

RG-07_APPROACHES IN RESOURCE GEOGRAPHY

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<i>PAPER</i>	<i>Resource Geography</i>
<i>MODULE</i>	APPROACHES IN RESOURCE GEOGRAPHY
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Learning Objectives: After studying this unit you should be able to:

- Enumerate different approaches to study natural resource management.
- Examine the present capitalist mode of production and derive a sustainable approach to counter the same.
- **Appreciate the differences between various APPROACHES.**
- Discuss the future trend in approaches to resource management

KEYWORDS

Physical milieu, perceptual knowledge, PAVE theory, total catchment management, geomatics

INTRODUCTION

Man has been exhausting the earth's resources ever since he climbed down from the trees and minerals and the fuel resources are the hardest hit. Mineral demands are increasing exponentially not only with population increase but also with rising living standards. Resources

are a cultural concept and are socially defined and are, therefore products of society (figure 1). Resource management goals are usually more specific more immediate and more clearly defined and are often single-purpose.



Figure 1 : Resources - A cultural concept

Various approaches in resource management have been developed by geographers and are inter-disciplinary in nature in which varieties of approaches have been developed to provide a framework for the rational use and management of natural resources. They are gleaned from a very large and varied literature and are well searched viewpoint. The approaches have been developed to protect/safeguard natural resources against their reckless exploitation and misuse by people. Also, they draw attention to the consequences of his perverse or inadvertent interference with their intricate workings of the natural systems. Currently, it has been seen that the world's most pressing social, economic and political problems are valid topics are resource management analysis. The major focus of attention for the geographer interested in resource management should be to clarify the various issues involved in order to provide a clearer basis for public judgment and social action. "As geographers, we believe it is vital to emphasize that some of the most significant problems in resource management can be examined only in their appropriate local settings: that is, we must never lose sight of the undeniable authenticity. the uniqueness of the economic, political and physical milieu of each region" Collins(2010).

TYPES OF APPROACHES

“There are at present seven major approaches to resource management which include:

- (i) **Ecological Approach**
- (ii) **Economic, Approach**
- (iii) **Behavioral Approach**
- (iv) **Integrated Approach and**
- (v) **Institutional Approach**
- (vi) **Community Based Approach**
- (vii) **Technological Approach” Gautam (2011)**

Let us now learn one by one:

1. Ecological Approach

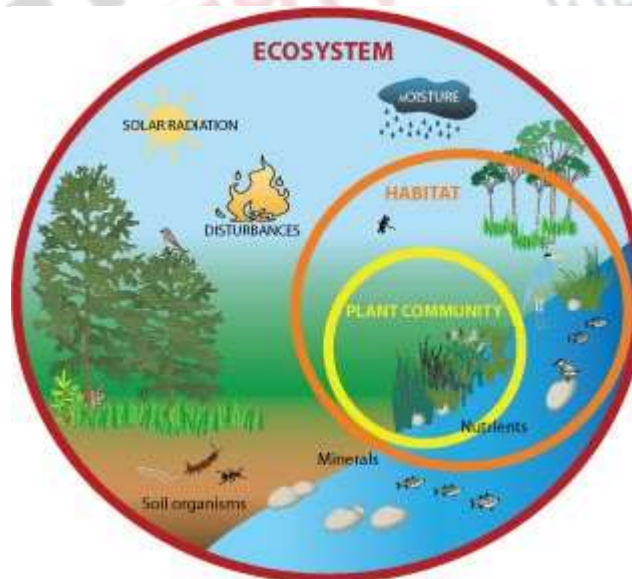


Figure 1: Ecosystem: Resource Base of Ecological Approach

First and foremost to understand the ecological approach is the concept of ecosystem. “An **ecosystem** is a biological environment consisting of all the organisms living in a particular area, as well as all the nonliving (abiotic), physical components of the environment with which the organisms interact, such as air, soil, water and sunlight, E. Odum (2013)”. There are natural ecosystem, terrestrial ecosystem; aquatic ecosystem; Lentic ecosystem- the ecosystem of a lake, pond or swamp ; Lotic ecosystem - the ecosystem of a river, stream or spring and artificial

ecosystem- ecosystems created by humans, Judy Jones (2011)". Eugne Odum founder of ecology stated: "Any unit that includes all of the organisms (ie: the "community") in a given area interacting with the physical environment so that a flow of energy leads to clearly defined trophic structure, biotic diversity, and material cycles (i.e.: exchange of materials between living and nonliving parts) within the system is an ecosystem, Odum (2011)."

