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CORRELATION OF RESOURCE IMPORTANCE AND LEGAL INERTIA

MIGUEL A. SANTOS
Baruch College (CUNY)

ABSTRACT

This article provides an analytical framework for discussing the problems and prospects of achieving environmental stability through developments in environmental law. It constructs a legal-scientific model for the interactions of developments in the law and environmental stability in a mathematical sense. The model suggests that in stable human-environment systems, evolution would lead to systems with environmental laws affecting stability which are difficult to change. In other words, these types of laws should have high inertia and local stability.

INTRODUCTION

The value of studying the interactions of environmental science and environmental law is clear to educated persons in our times. There are countless pieces of legislation, court decisions, and administrative regulations concerning natural resources and pollution. Apart from the inherently interesting aspect of the interactions of the environmental sciences and environmental jurisprudence, these laws and regulations force regulatory decisions concerning natural resources and pollution which directly or indirectly affect environmental stability. Because these regulations were mandated, it appears prudent to consider the relationship between legal stability and environmental stability.

This article describes some fundamental principles of environmental stability which are relevant to the maintenance of a self-sustainable human system.

Specifically, these stability principles incorporate some notions of the ecological sciences and environmental jurisprudence, and provide a framework to guide humanity in developing scientifically-relevant environmental laws. Before we proceed with our discussion, let us describe what we mean by a self-sustainable system and stability.

DEFINITIONS

In 1975, this writer described the mental model of the anthroposystem to refer to a functional and structural unit of interwoven and overlapping hierarchies of organization which maintain civilization in space and time [1]. An anthroposystem is a structural and functional unit of the environment because it can be considered a self-contained system, provided it has an energy source. In 1982, this model was mathematically described [2]. However, what really brought the notion of sustainability to public attention was the 1987 publication of *Our Common Future* by the United Nations World Commission on Environment and Development [3]. This report gave the concept of sustainability a narrower, economic perspective. The report defines sustainable development, as that which "meets the needs of the present generation with compromising the ability of future generations to meet their needs."

These overlapping terms suggest that the time is appropriate for the concept of sustainability to appear [4]. Whatever term is used, they all share the idea of a society in balance with its surroundings, a self-sustainable system.

The notion of sustainability is a wonderful, albeit elusive, concept that "means different things to different people" [5]. Nevertheless, this writer finds the concept of self-sustainable systems, such as anthroposystems, to be useful as a metaphor. Moreover, the concept provides a working plan that can be used to formulate other theories. It is a gloomy thought that the human-environment system may be so complex in space and in time that a universal concept such as the anthroposystem must be imaginary and/or unrealistic.

From the perspective of the anthroposystem model, the stability principle involves three fundamental facets: constancy, resilience, and inertia [6]. Constancy is the absence of change in some parameter of our human-environment system. Some examples of constancy would be racial composition, major producers, consumers, decomposers, the size of the anthroposystem, and features of the matrix. Resilience is regarded as the ability of an anthroposystem to recover and maintain its integrity (structure and function) after disturbance has occurred which changes some of its parameters. Therefore, an anthroposystem may be considered resilient if, during or after the perturbation (even though its racial or industrial composition may have changed significantly), it is able to continue to maintain its original configuration. Inertia refers to the ability of the anthroposystem to resist such disturbances. This process is also known as resistance.

Stability can also be thought of as local versus global [7]. Some anthroposystems are locally and globally stable and will always return to the same set point. Other systems are locally stable but are globally unstable if disturbed severely. Still other systems exhibit a high global stability but low local stability or may be both locally and globally unstable and may become extinct if perturbations are too great (see Figure 1).

Presently, ecologists have not come to mutual agreement as to which environmental parameters contribute to stability [8]. Nevertheless, we can formulate simple yet powerful statements at higher levels of abstraction about environmental jurisprudence without knowing the details of the parameters involved [9]. One may recall that scholars, such as Copernicus (solar system), Darwin (biological evolution), and Holmes (legal evolution), developed theories without understanding them in great detail. One distinctive aspect of evolution theory regarding jurisprudence is that it may be employed to describe the order and sequence of changes in a complex phenomenon, even though little is known about its constituents and the mechanisms connecting them [9].

