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School of Social Sciences

MANE-005
Environmental Anthropology

Block

2

THEORETICAL AND METHODOLOGICAL ISSUES OF ENVIRONMENTAL ANTHROPOLOGY

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BLOCK 2 THEORETICAL AND METHODOLOGICAL ISSUES OF ENVIRONMENTAL ANTHROPOLOGY

Introduction

Anthropology has a long-standing interest in the interaction of humans with their environments. Since the beginning of the discipline in the 19th century, scholars have been concerned with the ways in which societies interact with their environment and utilise natural resources, as with the ways in which natural processes are conceptualised and classified.

Anthropology is, by its very nature and tradition, a kind of multidisciplinary science. The four branches of Anthropology, despite a common concern with the central concept of culture and of social behaviour, have quite different traditions of theory, training, method, and practice. Environmental Anthropology is the study of human interactions with Nature. It can be the basis for understanding how past and present human populations contribute and respond to local and global environmental changes. Traditionally, ecological anthropologists have focused upon how humans adjusted to their environments through cultural and biological adaptation. On the other hand, the new Ecological or Environmental Anthropology blends theory and analysis with political awareness and policy concerns. Accordingly, new approaches and strategies have emerged, such as Environmentalism, applied Ecological Anthropology, Historical Ecology and Political Ecology etc. All these approaches in the cultural ecological tradition have important bearings for modern Anthropology. First, the works in cultural ecology not only signify a shift in the theoretical orientation in Anthropology in the explanation of intra and intercultural variations, but they also point to a very strong down-to-earth approach in Anthropology. The theoretical shift broadened the structure-functional or cultural holism into environmental holism and the down-to-earth approach demanded attention towards the material level of culture which gradually fell into oblivion during the golden period of structure-functionalism.

This block explores key concepts, theories, current approaches and methodological issues in the study of human culture and social activity in relation to ecological systems and the environment. The block starts with some of the main theoretical approaches and practical applications of the study of Environmental Anthropology (in particular, the cultural ecology of Steward, the concepts of carrying capacity and limiting factors as used in eco-systematic models, historical and political ecology, and new approaches deriving from post- structural anthropology). It also discuss some of the main cultural and social aspects of the human-environment interface, such as the relationship between social organisation and ecology; alternative forms of land use and management (with special reference to rain forest peoples); the impact of processes of globalisation on human interactions with the environment in a number of non-western societies; and the cultural dimension of human adaptation to the environment.

The units in this block unit 1 discuss the relationship between culture and environment from an anthropological perspective. Unit 2 deals with the application of the ecosystem approach in anthropology provided a materialistic, objective and empirical ground to view culture and society as human adaptation to the natural environment. Unit 3 talk about current approaches, which helps anthropologists in understanding the interrelationship between human beings and environment from an anthropological perspective. Unit 4 discuss about the various methods and techniques by which the relationship between human society and its environment has been studied by anthropologists.

UNIT 1 CULTURE-ENVIRONMENT RELATIONSHIP

Contents

Learning Objectives

At the end of this unit, you will be able to:

- understand the relationship between culture and environment from an anthropological perspective;
- encompass a sound grasp of the old to the recent theories advanced in anthropological theory on this relationship; and
- gain a greater appreciation of the role of Anthropology in contemporary environmental discourses.

1.1 INTRODUCTION

Once a central concern of Anthropology, culture- environment relationship or nature-society interface, in the recent years has tended to be relegated to the fringes of anthropological discussions, as post-modernism and culturalist perspectives have dominated the centre stage of theoretical developments in the social sciences generally (Descola and Pálsson, 1996). It has been pointed out that the situation is, however, changing again, as anthropologists are increasingly returning to the study of culture- environment issues, but with new perspectives (*ibid*.).

There are a number of reasons why this theme is now in the forefront of the public agenda, one of them being the ongoing changes in the culture-environment relationship, with anthropologists getting an opportunity to use their competence to address debated environmental issues such as the mechanisms of a sustainable mode of livelihood in non-industrial societies, the scope and status of indigenous

or traditional knowledge and techniques of resource management, the ideological foundations of conservationist movements, the challenges coming up in the wake of climate change etc. The challenge before Anthropology is not only to embrace the world of man but also that part of the world with which humans interact.

In this unit, we will be basically studying the main anthropological theories which have attempted to provide an understanding of the culture-environment relationship. In the process, we will also trace the development of Environmental or Ecological Anthropology as a specialised sub-discipline within Anthropology.

1.2 UNDERSTANDING CULTURE-ENVIRONMENT RELATIONSHIP: THEORETICAL PERSPECTIVES IN ENVIRONMENTAL OR ECOLOGICAL ANTHROPOLOGY

Environmental or Ecological Anthropology embraces within its realm, the study of the complex relations between people and their environments (Salzman and Attwood, 1996). The environment refers not just to biophysical context, but also to human interaction with, and interpretation of that context which is culturally perceived; the environment, therefore, is not just a set of things to which people adapt, but also a set of ongoing relations of mutual adaptation between culture and material context (*ibid.*). According to Anderson (1977), in common usage, studies that deal in any way with man-environment relations are labelled 'ecological'. However, as such a broad range is quite ineffective in guiding inquiry; he felt that it is pertinent to start with a workable definition which must begin with what ecology is not. Ecology is usually understood as the study of relations between organisms and their environment. Anderson (*ibid.*) pointed out that it is not equivalent to environment, although it is frequently used in this sense. It does not, in any strict sense, refer to the unforeseen consequences of many of man's activities, as in the phrase 'ecological disaster'; neither it is synonymous with conservation, narrowly construed. He preferred to define ecology as 'the study of entire assemblages of living organisms and their physical milieus, which together constitute integrated systems' (*ibid*, p.182). This definition in his view has the advantage of providing a framework that includes the study of all species. Moreover, environment in this view is seen not as external, but as an integral component of the total system- the 'givens' of the system.

Human populations, socially organised and oriented by means of particular cultures, have ongoing contact with and impact upon the land, climate, plant and animal species, and other humans in their environments and these in turn have reciprocal impacts. Environmental or Ecological Anthropology directs our attention to the ways in which a particular population purposely or unintentionally shapes its environment, and the ways in which its relations with the environment shape its culture and its social, economic and political life. Attention to the impact of environments on human societies has been longstanding in Philosophy and Geography, but in Social and Cultural Anthropology, stress on the ecological dimension is relatively recent. Environmental or ecological anthropology only became fully established in the 1960s. Nevertheless, anthropological interest in the environment and ecology goes back a long way. The following constitute the main theories regarding the relationship between culture and environment and how these have evolved over time and with the development of Anthropology as a discipline.

1.2.1 Environmental Determinism

The theory of environmental determinism claims that environmental features have a direct impact on the features of human behaviour, and thus, on human society. It is based on the belief that the environment (most notably its physical factors such as landforms and/or climate) determines the patterns of human culture and societal development. This theory rose to prominence in the late nineteenth century as a central concern of Human Geography, or Anthropogeography, as it is sometimes called. The German scholar Friedrich Ratzel was impressed by the influence of the natural setting on the ways of life of peoples and held the view that the habitat of a people cannot be neglected in assessing those influences that play on the formation and functioning of culture. However, his followers changed this to a more rigid formulation, which held that the habitat is the determining factor in shaping a way of life, which is called environmental determinism. Anthropology's initial development is linked with an intellectual emphasis to abandon various forms of racial and environmental determinism and the over-generalisations of Anthropogeography widespread in the late nineteenth century.

1.2.2 Environmental Possibilism

The early work of American anthropologists like that of Goldenweisser (1937) was characterised by a stress on historical and cultural descriptions, which focused on the uniqueness of human groups. According to this view, which has come to be known as historical particularism, environment was seen as an inert force that narrows human options but which played no dynamic role in the surfacing of observable human traits or institutions. In *The Mind of Primitive Man* (1911), Boas noted that the environment furnishes the material out of which people shaped and developed the artefacts of daily life but it was historical forces and diffusion, which primarily explained the particular forms that given artefact took.

Out of these basic works, thus, grew the theory of environmental possibilism or the particularist position that cultures, environments and histories are so variable that any generalisation is difficult. While the theory recognizes the primacy of the physical condition in the development of social and cultural patterns, it has paid sufficient attention to variation- the extent to which human beings has altered his environments and how subsistence patterns were moulded by social organisation and belief. The theory cautioned against simple geographical controls and advocated the meticulous analysis of each society and its most important legacy is the focus on empirical fieldwork.

1.2.3 Concept of Culture Area

In its most basic form, the concept of culture area denotes the spatial or geographical delineation of entire social formations, or associations of linked cultural particularities. It has its immediate scientific origins in the work of Ratzel, to which further developments were made by Mason. The latter delineated, though imprecisely (Vayda and Rappaport, 1968, p. 481), twelve 'ethnic environments' for the North American region. It was further developed and employed by Wisler in 1926 when he used it to orient his work on American Indian cultures. In this approach, geographical regions were divided into culture areas based on the fact that when cultures are viewed objectively, they are seen to form clusters, sufficiently homogeneous so that the regions in which they occur can be delimited on a map (Herskovits, 1952). This view was strongly espoused well into the

1930's, particularly by Kroeber (1939), who systematically observed the relationship between environmental and cultural variables for the same region. Vayda and Rappaport (*op.cit*.) opine that not only have the units selected been too gross spatially, some of sub-continenta proportions, but those of widely divergent size have frequently been lumped together indiscriminately as culture areas. Also, the selection of the criteria for designating a particular culture area has tended to be intrinsically arbitrary and, therefore, of inconsequential validity.

1.2.4 Cultural Ecology

During the 1950s, scholars witnessed one of the seminal works regarding the relationship between culture and environment, which remains to this day, a legacy that informs the dominant stream of interactional- analytical thinking on this issue. This was Steward's basic notion of 'adaptive interaction', which is the basis for his Cultural Ecology. His theory of Cultural Ecology stands intermediate between the deterministic and possibilist position and refers to 'a reciprocal or interactional phrasing of man-environment relations which assumes that neither man nor environment is necessarily dominant' (Anderson, 1973, p.185). Steward developed Cultural Ecology as a framework for causal explanation of cultural differences and similarities. He seized on ecological considerations and environmental influences as a remedy to cultural relativism and 'the fruitless assumption that culture comes from culture' (Steward, 1955, p.36) that pervaded Anthropology in the first half of this century. The principle of Cultural Relativism is based on the premise that it is culture that interprets the data of human experience by drawing the distinguishing lines and that the reaction to habitat differs among peoples who live in a single natural setting but whose cultures differ (Herskovits, 1952). Steward was generally familiar with the ecological and biological principles of his time and felt that the principal meaning of Ecology was adaptation to environment.