This approach is also called as physical science which focuses upon natural sciences, the good earth and the empirical method. These are shared by geomorphologists, climatologists, hydrologists and bio geographers who attempt to find solutions to problems of resource management in the measurement of physical attributes. This approach stresses upon nature and limits of resource but is silent about the human implications. Our ecological environment, although infinitely complex and varied, is a dynamic and organic whole. It is in a constant state of flux and is characterized by the dynamics of a certain number of interacting elements. We must understand these mechanisms; take them into account to make better use of the environment. Every intervention modifies this dynamic and affects the interactions and so does every development. **Figure 2 depicts the interactions and subsets of the processes of the Biosphere.**

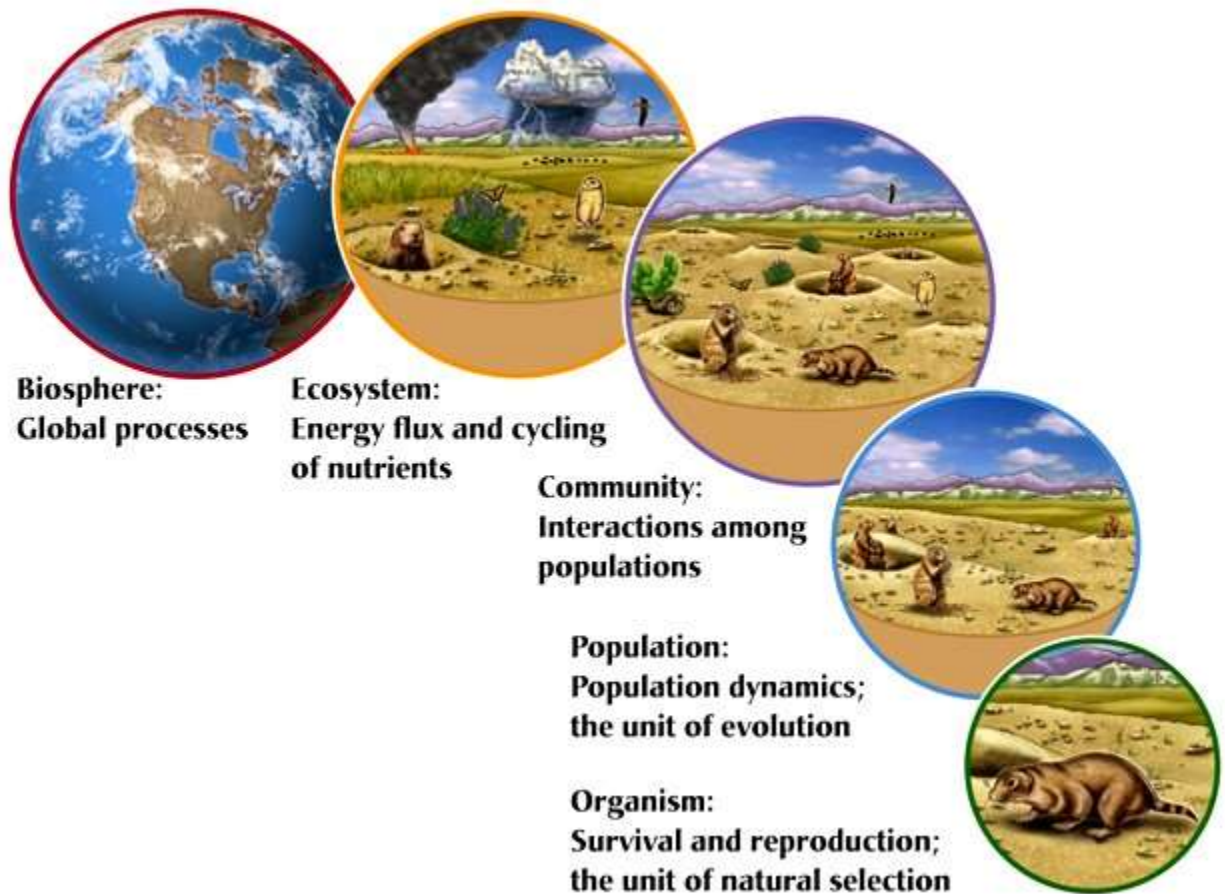


Figure2: Interactions and subsets of Biosphere .

