

Lab 1

Introduction to Environmental Problems: $P \times A \times T = I$

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Correlation

Miller 15th edition Chapter 1

Acorn Book-Topic Outline in the APES Course

- I. Earth Systems and Resources
- III. Population
- VI. Pollution
- VII. Global Change

Purpose

Students research a consumptive resource issue of their choice, starting with their own use of a product, and continuing to determine what average USA use is per capita, and global use. As part of the process the student researches what resources are necessary to create a product, documents the cradle-to-grave history of the product, and estimates environmental impact from use of the product. Students decide how to make an effective visual or written presentation of their research.

Objectives

What the student will learn from this activity

1. Be able to research the raw materials used to manufacture a product.
2. Be able to describe the life cycle of a product from raw materials through manufacturing, use, and disposal of the product.
3. Be able to recognize the accumulating effects of resource consumption and express those effects numerically.
4. Be able to describe and apply the equation $(Population) \times (Average\ resource\ use\ per\ person) \times (environmental\ effects\ of\ Technological\ production) = environmental\ Impact,$ $(P \times A \times T = I)$.
5. Be able to define associated terminology such as renewable and non-renewable resources, world views, natural capital, exponential growth, and sustainability

Background Information

We all use resources, both renewable and non renewable. Our resource use adds up over time, and the total resource use depends on the rates of use by others. Eventually, even seemingly trivial things add up. In an effort to reduce deforestation for example, China has had to enact a 5% tax on disposable chopsticks.

This Chapter 1 activity enables exploration of a resource, breaking it down into raw materials, processing, manufacturing, disposal, and other aspects of consumption, and then applying this information to the $PAT = I$ equation to determine impact. When we try to predict future impacts, the accumulating effect of consumption is increased as a result of population growth. Accordingly, we need to address sustainability. As part of doing so, we need to estimate

impacts. Forecasting is risky but it is not as harmful as waiting for the negative consequences of resource depletion or degradation. Reasonable extrapolations of resource use can be made using information readily available on the Internet or in libraries.

Materials

No special materials are required. Internet or library access is needed. Some art supplies may be used if the activity is documented in a poster. Audiovisual materials may be needed if the product is documented in a DVD or PowerPoint presentation.

Procedure

The class discusses use of resources—what is a product, what are the life stages of a product. Each student or student team selects a product to research. Factors to consider in the research: personal connection to or use of the product, estimated average consumption per capita in the USA, world consumption, projections of consumption change based on population growth. Current environmental impact should be estimated as well as the impact that will accumulate in a generation or other predetermined period based upon present population growth.

Format for Report

Introduction.

Include problem description, location, how selected

Methods

Include description of research approach—how you will collect data.

Results

This section contains data, but no conclusions drawn from the data. Include population projections, impact calculations, and any assumptions you had to make (including why they are reasonable assumptions)

Discussion

This contains conclusions drawn from analysis of the data, and focusing on the issue of sustainability. Make recommendations to reduce consumption, reduce impacts, recycle, change technology, and any other relevant aspects of promoting sustainability.

References

Provide bibliographic citations for all materials used—including reports, maps, books, web sites, interviews, and other sources.

Format for Poster

Must include $P \times A \times T = I$ in attention-grabbing visual format.

Describe each aspect of the *PAT* equation in terms of the topic explored

Present the results of your research similar to that for a paper.

Present conclusions and recommendations to promote sustainability.

Provide references on the poster as for paper format.

Evaluation

Factors considered in evaluation:

Oral summary.

Peer evaluation

Proper definition and addressing of $PAT=I$ equation for chosen product

Quality of assumptions, facts, and conclusions.

How the information is communicated

How well the format match the guidelines

How well the research is documented

How well the student displays critical thinking in the discussion and suggestions on sustainability?

Ability to make a personal connection between the topic, the student, and the audience

Important Terms

Exponential Growth

Globalization

Life Cycle.

Natural Capital

Nonrenewable Resource

Renewable Resource

Sustainability

Technology

Worldview

Additional Resources and References

"The Tragedy of the Commons," Garrett Hardin, Science, 162(1968):1243-1248. [This classic article can be found online at various host sites]

US Census Bureau, World Population Clock:

<http://www.census.gov/ipc/www/popclockworld.html>

US Census Bureau, USA Population Clock

<http://www.census.gov/population/www/popclockus.html>