Indian J.Sci.Res. 7(2) : 183-187, 2017 Review Article ISSN : 0976-2876 (Print)
ISSN : 2250-0138 (Online)

A SHIFT FROM ECOSYSTEM TO NOOSYSTEM: AN INDISPENSABLE NEED OF THE HOUR

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ABSTRACT

Ecosystem, which lays the basis for defining ecology, has always been viewed as an integrated unit of plants, animals and microbes interacting reciprocally with the biotic, abiotic and climatic factors composing their environment so that there is flow of energy, recycling of nutrients and display of regulatory functions. This kind of interpretation, however, is not adequate enough to understand the total systems dynamics. Considering the importance of integration of social, economic and cultural perspectives of human life with the conventional concept of ecosystem there was the milestone setting inception of the concept of 'noosystem'that paved the pathway to the genesis of such disciplines as environmental science, conservation biology, restoration ecology and deep ecology. The present work reviews all such perspectives so as to consolidate our concern with noosystem in general and deep ecology in particular.

KEYWORDS : Ecosystem, Noosystem, Deep Ecology

Since ecosystem has been the most talked about term for the last few decades while addressing issues of environment, biodiversity, restoration, conservation etc. at local, regional and global levels it is imperative to review its present state of art. Ecosystem, which lays the basis for defining ecology (Evans, 1956), requires understanding of relationships between structure and function within the system (Odum, 1962). In the past ecosystems used to be conceptualized as an operational system in the nature with certain structures interpreted in terms of population density, species diversity, standing crop, standing state, conditions laid for living like temperature, relative humidity, pH, albedo, wind etc. and functions in terms of resource recycling, ecological energetics, regulatory processes etc. Ecosystems used to be considered 'natural' ignoring the human concern. This however was not adequate enough to understand the total systems dynamics. Even in the most natural ecosystems such man-made compounds like pesticides, heavy metals, radioactive materials have been detected. There is also no reason to ignore the influence of man's social, impact and cultural perspectives of life on ecosystem dynamics. Ecologists have started realizing the urgent need to fill in the gaps in our total understanding of ecosystem properties, taking in to account the role of man in the ecosystem and evaluation of various stressors on the natural ecosystems. The science of stress ecology (Barrett et al., 1976) provides ecologists with a focal point to measure, evaluate, integrate and predict the effects of perturbations on the structure and function of natural ecosystems. Stress ecology started increasing our understanding ecosystem response to detrimental stressors of human origin that also include such important human factors as social, economic and cultural attributes. The realization paved the pathway for genesis of the concept of noosystem and novel interpretation of ecology with a lot of moral concern as the study of noosystem. Odum (1977) also started viewing ecology in a strict disciplinary context and emphasized that ecology needs to integrate a holistic approach, with the social sciences regarding efforts such as technological and environmental impact assessment Since there is almost no ecosystem that has escaped human intervention and the socio-economic perspectives of human life are linked with it Garry W. Barrett of the Institute of Environmental Sciences and Department of Zoology, Miami University introduced the term noosystem in place of ecosystem in 1978 in conformity with the vistas of the subject. Noosystem is thus the study of ecosystem in totality covering the social, economic and cultural aspects of human life in integration with its structural and functional aspects of its biological, physical and chemical components. The concept provided us with spirit to augment our ethics, values and philosophy of conservation, ecorestoration and environmental optimization to address contemporary issues related to life sustenance at local, regional and global levels.

It is noosystem knowledge that can profoundly influence contemporary aspects of our relationship with the environment wherein we want to live with peace and prosperity. Since no ecosystem on the earth has been spared

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from human intervention the responsibility for restoration and optimization can in no way be avoided. Realization of impact of human concern on environment and urgent need to optimize led to genesis of such disciplines as environmental science, conservation biology, restoration ecology etc.

Ecology and Ecosystem: A comprehension

The word "ecology" ("Ökologie") was coined by the German scientist Ernst Haeckel in 1866 although the essence of the subject had its inception much before the Christian era. Ancient Greek philosophers like Hippocrates and Aristotle conveyed the message of ecology in their scriptures pertaining to natural history. Modern ecology being interdisciplinary has transformed into a more rigorous science especially in the late 19th century. Our concepts on natural selection, adaptation and evolution have become cornerstones of modern ecology. Ecology does not deserve to be treated synonymous with environment, environmentalism, natural history, or environmental science. It is closely related to physiology, evolutionary biology, genetics, and ethology. Revelation and understanding of how biodiversity affects ecological composition and function have been prioritized as one of the thrust areas in contemporary ecological studies. Basically ecology which used to be defined as the study of the reciprocal relationship between living organisms and their environment is presently given a precision and treated as the study of ecosystems.