Perhaps more significant is the fact that in order to attain the required goal, resource development should take full account of these dynamics and interdependencies. A rational management of the environment can be understood only through knowledge of its dynamics. The study of the interrelationships that exist between organisms and their environment is known as ecology. Over the last few decades the conservation lobby has become more vocal and effective in creating a popular awareness and scientific interest in environmental damage. And also, it was becoming increasingly unacceptable because this damage could have serious repercussions for mankind. As a consequence, resource developers have increasingly begun to recognize that some kind of understanding of ecological processes is necessary before major resource development schemes are implemented. Resource management involves goals of output maximization and cost reduction, along with protecting the producing capital of resources for the future use. It, therefore, assumes paramount importance in the decision-making of utilizing any kind of resource, because no matter what type of resource man manages, the sole objective is to optimize the harvest, i.e., to obtain maximum production. As outlined by Bennett and Chorley (1978) “the more complex the segment of the real world, the greater the likelihood that it will be modelled like a synthetic system, and the ecosystem provides a prime example of systems synthesis (MONDAL n.d.)”.

2. Economic Approach

The most comprehensive and fundamental approach to resource management is a theory of resource allocation developed by economists. Economists have been involved in various ways in natural resources management and have made important contributions in resource allocation research in understanding the processes operating the resulting outcomes; analyzing who has the power to determine the distributive patterns; and in assessing the role and efficacy of public policy measures. Aim of this theory is the allocation of the wealth or welfare derived from the resource base and the distribution of the costs of resource conservation. Figure 3: depicts the Break Even Point of Economic Approach.

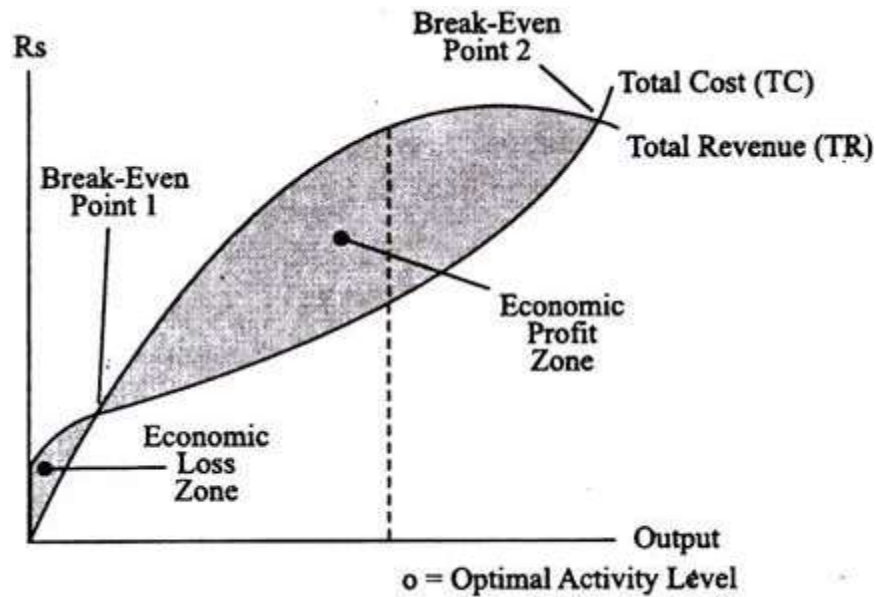


Figure 3: Break Even Point of Economic Approach

“The term political economy has often been used synonymously to indicate the area of resource allocation and the determination of aggregate economic activity, Smith (2015)”. This has appeared frequently in recent studies of contemporary economies, politics, international relations and resource management. It has a long history and numerous interpretations. “This is mainly associated with the works of Smith, Ricardo, Malthus, Mill and Marx. It studies the interaction of democratic political processes and the market determined economic relations , Robinson (2015)”. This approach takes into view the historical-structural stance incorporating within its framework its structural-institutional forces and individual or household responses to such factors in the wider political economy. However, this approach has rarely been applied to Third World settings. The model lays the blame on irrational and ignorant land-users and overpopulation. Another feature of the economic approach is the comprehensive examination of the social, economic and political dimensions of global natural resource use. This approach stresses the reordering social relations automatically can or will solve resource scarcity problems.

