{mile}^2} = 10,764,908\text{ft}^2$$

so, **acres per hectare** (ha) equals:

$$\frac{10,764,908\text{ft}^2}{\text{km}^2} \times \frac{1\text{km}^2}{100 \text{ ha}} \times \frac{1 \text{ acre}}{43,560\text{ft}^2} = 2.47 \frac{\text{acres}}{\text{ha}}$$

Key Ideas:

1. **Environmental Studies** – is a broad subject it includes biology, chemistry, earth science as well as economics, literature, ethics, etc. It is important because it helps us to understand the consequences of our actions.
2. **Ways humans have altered the environment** :
Convert land to different forms
Change the chemistry of air, water and soil
Technology and population growth speed up the rate of our effect
3. **Five Environmental Health Indicators**
 - Biological Diversity
 - Ability to grow food
 - Surface Temperatures and CO₂ concentrations
 - Human Population growth
 - Resource Depletion
4. **Sustainability** = the ability to meet current needs without compromising future generations to meeting their needs. Human footprint measures a how much person consumes per area of land
5. **Scientific Method** –
 - Observe & question
 - Form a hypothesis
 - Collect data and experiment
 - Interpret results
6. **Challenges of Environmental Studies:**
 - lack of **baseline data**—no control to compare to
 - Subjectivity**- must use value judgements
 - Interactions**- lots of complex and intertwined interactions

Important Charts and Tables:

Table 1.2 – Five Key Global Health indicators:

TABLE 1.2 Five key global environmental indicators			
Indicator	Recent trend	Outlook for future	Overall impact on environmental quality
Biological diversity	Large number of extinctions, extinction rate increasing	Extinctions will continue	Negative
Food production support	Per capita production possibly increasing	Unclear leveling off	May affect the number of people Earth can support
Average global surface temperature and CO ₂ concentrations	CO ₂ concentrations and temperatures increasing	Probably will continue to increase, at least in the short term	Effects are uncertain and varied but probably detrimental
Human population	Still increasing, but growth rate slowing	Population leveling off	Negative
Resource depletion	Many resources are being depleted at rapid rates. But human ingenuity frequently develops "new" resources, and efficiency of resource use is increasing in many cases	Unknown	Increased use of most resources has negative effects

This chapter neither discusses nor introduces any treaties or legislation

Areas of Concern - This is an introductory chapter, so it introduces several main areas of concern as environmental indicators including:

- Declining Biological Diversity
- Feeding the growing human population
- Climate Change
- Human population growth
- Resource depletion

Yay for Us: No specific actions, but talks about how studying environmental science will help us to better address problems that we face now and in the future. Also, talks about how we can use environmental indicators to help us make improvements in the place we live.

Important Vocabulary Words:

System = set of interacting components that influence each other by exchanging energy and or matter

Ecosystem = an area of study that is a specific area of the earth and includes looking at both biotic and abiotic parts

Biotic = living

Abiotic = non-living

Sustainability = living so that we can use resources without depriving future generations of those resources

Biodiversity = the diversity of life forms in an environment

Anthropogenic = derived from human activities

Ecological Footprint – measure of how much a person consumes per unit area of land

Hypothesis = a testable conjecture (educated guess)

Control group = a group that experiences exactly the same conditions as the experimental group except for the one variable that is under study

Natural Experiment – using a natural event as a way to conduct a study you wouldn't be able to do otherwise. (forest regrowth study after a volcanic eruption)

Some possible multiple choice questions from this chapter:

1. Sustainable development
 - a. was demonstrated on Easter Island.
 - b. requires resources to be saved and stored for one generation.
 - c. is achieved when food is raised by the people who are eating it.
 - d. balances human needs and economic development.
 - e. Allows for clear-cutting of trees.
2. Calculating ecological footprint involves consideration of
 - a. the impact of activities on the resources of Earth.
 - b. lifestyle.
 - c. water usage for crops and direct consumption.
 - d. food calories required for continuing normal activity.
 - e. All of these answers are correct.
3. Controlled experiments in nature are difficult because
 - a. it is impossible to determine what kind of conditions are needed for the experiment.
 - b. large amounts of land are sometimes required to produce natural conditions.
 - c. animals cannot be studied because they do not stay still.
 - d. scientists do not like to do the fieldwork required.
 - e. Both a and b.

Some **Possible FRQs** could be about:

Designing an experiment to test an observation about something that is happening in the environment. Quite possibly an observation related to one of the environmental indicators.

Anything to do with environmental indicators

Also, topics related to Ecological Footprints

Answers to multiple choice questions: d, e, and b

Be sure to review the **scientific method**. Know how to make a good hypothesis, and be able to set up a controlled experiment to test that hypothesis