Steward framed his approach in terms of adaptation and the adaptive processes through which a historically derived culture is modified in a particular environment, arguing on analytical and empirical grounds that over the millennia, cultures in different environments have changed tremendously, and these changes are basically traceable to new adaptations required by changing technology and productive arrangements. Thus, the method of Cultural Ecology developed by him stressed on technology, asserting that the key to the adaptation of a culture is its technology. However, he emphasised that the extent to which productive activities influence a culture is always an empirical problem.

Steward was concerned with cross-cultural comparisons and with the causal connection between social structure and modes of subsistence. The crucial focus in his approach was neither on environment nor culture. Rather, the process of resource utilisation, in its fullest sense, was research priority. The cultural ecological approach proposed by him involved both a problem and a method. The problem was to test whether the adjustment of human societies to their environments required specific type of behaviour or whether there is considerable latitude to human responses. The method, according to him, involved three procedures:

- To analyse the inter-relationship of exploitative or productive technology and environment.

- To analyse the behaviour patterns involved in the exploitation of a particular area by means of a particular technology.

- To ascertain the extent to which the behaviour pattern entailed in exploiting the environment affect other aspects of culture.

The theory of Cultural Ecology, as developed by Steward, paid primary attention to those features which empirical analysis showed to be most closely involved in the utilisation of environment in culturally prescribed ways, which he referred to as culture core. He defined a culture core as the constellation of features which are most closely related to subsistence activities and economic arrangements (1955, p.35). However, he had insisted that the expression 'culturally prescribed ways', must be taken with caution, for its anthropological usage is frequently 'loaded'. The normative concept, which views culture as a system of mutually reinforcing practices backed by a set of attitudes and values, seems to regard all human behaviour as so completely determined by culture that environmental adaptations have no effect. It considers that the entire pattern of technology, land use, land tenure, and social features derive entirely from culture. Steward's concept of Cultural Ecology, however, is less concerned with the origin and diffusion of technologies than with the fact that they may be used differently and entails different social arrangements in each environment. The environment is not only permissive or prohibitive with respect to these technologies, but special local features may require social adaptations, which have far-reaching consequences.

According to Moran (1984), the value of Cultural Ecology lies in the fact that from the broad generalities of the environmental determinists and the detailed inductive findings of the possibilists, Steward proposed a research method that paid both careful attention to empirical details that causally linked the cognized environment, social organisation, and the behavioural expressions of human resource use. Steward delimited, more than anyone before him, the field of human/environment interactions. He viewed social institutions as having a functional unity that expressed solutions to recurrent subsistence problems. Cultural Anthropology had been described as a methodological tool for ascertaining how the adaptation of a culture to its environment may entail certain changes. However, Geertz (1963) has pointed out that the concept of culture core, as advanced by Steward, proved to underestimate the scope, complexity, variability, and subtlety of environmental and social systems. Vayda and Rappaport (1968), among others, found the concept of the culture core to give undue weight to culture as the primary unit of analysis, and found the presumption that organisation for subsistence had causal priority to other aspects of human society and culture to be both untested and premature.

1.2.5 The Concept of Ecosystem

The concept of ecosystem made its way into Anthropology in the 1960s, when critiques of Steward's Cultural Ecology paradigm led anthropologists towards a more explicitly biological paradigm. The term 'ecosystem' refers to one of the specialised concepts developed in biology pertaining to empirical systems and consists of a set of generalisations about the interdependent nutritional and populational processes of plant and animal species living in defined physical environments (Bennett, 1984). In his *Fundamentals of Ecology* (1953), Odum offered the ecosystem as an organising principle emphasizing interdependence,

obligatory and causal relationships. The primary assumption was that ecosystems are cybernetic entities—that is, they are self-regulating and self-organising systems controlled by information-carrying feedback loops. In keeping with the cybernetic view, ecosystems were portrayed as orderly, stable, homeostatic, functional and antentropic.

Geertz in his *Agricultural Involution* (1963) was the first to argue for the usefulness of the ecosystem as a unit of analysis in Social/Cultural Anthropology. Its merits were stated: system theory provided a broad framework, essentially qualitative and descriptive, that emphasised the internal dynamics of such systems and how they develop and change. Vayda and Rappaport (1968, p.492) were perhaps the first anthropologists to advance the notion of 'the possibility and desirability of a single science of ecology with laws and principles that apply to man as they do to other species'. They argued that the cybernetic approach to ecosystems ecology should be adopted in analyzing the 'regulating or homeostatic functions of cultural practices' (1968, p.495). They first focused on an analysis of energy input and output in technology and social organisation of work to collect and produce food. All of this was set within the biological framework of limiting factors and carrying capacity. Components of culture such as religion and warfare were viewed as regulating mechanisms that helped to maintain a balance between the population and its resources. This theoretical framework was implemented by Rappaport (1967) in his fieldwork among the Tsembaga of New Guinea. He viewed their ritual and warfare as regulating the delicate balance between the human and pig populations to reduce competition between the two species, with humans being surprisingly close to pigs in physiology, body and group size and omnivorous diet. He argued that a human population was a species within the ecosystem; that the system operated according to laws of nature that could be understood in the light of system theory. In this framework major cultural processes like ritual could be understood to play cybernetic functions.

This 'biologisation' of the ecological approach in Cultural Anthropology led to the label of Ecological Anthropology replacing Steward's label of Cultural Ecology, although the two are sometimes used as synonyms. Through the work of Rappaport in particular, the cybernetic/ecosystemic view became a dominant trend in environmental or Ecological Anthropology. To cybernetic ecological anthropologists, adaptation of ecological units does not refer to Darwinian struggle for reproductive success or efficient resource utilisation, but rather to maintenance of equilibrium, homeostasis, and above all an un-degraded ecosystem. Rappaport (1977, p.168), for example, defined adaptation as 'the process through which living systems maintain homeostasis' and he explicitly included ecosystems within this class of adaptive systems, arguing that 'the proper goal of adaptive system is merely to persist' (*ibid*., p.178.). A generation of anthropologists, trained in Ecology and Systems Theory, then went to the field to measure the flow of energy through the throphic levels of the ecosystems of which humans were but a part (Rappaport, 1967). The choice of research site was still a local community, and was often treated as a closed system for the purposes of analysis.

1.3 LIMITATIONS OF THE ECOSYSTEM CONCEPT

According to Moran (*op.cit*.), perhaps no work had a greater impact on the development of an ecosystem approach in Anthropology than Rappaport's study

of the New Guinea population (1967) nor had any other study attracted as many critics of an ecological approach. The main challenge for human ecology, as Vayda and McCay (1975) saw it, was to discover and identify the actual problems people face and to delineate their ways of coping with these problems. However, there are a number of problems in applying the ecosystem concept to Anthropology. According to Ellen (1981), anthropological ecosystem studies over-emphasised the self-regulatory feature of ecosystems to the neglect of processes by which systems transform themselves in response to either external or internal dynamics. Cognitive dimensions of human behaviour had been neglected despite the knowledge that cultural factors mediate such ecological dimensions as population size and resource use. Another shortcoming of the 'ecosystemic' approach was pointed out to be an over-emphasis on constraints to the neglect of innovation on the part of organisms in general, and humans in particular. There is also a tendency for models to ignore time and structural change, thereby overemphasizing stability in ecosystems. According to Vayda and McCay (*op.cit*.), ecosystem analysis is more complete and more attuned to ecological theory when it moves beyond the detailed appraisal of how a population survives and how its members respond to various 'perturbations.' Consideration of how they respond differently from one generation to the next, how they respond to novel and sometimes externally induced problem allows for explanations that are more consistent with our understanding of the adaptability of human populations.

1.4 CULTURAL MATERIALISM

Following the above developments in the realm of Environmental or Ecological Anthropology, Marvin Harris attempted to advance the ecological explanation as well as description of cultures by developing an explicit and systematic scientific research strategy, which he called cultural materialism. Harris and his students applied this research strategy to explain seemingly arbitrary religious beliefs and customs in terms of ecological adaptation. According to Harris (1979), the granting of sacred status to cattle among the Hindus of India and the consequent prohibition on beef eating was necessary for a high density population of pre-industrial rural cultivators. The high caloric and spatial cost of raising livestock for meat consumption could not be sustained and was rejected in favour of more efficient grain consumption. But in this adaptation of grain production and consumption, cattle played an important part, supplying traction for ploughs, manure for fertiliser, and milk and butter for consumption. Holy status protected cattle from consumption as meat and saved them for supporting grain cultivation. Harris had shown that the composition of village cattle herds varies predictably in accordance with farmers' pragmatic needs for different ratios of bovine species and sexes in different eco-zones, which means that Indian villages use mainly practical criteria rather than mystical ones for managing their livestock. The work of Harris and others working along similar lines have been criticized on many points, but especially for confusing origins and functions and for assuming that almost anything that persists is adaptive (Salzman and Attwood, 1996).

1.5 HISTORICAL ECOLOGY

A few anthropologists had tried to transcend some of the limitations of the above approaches by adding a diachronic dimension in examining how both culture

and environment mutually influence and change each other over time, an approach called historical ecology. Most notable is the work of William Balée in the early 1990s on the Ka'apor in the Amazon of Brazil, who recognizes 768 species of plants from seed to reproductive adult stages, the largest ethno-botanical repertoire reported for any people in the Amazon (Barfield, 1997). Balée has tried to apply Historical Ecology to integrate aspects of Ethno Ecology, Political Ecology and Regional Ecology in a processual framework. In this context, he has analyzed the Ka'apor's response to adaptive constraints and opportunities in both their social and natural environments, including other indigenous societies, Afro-Americans, and European migrants who have each had an impact on their natural environment.

1.6 SUMMARY

The anthropological approaches to human-environment interactions described above have been largely confined to basic research with very little attention being paid to applied problems, let alone to action or advocacy work. Early studies of humans and their environment moved from the "Environmental Determinism" to the "Environmental Possibilism" and to the "Cultural Ecology" of Julian Steward. The first major theory regarding the interaction between culture and environment, one that has been in circulation since the time of classical Greece, is Environmental Determinism (ED), or Evironmentalism. This idea basically states that environment mechanically "dictates" how a culture adapts. Later on the general orientation of explanations of man-environment interrelations in the United States shifted towards what came to be called "Possibilism"/ Environmental Possibilism (EP) in the late 1920s and the 1930s. In Possibilism, the environment is seen as a limiting or enabling factor rather than a determining factor. In the 1950s-60s significant progress came from the development of what came to be known as "Cultural Ecology," engaged with the analysis of cultural adaptation to natural environments an approach proposed by Julian H. Steward. He also developed the concept of *culture core* as the behavior patterns most closely linked to the environment (e.g., subsistence and food acquisition). Other approaches followed Cultural Ecology that expanded the scope of environmental research in Anthropology. As scholarly paradigms evolved in the latter half of the 20th century, Roy Rappaport and Vayda, A.P (1968), developed an ecosystem approach that treated human populations as one of a number of interacting species and physical components and transformed *Cultural Ecology* into *Ecological Anthropology.* The idea of cultural materialism in anthropology was most prominently and vigorously proposed by the American anthropologist Marvin Harris (1927-2001). He strongly held the view that similar technologies applied to similar environments tend to produce similar kinds of economic and sociocultural arrangements. According to the theory of cultural materialism, cultural systems are nothing but adaptive responses to solve practical problems of human survival and resource management in specific environments which should be analyzed from a historical perspective.

