Development and Growth in a Sustainable Society

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Abstract: *This article aims to draw attention to the support social development can have in obtaining a sustainable development by using inspiration taken form nature, from the way ecosystems organize, develop and groe.*

Keywords: *support social development, sustainable development, ecosystems.*

1. Introduction

As we all know, we are faced now with a whole series of global environmental problems which are harming the biosphere and human life in alarming ways that may soon become irreversible. The great challenge of our time is to create sustainable communities; that is, social and cultural environments in which we can satisfy our needs without diminishing the chances of future generations. The concept of sustainability was introduced in the early 80's by Lester Brown, founder of the Worldwatch Institute. He defined a sustainable society as one that is "able to satisfy its needs without diminishing the chances of future generations". The report of the World Commission of Environment and Development, the so called "Brundtland Report", used after a few years the same definition to present the notion of sustainable development: "Humankind has the ability to achieve sustainable development - to meet the needs of the present without compromising the ability of future generations to meet their own needs". The definitions of sustainability are important because they are a reminder of the responsibility to pass on to the future generations a world with as many opportunities as the one we inherited.

The rise of nature into culture is the sign of a new paradigm into the research and development. The quality of the minds the new biology attracts, the rapid growth and excitement it generates, its broad influence as a unifying concept, and its potential for reshaping culture all suggest we are witnessing now a historic transformation.

Most societies aspire to achieve economic development to secure rising standards of living, both for themselves and for future generations. They also seek to protect and enhance their environment, now and for their children. Reconciling these two aspirations is at the heart of sustainable development. In our attempts to build and nurture sustainable communities humans can learn valuable lessons from ecosystems, which are sustainable communities of plants, animals, and microorganisms. In over four billion years of evolution, ecosystems have developed the most intricate and subtle ways of organizing themselves so as to maximize sustainability.

2. Community and Ecology in a Sustainable Society

Understanding the concept of "community" is extremely important today, not only for the emotional and spiritual well-being, but for the future of our society and the survival of humanity. There are laws of sustainability which are natural laws, as stringent as the laws of physics, but until recently they have not been studied. Rather than principles of ecology, these laws are merely patterns of organization that allows an understanding of how ecosystems organize themselves. Their very essence will be presented, for a better understanding of the principles of organization of the sustainable systems.

2.1. Relationships

The reason for studying ecosystems is that by doing this one can learn about building sustainable human communities. We need to understand relationships, and this is something that runs counter to the traditional scientific enterprise in Western culture. Traditionally scientists have tried to measure and weigh things, but relationships cannot be measured and weighed. Relationships need to be mapped.

When doing that, one discovers that certain configurations of relationships appear again and again. These are the so called patterns, and the study of relationships leads scientists to the study of patterns, which are configurations of relationships appearing repeatedly.

2.2. Form and Pattern

The study of ecosystems leads to the study of relationships, which leads also to the notion of *pattern*. Notion studied intensively both in technical and social fields, the notion of "pattern" reveals a tension that has been characteristic in Western science and philosophy throughout the ages. It is a tension between the study of substance and the study of form.

Table. 1. Parallel between different approaches

SUBSTANCE	FORM
What is it made of?	What is its pattern?
study of quantities	study of quality
requires quantitative measuring	requires visualizing and mapping

The study of substance starts with the question, *What is it made of?* The study of form starts with the question, *What is its pattern?* Those are two very different approaches. Both of them have existed throughout our scientific and philosophical tradition. The study of pattern began with the Pythagoreans in Greek antiquity, and the study on substance began at the same time with Parmenides and Democritus. In asking this question, the Greeks came up with the idea of four fundamental elements: earth, fire, air, and water. In modern times, these were recast into the chemical elements; many more than four, but still the basic elements of which all matter consists. In the nineteenth century, Dalton identified the chemical elements with atoms, and with the rise of atomic physics in our century the atoms were reduced to nuclei and electrons, and the nuclei to other subatomic particles.

Similarly, in biology the basic elements first were organisms, or species. In the eighteenth and nineteenth centuries there were very complex classification schemes of species. Then, with the discovery of cells as the common elements in all organisms, the focus shifted from organisms to cells. Cellular biology was at the forefront of biology. Then the cell was broken down into its macromolecules, into the enzymes and proteins and amino acids and so on, and molecular biology was the new frontier.

