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The Role of Geography in Ecological Studies

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Geography, as an integrating science, studies the environment in its totality including it's physico-genic (natural) and anthropogenic (cultural) components. Ecology is an inter-disciplinary field of investigation and geography can play a leading role in fundamentally synthesizing different studies. Environment is an aggregate of abiotic, biotic and anthropogenic elements which are either altered or created by social activities. There is the various relations between such an organized environment and the objects being studied by various sciences, which establishes the substantive contents of ecological approaches. Even when these objects themselves are the part of the environment constituting the individual components within it that are studied by various disciplines, their aggregates and mutual interactions lend an element of integral unit to the environment and define a need of a specific science. Geography is able to perform this function or a specific science for the ecological studies.

The task of the ecological studies in geography is to identify the terrestrial structures of the joint natural-technogenic system (forest, agrarian, urban, industrial, recreational, etc.) in which the use of the most progressive form of production activities makes possible transformations of the human society because the modern geography is a science concerned with the transformations. It can comprehensively discuss the interactions between "Man and the Biosphere".

Assessment of human impact on environment is a significant element in the organisational management and optimisation of the "Man-society- nature" system. Such studies are essential for developing a model for man biosphere relationships on the lines of mutually useful interaction with the inbuilt mechanism for the environmental protection and conservation, economic and non-economic interactions within the "society-environment" system need serious and in-depth studies. Such studies should aim at :—

1. Studies or interactions and chain reaction mechanisms in natural, social and economic systems and sub-systems of the Geo-environment.
2. Studies of the results of various integrating impacts including cumulative effects.
3. Evaluation of socio-economic and other influences on the system which further needs the studies about—

    a) fundamental theoretical evaluation of the interaction in natural and anthropogenic ecosystems;
    b) studies of anthropogenic effects on the environment including both in positive and negative manner;
    c) studies or the applied problems in this field.

These studies will provide understanding of the Geo-ecosystem and facilitate the approach developing a forecast system for the useful interaction and will reveal :—

1. the structural changes in natural eco-systems and the socio-economic system;
2. finding the conditions of stability of natural ecosystems and their genetic series in relation to diverse anthropogenic influences;
3. finding the conditions of stability of the socio-economic system (as productive sub system of the broad anthropogenic ecosystem) in relation to changes (deliberate and natural) in the environment;
4. development of the system of forecasts of the impact on various ecosystems and their components (environment, socio-economic systems and others) ;
5. adjustments in technological, socio-economic and political-cultural plans for the development in the light of dangers to the environments.

There are three main aspects of the "Man-Nature Interactions" : Firstly, the technological and economic aspect related to progressive depletion of the earth's natural resources; secondly, the ecological aspects concerning the environmental pollution and disturbances of the biological balance; thirdly, the social and political aspects. The ecological problems have arisen from the disturbances of the balance in nature as a result of pollution of environment on the world-wide scale. So the task is to find those conditions of biological balance in which the nature can develop in accord with the needs of the human culture. Differences in the socio-political systems throughout the world are rather in a way obstructing the solution of the problems of the "Man-Nature" relationship.

The interaction between man, society and the environment may be regarded as the use or all the possible resources for the material production (viz. production of raw-materials, agricultural production, production of energy, finished goods, etc), and guarantying the suitable conditions for human survival. Though the man is creator but not an irresponsible creator. So the task of conservation of the environment on the earth is essential on his way to the Stars. Geography is the science that embraces both the production environment and the natural environment in a systematic manner. The multifarious association of human society with the natural environmental changes according to space (geographically) and time (evolutionally). So, man is constantly exposed to environmental influences. Geography is more competent to study this intimately interconnected phenomenon. Components and processes within the environment have internal links with their subsystems and external links with other processes, which makes the prediction about changes due to anthropogenic activities unpredictable. Therefore, ecological studies require specific studies by other

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disciplines too. The key role of geography in such studies will be assimilation of links to understand the environment in its totality.

Social and economic aspects are of immense importance for the interaction between nature and the society. Geography covers a broad spectrum of sciences covering both the natural and the social phenomena. By virtue of this, the field of its interest covers nature, people and economy considered in relation to their terrestrial structure. The comprehensive integration of scientific knowledge of the Sciences of the Earth is the crux of modern constructive geography which centres on the problems of planned remarking of nature and rational utilization of natural resources. The ecology of an eco-system (ecological system, geobiocenosis, etc.) includes the group of mutually interdependent living organisms with the elements of the environment, their influence on them is particularly asbeciated as a whole, should embrace the totality of the processes occurring in the biosphere in such way that all the elements of this activity, both those produced directly by man and those proceeding under his influence and control in nature, represent a harmonious whole.