The term 'ecosystem' was coined by Professor Arthur Tansley, a British Botanist, in 1935 to describe a discrete unit that consists of living and nonliving parts to form a stable system. In his words it is a “system resulting from the integration of all living and nonliving factors of the environment”. Since then there has been a progressive increase in the usage and importance of the subject and it has become the basis for the definition of Ecology. Ecology is presently defined as the study of ecosystems. For ecosystem an equivalent term 'biogeocoenosis' is in use in certain European and Russian literature which is treated as an integrated system of interacting 'biocoenosis' (community) and 'biotope' (physical environment) of a place at a particular time.

Conservation and Restoration

Conservation is an ethic of resource use, allocation, restoration and protection with its primary focus upon sustaining the health of the natural world: its habitats and biological diversities. It is no more a bias to conserve solitarily any species or resource without any ecosystem concern. Even if it is the conservation of any species the approach is always framed in the organizational principles of an ecosystem.

The term conservation biology was introduced as the title of a conference held at the University of California, San Diego in La Jolla, California in 1978 organized by biologists Bruce Wilcox and Michael E. Soulé. The conference, prompted by the concern of scientists with the issues of tropical deforestation, disappearing species, eroding genetic diversity within species, was successful to bridge the then gap existing between theoretical ecology and population biology with the conservation policy and practice.. Conservation biology and the concept of biological diversity (biodiversity) emerged together, helping crystallize the modern era of conservation science and policy.

Almost simultaneously emanated the concept of 'ecological restoration' which got defined as the science to deal with all such activities that initiate or accelerate the recovery of an ecosystem with respect to its health, integrity and sustainability. Restoration ecology emerged as a separate scientific field in the 1980s as the ecological study and practice of restoring degraded, damaged, or destroyed habitats and ecosystems within a short time frame. The practice of ecological restoration includes wide scope of projects including: erosion control, reforestation, the use of genetically local native species, removal of invasive species and management of weeds, revegetation of disturbed areas, day-lighting streams, desiltation of rivers, desalination of otherwise fresh water, reintroduction of indigenous species, as well as habitat and range improvement for targeted species.

The term restoration ecology is commonly used for the academic study of the process, whereas "ecological restoration" is the term commonly used for the actual project or process by the restoration practitioners. Yet the scientific field of "restoration ecology" was only first

formally identified and coined in the late 1980s, by John Aber and William Jordan. The study of restoration ecology has only become a robust and independent scientific discipline over the last few decades and the efforts for ecological restoration have also increased rapidly in recent years.

Restoration ecology, as a scientific discipline, is theoretically rooted in conservation biology. While restoration ecology may be viewed as a sub-discipline of conservation biology, foundational differences exist between the disciplines' approaches, focuses and modes of inquiry.

The fundamental difference between conservation biology and restoration ecology lies in their philosophical approaches to the same problems. Conservation biology attempts to preserve and maintain existing habitat and biodiversity. In contrast, restoration ecology assumes that environmental degradation and population declines are somewhat reversible processes. Therefore, targeted human intervention is used to promote habitat and biodiversity recovery and associated gains. This does not provide, however, an excuse for converting extremely valuable "pristine" habitat into other uses.

Deep Ecology

It is high time that we have to rise to the level of humanity and divinity and review our relationship with the environment and realize our responsibilities. All developments that have been taking place in developed as well as developing countries have no where spared the environment from getting deranged. Irrational exploitation of natural resources and biodiversity associated with development failed to give materialistic pleasure and comfort to all. People with great feelings for the sufferings of plant and animal lives and upsetting of the life-sustaining system under circumstances of pollution resulting from mining activities, rapid industrialization, urbanization, irrational use of agrochemicals- fertilizers and pesticides, poaching, biopiracy and many other acts of cruelty and devastation, disposal of radioactive substances etc. emerged with the spirit to evoke awareness and consciousness in general people to put forth a strong resilience to such rapidly progressing evil activities fueled by vices tending to push the earth to a life-less planet. Environmentalism started emerging as a popular grassroots political movement in the 1960s with the publication of Rachel Carson's book Silent Spring. Many others well aware about the detrimental effects of modern industrial technology on environment joined those who were already involved in conservation and preservation endeavours. Words of Rachel Carson “It is a wholesome and necessary thing for us to turn again to the earth and in the contemplation of beauties to know the sense of wonder and humility” further acted as an augmenter. In 1970 Richard M. Nixon created the Environmental Protection Agency (EPA). Environmentalism became well established on the public agenda on the First National Earth Day in 1970.In 1971 when the American Astronaut Edgar Mitchell was traveling to the Moon in the space craft, Apollo14 he caught a glimpse of the Earth and exclaimed with astonishment and pleasure “What a sparkling beautiful blue and white jewel, embedded in a dark sea of mystery!” The scenario changed so rapidly over the years that if Mitchell had been sent 4 decades later on a space trip, equipped with infrared spectacles to enable him to see the invisible gases in the atmosphere he would exclaim with horror, “What have we done on Earth to change the scenario!”

