



***Guide to the Healing Earth* Introduction**

Part 2 Science

Thorough discussions of environmental science occur in each chapter of *HE*. In this part of the Introduction, students are given a brief orientation on science as a way of knowing. You will likely have your own time tested material approach to this subject, so feel free to add, subtract, and adjust what is presented in this part of the *HE* Introduction. The following three terms surface in this part of the Introduction and *HE* treats them in the following way:



- **Science**: a systematic way to study the structures and processes of the natural world.
- **Environmental Science**: the study of the structures and processes of the natural world and the impact that human beings have on them.
- **Ecology**: the study of the complex relationships between organisms and their physical environment.

You will no doubt have your own preferred definitions of these terms. This part of the Introduction can be an opportune time to discuss your definitions in relation to those given in *HE*. Here some ideas on how to approach the material in this part of the Introduction:

- Discuss the **scientific method** (including the meanings of *fact* and *theory* in science).
- Offer a brief biography of a model scientist (like Melvin Calvin in the 'Inspired People' box) whose devotion to detail and respect for the scientific method has contributed to the well-being of the Earth and humanity.



HE is an *integrated* approach to environmental science. One of the fruits of this approach is to help students move from a naïve understanding of science to a more sophisticated understanding. One dimension of this sophistication is to help students understand that science does not *in itself* contain moral values and does not *in itself* lead to actions that heal the world. Rather, an ethic of well-being must be *brought to science*, so that scientific work can be directed toward the good of the Earth and humanity. This is why students must be educated in environmental science by way of a careful *integration* of science and ethics. One suggestion along these lines is given below:

- Contrast the model of a ‘good’ scientist with scientists who have used the scientific method in ways that *harm* the Earth and human beings.
 - There are several well-known examples you could discuss. One is the Tuskegee experiment conducted by the U.S. Public Health Service. You can read a brief summary of this experiment in the box below or [see the detailed story here](#).
- Have a discussion with your students about the distinction between a *technically* ‘good’ scientist—where the word ‘good’ is used to describe someone who is an excellent practitioner of scientific method and a *morally* ‘good’ scientist—where the word ‘good’ is used to describe scientists who use the scientific method for the well-being of persons, society, and the natural world.



The Tuskegee Experiment was a clinical study conducted by Tuskegee University in conjunction with the U.S. Public Health Service between 1932 and 1972. Participants of the study were African-American men who had syphilis (a degenerative disease). Although there were treatments available for syphilis, the experimenters withheld treatment from several hundreds of participants. Additionally, the experimenters lied to these participants, telling them that they were being treated for syphilis and receiving free health care.

The goal of this experiment was to catalogue the progression of untreated syphilis in African-American men. Therefore, treatment was dishonestly withheld from participants, sometimes even until their death. All untreated participants experienced increasingly poor health because they were not treated for syphilis.

At the end of the science section there is a brief discussion of the impact of human society on the natural world. Those impacts include human economic practices, political policies, cultural lifestyles, technology, and many other human activities. It is activities such as these that create the majority of the ethical challenges we face today in relation to the environment. Ethics is addressed more in depth in the next section, but it may be useful at this point to help students start making connections between science and ethics by looking at society.

- Help students to be more aware of the social structures that make life possible (or difficult) on Earth by having a discussion about what makes up a human society; such as

- The economic structures and processes that produce and distribute the goods we all consume.
- Political structures and processes that create laws and policies that citizens are expected to follow.
- Cultural structures and processes that provide the language, education, art, literature, and recreation necessary for human existence.
- Family structures and processes that define spousal and kinship relationality, provide for child care, and manage households.

There are several ways that you can include these points in your classroom:

- Discuss how these structures and processes impact the natural world (e.g. economic practices of production and distribution, political policies and regulations, cultural patterns of consumptions, etc.).
- Examine the lives of people like Rachel Carson and Aldo Leopold (in the 'Inspired People' boxes) or another person that you are familiar with who worked diligently to improve the impact of human society on the environment.
- *HE* stresses the importance of *global* environmental awareness. Consider including examples of different kinds of societies (e.g. rich/poor; developed/undeveloped; urban/rural; north/south; east/west) in your discussions.
- You may also want to *reverse* the discussion and point out the *ecosystem services* that the natural world provides for human society. The familiar treatment of this topic in **2005 Millennium Ecosystem Assessment Report** is helpful here, especially the well-known **ecosystem services chart**. [Go here](http://www.globaleducationmagazine.com/ambiantal-environmental-services-environmental-education/) for the chart and a helpful explanation. (<http://www.globaleducationmagazine.com/ambiantal-environmental-services-environmental-education/>)

As explained throughout *HE*, science is the discipline that enables us to acquire the empirical data we need to address today's environmental challenges. However, empirical data and scientific findings alone do not tell us about what we *should do* in response to these challenges. Therefore, science must integrate ethics in order to help us make choices that heal the Earth and enhance human life. We now turn to the discussion of ethics in the *HE* Introduction.

***Laudato Si'* 15: ". . . the best scientific research today . . . [provides] a concrete foundation for the ethical and spiritual itinerary that follows."**

Select Background Resources for This Section

Adam Briggle and Carl Mitcham, *Ethics and Science: An Introduction*. New York, NY: Cambridge University Press, 2012.

National Science Foundation, *Not Just a Guy in a White Coat: Helping the Public Understand How Science Really Works*.

(https://www.nsf.gov/news/news_summ.jsp?cntn_id=114305)

Daniel Little, *Understanding Society: Innovative Thinking about Social Agency and Structure*.

(<http://understandingsociety.blogspot.com/2007/11/what-is-social-structure.html>)

Harriet A. Washington, *Medical Apartheid: The Dark of Medical Experimentation on Black Americans from Colonial Times to the Present*. New York, NY; Random House, 2008.