Ecology interprets various natural and social objects in a scientific and systematic approach based on the knowledge and methodology of different sciences including biology, geography, geophysics, geochemistry, geology, sociology, economics, engineering, law and planning, etc. The significance of this multifarious approach is increasing with the steady development of science and technology in every spheres. This development now requires directions in ecological thought so that ecological orientation may also be developed in every field or the knowledge because ecology is not only a scientific discipline, in its special approach it studies the natural development of everything existing on the earth and affecting the life and the environment, including its interaction with human society and activity. The systematic interpretation of this process is undertaken by various scientific disciplines selecting various objects for study having one common goal in isolation. At the same time one such discipline is required which may deal environment in the spheres of abiotic, biotic and technogenic components in its totality and organised links. Geography is the science or system of sciences in which environment is treated as an integrated whole. Moreover, these are several specialised branches of geography competent enough to study various aspects of the environment which is highly variable in spatial terms. Therefore the geographic study of the environment is essential for ecological studies on local, regional or global level. Such studies will make geography to share the leading role in ecological studies on interdisciplinary basis. Geography possesses vast scientific information on the natural environment, resources and pattern of their utilization on every level along with necessary methodology. Geography has also area potential or comprehensive approach to study the natural and social aspects which is of basic significance for ecological studies and understanding in a systematic manner. In this field, geography may monitor anthropogenic changes in the environment, development of system of forecasting of the wide ranging consequences of economic activities, monitoring of natural disasters and their prevention and the optimization of the environment in the combined natural and technological systems created by man.

Changes due to anthropogenic activities result in the changes in geosystems. Monitoring of its stress, links and interaction with various components of the environment are essential for finding basic fundamentals of ecological planning. Such monitoring will require elaborate spatial and communicational organization and arrangements for data processing for developing the "Geographic Information System" (GIS) required for ecological planning. Man is constantly changing, modifying, expanding and improving the ways and means for interacting with the nature through development and innovations in the technology.

The present ecological situation has been produced by the economic, social and political systems which are different from country to country without any consideration of the geographic environment. Thinking of geography with the economic development is the keystone for the balanced eco-development because it is not only necessary to fight pollution, conservation of environment but also necessary for the conservation of fastly exhausting resources and their economic utilization .with organised efficiency.

It will result in qualitative leap in man-nature relationship. The inter-relationship between man and nature is usually considered from economic, social, technical, geographic, ecological, biological and organizational point of view, but in isolation and single factor of influence. At present the geo-ecological point of view is the most organised and unified system to visualize entire environment and its elements because ecological problems are organically interwoven with all other socio-political and socioeconomic problems. This point of view only be developed around geography because nothing in nature is completely isolated as many other branches of study while geography deals them in an integrated framework. The interrelationship between man and nature forms a dynamic, rather than a static system, and regulation of it must therefore also be dynamic.

The concern for ecological conservation is increasing with the economic development throughout the world. Conservation with the development is the immediate need of man for his further survival. This goal requires immense understanding of the entire system of the biosphere and its subsystems. Therefore, it is necessary to find forms of anthropogenic activities that not only exert a minimal damage to the environment, but by influencing natural processes in a planned manner and guiding their development in ways that are favourable to human activities. The basic object of geo-eco-logical studies, thus, is to identify the territorial structures of joint natural- technological systems (forest, agricultural, urban, industrial, recreational, etc.) in which use of the most progressive forms of production activities makes possible transformations of the environment that are optimal from the point of view of the vital activities of the human society.

All the components and processes of the biosphere are intimately interconnected. So their optimization depends upon their proper understanding. It is necessary to check the unpredictable changes in the environment as a result of the human activities. Geography is closely concerned with nature, man and the economy in relation to their territorial structure. Optimization of the environment also depends on the same

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elements and their interaction. The geographic studies of the interaction is essential to understand the objective and laws of the nature. Such complex study of interchange of matter and energy between nature and human society requires a quantitative study and modeling of the phenomenon. The study of the structure and laws of formation of the earth's envelope containing organic system (Biosphere) is essential for establishing proper relationships and interaction between biogenic and technogenic systems and their harmonious and balanced development. Such planned remarking of the nature and relational utilization of natural resources will be the central theme for the geo-ecological studies. This will help in developing organic combinations of natural and technical elements. The behavioural changes in man-society- nature relationship will be the arch-stone in the optimization of inter-relationship.

The integrated character of the relationships between man, society and the environment as it exists in reality contradicts their division as an object of research between many fields of different science cycles-social, natural, and technical. Such division is indispensable on account of research methodology involved in understanding various aspects of man-society-nature and need of specialized research. The basic objective of unifying these studies can be tackled by the geographical science which is developing into a comprehensive, constructive and transformative science equipped with upto-date theory and rapidly renovating its methodology. It is precisely geographical science that has traditionally applied an integrated and systematic approach to natural and social phenomena, considering the unity of natural and social territorial systems with emphasis on the integrated study of all the internal and external links between the systems. Therefore, geography has great potentialities for integrating ecological studies because this the science that has environment consciousness. The ecological degradation of the environment endangers the total stability of the entire biospheric systems. The geographical reconstruction of the environment may not be possible without the active involvement of geography.

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