3. Behavioral Approach

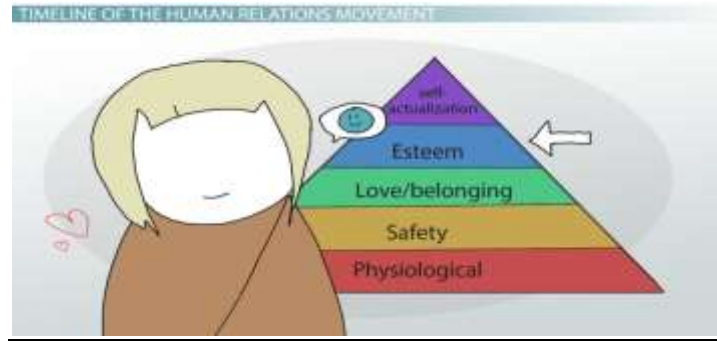


Figure 4: Needs of an Individual

Behavioral approach is the most rapidly growing approach to resource management which include the behavioral aspects of the human use of the environment resources. This focuses upon the human dimensions of resource management. It includes public, technical experts, private managers and public managers. This approach emphasizes on behavior and on processes relating to the human actors of resource system. Behavioral geographers argue that farmers' knowledge of soils and weather conditions constitute what is termed as perceptual knowledge. This approach involves a consideration of three basic aspects: environment choices or alternatives and goals each of which is imperfectly perceived by man and which eventually lead to decisions. As alluded to earlier, recent research in behavioral geography has tended:

- (1) an assessment of the perceived knowledge of the environment,
- (2) perception of alternate land uses available to the farmer, and
- (3) perception of the goals sought by farmer, whether this is concerned with subsistence profit maximization etc.

Indeed, studies on perception and attitudes present insights about resource management strategies. Perception is the ability of mind to apprehend objects through the senses of sight, hearing, smell and touch. As geographers have observed, "the explanation and understanding of the vast range of material which human geographers study, from continental patterns of migration to the behavior of farmers in areas of climatic hazard, can be greatly increased by consideration of the individual's perception of his environment. A highly acclaimed geographical contribution to the resource management field is the work on natural hazards a series of investigations into the human response to natural hazards guided by theories of decision-making influenced by methods of psychology and sociology.

Through the case studies it has been determined the way in which individuals perceive resource management problems and issues and also examine the range of strategies. The task of resource management decision making has become more complex and multidimensional

because it is based on components like **Perception, Attitude, Value and Emotions (PAVE theory)**

Perception and attitude studies contribute significantly to resource management problems and studies offer pragmatic reasons for citizen involvement:

(1) surveys of public viewpoints provide basic information which the managers can consider when making decisions, and

(2) managers can better judge the transferability of experiences from one region to another. The task of evaluation in resource management decision-making is becoming increasingly complex.

Behavioral approach suggests many steps for acceleration of social science research in the resources management field, and particularly in the following five areas:

(1) the identification of the nature and magnitude of resources problems and of the demands for resource-related goods and services;

(2) the delineation of alternative strategies for dealing with resource problems;

(3) highlight reviews of projects and policies;

(4) examination of alternative ways of identifying public views; and

(5) development of more sophisticated techniques for taking account of multiple objectives, multiple strategies, and a wide range of values.

