

# The “Population-Poverty-Environment” Connection

## Introduction:

A common unifying theme of modern environmental science is the population-poverty-environmental degradation (PPE) model, whereby overpopulation in a society of scarce resources exacerbates poverty and environmental degradation. Populations living under these conditions subsequently usually have higher fertility rates, which compounds the problem and perpetuates the cycle. However, progress in solving these problems has been extremely difficult. Could the model be flawed? In this two-part activity we will put the PPE model under the scrutiny of the scientific method (Part 1) and then follow up our analysis with a qualitative “ground-truthing” of the phenomena (Part 2).

## Objectives:

Upon completion of this activity, students will be able to:

1. Apply scientific analysis as a problem solving tool outside the realm of traditional laboratory science.
2. Understand the relationships between population size, poverty, and health of the natural environment on a global scale.
3. Realize the fundamental differences between developing world and developed western societies and their relationships to the natural world.
4. Understand the difficulty in applying scientific models to human phenomena.

## Part 1. Quantitative analysis:

To accurately test an hypothesis we must be able to measure the relationship we are testing. This requires assigning numerical values to “poverty”, “population”, and “environmental degradation”. In addition, if we are going to test for the presence of something, we need to know what the situation looks like when that phenomenon is missing. For example, what exactly is “poverty”? What would be the daily wage of an impoverished individual? One dollar? Two dollars? To know what poverty is, one needs to know how a society would appear *in the absence* of poverty. To make a valid comparison, let’s use the United States, where on average the PPE model does not exist.

## Instructions:

1. Choose a nation in the developing world that you will examine for the effects of the PPE cycle. A list of all nations can be found on the CIA’s Factbook website:

<https://www.cia.gov/library/publications/the-world-factbook/>

2. Complete the table below for both the nation you are investigating and the United States using the following sources for your measurements:

**Poverty:** The CIA’s Factbook has a wealth of information in an easily accessible format. Go to the website below, choose the nation from the pulldown menu and then find the value for “percent below poverty”

<https://www.cia.gov/library/publications/the-world-factbook/>

**Population:** Rather than the absolute number in the population, the more important value is population density. This information can be found at:

<http://esa.un.org/unpp/>

**Environmental Degradation:** This is perhaps the most difficult to measure, because it is actually a factor of many variables. Fortunately, such a measurement has already been created and is called Environmental Performance Index. Find the Index for your nation using the excellent interactive map at: <http://epi.yale.edu/Home>

Table 1. Comparisons of PPE variables between the United States and a developing nation.

<b>Nation</b>	United States	
<b>Percent below poverty line</b>		
<b>Population Density</b>		
<b>Environmental Performance Index</b>		

3. A basic tenet of good scientific analysis is replicating your experiment to confirm your results. Do this by combining your data with that of at least 4 other students' data, *who chose different nations than yours*, for a total of 5 replications. (Note: If time permits, combine the data for all members of the class for a stronger analysis.) Take the average of these values for poverty, population density and environmental degradation and complete the table below:

Table 2. Comparisons of average PPE variables between the United States and developing nations.

<b>Nation</b>	United States	Nation's Average
<b>Percent below poverty line</b>		
<b>Population Density</b>		
<b>Environmental Performance Index</b>		

4. Derive conclusions from your results. Is there a large difference between the United States and the developing nations for all of these variables? What does this say about the validity of the PPE cycle?

## Part 2. Qualitative analysis

It is important that measurements accurately reflect the event we are measuring, especially if we are doing the measurements from a distance. In science, this is often called “ground-truthing”. We will accomplish this by using only media sources from the nation you have chosen.

### Instructions:

Using the site below, find a news media source for your country. In that media source, look for the kind of news that dominates the coverage. Find one article that illustrates the connection between poverty, population size, and environmental degradation. If reading this online newspaper suggests to you that some other variable is affecting this cycle, find an article that illustrates the presence of that variable. In other words, does the quantitative data reflect what is actually happening “on the ground”? Provide a 200-word synopsis of the article you chose, with citation, and state how you believe this reflects upon the validity of the PPE cycle.

List of foreign news media sources: <http://library.uncg.edu/news/>

Here is an example of a portion of an article from Nairobi, Kenya's *East African Standard*:

## Loggers threaten valuable trees in their pursuit of riches

Published on 02/11/2008

By Titus Too

Valuable trees in the larger Nandi District forests are under threat from residents out to make a quick shilling. The demand for the trees, such as the Elgon Teak, is so high that it takes only hours for one to earn millions from the valuable wood products of the tree that takes between 250 to 300 years to mature. In Nandi South District, the tree has rapidly reduced in the forests, thanks to the residents' insatiable demand for it.

Loggers target the tree for its quality timber for furniture and other wood products.

The district has expansive indigenous forests measuring thousands of acres. They boast of over 20 other tree species of hard wood products, but none of them is in as high demand as the Elgon Teak.

The Elgon Teak is only found at Kobujoi forest in Aldai. The forest covers more than 17,900 hectares and runs across Nandi North District bordering Kakamega and Lugari districts in Western Province.



Nandi South District Forest Officer, Mr Joshua Charana , stands next to a young Elgon Teak

According to the District Forest Officer, Mr Joshua Charana, the tree can no longer be found in the 7,000 hectare Tinderet forest as well as in the 4,000 hectare Kapchorwa forest.

The wood from the tree is largely used in making wood rails, carvings, and joinery. It is also used in building bridges and for the manufacture of boats, among others. It is in high demand both locally and internationally.

Charana says the tree species grows very slowly and it could take up to 300 years to mature. Its timber products cost upward of Sh6,748 per cubic metre and a mature tree may measure between 20 to 30 cubic metres.

From: *The East African Standard* Nairobi, Kenya, November 7, 2008.

**Instructor Notes:**

This assignment teaches the components of sound scientific analysis while increasing students' awareness of global issues. I have purposely not included many specific instructions, instead requiring students to search a bit for the information. This opens the experience to serendipity, and expands the activity to the social sciences and geography. It could be used on both the high school and college level. Because the data is internet-derived, it can be used both in the face-to-face and online settings.

Because searching through foreign media is a fascinating exercise, give students time to get sidetracked in their search. This part of the activity should be emphasized because it adds richness to the experience.

Assessments, at a minimum, are derived from completion of the quantitative data, providing data for others in their analysis, and the qualitative summary of the article. If used in the online setting, students' data can be posted to the discussion forum. In addition, debate regarding the PPE model can be moderated on a discussion forum.