According to Wolf (1964, p.94), 'the goal of Anthropology is the creation of an image of man that will be adequate to the experience of our times'. Such an image of man must take cognizance of the experience of man within the context of the whole biosphere. A science of man, according to Anderson (1973) must seek to integrate a concern for human ends with the scientific mode of thought,

which owes its success to its emphasis upon means. According to him, calls heard for greater concern of Anthropology with crucial social and biological issues are certainly justified. In developing a new scientific humanism, the anthropologist should fuse the scientist's commitment to truth and the humanist's commitment to human welfare. In an adequate scientific humanism, the scientifically relevant and the humanly relevant should coincide. An ecological perspective, including an adequate ecological ethic, may provide the soundest basis for judging social relevance and for defining the frame of scientific enquiry. This is perhaps the strongest argument for going beyond an Anthropological or Ecological Anthropology towards the multi-disciplinary development of Anthropological Ecology or "Ecosystematology" (Schultz, 1967). The effect of these debates has been that ecological anthropology is gradually being incorporated into more general theoretical discourse with current awareness of global environmental problems drawing Ecological Anthropology into multidisciplinary debates over 'sustainable development' and how Anthropology could contribute to the environmentalist discourse.

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Sample Questions

1) What are the main anthropological theories regarding the relationship between culture and environment?

2) What are the key aspects of Julian Steward's theory of Cultural Ecology?

3) How did the 'Ecosystem' approach gain importance in Anthropology? What are its limitations?

4) Write short notes on the following:

   a) Environmental Possibilism

   b) Cultural Materialism

UNIT 2 APPLICATION OF CONCEPT OF ECOSYSTEM IN ANTHROPOLOGY

Contents

Learning Objectives

At the end of this unit, you will be able to:

- understand the historical background and the importance of the concept of ecosystem in Anthropology;
- know about the pioneering and classical works done by anthropologists who applied the concept of ecology and ecosystem in the study of the relationship between culture and environment;
- gain knowledge about the notable works done by the Indian anthropologists in the field of ecological anthropology;
- know about the basic tenets of ethno-ecology and cultural materialism; and
- understand in brief about the criticisms of the ecosystem approach in Anthropology.

2.1 INTRODUCTION

Other approaches followed Cultural Ecology that expanded the scope of environmental research in Anthropology. In the 1960s and 1970s, the field became influenced by new concepts developed by anthropologists who largely structured

their data based on ecological models. Roy A. Rappaport, and Andrew P. Vayda (1968), developed an Ecosystem Approach that treated human populations as one of a number of interacting species and physical components and transformed *Cultural Ecology* into *Ecological Anthropology.* While Steward tied culture into the environment, a new approach, called the "New Ecology," tied culture into the emerging science of Systems Ecology (e.g.,Vayda and Rappaport 1968). They suggested that instead of studying how cultures are adapted to the environment, attention should be focused on the relationship of specific human population to specific ecosystem. In their view, human beings constitute simply another population among the many populations of plants and animals species that interact with each other with the non-living components (climate, soil, water etc) of their local ecosystem. Thus, the ecosystem rather that culture, constitutes the fundamental unit of analysis in their conceptual framework for Human Ecology. The analytic unit shifted from "culture" to the ecological population, which was seen as using culture as a means (the primary means) of adaptation to environments. It was argued that human cultures were not unique but formed only one of the population units interacting "to form food webs, biotic communities, and ecosystems" (Vayda and Rappaport, 1968). This approach placed humans within a unified science of Ecology so that what was learned about human behaviour would have greater applicability as a way to conduct holistic studies of humans in their environment. The ecosystem approach was adopted from General Systems Theory, which had been developed within Ecology in the 1930s and 1940s. General systems theory emphasised wholeness, connectedness and feedback.

2.2 CONCEPT OF ECOSYSTEM

The concept of ecosystem originated in the biological sciences wherein living organisms were viewed as interrelated parts of the physical environment, and together they constituted a whole that maintained stability over time through mutual feedbacks (Miller 2004). The concept owes its origin to the works of the biologists who studied the interrelationships between the abiotic (non-living) and biotic (living) parts of the environment. Ecosystem basically refers to *interdependence* of the inorganic and organic parts of any geographical space in which continuous *exchange* of matter and energy takes place. The anthropological implication of the concept of ecosystem is significant because humans can also be viewed as a part of this system participating in the process of energy flow and cycling of matter within the system (Moran, 1990 & 1996). The concept of ecosystem is employed by the scientists both as a *concrete reality* as well as a *model* to understand the complex relationship between the inorganic and organic components of nature. It is difficult to draw neat boundaries of ecosystems as well as to determine their size. Ecosystems can be as small as a pond and as big as large forests and deserts and different ecosystems often overlap. The application of the concept of ecosystem by the biologists and anthropologists has also been influenced by the General Systems Theory in Philosophy under which ecosystems are viewed as a series of interdependent parts wherein each part functions for the maintenance of the whole system. Another important concept within ecosystem approach is "feedback". Feedbacks are mechanisms by which an ecosystem maintains equilibrium by returning to its original condition under stress. This is known "negative feedback". There is another kind of feedback by which the ecosystem moves toward disequilibrium and change. This is known as "positive

feedback". Anthropologists like A.P.Vyada and Roy Rappaport employed Ecosystem Approach and the concept of feedbacks in the line of System Theory to understand the cultural factors which regulated the relationship between small human communities and the biotic and abiotic components of the natural environment.

2.3 HISTORICAL BACKGROUND OF THE IDEA OF ECOSYSTEM IN ANTHROPOLOGY

Although, the application of the sophisticated concepts of 'Ecosystem' took place much later, the interest of the anthropologists in looking at the relationship between culture and natural environment can be traced back to the works of the German geographer Friedrich Ratzel (1844-1904) in the late nineteenth century who held that culture is largely shaped by the immediate geographical environment and much of cultural diversity was caused by the variation in the natural environment. Followers of Ratzel in Europe and America continued this tradition of research and formed a school which later became famous as 'Geographical or Environmental determinism'. These scholars were also known as 'Anthropogeographers'. Later, a number of anthropologists in United States of America were influenced by the works of Geographical Determinists and made attempts to find out the relationship between culture and natural areas. A notable pioneer in this culture and natural area research was Clark Wissler (1870-1947) who was a student of Franz Boas (1858-1942), the founding father of American anthropology. Wissler first recognized that the natural areas of native North America corresponded closely with the culture areas. He particularly gave emphasis on the close relationship between subsistence pattern and physical environment but at the same time Wissler also noted the fact that culture areas are not always identical to their natural areas. The work of Wissler was further extended by Alfred Kroeber (1876-1960) another student of Franz Boas, who examined the relationship between geographical environment and culture areas in North America. Although, Kroeber did extensive research on the relationship between environment and culture, he believed that environment only plays the role of a limiting factor in shaping culture traits, a view which was also shared by Boas. In other words, both Kroeber and Boas believed and they attempted to demonstrate through research that it may be possible to predict what type of culture traits cannot survive or exist in a particular natural area. For example, one may say that woolen garments will not be worn by women and men in a hot desert. But one cannot predict the number of possible culture traits in a particular environment. So, one will not be able to say exactly the specific kind of light garments women and men would wear in a desert. This view, which granted importance to environment and bestowed a relative autonomy to culture and historical factors to understand the dynamics of human society, was later designated as 'cultural possibilism'. Within the framework of possibilism, the British social anthropologist, Daryll Forde (1902-1973) made an outstanding study in his book *Habitat, Economy and Society*(1934) about the relationship between geographical environment and culture traits, in which he concentrated more on material culture(tools, technology and economic pursuits) in a comparative framework.

Despite the difference, 'environmental determinism' and 'cultural possibilism' had one fundamental similarity: both schools of thought viewed 'environment'

and 'culture' as separate and distinct domains which interacted with the other. In the mid 1930s, Julian H. Steward (1902-1972) a student of Kroeber who was working under a possibilist tradition developed the idea of 'Cultural Ecology' in which 'Environment' and 'Culture' were viewed for the first time as two *causally related components* in a single framework. Historically, the roots of the ecosystem concept could be traced back to the concept of Cultural Ecology as developed by Steward.

Activity

Identify a community in your locality and list the biotic and abiotic components which surround the community.

2.4 PIONEERS OF THE ECOSYSTEM CONCEPT IN ANTHROPOLOGY

Julian Steward was a student of A.L.Kroeber and started his research under the influence of Cultural Possibilism. Steward, however moved away from culture area approach and emphasised more on the close relationship between technology and environment but Steward was not an Environmental Determinist. While both groups of scholars within the fold of Environmental Determinism and Cultural Possibilsm viewed 'Culture' and 'Environment' as separate domains which influence each other, Steward treated them as interacting entities in a single framework. He viewed culture as an adaptive mechanism by which human beings adjust with their natural environment. According to Steward, every aspect of a culture does not adapt with the physical environment in the same manner. Although, he began his research in Archaeology, Steward gradually moved towards ethnographic studies of small populations. He found that the technologies of production and the related behaviour patterns and social organisational features of a small community are linked more intensively with the immediate natural environment and forms a constellation, which he termed as the 'culture core'. Thus, among the Shoshone hunter-gatherers of North America Steward found that the technology of hunting is related with patrilineal kinship, patrilocal residence, band exogamy and low population density, which in turn helped the community members to successfully use their scarce hunting game resource base within a restricted area. According to him, hunter-gatherers under restricted and scarce resource base may have different types of hunting implements but patrilineal band structure is the common feature among them, and this is the 'core' of the hunting-gathering societies which has evolved over a long period of time in order to adapt in a specific type of environmental conditions. So, there is a causal relation between environment and the behaviour of human beings related to the *productive technology* and this relation *recurs* through history. The idea of Ecosystem was embedded in Steward's thought since he viewed environment, productive technologies and related cultural behaviour is a causally interrelated network of relation which persist over time. For Steward, the principal meaning of ecology is concerned with the adaptation of human beings with the natural environment but human beings do not only adapt like animals, they adapt by means of culture(Steward, 1955:31). To understand human adaptations to the natural environment, Steward employed a new concept which he termed as *Cultural Ecology*. According to Steward, C*ultural Ecology is the study of the relationship between culture and natural environment in which two orders of phenomena are involved: (i) all the biotic and abiotic features of the natural*

environment and (ii) the cultural elements by which human beings adapt with the environment including technology and economic organisation (Hatch 1973: 114-115). But Steward did not believe in a circular causality of all the parts of the ecosystem in which every part has an equal role to play for the maintenance of the whole. This is the reason that he subdivided culture into 'core' and 'secondary features'. Another important aspect of the contribution of Julian Steward lies in the field of Cultural Evolution. For him, human ecosystems are dynamic and social evolution is not unilinear, it is multilinear, since each culture *adapts* to its local environment and also *changes* in its unique way.