4. Integrated Approach

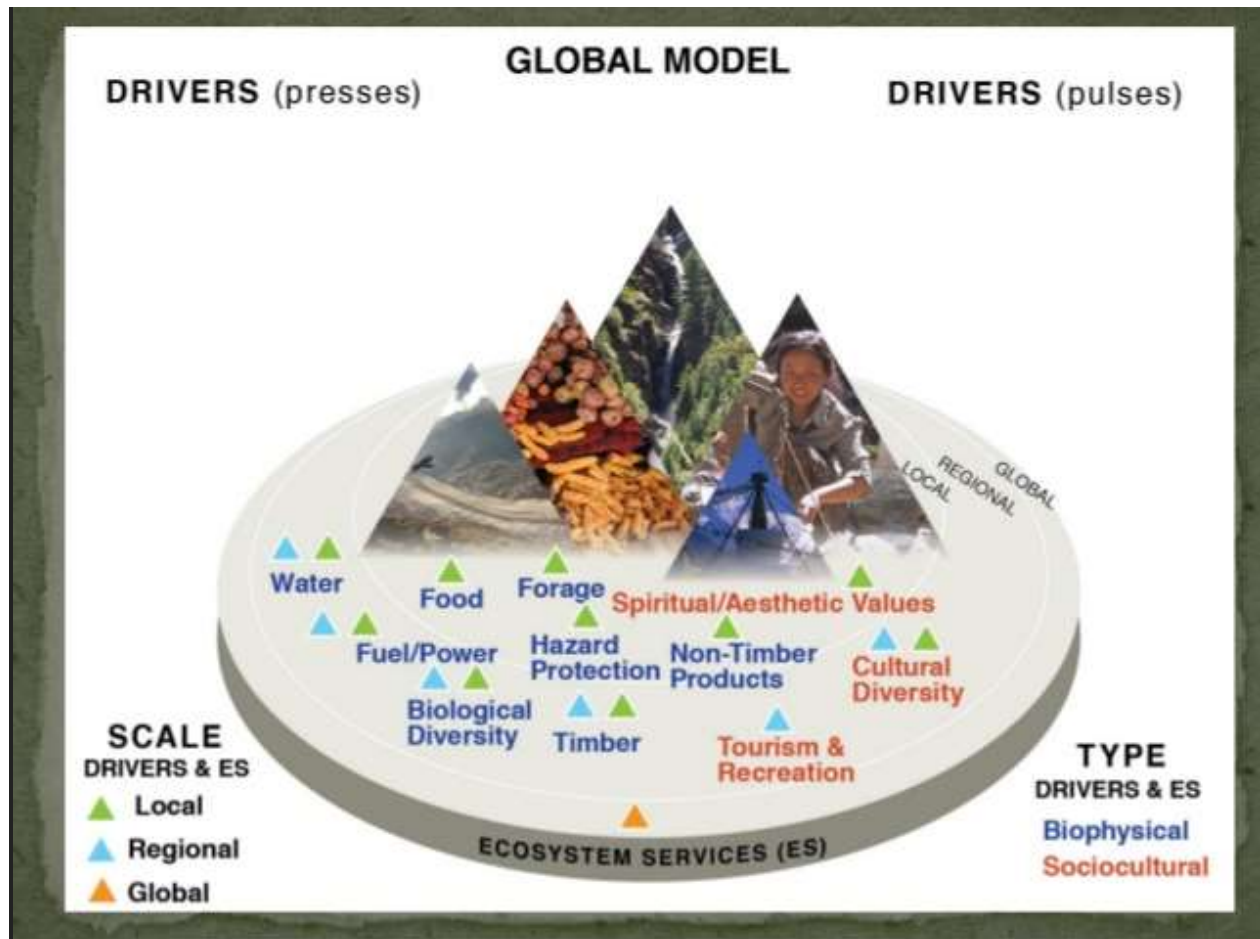


Figure 5: GLOBAL MODEL:Source:J.Klein (Colorado, State University, U SA) at Our Common Future Conference, July7-10 in Paris, France, 2016

“Integrated resource management incorporates **four elements**:

- (1) a multiplicity "of purposes, means and participant strategies,
- (2) a blending of various resource sectors,
- (3) the use of resource management as a mechanism for social and economic change, and
- (4) a striving for accommodation and compromise (Amunyunzu n.d.)”.

As a concept, integration is well established in the management field which leads to cooperation and coordination, and, in turn, leads to improved effectiveness. “The search for integration can occur at normative, strategic or operational levels. A normative level considers a reconsideration of the value premises underlying decisions, the definition of desired ends and ideals, and decisions that determine what ought to be done. A strategic level includes analysis and evaluation of alternative goals and objectives, the selection and design of means to attain desired goals, and decisions that determine what can be done. And lastly, an operational level

takes into account plan implementation, purposeful actions/interventions to affect change, and decisions that determine what will be done Racold, 1999)” .

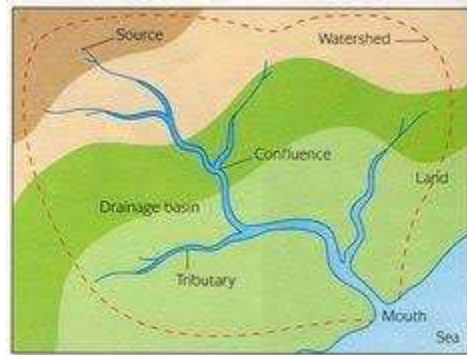


Figure6: River basin

Water plays very critical role in all kinds of developmental activities and in the maintenance of ecological balance within the watershed of the river basin. This concept has evolved as a sub-paradigm in the comprehensive development and planning of river basin to maintain its ecological unity and integrity. The river basin forms a biogeographical system which is generally called process-response system and it is dynamic in nature. Thus, a river basin is selected as a unit for development and management of resources, the presumption being that its physical unity makes in general a suitable multi-purpose economic region. In modern times, approaches to the planning for the development of water resources have progressed from single-purpose use of water of river basin, such as irrigation, flood control and the generation of hydroelectricity to multipurpose uses due to the development of engineering techniques. The terms "total catchment management", "integrated catchment management", "integrated resource management" and "river basin management" are used interchangeably.