At the same time, throughout the same history of science, the study of pattern was always there, and at various times it came to the forefront, but most times it was neglected or suppressed. As I said, when you study pattern, you need to map the pattern, whereas the study of substance is the study of quantities that can be measured. The study of pattern, or of form, is the study of quality, which requires visualizing and mapping. Form and pattern must be visualized.

This very important aspect of studying patterns is the reason why, every time the study of pattern was in the forefront, artists like Leonardo da Vinci and the German poet Goethe in the eighteenth century, who made significant contributions to biology through his study of pattern, contributed significantly to the advancement of science.

Recognizing that the study of pattern is central to ecology, scientists like Fridjof Capra begin to look for answers to the crucial question: *What is the characteristic pattern of life?*

2.3. Networks

The first step in answering this question is based on a simple observation: wherever one sees the phenomenon of life, one observes networks. Again, the study of networks was brought into science with ecology in the 1920s when people studied food chains of feeding relationships. They begin to concentrate on the network pattern. Later on, in mathematics, a whole set of tools was developed to study networks. Then scientists realized that the network pattern is not only characteristic of ecological communities as a whole, but of every member of that community. Every organism is a network of organs, of cells, of various components; and every cell is a network of similar components.

The main characteristic of any network is that it is nonlinear; which means that the relationships in a network pattern are nonlinear relationships. Because of this nonlinearity, an influence or message may travel around a cyclical path and come back to its origin. The important concept of *feedback*, which was discovered in the 1940s, in cybernetics, is connected with the network pattern. Because of the feedback loops in networks, because an influence travels around a loop and comes back, one can have self-regulation; and also self-organization. Transposed at a community network level, this means that a community can regulate itself. The community can learn from its mistakes, so the community can organize itself and can learn. Development and learning are always part of the very essence of life because of this network pattern.

2.4. Self-Organization

Understanding, as Fridjof Capra said, that "life is networks", one can understand that the key characteristic of life is self-organization. Although simple, this sentence is at the very forefront of science today.

When looking at an ecosystem, we have interdependence, network relationships, feedback loops, cyclical flows; and many species in a community. All of this together implies cooperation and partnership. In the nineteenth century, the Darwinists and Social Darwinists talked about the competition in nature. In the twentieth century, ecologists have discovered that in the self-organization of ecosystems cooperation is actually much more important than competition. We constantly observe partnerships, linkages, associations, species living inside one another depending on one another for survival. Partnership is a key characteristic of life. Self-organization is a collective enterprise.

We see that these principles - interdependence, network patterns, feedback loops, the cyclical flows of energy and matter, recycling, cooperation, partnership - are all different aspects, different perspectives on one and the same phenomenon. This is how ecosystems organize themselves in a sustainable way.

3. Conclusions

Most societies aspire to achieve economic development to secure rising standards of living, both for themselves and for future generations. They also seek to protect and enhance their environment, now and for their children. Reconciling these two aspirations is at the heart of sustainable development. In our attempts to build and nurture sustainable communities humans can learn valuable lessons from ecosystems, which are sustainable communities.

In its original meaning, "development" identifies a fundamental characteristic of all life. Over the past twenty years, a scientific understanding of life has emerged at the forefront of science, clarifying the roots and basic dynamics of the process of development.

One of the basic characteristics of life is that living systems are open systems. They need a continual flow of energy and matter (air, food, water, etc.) to stay alive. The detailed dynamics of this flow of energy and matter have been studied in great detail over the past two decades, leading to a new understanding of the basic principles of sustainable development.

This new understanding shows us that development is a fundamental property of life. All living systems develop; life continually reaches out to create novelty. What is created depends on the systems' internal structures. And since these internal structures change in the process of development, the path of development when new order emerges is a path of ongoing structural changes.

When we study nature, we can see quite clearly that, although growth is a central characteristic of life, indefinite and unrestricted growth is not sustainable. It is important, however, to realize that there can still be development without physical growth, because there can be learning and maturing.

So these are some of the basic principles of ecology: interdependence, recycling, partnership, flexibility, diversity, and as a consequence of all these, sustainability. As our society faces the beginning of a new millennium, the survival of humanity will depend on our ecological literacy, on our ability to understand these principles of ecology and live accordingly.

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