Leslie White (1900-1972) was contemporary to Steward and his contribution should also be discussed in the field of Ecology since White also viewed culture as a kind of adaptation to the natural environment and he made a novel attempt to measure the complexity and evolutionary progress of human societies in terms of the *amount of energy harnessed per capita per year*. In his famous article written in 1943 on energy and evolution of culture, White proposed that the advancement of human societies took place through an increase in the amount of energy utilised by technology. For White, technology, amount of energy harnessed and sociocultural complexity are interrelated variables which should be taken into consideration to understand social evolution and he proposed a grand scheme of 'Universal Evolution' applicable to all kinds of human societies.

Despite their differences, Steward and White provided a *materialistic* view of culture, which lie at the heart of later day Ecosystem Approaches in Anthropology. Both of them gave primary importance to the *adaptive* nature of culture in relation to the natural environment and also to *productive technology and resource management strategies* of human beings. All these ideas were important for the future generation of ecological anthropologists, who studied culture from an ecological perspective.

2.5 NOTABLE CONTRIBUTIONS ON APPLICATION OF CONCEPT OF ECOSYSTEM IN ANTHROPOLOGY

The ground prepared by Julian Steward and Leslie White in American Anthropology was taken up by later anthropologists who developed the Ecosystem Approach in Anthropology in a more sophisticated manner. In this connection, we would discuss about the works of the following anthropologists, viz. Tarak Chandra Das (1898-1964), Clifford Geertz (1926-2006), Fredrik Barth (1928-), Andrew P. Vayda (1931-), Roy A.Rappaport(1926-97) and Robert MCc Netting (1934-95) and Madhav Gadgil(1942-) and Kailash Malhotra(). We would begin with Geertz.

2.5.1 The Relationship between Environment and Productive Technology

Tarak Chandra Das (1898-1964) was a pioneering Indian anthropologist during the formative period of the discipline who conducted an intensive study on the dynamic relationship between productive technology and natural environment as early as 1937.

The field study of Das was published in the prestigious international journal *Anthropos* under the title 'Some notes on the economic and agricultural life of a little known tribe on the eastern frontier of India' (Das, 1937:440-449).

In his paper Das dealt with the relationship between the variation in technology of agricultural practices with the natural environment and the socioeconomic consequences of this variation within the same tribe. The name of the tribe is Chiru, who like the Purums belonged to the old Kuki group of tribes of the north-east India. At the time of Das' field work during 1931-34, the Chiru population was 1272 and they lived in 11 villages, 9 of which were situated on the top of the hills and 2 were on the plains of the Manipur valley. Here Das first established the importance of agriculture particularly shifting hill cultivation among the Chirus despite the presence of hunting, fishing and gathering which were found to be subsidiary occupations among them. According to Das:

> *Agriculture forms the basis of Chiru economic life. All other activities, whether social, religious, or economic are directly or indirectly connected with this important food-producing work. Economic activities like hunting, fishing, rearing of domestic animals and trading are all subservient to agriculture' (Das, 1937:441).*

But how did he substantiate his claims made in the above statement? Without going into quantification, Das adopted the Ethnographic Methodology to prove his argument.

First, he described the methods and situations under which the Chirus engage them in fishing, hunting-gathering, domestication of animals and trading.

Second, he then described in brief the different rites and rituals connected with *Jhum* cultivation and the role of traditional village officials in those communal festivals. The evidences put forward by Das revealed how the natural environment and the socio-religious practices of the tribe have made shifting hill cultivation as the main economic foundation of the tribe. Das then proceeded further to look into the sociological implications of this cultural ecological scenario of the Chiru society. In the words of Das:

> *Chiru society is composed of agriculturists only. As already shown, hunting, fishing and trading have not grown into independent occupations, but are practised along with agriculture and is subordinated to its interest. Thus, these avocations have failed to produce special socio-economic groups. The traces of stratifications found among them cannot be attributed to economic pursuits.* (Ibid 1937: 443).

A careful reading of the paper reveals that the economic life of the Chirus which Das constructed is not a simple description of the methods of shifting hill cultivation and the associated religious rituals and rites. Neither it is an ethnographic report for the search of borrowed culture traits from the neighbouring tribes and Hinduised populations nor was it an attempt to put the Chirus in the classical scheme of social evolution. The ethnography of Das on the other hand is a penetrating analysis of the various socio-cultural dimensions of shifting hill cultivation in an environmental framework and the slow changes that had been taking place at the time of observation. Take for example, Das' method of dealing with an apparently simple ethnographic observation. He recorded that majority

of the Chiru villages possess only 20-30 households and the biggest village did not contain more than 40 households. But what are the reasons and consequences of Chiru village size in terms of the households? It is better to quote Das:

> *The Chirus do not renew the fertility of an exhausted patch of land by means of fertilisers. It is left to nature which by accumulating the mould for years together makes it again fit for another period of cultivation. The effects of discarding exhausted patches of land are many and far-reaching. It has led to scattering of villages at considerable distance from one another. It puts a limit to the growth of population in each village…. Increase of population leads to establishment of new villages in order to relieve pressure on land. This type of cultivation does not help in the accumulation of wealth in individual hands and consequent growth of rank. On the other hand it has bred an extreme democratic spirit in their social and political life (Ibid 1937: 445).*

The most interesting aspect of Das's work on the Chirus is about the changes that took place in their socio-political life due to migration of some sections of the tribe from the hills to the edge of the Imphal valley. Das' observations can be called pioneering in terms of its analytical strength. According to him a shift from *Jhum* cultivation on the hills to wet rice cultivation on the edge of the valley is not only a techno-economic affair but it also entailed a whole gamut of socio-political changes in the life of the Chirus. That is why he began his observation by contrasting the ownership pattern of *Jhum* land with that of the plains land. While the *Jhum* land was not owned by any individual family but under the control of the village authority, the plains land could be owned by an individual family for which a rent had to be paid to a supra-local political authority. Since wet rice cultivation with the plough could be carried out in the plains, the crop output was higher and a section of the Chirus (though small in number during the time of Das' field work) was found to have been adopting the plains-land cultivation. This shift has had immense socio-political consequences for the community. The analysis forwarded by Das deserves to be quoted in his inimitable words:

> *So long we had been dealing with Jhum-land only. Besides this there is another kind of land which is gradually coming into prominence in Chiru economic life. This is the land at the feet of the hills where plough-cultivation is possible… The village community has no authority over the disposal of this type of land and it does not hold itself in any way responsible for its fortune. On the other hand it is a source of danger to the authority of the village community. The bachelors' house, marriage by service, equal right of every individual over the village jhum-land, and setting up of new houses soon after marriage, are institutions directed to the same end, namely undermining the influence of the family and setting up the village community as the only body to which one may look for help and succour. But the new type of land will set up the family over the village community and place the house-father above all (Das, 137:446).*

Activity

Enumerate the reasons of considering the work of T.C.Das as a representative of Ecological studies in Anthropology.

2.5.2 Generalised and Specialised Ecosystems

Clifford Geertz in his famous book *Agricultural Involution*(1963) for the first time introduced the concept of "generalised" and "specialised" ecosystems Anthropology by directly borrowing the concepts from the ecologist E.P.Odum(Geertz, 1963:7). According to Geertz:

> *By a generalised ecosystem is meant one in which a great variety of species exists, so that the energy produced by the system is distributed among a relatively large number of different species, each of which is represented by a relatively small number of individuals.(Ibid: 7)*

The specialised ecosystem on the other hand is characterised by:

> *…a relatively small number of species, each of which is represented by a relatively large number of individuals. (Ibid: 7).*

In *his book Agricultural Involution* Geertz made a comparative analysis of the above two types of ecosystems in Indonesia under the impact of colonialism and increasing population pressure. He had specifically shown that these two ecosystems in Indonesia, one represented by 'swidden' or slash-and-burn agriculture (generalised) and the other represented by 'wet-rice agriculture' (specialised) had two different types of dynamics, which finally determined the differences in population density, modes of land use, and agricultural productivity in outer and inner parts of Indonesia. The generalised ecosystem in Indonesia supported a smaller population with higher plant diversity and lesser productivity while the specialised ecosystem could support a larger and denser population with lesser plant diversity but higher agricultural productivity. The findings of Geertz had immense implications for modernisation of food production system in post-colonial Indonesia since any attempt towards technological improvement in agriculture should take into consideration the dynamics and peculiarities of the two types of ecosystems in the country.

2.5.3 Ethnic Groups and Ecological Niches

Fredrik Barth is our next author. Barth was a Norwegian Social Anthropologist trained in Great Britain who applied the concept of "niche" in understanding the relationship of different ethnic groups in a wide geographical area. Like Geertz, Barth also borrowed the concepts of ecological niche, competition and symbiosis from the biological sciences to analyze the adaptation of three ethnic groups having distinct technological and social organisational features in the Swat valley in Pakistan. In biology, the concept of ecological niche refers to the *functional role* a species plays in a given ecosystem. 'Ecological niche' is different from the 'habitat' of a particular species. Biologists popularly designate niche as the 'occupation' while habitat the 'address' of the species. (Miller, 2004:98) Barth looks at the relationship of three ethnic groups, viz. Pathan, Kohistani and Gujar in terms of their distribution and long and short-term migrations and movements in the Swat and Indus river valleys of Pakistan. He observed that the distribution and the movement of these ethnic groups can be explained in an "ecologic framework". By using the ecologic framework Barth worked out four important principles which are as follows:

1) *The distribution of ethnic groups is controlled not by objective and fixed "natural areas" but by the distribution of the specific ecologic niches which*

the group, with its particular economic and political organisation, is able to exploit (Barth 1956: 362-375). This is exemplified by the expansion of the Pathans, who though had superior military strength did not move beyond the double crop area since their economy and political organisation required a considerable surplus.

2) *Different ethnic groups will establish themselves in stable co-residence in an area if they exploit different ecologic niches, and especially if they can thus establish symbiotic economic relations (Ibid).* The relationship between the settled agriculturist Pathans and semi-nomadic Gujars revealed a symbiotic relationship. Thus, Gujars were assimilated as a specialised occupational group of herders within the stratified agricultural Pathan economy, but at the same time they also practiced pastoralism in winter in the higher altitudes an ecological niche not utilised by the Pathans. The Gujars supply milk, dairy products and meat to the Pathans.