In 1972, Naess made a presentation in Bucharest at the Third World Future Research Conference in which he discussed the longer-range background of the ecology movement and its concern with an ethic respecting nature and the inherent worth of other beings. In 1973, Norwegian philosopher and mountaineer Arne Naess introduced “deep ecology” to environmental literature which boosted our moral concern, humanity and responsibilities for a World capable of rendering physical, psychological and social wellbeing to all. The long-range deep approach involves redesigning our whole systems based on values and methods that truly preserve the ecological and cultural diversity of natural systems. Naess would be remembered with great honour for his vision and devotion in his mission in all days to come. His 10 volume- work, The Selected Works of Arne Naess, published in 2005 by the Foundation for Deep Ecology made him immortal. “Supporters of the deep ecology movement” (rather than being referred to as

"deep ecologists") are united by a long-range vision of what is necessary to protect the integrity of the Earth's ecological communities and ecocentric values.

Great Women Sacrificing them and Sowing the Seeds of Environmental Movements

It was a Tuesday, in Khejadili, a green village amidst the barren Thar Desert, 10th day of the bright fortnight of the month Bhadra in 1730 A.D. where a party of Maharaja Abhay Singh of Marwar (Jodhpur) state wanted to fell green Khejri (Prosopis cineraria) trees to burn lime for the construction of his new palace. Amrita Devi and 366 others hugged the trees to save them when they were axed to death. at that stage of their sacrifice Amrita Devi had the courage to she spoke these words: "Sar sāntey rūkh rahe to bhī sasto jān" (सर सान्टे रूख रहे तो भी सस्तो जाण) . We must express our Homage to Amrita Devi, Asu,, Ratni and Bhagu bai and 363 other Bishnois who became matrys to sow the seeds of Chipko movement. Every year the 13 September is observed as Khejrali Divas in Rajasthan.

Nobel Prize for Noble Work

Wangari Maathai, a Professor at the Nairobi University, launched the Green Belt Movement (GBM) in 1977 with an objective to empower the people and to show them that they could choose to destroy or build the environment. GBM encouraged poor women to plant millions of trees to combat deforestation, in return for which they received sufficient fuel wood.

The movement has set up 5000 tree nurseries run by women and disabled persons. Seedlings are given away free to groups and individuals. In due course of time the movement spread to many other African countries. The movement that Wangari Maathai started resulted in to planting of 30 million trees in 20 countries. She campaigned for women's rights and greater democracy in her country and was vilified and forced to leave her country for some time. However, later on she became a Member of Parliament and Assistant Minister for Environment. She was awarded the Nobel Peace Prize in 2004 to become the first African woman to have received the honour.

Summing Up

Ecosystems are of large variety of sizes and maturation levels which get reflected in community-composition and functions. Delimitation of ecosystems is often very difficult. Moreover, the boundaries of ecosystems are sensitive to climate and other variables. Different chemicals, seeds, spores and other propagules, organisms and other bio-matters and suspended particulate matters randomly get transferred from one ecosystem to another. Animals often immigrate into or emigrate from populations of an area or periodically visit it. Moreover anthropogenic activities in concomitance with the socio-economic and cultural perspectives of concerned human communities are interactive within and with other ecosystems near and far. All these process, natural as well as anthropogenic, integrate many ecosystems and establish communication in varied degrees through the import and export of both energy and matter. Depletion of natural resources, especially the nonrenewable ones, and uploading of pollutants in the air, water and soils are beyond control at local, regional and global levels. There have been global climatic changes resulting from global warming and global dimming. Nuclear winters are also not far off. Keeping all these in mind the projects concerning sustainable development, utilization of natural resources, optimization of environment and various other perspectives of an ecosystem should be in integration and coordination directly or indirectly with a network of others in the proximity and distance. Only integrated projects strengthened with environmental ethics, values and mutual faith and understanding can successfully augment ecosystem restoration, biodiversity conservation and environmental optimization. What we need is to be conceptualized cordially with the sense of 'Deep ecology' which is a contemporary ecological and environmental philosophy characterized by its advocacy of the inherent worth of living beings regardless of their instrumental utility to human needs, and advocacy for a radical restructuring of modern human societies in accordance with such ideas.

Thus the scientific and technological strategies for conservation, restoration, preservation have to maintain a rapprochement and coordination with deep ecology for

optimizing the planet which we want must prevail once again as "a sparkling beautiful blue and white jewel, embedded in a dark sea of mystery!"

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