In order for an anthroposystem (or society) to keep its integrity, it must maintain a position of equilibrium on a resource treadmill. In other words, maintaining integrity is only possible through the continuous acquisition of resources in the face of changing external environment and internal conditions, e.g., socio-economic-political parameters. Human environmental systems with high

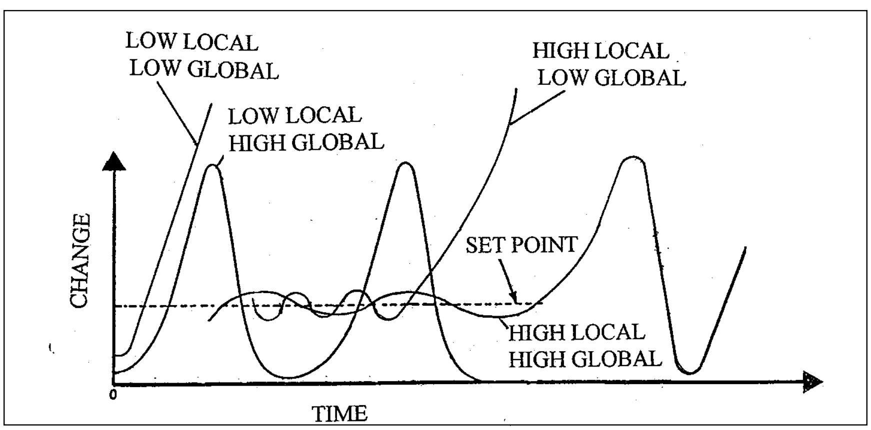

Figure 1. Diagram illustrating the principle of set point and oscillation.

local/global stability resist changes in their integrity and fluctuate around the theoretical set point or carrying capacity. However, as Figure 1 shows, those systems which do not meet these conditions may be subject to drastic changes.

Consider, for example, the Montreal Protocol and its amendments, which about 150 nations have ratified. Under this treaty, nations agreed to phase out the production of CFCs and other ozone depleting chemicals by the year 2010. Because there has been about a 5 percent cumulative decline in the stratospheric ozone over the Northern Hemisphere since 1979 [10], we can speculate that the ozone level has low local stability; however, we don't know its global stability. Only time will tell whether the international system will react quickly enough to avert drastic oscillations of the ozone layer.

The Kyoto Protocol, a treaty under which the reduction of emissions of greenhouse gases are to be made, has been ratified by few countries. One should note that, even if control measures are fully implemented, global climatic change will continue for nearly another century. Because of the long atmosphere life spans of many greenhouse gases (up to 100 years), a return to near-natural levels of these gases will take centuries, if they are at all recoverable [10]. Apparently, climate change exhibits low inertia and local stability; whether it exhibits resiliency or high global stability remains to be seen.

ENVIRONMENTAL LAWS CONCERNING STABILITY

One of the primary objectives of environmental jurisprudence is to maintain the order of nature [11]. Environmental law is, in fact, instrumental in imposing necessary stability on earth's diverse and rapidly changing human-environment complex. By means of land use controls, air quality acts, water quality acts, and species preservation acts, the legal system should seek to prevent environmental instability by imposing appropriate codes of conduct upon the earth's inhabitants. Immediate self-interest is outweighed by a long-term stable anthroposystem.

In addition, both human society and the environment are dynamic—constantly in motion and constantly changing. It is necessary to look at the human-environment system in equilibrium. In reality, however, the system is constantly exposed to endless conflicts and changes. Civilizations and regimes have risen and fallen. Moreover, constitutions, statutes, court-decisions, and administrative rules are constantly being amended, repealed, overturned, or modified.

How, then, can a society with an unstable nature be used to achieve environmental stability via its legal system? Part of the answer lies in making environmental laws that affect stability—difficult to change. In other words, these types of laws should have high inertia and local stability.