3) *If different ethnic groups are able to exploit the same niches fully, the militarily more powerful will normally replace the weaker... (Ibid).* In Swat this has happened when the Pathans invaded the Kohistani territory and the latter were pushed to areas inhospitable to the Pathans. But the Kohistanis maintained their autonomy through mono-crop agriculture and animal herding.

4) *If different ethnic groups exploit the same ecologic niches but the weaker of them is better able to utilise marginal environments, the groups may co-reside in one area, as Gujars and Kohistanis in West Kohistan (Ibid).*

The 'ecologic' method utilised by Fredrik Barth in the mid-fifties to explain the symbiotic as well as competitive relations among the three ethnic groups of Swat area of Pakistan was unique and should be regarded as an independent line of research in the application of Ecosystem Approach in Anthropology.

2.5.4 Population Expansion through Warfare

We would now discuss the contribution of A.P. Vayda towards the application of ecosystem approach in anthropology. Vayda pioneered a very interesting area of ecological research in his famous paper 'Expansion and warfare among swidden agriculturalists' published in *American Anthropologist* as early as 1961 (Vayda, 1961: 346-58). In that paper he began by questioning the standard anthropological interpretation of warfare among simple societies as expression of 'social solidarity' or as a 'safety-valve institution' for the release of pent-up aggressions. By using the ethnographic literature and other archival sources, Vayda presented two case studies of warfare among the Maoris of New Zealand and Ibans of Sarawak in which he explained the process of expansion of populations in a purely ecological framework. According to Vayda, the need for expansion of these tribal communities arose from the practice of slash-and-burn agriculture which involved clearing of forests for agriculture and keeping large amount of land as fallow for some years before they are again ready for cultivation. Warfare among the Maoris took place for capturing land which has already been cleared by other groups. Vayda argued:

…Maori groups needing more land may have preferred getting previously used land from other groups, by force if necessary, rather than expanding into the virgin rain forest. If the time and effort required for clearing virgin land were considerably more than were necessary for the operations of both conquest and the preparation of previously used land for cultivation, it follows that territorial conquests, such as some of those recorded in Maori traditional history, would have added more efficiently to the prosperity of particular groups than would peaceful dispersion(Ibid).

Vayda extended the above line of argument to envisage Maori intra-tribal warfare in the form of a 'chain reaction' model in which the expansion of one group into the contiguous territory of the second group led the second to the territory of the third and so on until the last group in the chain had to take the trouble to clear the virgin forest for survival.

In the second model, Vayda analyzed the expansion of the Ibans of Sarawak in Indonesia. In contrast to Maoris, the Ibans displayed remarkable mobility over geographical space and lesser frequency of intra-tribal warfare; the Ibans however, were found to be engaged in warfare with other tribes. According to Vayda, the expansion of the Ibans took place through a variety of environmental and socio-economic factors. The Ibans expanded into the riverside lands of the other tribes which facilitated intra-community movements among them. This kind of expansion enabled the Ibans to cooperate more effectively in military undertakings and also provided the tribe access to trading with Chinese and Malay businessmen from whom they got a variety of goods including guns and European iron and steel which further strengthened their economic and military power over a wider territory.

2.5.5 Resource Management through Religious Ritual

In this subsection, we would discuss one of the most remarkable contributions in Ecological Anthropology which employed the conceptual tools of ecosystem to explain the role of rituals among the Tsembaga Marings of New Guinea Islands. In this work Rappaport described the culture of the Tsembaga as a system in which a particular religious ritual functioned to maintain equilibrium between humans and their subsistence resources. Rappaport viewed the relations of the Tsembaga with their environment as a complex system composed of two subsystems, viz.(i) a local subsystem which is constituted by the Tsembaga cultural practices and the immediate nonhuman components of the environment and (ii) a larger regional subsystem of which Tsembaga is one of the constituent units. A lot of quantitative data on calorie consumption, protein intake as well as number of domestic animal over time were collected by Rappaport. The major finding of the study is quite interesting. The Tsembaga mainly subsist on horticulture along with domestication of pigs. Normally, the pig population served a number of functions to the horticulture gardens and the household economy of the tribe and they did not eat pork frequently. Rappaport through his meticulous collection and analysis of field data observed that the increase in the pig population among the Tesmbaga created a stress in the system and the pig began to compete with the human population at the local level. When the stress crossed the threshold of the system, the members of the village community performed a ritual addressed to their ancestors in which large numbers of domestic pigs were slaughtered and the pork was eaten as well as distributed among the kins and allies who helped a

particular group in warfare and various economic activities. This pig slaughter ritual reduced the stress in the system and also supplied essential protein to the community members, enhanced social solidarity among kins and allies brought back equilibrium in the system by reducing the pig population to much below the threshold of stress. We quote from Rappaport:

> **…..** *the operation of ritual among the Tsembaga and other Maring helps to maintain an undegraded environment, limits fighting to frequencies which do not endanger the existence of the regional population, adjusts man-land ratio, facilitates trade, distributes local surpluses of pig throughout the regional population in the form of pork, and assures people of high quality protein when they are most in need of it. (Rappaport 1967: 17-30).*

The work of Rappaport on the ritual regulation of environmental relations is regarded as one of the most important contributions in the field of Ecological Studies in Anthropology in which we find the application of ecosystem approach in a sophisticated manner and it became very popular in Anthropology and other disciplines during the 1960s and 70s.

2.5.6 The Ecological Sustainability of Peasant Economy

Our penultimate author is Robert Mc Netting who made life-long contributions in the field of Ecological Anthropology. Netting pursued and extended the questions raised by Julian Steward in his construction of Cultural Ecology in an intensive as well as cross-cultural framework. One of the most remarkable works of Netting was done on the small farmers of the hilly region in northern Nigeria in West Africa. He studied a group of sedentary farmers, the Kofyars, who carried out intensive agriculture on small plots of land by terracing and irrigation. The description and analysis carried out by Netting revealed that the various features of the physical environment (rainfall, soil fertility, hill slope etc.) of the Kofyars were intimately related with demographic (e.g. population size), economic (socioeconomic and cultural variables as "social instrumentalities" which played a crucial role for the maintenance of the peasant household within the wider market economy (Netting, 1968).

In a later period Netting undertook research during the early 1970s on the German-speaking Alpine community of Törbel in the Vispertal of the Valais canton of southern Switzerland. The Törbel inhabitants practiced an intensive, largely self-sufficient, mixed farming and herding economy. In this remarkable research, Netting combined his anthropological fieldwork with available historical data from the archives to understand the mechanisms which maintained stability of the nuclear family over long period under changing socioeconomic conditions. His most salient contribution was in the analysis of historical records on household structure and migration in this largely endogamous community. Netting collected and cross-checked census data from 1829—1880 with the help of Walter Elias and Larry Manire and undertook computer analysis using software developed by the Cambridge Center for the Study of Population and Social Structure (Linares, 1995).

Netting found that between 1829 and 1880 three-fourths of Törbel's households continued to encompass four to eight members, with the modal number being four or five. There were minor increases in the age of marriage, frequency of

celibacy, and average life span of the parents. But the number of households remained fairly stable. The formation of new households was seriously constrained by the limit placed on resources—namely, meadows, gardens, grain fields, and water to irrigate them. Households with extended family units that included maiden aunts, or celibate uncles became more common through time; but when emigration and wage labour opportunities presented themselves, households contracted in size. The ideal continued to be the nuclear household, well adapted to a relatively static agrarian economy. Within relatively narrow boundaries, therefore, the household served as the main institution through which individuals responded to short-term social and economic changes. This work of Robert MCc Netting became a classic, referred by economic historians and students of rural European life as well as by anthropologists and cultural ecologists (Netting, 1981).

2.5.7 An Ecosystem Approach to Caste System

Our last description is a brilliant study conducted jointly by an Indian biologist and an anthropologist in the early eighties to explain the hereditary monopoly of certain occupations from an ecosystem perspective. The work was done by Madhav Gadgil and Kailash Malhotra through their intensive fieldwork in the Maharashtra state in western India. The study revealed that seven hereditary caste groups like Kunbi, Gavli, Hatkar, Tirumal Nandiwallas, Fulmali Nandiwallas, Vaidus and Phasepardhis pursued their respective traditional occupations in a wide area without conflict and competition by using specific technologies and natural resource base. According to Gadgil and Malhotra, these caste groups depended much on the natural resources in such a manner that each one of them survived in their own ecological niche without encroaching the niche of the other caste group, although some of them lived in the same geographical area. The authors termed this specialised zone specific habitation of the caste groups as "resource partitioning" which often led to the monopoly of even a clan or lineage of a particular caste. But along with "resource partitioning", there also existed a kind of symbiotic relation between the different castes living in adjacent regions. Thus the Kunbis lived in the lower valleys and practiced cereal cultivation while the Gavlis were cattle herders who lived on the upper hill terraces of the western ghat. The Kunbis supplied cereals to Gavlis and in exchange received butter from the latter. More interestingly, the three non-pastoral nomadic caste groups (Tirumal Nandiwallas, Vaidus and Phasepardhis), though practised hunting differed markedly in terms of game animals and implements, which minimised competition among them. Gadgil and Malhotra finally observed that with the advent of colonialism the traditional resource base of these castes collapsed and as a result conflict among the caste groups began to take place and the caste system in the region became maladaptive (Gadgil and Malhotra, 1983).

2.5.8 Criticisms of the Ecosystem Approach

The Ecosystem Approach in Anthropology which was developed to explain variation within and between cultures has been criticized mainly on the following grounds:

i) the Ecological Approach paid more emphasis on the *stability* of socio-cultural systems rather than the change and instability which often takes place in an ecosystem.

ii) Ecological anthropologists sometime give more importance to *energy and exchange of materials* in analyzing ecosystems in which humans play their roles rather than paying importance to the *symbolic functions* of culture.

iii) The Marxist anthropologists criticized Ecosystem Approach in Anthropology on the ground that the latter viewed the different components of ecosystem in circular relationship. The Marxists argue that some parts of the ecosystem (e.g. productive technology and relations of production) are more important than others (e.g. beliefs, values, morals etc.) and there is a hierarchy of relations within each ecosystem. The proponents of the Ecosystem Approach in Anthropology, according to the Marxists were wrong for not considering the productive relations of an ecosystem as the most important.

iv) The Ecosystem theorists in Anthropology were also criticized for giving too much emphasis on the *synchronic* aspects of the system and rarely look into its *diachronic* dimensions. This means that the Ecosystem Approaches in Anthropology always view human-environment relationships at a particular point of time; they rarely studied those relations over long periods of time.

