# Chapter 4

# Thinking Systemically and Sustainably

## Chapter Overview

A systemic approach is much more than a schematic of boxes and lines that describe the system. It involves looking at the big picture, exploring the interrelationships (interconnections), and then looking at different ways of interpreting the same data. It is important to recognize how complex the human system is and what is required of it to get to sustainability. Numerous definitions of sustainability exist, but they all say more or less the same thing: Living within the limits of the planet and caring for future generations. As a concluding perspective to lead to the chapters that follow, consider this definition, too: The integration of the sociocultural-psychological aspects of how people live, with the ecological-economic aspects of where people live, that benefits everything for all time.

It is critical to understand how people in developed countries, especially the United States, are separated from each other within communities and have become hyperindividualistic. The short-term acquisition of stuff is creating a myriad range of environmental problems that may end up eventually removing humans from the planet. It is not an inevitable conclusion that people have to suffer the negative consequences of current industrialized lifestyles.

## Vocabulary Terms

3P model (people, planet, profit)

boundaries

Cassandra syndrome

chaos theory

constructive rationalization

cradle–grave mindset

critical mind

cyclic system

exponential function

genetic resistance

mass extinctions

Milankovich cycles

participatory democracy

precautionary

presuppositions

root cause analysis

subsystems

stratospheric ozone

symbolic belief

systematic

systemic thinking

systemically

symptomatic thinking

## Terms With Definitions

**3P model (people, planet, profit)—**An ethics model that emphasizes the inclusion of **p**eople’s needs, the **p**lanet’s needs as in ecological services, and the needs of businesses to create sustainable **p**rofits.

**boundaries—**Defining factors of a border of a system or limit to action within the system.

**Cassandra syndrome—**The tendency to ignore scientific information or scientists predicting specific consequences when questionable or unpopular ideas are presented.

**chaos theory—**The study of dynamic systems where minor perturbations can create large consequences down the line, but where the outcomes can be wide ranging (hence unpredictable) depending on the interaction of numerous perturbations acting synergistically.

**constructive rationalization—**Logical thinking that uses rigorous data to come to rational conclusions.

**cradle–grave mindset—**Thinking of products from virgin materials to final disposal as a linear system.

**critical mind—**Asking rational questions and using rigorous data before forming any opinions.

**cyclic system—**A system where everything occurs within that system in interrelated cycles, usually controlled by a feedback mechanism. Typical of closed systems like the Earth where all matter is contained solely on the planet.

**exponential function—**Used to model relationships where constant growth exists over a specific time. Allows predictions of future growth rates and usage of known amounts of available resources.

**genetic resistance—**Occurs when most of a species dies off when treated by a poison, but where some individuals are not affected because of a specific genetic trait that protects them. These individuals then breed more offspring that share the same resistance factors, rendering the poison ineffective for future use.

**mass extinctions—**Periods in Earth’s geological history where major catastrophic events killed off large numbers of species all over the planet. Believed to have happened at least five times.

**Milankovich cycles—**Description of three different cycles in Earth’s orbit or axial tilt in relation to the sun.

**participatory democracy—**A government in which citizens have a more prominent voice in developing policy and legislation.

**precautionary—**The action of being aware of consequences before making any decisions on specific actions.

**presuppositions—**A preformed belief or assumption about something that is taken for granted and not questioned.

**root cause analysis—**A process for identifying the root cause of a problem as opposed to merely symptoms of the problem.

**subsystem—**A unique and independent component that is nested within a larger system. For instance, the engine of a car is a subsystem of the whole car. The engine may produce the power, but the rest of the car’s systems are required for the car to actually move.

**stratospheric ozone—**Also called *good ozone,* the ozone layer that extends upward from about 6 to 30 miles (in the stratosphere) and protects life on Earth from the sun's harmful ultraviolet rays.

**symbolic belief—**Where individuals may state a specific belief but their actions suggest only token action, not full engagement with the belief.

**systematic—**Not to be confused with systemic, it means the methodical and sequential series of actions toward a conclusion.

**systemic thinking—**Thinking about the whole system or group of systems and the many perturbations that may occur.

**systemically—**Means considering a system.

**symptomatic thinking—**Thinking about just the symptoms of a problem and not the whole system that is being affected. Can also include ignoring or not actively seeking the cause of a problem.

## Extended Learning Activities

1. Go to the population clock (galen.metapath.org/popclk.html) and, using the exponential function (see pages 77-79), calculate the present growth rate of the human population using today’s date from the exact same date 5, 10, and 20 years ago. Assuming this rate remained constant in each of the three time frames, at what point will the human population reach 8 billion people? How will it differ if the rate falls another 10 percent below today’s rate of the last 5 years?
2. The first step in learning to think systemically is to focus on interrelationships and understand the boundaries of the system you are looking at. Can you find the interrelationships from the apparent tangled chaos of the whole system? Pick a system with which you are familiar. Now, analyze it using the following statements:

* What is the nature of the interrelationships within the system or subsystem being reviewed?
* What are the connections between these interrelationships?
* What are the scientific and social processes that exist between them?
* What are the main patterns that emerge? Are there obvious feedback system effects?
* What are the consequences for the system from continued positive or negative feedback systems?
* How do the interrelationships affect the behavior of the effect being reviewed? How do they vary over time?
* Do similar interrelationships exist that differ when viewed through another system or subsystem?
* Do any nonlinear effects exist where an apparently unrelated factor is having an effect on your system?

1. Choose an environmental issue that you have heard about. In order to better understand this issue, you need to incorporate critical-thinking skills that delve into alternative perspectives of the same issue. How might you go about finding out valid information regarding this issue? How will you determine this validity? Simply agreeing or disagreeing is not sufficient. What critical thinking skills are required? Describe the process and resources you used to inquire about and better understand the nature of this issue. What, if any, opinions did you have? How were your opinions modified during this process? How has your knowledge and attitude toward this issue changed as you delved into valid scientific resources to help you better understand this issue? Do you still have a lack of understanding, or are some components of the issue not clear? If so, how do you plan get that resolved?

## Research and Response Questions

1. Research 5 to 10 people’s attitudes toward an environmental problem (e.g., global warming) and determine whether they exhibit symptoms of the Cassandra syndrome and whether or not they approach the problem with critical thinking. Document the criteria you used to make your determination.
2. Research 5 to 10 people’s attitudes toward an environmental problem and decipher how they think about solving the problem. Do they approach the problem systemically or symptomatically? Document how you came to your conclusion.

## Web Links

[EcoFuture](http://www.ecofuture.org/)

[*Exponential Growth and The Rule of 70*](http://www.ecofuture.org/pop/facts/exponential70.html)

[Population Reference Bureau](http://www.prb.org/)

[Systems Thinking, Systems Tools and Chaos Theory](http://managementhelp.org/systems/index.htm)

[Systemic Thinking](http://www.systemicthinking.com/)

[World population clock](http://galen.metapath.org/popclk.html)