It is said that laws which cost more to change are least subject to change [12]. For instance, since the U.S. Constitution is difficult to amend, it has been amended only twenty-six times. One may ask, then, what kinds of environmental laws are least likely to change? The answer is: those laws that are incorporated into the constitution. Laws or regulations promulgated by environmental agencies are easier to change, while statutes are intermediate in their inertia.

Consequently, if environmental stability is one of the primary goals of environmental jurisprudence, then laws buttressing stability should be incorporated into the constitution of the government. That is, the more important a resource is to the maintenance of stability, the more inertia laws governing its regulations should possess (see Figure 2). For example, carbon dioxide, in relation to its ambient concentration at sea level perhaps is one of the most important natural resources. It is a raw material for photosynthesis and a "greenhouse gas." If green plants receive insufficient amounts of carbon dioxide, the rate of photosynthesis decreases. Yet, if carbon dioxide concentration increases, the planet's average temperature is predicted to rise.

Thus, in a stable human-environment system, the ambient carbon dioxide concentration is defined by the constitution. At the same time, a public agency with stability-related duties, through its controlling signals such as generalized pressure, direct regulation, marked-like approaches, subsidization, and public

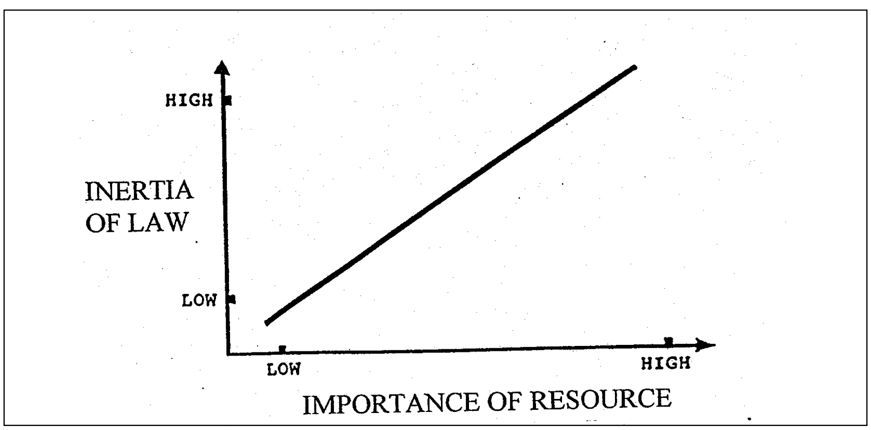

Figure 2. The graph indicates the relationship between the importance of a resource to the maintenance of environmental stability and inertia of law regulating that particular resource. The values of greater importance are correlated with the values of greater inertia.

production of keystone resources, continually affects the anthroposystem in a direction that minimizes the error signal.

Moreover, the public agency with stability-delegated duties must recognize the fact that environmental features themselves may inherently have different local/global stability. One of the major concerns of environmental engineering, through such a control mechanism, is that the controlling signals may not have an immediate impact on the anthroposystem's output. The longer the time lag between inputs and outputs, the greater the oscillation. Consequently, actual anthroposystem output may fluctuate around the constitutionally set point, depending upon the local/global stability of environmental parameters.

Since different anthroposystems differ from each other in their ability to compete for resources and avoid ecological catastrophes, those that are most suited for their environment are the ones most likely to survive. Differences in adaptiveness among anthroposystems are due to socio-economic-legal differences that may be transcended from generation to generation. Across many generations (evolutionary time), however, differential reproduction among different anthroposystems would lead to distinct constitutional makeups. Large fluctuations are dangerous for an anthroposystem since they may lead to either oversaturation of the environment or to undersaturation, which increases the probability of extinction. As a consequence, stable systems contain mechanisms that allow them to regulate their own state at or around the set point. Evolution would lead to anthroposystems with environmental laws affecting stability that are difficult to change. In this sense, anthroposystems evolve.

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Direct reprint requests to:

Miguel A. Santos
506 Baruch College
Department of Natural Sciences
17 Lexington Ave.
New York, NY 10010
Box A