2.5.9 Ethnoecology

Ethnoecology is the scientific study of how people of a particular culture view the natural environment around them. It is regarded as one of the most important branches of Ecological Anthropology and it began with the early researches of Harold Conklin(1926-) who did pioneering works on the a tribe named Hanunoo in the Philippines. Conklin's study on the colour categories of the Hanunoo has become famous in Cognitive Anthropology, a subfield of Anthropology which studies different systems of native classifications in a comparative framework. One of the most interesting studies done by Conklin dealt with the native categories of slash-and-burn cultivation practiced by the Hanunoo of the southeastern Mindoro Island in the Philippines. In this classic study which was first published in 1954, Harold Conklin contrasted the western view of slash-and-burn cultivation with the native ideas of this traditional method of growing crops in the hill slopes. The field observations done by the author revealed that the knowledge of the Hanunoo is more intensive than the outside observers regarding the variety of crops grown in a plot, nature of forest cleared for cultivation, time interval between two successive plantation and the like(Conklin, 1954:133-42). We quote from the author:

> *More than 450 animal types and over 1,600 plant types are distinguished. The floral components are more significant, especially in regard to swidden agriculture. Of some 1,500 "useful" plant types over 430 are cultigens (most of which are swidden grown), existing only by virtue of the conscious domestication of the Hanunoo. Partly as a result of this intensified interest in plant domestication and detailed knowledge of minute differences in vegetative structures, Hanunoo plant categories outnumber, by more than 400 types, the taxonomic species into which the same local flora is grouped by systematic botanists(Ibid).*

Activity

Try to collect a list of native terms of plants from any individual who do not belong to your own community and note their uses to the community.

2.5.10 Cultural Materialism

The idea of Cultural Materialism in Anthropology was most prominently and vigorously proposed by the American anthropologist Marvin Harris (1927-2001). He strongly held the view that similar technologies applied to similar environments tend to produce similar kinds of economic and sociocultural arrangements. According to the theory of Cultural Materialism, cultural systems are nothing but adaptive responses to solve practical problems of human survival and resource management in specific environments which should be analyzed from a historical perspective. One of the most famous works done by Harris under the framework of cultural materialism was published under the title "The Cultural Ecology of India's Sacred Cattle" published in Current Anthropology in the year 1966. In this paper Harris argued that Hindu religious view about the sacredness of cow and the related taboo on the killing of this animal has ecological functions and should be analyzed from an ecosystem perspective. In order to support his hypothesis Harris looked into the major components of India's sacred cattle complex some of which are: (i) milk production, (ii) use of cattle in agriculture as traction animals, (iii) use of cow-dung as manure etc. With the help of data collected from secondary sources Harris showed that cows are not "useless" animals under existing technological, environmental and socioeconomic conditions of India and this is reason from which the Hindu view about the sacredness of cow originated. To quote from Harris:

> *….explanation of taboos, customs, and rituals associated with management of Indian cattle be sought in "positive-functioned" and probably "adaptive" processes of the ecological system of which they are a part, rather than in the influence of Hindu theology (Harris 1966: 51-59).*

In his later works Harris explained many different kinds of sociocultural phenomena by placing them in their specific environmental, demographic, technological and economic contexts.

2.6 SUMMARY

Steward's Cultural Ecology influenced the Ecological Anthropology of Roy Rappaport and Andrew P. Vayda, but the analytic unit shifted from "culture" to the ecological population, which was seen as using culture as a means (the primary means) of adaptation to environments. In the 1960s and 1970s, the field became influenced by new concepts developed by anthropologists who largely structured their data based on ecological models. Roy A. Rappaport, and Andrew P. Vayda (1968), developed an ecosystem approach that treated human populations as one of a number of interacting species and physical components and transformed *Cultural Ecology* into *Ecological Anthropology.* Vayda and Rappaport (1968) suggested that instead of studying how cultures are adapted to the environment, attention should be focused on the relationship of specific human population to specific ecosystem. In their view, human beings constitute simply another population among many populations of plants and animal species that interact with each other with the non-living components (Climate, soil, water etc) of their local ecosystem. Thus, the ecosystem, rather than culture, constitutes the fundamental unit of analysis in their conceptual framework for human ecology.

The application of Ecosystem Approach in Anthropology dates back to works done by the American anthropologist Julian Steward who first viewed culture and natural environment within a holistic framework which he labeled as cultural ecology. Inspired by Steward later generation of anthropologists particularly A.P.Vyada and Roy Rappaport employed the concept of ecosystem in a much more rigorous manner to understand the mechanisms of population expansion, warfare and the ecological roles played by religious rituals in simple technology using societies. A remarkable contribution was made by T.C.Das, an Indian anthropologist in the field of Ecological Anthropology as early as 1937.

The Ecosystem Approach in Anthropology was criticized for its emphasis on the *stability* of sociocultural systems rather than change and disequilibrium. There are however ecological studies of long and short-term changes in the ecosystems as exemplified by the studies done by Netting.

The enthnoecological studies on the other hand revealed the richness of the native categories of the natural environment while the cultural materialism of Marvin Harris directed our attention to the importance of viewing food taboos from an ecological perspective.

All in all, the application of the Ecosystem Approach in Anthropology provided a materialistic, objective and empirical ground to view culture and society as human adaptation to the natural environment.

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Sample Questions

1) Define ecosystem and discuss its importance in Anthropology.

2) Discuss briefly about the concept of Cultural Ecology as propounded by Julian Steward.

3) Discuss about the contributions of Clifford Geertz in his study of agricultural systems in Indonesia.

4) Discuss how A.P.Vayda and Roy Rappaport employed the concept of Ecosystem in Anthropology.

UNIT 3 CURRENT APPROACHES IN ENVIRONMENTAL ANTHROPOLOGY

Contents

Learning Objectives

At the end of this unit, you will be able to:

- know about various key concepts, theories, and current approaches in environmental anthropology;
- be familiar with the approaches that helped anthropologists in understanding the interrelationship between human beings and environment from an anthropological perspective;
- understand how environmental anthropological research is aiding in bringing a deeper understanding about different dimensions of human endeavor in environmental context; and
- adopt an appropriate methodology to study/understand a situation

3.1 INTRODUCTION

Environmental Anthropology, one of the sub-fields of Anthropology, has emerged only in the 1980s, and has been flourishing since the 1990s. Since Human Ecology, System Ecology, Political Ecology, Environmental Economics etc all fall under the category of Environmental Anthropology it may also be regarded as, "Ecological Anthropology" or, "Cultural Ecology". Currently, Environmental Anthropology is viewed as the study which centers upon the dynamic interaction between human beings and their eco-systems or, natural environment that will cater the students with more understanding, and the nature of applicability in this emerging field. Consequently, Environmental Anthropology has cater an integrated analysis to understand environmental problems and knowledge in a "scientific" and "anthropological" standpoint, especially as a relatively new area

of Applied Anthropology. This requires familiarity with its approaches. Thus, this course topic is to explore theories and methodological approaches of ecological anthropology, human adaptability, subsistence strategies, human alteration of the environment, indigenous knowledge of flora and fauna, ethno-biological classification, natural resource sustainability, political ecology, gender and environment, intellectual property rights, biodiversity conservation, development policies, environmental movements, environmental justice and the current issues in Environmental Anthropology. This critical thinking course is designed to help learner to understand the methodological approaches of Environmental Anthropology, and as a result learner will be proficient to adopting a suitable research strategy-approach in due situations.

3.2 THEORETICAL APPROACHES AND PERSPECTIVES IN ENVIRONMENTAL ANTHROPOLOGY

Environmental Anthropology makes an effort to understand not only "how the environment shapes human culture and society", but also "how human beings shape up the environment" with an appropriate theoretical framework, an inter-disciplinary one, which indebted subjects like science of Health, Geography, Ecology, History, Archaeology, Politics, Economy, Sociology, Law, Resource Management, Policy Analysis etc. So, it offers an opportunity to study the "multiple dimensions of environment", its prospects and challenges, and to lead for better resolutions, and solutions. For a few decades, anthropological research on environment and environmental issues has been increased notably as part of a demand, both subjective and public, creating a more sensibility in environmental issues and "environmental activism", 'across the globe. That has brought hefty changes in human-environment relation due to the development in the sphere of communication and technology.

Environment is often used to refer both "Nature" in its usual meaning, as well as "the environment of a human group" including its "cultural" and "biophysical elements" (Rappaport, 1979). Further, the "socio-natural" unit of analysis has been wide open through the concept of environment as "a research tool" (Smith and Reeves 1989). Environmental Anthropology saw how the social-cultural, and environment interaction has been shaping each other through a process of mutual influence, and covers a wide range of aspects that our minds have developed. In this context, environmental studies crosses academic disciplinary borders, and have necessarily become a combination of natural and social-science approach in unique ways to "trans-disciplinary research". Anthropology is in the forefront of environmental research by its specific contributions with a wider enthusiasm on human-environment interaction in the context of 'society' and 'culture' through a number of substantial holistic and empirical studies.

3.2.1 Theoretical Orientations in Environmental Anthropology

Environmental Anthropology has been established through a number of intellectual inputs from the cultural evolutionism of Tylor, Morgan, and others in the nineteenth century by assuming that all cultures could be moved through stages in a relatively fixed sequence. Thus, Environmental Anthropology has been approached with its subject severally during the course of its development

with theoretical background of Cultural Ecology and Multilinear evolution, Cultural materialism, Eco-systems approach, Population ecology, Ethno ecology, Social ecology, Ecofeminism, Political ecology, Symbolic ecology, Human ecology, Evolutionary ecology, Ecological economics, Traditional ecological knowledge, Liberation ecology, Paleo ecology, Nutrition ecology, Socio-biology, Materialism and Environmental determinism and possibilism, Historical particularism and Age-area by the influence of German diffusionism, Environmental particularism, Sustainable development, Developmentalism and environmentalism, Environmental justice, Environmental conservation, Environmental risk, Environmental history and Historical ecology, Resource management, Human rights and Property rights, Functionalism, Structuralism, Marxism, Post-modernism etc. Currently, the environmental research in Anthropology is moving on two major approaches with distinct methodologies, and objectives. The first approach, "Ecological Anthropology" is using ecological methodologies to study the human-environment interrelations. The "Human Systems Ecology" initially developed by Bennett (1976), has been considered as one of the influential approaches in this notion. It treated the "Human Ecology as human behavior," whereby cultural elements are translated into active behavioral tendencies involving "responses and adaptations made by real people in real-life contexts" (Bennett, 1993). The second approach, "Anthropology of Environmentalism", has been making attempt to study Environmentalism as a type of human action through "Ethnographic Methodologies". This dealt with the analysis of political awareness, and policy concerns. Therefore, new subfields have emerged, such as applied Ecological Anthropology and Political Ecology (Greenberg and Park, 1994).