5. Institutional Approach

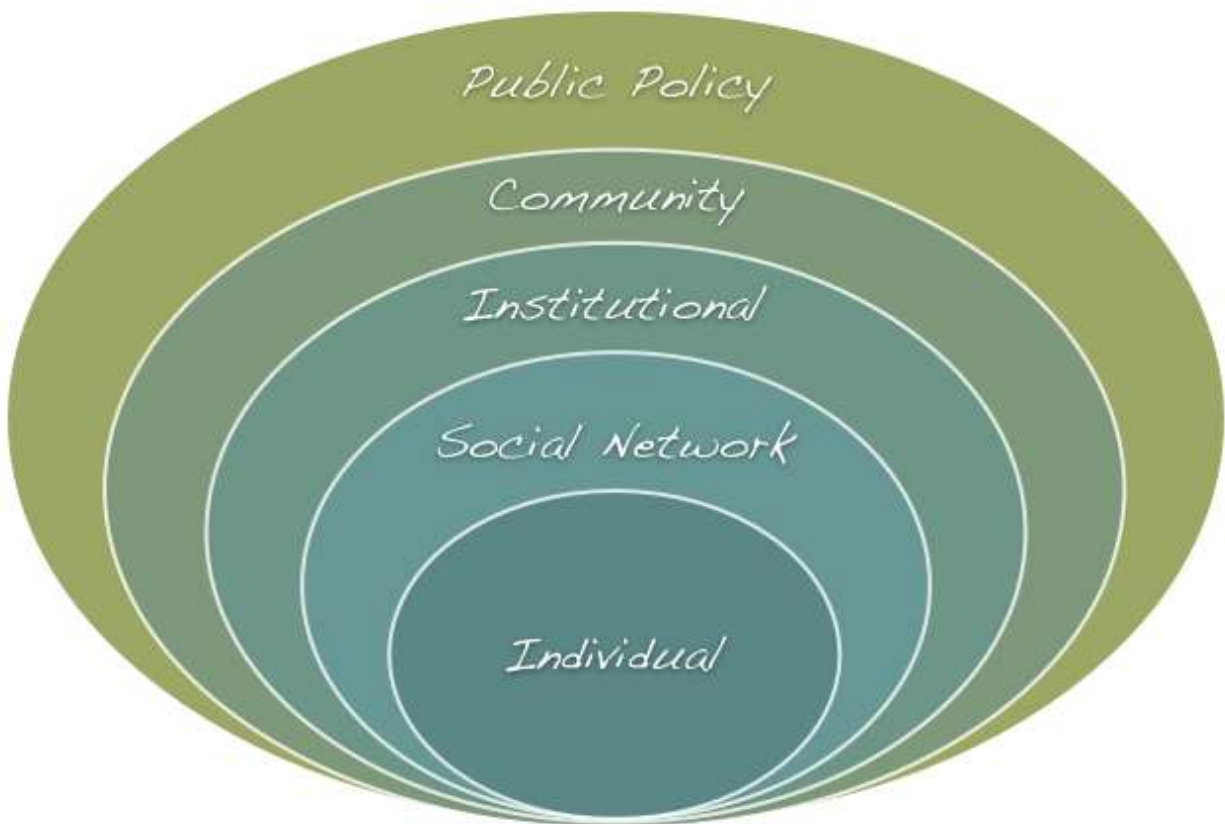


FIGURE 7: Institutional Approach:

Institutional approach focuses on the analysis of formation of institutional arrangements in response to changing needs and existence stress. This approach is biased to economic, political law and business administration institutions which emphasize the role of social political and economic organizations in determining economic events. Hence, the success and failure of resource management is tied up with institutional structure, the pattern of agencies, laws and policies which pertain to resource issues. Institutional arrangement is defined as composite of legal powers, administrative structures and financial division. Institutions include both formal and informal interactions between individuals and groups. Resource managers in India have become interested in institutional arrangements and their role in the management of natural resources. "In the desert grass and shrub lands of Rajasthan, where multiple contending institutions govern village resources, the role of social institutions rules norms and systems of authority and power are overwhelming, Mandal(1991)". Many research scholars have highlighted the institutional issues of natural resources such as forest, water, and grazing lands in Rajasthan where special cases of extra-legal resource management institutions which are posing challenges and corruptions in the use of natural resources.

