



Book review

Sustainability and Regeneration of Ecological Systems in Western Pennsylvania, USA: Research and Efforts

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This book deals with sustainability and the regeneration of multilevel systems starting from the ecosphere down to molecular structures. As integral part of the Earth's ecosystem, intelligence demands that humans protect and maintain the various functions of the primary biosphere cycles, so as to prevent the loss of soil and desertification, the pollution of air and water, the formation and expansion of the hole in Earth's ozone layer, the reduction of biodiversity, and global warming. The evidence is formidable that these harmful processes are the results of human activity in the Industrial Age.

Therefore the book contains ideas concerning some philosophical and biological aspects of human society development, which are based on the processes of ecosphere regeneration, and the creation and restoration of systems in which human society might successfully integrate with the general biological cycle. To this purpose, humans might utilize some mechanisms of autotrophy and regeneration which are specific to other living organisms: like autotrophs (plants, trees or some microbial communities). This book is based on the results of the research on identification and application of the ways to protect Earth's ecosystem against further degradation. Humans are an essential part of this process: community coexistence, education, shelter building,

energy production, water purification and recycling, agriculture, the production of fabricated soil for the landscape rehabilitation, and the preservation and propagation of wild flora.

Strategies for both indoor and outdoor systems are covered in this publication. Any concept of alternative technologies presume the integration of information which makes human life healthier and more in harmony with other species and elements of the Biosphere.

Some ecosystems might be preserved for the protection of species biodiversity, as it has been done at the Jennings Environmental Education Center in case of the Pennsylvania Relict Prairie Ecosystem. Abandoned mine impacted watersheds in additional regions could be restored using natural materials, according to the model provided at the Jennings Center. Over 11 miles of stream have been significantly improved, with fish returning after a century of degradation. An essential part of this new paradigm for human society is the application of natural systems in agriculture.

Agro-ecology is currently being considered as an alternative model of farming. Old varieties of vegetables and crops which were widespread during the green revolution need to be protected in special seed banks. Regeneration and vegetative propagation (cloning) of old varieties and cultivars could be greatly expanded. Synthetic herbicides might be substituted with native ecological factors like allelopathogens. Such kinds of chemical signalling can help to restore native ecosystems.

Some of the eco-technologies which were developed for Earth ecosystems could be adapted to conditions on other planets. Biological cycling with oxygen regeneration and waste water cleaning could potentially be used in space conditions.

In nature, both small and large cycles exist for the turnover of elements and substances. Human activity often results in the degradation and sometimes the complete breakdown of these cycles, which leads to the accumulation of wastes and to pollution of the

Biosphere. Therefore, the search for alternative forms of energy is urgent for the healthy development of human communities. Humans use non-renewable forms of energy which are located mostly in the lithosphere. This brings about the pollution of air by carbon dioxide, and the pollution of water and soil by substances such as iron, aluminum and organic residues. Such ecological degradation modifies the normal succession of biological species, and results in a reduction of biodiversity. Contamination of soil and desertification lead to the destruction of the soil eco-communities (a loss of about 20 million hectares per year). The creation of new super-productive forms of crops leads to the leaching of high amounts of nitrogen and phosphorus.

Human communities need to search for new paradigms for living and for ways to integrate human activities into the natural biological cycles of the Biosphere. This is the only way to ensure the continuation of our species on this planet. The modelling of such alternative approaches is described in this book. The ideas presented in this book were developed by researchers from different scientific institutions in Pennsylvania, the main concept of molecular mechanisms of the Sustainability is also emphasized in reviewed publication. This book will be of particular interest to biologists, soil scientists, ecologists, agronomists, architects and students in colleges and universities.

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