3.2.2 Earlier Approaches in Environmental Anthropology

Cultural ecology was popular in the 1950s and early 1960s. This approach of study had dealt with "Environment" (ecology), "Culture" and "Adaptation" emphasised on quality, quantity, and distribution of resource. This approach was much owed to Steward (1955) and his diachronic approach. He has attempted to examine the effect of environment on culture by proposing "Culture Core" to demonstrate the relation between certain features of the environment and certain cultural traits of the sets of people living in that environment. He has viewed in Boasian Approach the other elements of culture as autonomous, and subject to the culture history. He said about "limiting factor", which shows how resources could be a variable in a region that despite the limits or, settings of any other variable, will limit the carrying capacity of that region to a certain number. He has argued about "regularities" or, "similarities" between cultures that recur in historically separate or distinct areas or, traditions in a line of multilinear evolution. With many similarities, White (1959) inspired by Marxism, also approached the relation between environment and culture in a unilinear way, and he was much less interested in "adaptation" of groups to specific environments than Steward. They used diachronic approach in their studies.

The neoevolutionism, distinguished from the earlier evolutionism of Tylor, Morgan, and others, likely to be put in inspiration from both Steward and White. Harris' cultural materialism incorporates the ecological explanation and move on a more explicit, and systematic scientific research strategy (Barfield, 1997). He had used "the concept of adaptation" as his main explanatory mechanism (Milton, 1997). This approach shows a desire to move Anthropology in a

Darwinian direction. In his study on the Indian cattle beliefs, Harris (1966) pointed out how current conditions result in ecological utility, and argued that such utility explains the origin of the custom.

The other line of resolution of Steward and White, neofunctionalism, has been much associated with Harris (1975, 1979)-who has greater concern with causality, and the early work of Vayda (1968, 1976) and Rappaport (1967, 1971) who were concerned with system functioning. This approach sees the social organisation, and culture of specific populations as "functional adaptations" which permit them to take advantage of their environments successfully, without exceeding their carrying capacity. They considered "local populations" rather than cultures as their "units of analysis". This approach aims at examining the "interaction between environment and population" than viewing the environment as passive in shaping culture. The methodology is more explicit, rigorous, and quantitative, and even adopts concepts from Biological Ecology, terms like adaptation, niche, and carrying capacity.

An approach that Orlove (1980) terms the Processual Approach lay in contrast to the work of Steward, White, the neoevolutionary, and neofunctionalist views. It shows the importance of diachronic studies on environment to examine mechanisms of change through "the relation of demographic variables and production systems" partially stimulated by Boserup (1965), "the response of populations to environmental stress" (Salisbury 1975; Vayda and MacKay 1975, 1977), "the formation and consolidation of adaptive strategies" (Bennett 1969, 1976; Bettinger 1978; Cancian 1972; Canfield 1973) by following Barth's (1956) early work on the use of the concept of the niche, and new work in Marxism-"Political Economy" and "Structural Marxism".

Ecosystem approach or, model is used by ecological/environmental anthropologists. Moran (1990:3) claims that this view examines the physical (abiotic) environment as the basis around which evolve species, and adaptive responses. Rappaport and Vayda in the 1960s focus upon the "ecosystems" approach, systems functioning, and the flow of energy with the use of measurements as caloric expenditure and protein consumption. The ecosystems research had claimed that symbolic or, ritual behavior could be explained if it functioned to improve energetic efficiencies (Rappaport, 1968). Moran (1979) argued that carrying capacity was the number of individuals that a habitat could support, and which was related to population pressure and to the demands of a population over resources of its ecosystem. Moran (2000) argued that successfully developed life-styles could be reproduced over time in a given surrounding. Rappaport (1967) used this approach in his study on the Tsembaga society. The earlier approaches remained popular among ecological anthropologists during the 1960s and the 1970s (Milton, 1997), and the Systems Ecology further redefined, and transformed it with the study of complex systems, and its radical critique of science (Odum 1983, Prigogine and Stengers 1984; Salthe 1985; Holling 1986; Wicken 1987), and which resulted in a "new ecology" which could answer most of the criticisms of Ecosystems (Scoones, 1999).

The structural point of view has been trying to reveal the environmental influences on social structure in many ways. The book, "Social Stratification in Polynesia" (Sahlins, 1958) has argued that environmental and technological features provide vividness in the Polynesian political organisation and

hierarchically arranged descent groups, and in "Poor man, rich man, big man, chief: Political types in Malanesia and Polynesia" also shown the association of environment and social structure in the larger political units in eastern Melanesia (Sahlins, 1965).

3.2.3 Current Trends in Environmental Anthropology

The new ecology viewed the dynamics of ecosystems as complex adaptive systems. Lepofsky et al. (2003) and Pereira and da Fonseca (2003) are two examples whose careful and detailed studies offer both cautions and roadmaps for judging human impacts on complex human–ecological systems. The new ecology helps to study the context of our human experience as tremendously complex and endlessly evolving with self-organisation, hierarchy, scale, dissipative structures, co-evolution, history, nonlinear dynamics, these and other features of complex systems.

Paine (1969) introduced the keystone concept describing the effects of predation by the sea star *Pisaster ochraceus* on the structure of intertidal ecosystems. The absence of the sea star made its prey species a less competitive, resulting in the loss of diversity in the ecosystem. The sea star thus played a vital ecological function in maintaining the system in a more complex way (Paine 1966, 1969). Recently the concepts of ecosystem structure, and dynamics suggest a more broader concept of keystones that can play a significant role in controlling ecosystems (Holling, 1992).

Anthropology is, by its very nature and tradition, a kind of multidisciplinary science. Within Anthropology, ecological approaches have been employed in a variety of ways. There are a number of approaches to a *Human Ecology* that have been applied since the early 1980s. These represent the increasing specialisation in anthropology, not only by the subfields that were described earlier on, but also by different theoretical approaches. The ecological or environmental approach in Anthropology includes topics as diverse as Primate Ecology, Cultural Ecology, Paleoecology, Human Adaptability Studies, Ethnoecology, Agararian Ecology, Pastoral Ecology, Geographic Information Systems and Remote Sensing, Landscape Ecology, Historical Ecology, Environmental History, Political Ecology, Ecofeminism, Environmentalism, Environmental justice, Symbolic ecology, Human ecology, Evolutionary Ecology, Ecological Economics, Sustainable Development, Traditional Ecological Knowledge (TEK), Conservation, Environmental Risk, and Liberation Ecology, and a number of other areas, many of them interdisciplinary in scope and methodology (Moran, 1996).

Significant progress came from the development of what came to be known as Cultural Ecology," an approach proposed by Julian H. Steward, whose emphasis on behavioral considerations and on the comparative method make this approach among the most robust in the study of Environmental Anthropology. Other approaches followed Cultural Ecology that expanded the scope of environmental research in Anthropology. Whereas cultural ecology seemed to be concerned with cultural areas as a unit of analysis, the approach proposed by A. P. Vayda and R. Rappaport (1976) emphasise that humans are but a compartment in much larger ecological systems.The ecosystem concept accords the physical environment a more prominent place than any other biological concept or theory.

In the latter part of the'1970s and a good part of the 1980s, anthropologists with environmental interests took a number of directions. One of the most notable ones was to focus on biocultural processes using concepts from evolutionary ecology. Evolutionary ecology refers to the study of evolution and adaptive design in Ecological context (Smith and Winterhalder, 1992).

Another direction taken by researchers was to focus on ethno-ecology or ethno-science, the study of how people categorise their environment. This approach focuses on "the words that go with things," trying to understand how a population segments by name certain environment domains and examines the criteria that are used to arrive at that particular structure. This permits assessment of whether morphology or action are more important or whether colour, age, height, or some other characteristic is used by a population. Data collection in the ethno-ecological tradition aims at eliciting native terms for plants, animals, insects, soil types, and so on. It is a linguistics-derived tradition concerned with the 'labels' that go with things and the distinguishing characteristics between them. It provides an excellent starting point for environmental research by providing a locally relevant set of terms and the meaningful differences between items. This approach is important for testing theories of cognition and perception (Berlin, 1992).

The approach of Ethnobiology with applied Anthropology in the advent of participatory approaches to development, and the "indigenous knowledge inquiries" is closely related to, or combined with, Ethnoscience and Ethnoecology. Ethno-ecology approach and study native thought about environmental phenomena (Barfield, 1997), and often focus on indigenous classification referring to specific aspects of the environment such as, soil types, plants, and animals. It can be seen in combination with political–economic forces under labels as, "Biology of Poverty" (Thomas, 1998), "Critical and Humanistic Biology" (Blakey, 1998), "Critical Biocultural Medical Anthropology" (Singer, 1998; Leatherman 1996; Leatherman et al. 1993), and "Political-Ecology of Human Biology" (Leatherman and Thomas, 2001).

Political Ecology, a term first coined in 1972 (Wolf, 1972), deals with the fundamental political issues of structural relations of power and domination over environmental resources to understand the relationships of social, political, and environmental processes (Blaikie and Brookfield 1987; Bryant 1992; Bryant and Bailey 1997; Greenberg and Park 1994). It has been earlier concerned with market integration, commercialisation, and the dislocation of customary forms of resource management than adaptation and homeostasis (Peet and Watts, 1996) explain, by the late 1970s, and has been further influenced by Blaikie and Brookfield (1987), "debate on soil conservation" (Blaikie, 1985), "agriculturalist-pastoralist interactions" (Bassett, 1988), "deforestation" (Durham, 1995), "land use in Amazonia" (Hecht and Cockbum, 1990), and ecology and political processes.

This political economy approach was followed by Political Ecology which takes a more critical approach and focuses on issues of rights and powers and access to resources. Political ecology tries to understand the power relations among resource users and among the resource users and those who hold power. Political Ecology unites aspects of Geography and Political Economy. The union of these critical and empirical approaches is occurring within Ecological Anthropology to reflect the real complexity of human environment interactions. In response to Political Ecology, Human Ecology during the 1990s and early twenty first century,

turned its focus to historical awareness and a concern about national and international policy effects on local populations (Bates, Daniel. and Susan Lees, 1996).

The field of Political Ecology rose rapidly in the late 1980s and the 1990s, heavily influenced by contemporary economic and political theories (Bennett 1976, 1992; Robbins 2004). Perhaps most important of these influences was environmental politics. Worldwide battles between exploiters and conservationists have always had a serious impact on indigenous communities (see Bodley, 1999). For example, by the 1990s, even remote native groups in rainforests found themselves used as pawns in power struggles between national governments, multinational companies, and international conservation organisations. Such struggles are not limited to native groups, as African American communities in the southern United States suddenly find themselves targeted as sites for toxic waste disposal (Bullard, 1990). As a result, gender, ethnicity, and identity—all concepts that are notorious political battlegrounds as well as traditional subjects for anthropologists to examine—emerged as important topics of ecological-anthropological research (Mark Q. Sutton and E. N. Anderson, 2010).

The Ecological Economics or, Environmental Economics emerged as a co-evolutionary system approach looking into both the economic and ecological systems (Norgaard, 1994). It discusses about natural resource issues in terms of the market failure problems arising from externalities, and the rational allocation of scarce resources (Markandya and Richardson, 1992). It has been also focusing the "limits and carrying capacity" (Arrow et al, 1995), "economics of the coming spaceship earth" (Boulding, 1992), "economics as a life science" (Daly, 1992), and "through natural succession ecosystems develop complex feedback mechanisms to ensure their stability" (Barbier, 1989).