6. Community Based Approach



Figure 8: Community Based Decision Making

Community Based Approach challenges the assumption that conservation is only possible through the exclusion of human activities. This is a new people centered thinking in conservation and management which gradually emerging quite important among the developing countries including India, mainly derived from a political reaction against the environmental authoritarianism of the state. “This is a paradigm shift towards decentralization at the policy level in resource management. The centralized approach dominated natural resource management in India during the colonial period, Barron, (1997)”. It stresses participation (Figure 8) and decentralization of resource management in contrast to top-down approach currently practiced. Local institution is given due recognition and decision-making is made open with equitable sharing of cost and benefits between the state and local communities.

7. Technological Approach

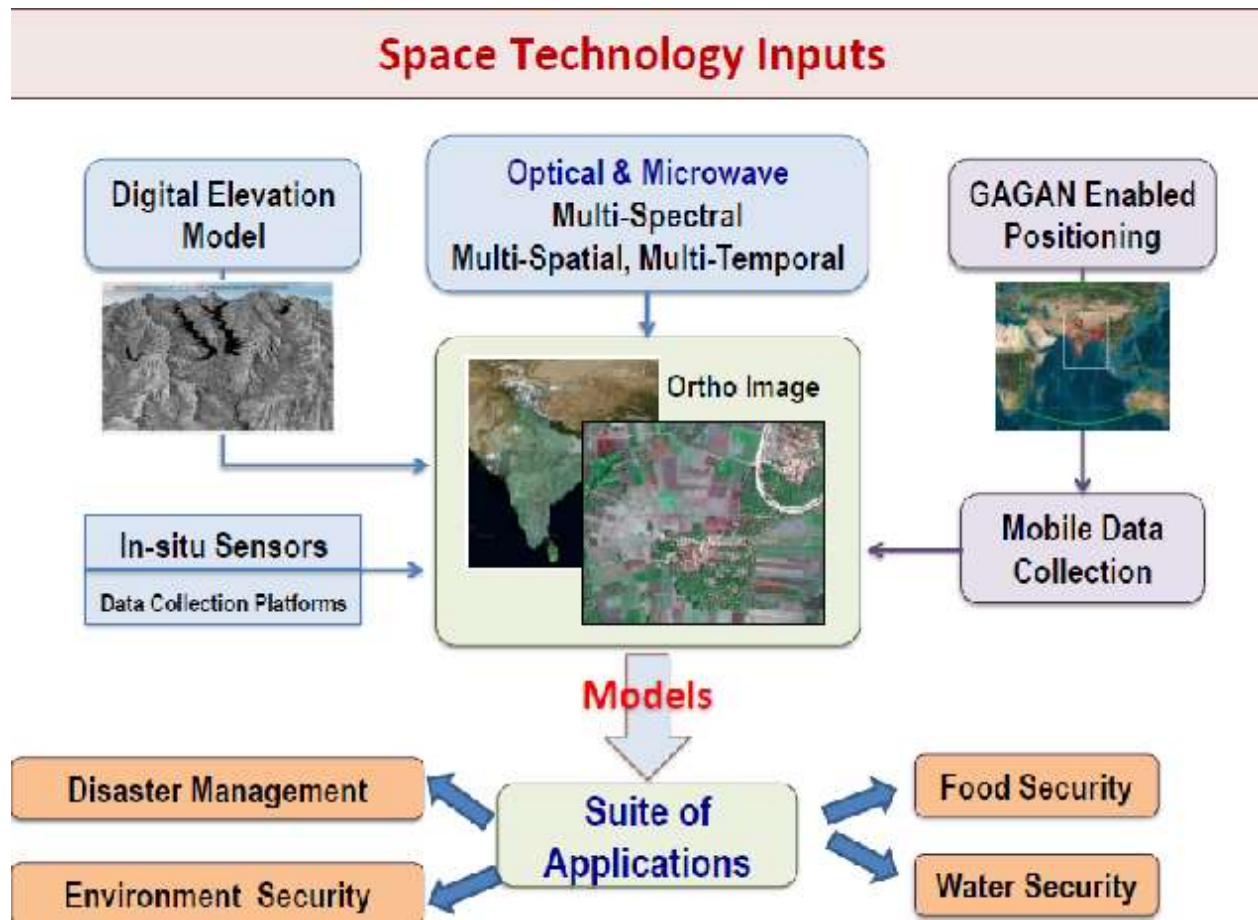
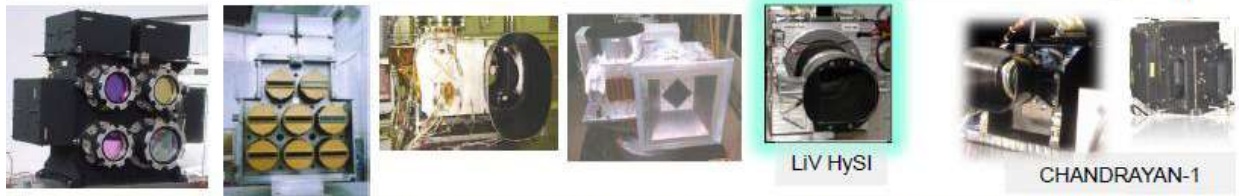


Figure 9:Space Technology Inputs

Information technology mainly Remote Sensing (RS) and Geographical Information System (GIS) are methodological approach in natural resources management which have great potential as a tool to support decision making. It is also known as geomatics or ecoinformatics which has brought revolution in natural resources management. It has proven as a powerful tool for studying natural resources and helps in locating features, extent of coverage, monitoring the resources and in generating models to probable scenarios, which assist in optimizing resource utilization. There are two advanced information systems-**remote sensing and geographical information system (GIS)**-that are used to monitor and study resource processes and how human activities are affecting these processes. Today the amount of data gathered on natural resources from remote sensing satellites and many other sources overwhelming. Tremendous amount of data is being generated through high resolution images. Inventory of land, water and biomass resources can hardly be conceived without satellite images. While remote sensing helps in data acquisition at regular intervals, GIS application has enlarged the horizon of data assimilation. There are no other effective and efficient measures to gather and disseminate and has also provided a test bed for assessing impacts of alternate use and create future use scenarios. Resource data are to analyze and present the information needed to develop sustainable resource management programs in **India**.

Electro-optical Imaging Systems Developed By ISRO - Synopsis



Sensors developed to observe earth (land, ocean, atmosphere) and moon from space in various wavelength bands



Figure 10: Some examples of Electri-optical Sensors and High Resolution Images

We have lots of data being collected by different satellites (Figure and at the same time we have lots of open source and proprietary source GIS Software with lot of capabilities). The efficient data and information management system must be implemented to handle, store and disseminate data. Figure 10 illustrates some examples of Electri-optical Sensors and High Resolution Images Over the past 20 years, sophisticated computer-based information systems have evolved that are proving to be essential tools in India in developing management strategies. The GIS that include both the hardware and software components is utilized to store, analyze, overlay and map digital data in a geographically referenced format. They handle and process geographic information over high speed networks such as internet. Thus, GIS have become an essential link between the data collection technologies, such as remote sensing, and the policy makers such as bureaucrats and organizations. RS-GIS application is widespread in the field of natural resource management and the scope is enlarging over the years, although potential of these techniques are yet to be fully realizable. It is now widely used in areas of resource management, from ecology to geology and from oceanography to Himalayan geomorphology and resources. As natural resource managers, biologists, botanists, ecologists, environmental regulators, geographers, hydrologists, petroleum engineers, planners and

foresters are relying on analytical power of GIS making critical decisions. GIS provides deeper understanding of the problem we face by giving accurate information. Decision makers need a complete picture of the issues before taking action, such as planting crops, drilling for oil, restoring habitats and monitoring endangered species. Therefore, it has always been fundamentally as application-led technology.

SUMMARY

- The main objective of the Natural resources management is to promote, develop the ideas of renewable resources, the renewability criterion care for the resource classification automatically develop the relation of an exploitation strategy on resources.

-We have learned 9 approaches today to study natural resource management.

- Community Based Approach challenges the assumption that conservation is only possible through the exclusion of human activities. This is a new people centered thinking in conservation and management which gradually emerging quite important among the developing countries including India, mainly derived from a political reaction against the environmental authoritarianism of the state.

- The resulting picture of the future availability of natural resources is: Critically important to stakeholders: Despite exhortations by some to decouple economic growth from the increasing use of resources, the world's current economic systems require reliable access to natural resources to deliver populations with even a minimal quality of life.