Environmental Symbology refers to the study of symbolic meaning within the human environment including personal, social, cultural, and mythic contexts of understanding. In the ''broadest possible view'' (Martin and Guerin, 2005) environmental symbology has attempted to give a holistic definition of both the built and natural environment as human space, "symbology of the built environment" (Clark 2008, 2009) and "architectonic analysis" (Preziosi, 1979). Since, the human beings spend more than 90% of their time inside buildings (Day, 2002) the *interior* environment has a great impact on them. Environmental symbology shares with Environmental Psychology to understand how space becomes a vessel of personal symbolic meaning. For example, the framework for studying the personal meaning of childhood spaces (Day 1990, 2002; Israel 2003; Marcus 1995; Troutman; 1997). Language synthesis also can be done through this approach to examine how humans shape their environment with symbolic language (Fromm 1951; Hall 1959, 1966; Preziosi 1979; Turner 1967).

Emic and etic approaches also used as a helpful approach. A manifest function is explicitly adopted to examine participation in a relevant action. It sees through "emic" with cognized models, 'a rain dance as the manifest function' to produce rain intended and desired by people participating and performing ritual. The latent function of a behavior is not explicitly viewed, recognized or, intended by the people who involved in it. It can be done by an outsider, observer with an "etic approach" and operational models. It has been demonstrated in the "Pigs for the Ancestors: Ritual in the Ecology of a New Guinea People" (Rapapport,

1967), the sacrifice of too many pigs as the latent function while the pig sacrifice to ancestors as manifest function (Balee 1996).

Evolutionary Ecology arose from Mac Arthur's (MacArthur, 1960; MacArthur and Pianka, 1966) work in the 1960s that combined ideas from Darwinian evolution, Ethology, Population Biology, and Mathematical Modeling. Much of the work deals with mathematical models of behavior within an adaptation framework. Anthropologists have been interested in this area of combined economic and ecological modeling of human behavior since the 1970s (Dyson-Hudson and Smith, 1978; Smith, 1979; Thomas et al., 1979). Sometimes the research is identified as *Behavioral Ecology* (Borgerhoff Mulder and Sellen, 1994). Four areas of research that are germane to Anthropology were identified: (1) foraging strategies; (2) mating systems and life history strategies; (3) spatial organisation and group formation; and (4) niche theory, population dynamics, and community structure (Smith, 1983). Much of the research to date has focused among hunter-gatherers and pastoralists societies. Anthropologists are particularly well suited to this kind of detailed observational research, because of lengthy time requirements for field observation within the tradition of extended field work in anthropology.

An even more recent development is the variety of forms of what is coming to be known as 'Historical Ecology" (Crumley, 1994). Historical Ecology or, Environmental History studies how culture and environment influence each other over time (Barfield, 1997) with the concerns of both spatial and temporal dynamics in new ecology. This approach has been moved with ecological thinking, particularly with "equilibrium, balance-of-nature" (Worster, 1979). This view has become an important tool for the re-conceptualisation of the dynamics of human-environmental change. Influenced on the landscape studies of Carl Sauer and colleagues (Price and Lewis 1993; Rowntree; 1996), and landscape and history (Glacken 1967, Schama, 1995), the environmental historians (eg: Worster 1979, 1985; Cronon 1983, 1990; Silver 1990; White 1990; Hurley 1995) have done notable analyses of the interaction of environmental, social, political, and economic change by taking nature as a significant historical actor (Merchant, 1989). Most practitioners of this approach are from Ethnohistory and Archaeology, and they build their theory on ideas from landscape Ecology, Geography, Archaeology, History, and Ethnohistory. In practice, it has been something of a blend of these fields. Anthropology with more historical detail than usual, or History with more holistic cultural and environmental data than usual (e.g., Ehrlich, 2000).This is an important application of Ecology to Anthropology, since losses in biodiversity during the present century can be placed in the context of earlier times through studies of prehistory.

Historical ecologists, like other human ecologists in recent years, have paid much attention to the influence of small-scale societies on their environments. Such people were once dismissed as "primitives" and "savages"who had minimal effect on their surroundings—who were, according to earlier formulations, part of "nature" rather than "culture." In North America, we still find Native American exhibits in museums of natural history rather than in museums of history or art. From such unthinking prejudice, contemporary ecological anthropology—including historical ecology—can deliver us (Mark Q. Sutton and E. N. Anderson, 2010).

Landscape e Ecology, with its background in Geography and Geomorphology, has a particular appeal to sociocultural anthropologists because of their current interests in land use in the Third World (Coppolillo, 2000). Archaeologists, as noted, are also drawn to this framework (in the context of *historical ecology*) for research because of the anthropogenic transformations of the landscape that are a part of human prehistory and history (Balée, 1998). Studies of the *ecology of health and adaptability* of non-Western populations provide a breadth of environmental and health conditions not usually experienced by Western peoples. It is therefore important to study traditional as well as industrial peoples to gain insights into the full spectrum of environmental influences on health.

The Marxian approach to environmental studies has its appropriate relevance. It sees adaptive strategies as outcome of decision making, allocation of resources to a hierarchy of goals under conditions, and examines the class conflicts in the light of resource distribution and the source of the goals and constraints. This approach is recently going much on "structural Marxism" (Bloch 1978; Friedman and Rowlands 1977; Godelier 1977), and the "new political economy", both questioning the rigid sequence of succession of modes and the determination of the superstructure by the base (Heinen 1975; Legros 1977; Orlove 1978).

Environmental Determinism, a deterministic approach used to explain race, human demography, material culture, cultural variation and cultural change. It viewed human activities as governed by the environment, primarily the physical environment, and such environmental factors determining human, social and cultural behaviors (Milton, 1997). It has been counter argued with possibilism, a view that the environment as a range of opportunities from which the individual may choose. This choice is possibly individual's needs and norms rather than in deterministic ways.

Recently, the Environmental Anthropology studies have concern for the environment–technology-social-organisation nexus with the emphasis on development programs, and the analysis of environmental degradation (Netting 1996). Many environmental anthropologists believe in Environmentalism, and think of Ethnography is appropriate, equitable, and effective to suit to deal with "environmental policy" (Blount and Pitchon 2007; Checker 2007; Haenn and Casagrande 2007; McCay 2000; West 2005). The sustainability approach most probably seems to be a new field to understand "the fundamental character of interactions between nature and society'' (Kates et al., 2001).Environmental Anthropology, thus marching a head with a multitude of approaches in a multi-dimensional framework.

It has been seen now that the Environmental Anthropology as being far-ranging in its nature. Thus, Satellite imagery can be used to locate ecological spots such as, the areas of ecological imbalance, and pollution. Geographical Information Systems (GIS) and other related techniques may be used to map various kinds of data on human and environmental features (Sponsel et al. 1994). Macroscope software is also employable in mapping activities. Survey can be done across space and time, and can be compared. Ethnographic research helps to gather first hand information of people and their lives, and helps to discover relevant issues and their fit solutions. The linkages methodology elaborated by Kottak and Colson (1994), a line of inquiry entailed a census approach, a network approach (to trace relationships associated with geographical mobility and external

interventions), survey and ethnographic techniques can be used. Risk analysis, content analysis, statistical, and computational packages, and many field-oriented methods and techniques are employable in suitable contexts. The proper methodological approach and strategies for accessing values or, areas of cultural consensus, identifying and interpreting social mechanisms help us to understand human-environment interaction, and interrelation in a more appropriate, and comprehensive way.

Environmental Anthropology builds on the past experience of anthropologists working on human use of environment but it must perforce go beyond those approaches. An Environmental Anthropology for the twenty-first century must build on the comparative approaches proposed by Steward if analysis of global environmental changes is to be informed by local and regional divergences in causes and effects. This poses a major challenge to research methods, in that generally agreed-upon ways of selecting sample communities or sites and what data is to be collected across highly variable sites must be undertaken despite differences in e Environment, Culture, Economy, and History. Efforts are currently under way at a number of international centers to arrive at these shared *stan*dards (Tuner and Turner 1994; Moran 1992, 1994).

3.3 APPROACHING AND UNDERSTANDING A SITUATION AROUND YOU THROUGH A SUITABLE APPROACH

Having a thorough understanding of the diversified approaches in Environmental Anthropology, you should turn, and look into a situation around you by adopting an appropriate approach. The approach will help you to explore, and analyze it to get a scientific anthropological insight in an environmental perspective.

Activity 1

Find out an issue related to environmental degradation in your neighborhood. Explore this situation with a suitable approach of Environmental Anthropology.

Activity 2

Find out the cause and effect of climate change/air pollution in your neighborhood. Explore this situation with a suitable Environmental Anthropology approach.

3.4 ACCOMPLISHMENT AND CRITICISM

The environmental or, ecological approach has taken anthropological knowledge far and wide. Its knowledge-application adds Anthropology a new scientific perspective. Environmental Anthropology contributes much to the development of extended models of sustainability for humankind. In an environmental or, ecological framework, its research, and study explore, and help to learn more about intimate interactions between humans and their environments. The Environmental Anthropology through its interdisciplinary undertaking, and current approaches gives Anthropology a new dimension.

Environmental or, ecological anthropologists, only on a few occasions actually subscribe to the earlier notions today. Studies conducted within a cultural ecology perspective are limited, and have been criticized only as an attempt to explain how things stay the same, as opposed to how things can change (Balee, 1996). Currently, it has not much worried about either adaptation or, reproduction but, giving attention to both the biological factors, and the full range of human factors in the world environmental crisis, and looking how to solve the crisis, and save our humanity. Environmental Anthropology has to think more about sustainability, and equally the fact that holistic vision is challenging, and is not easily understandable.

3.5 SUMMARY

Anthropology is, by its very nature and tradition, a kind of multidisciplinary science. Within anthropology, ecological approaches have been employed in a variety of ways. There are a number of approaches to a *human Ecology* that have been applied since the early 1980s. These represent the increasing specialisation in Anthropology, not only by the subfields that were described earlier on, but also by different theoretical approaches. The ecological or environmental approach in anthropology includes topics as diverse as Primate Ecology, Cultural Ecology, Paleoecology, Human Adaptabiity Studies, Ethnoecology, agararian Ecology, Pastoral Ecology, Geographic Information Systems and Remote Sensing, Landscape Ecology, Historical Ecology, Environmental History, Political Ecology, Ecofeminism, Environmentalism, Environmental Justice, Symbolic Ecology, Human Ecology, Evolutionary Ecology, Ecological Economics, Sustainable Development, Traditional Ecological Knowledge (TEK), Conservation, Environmental Risk, and Liberation Ecology, and a number of other areas, many of them interdisciplinary in scope and methodology.

Significant progress came from the development of what came to be known as Cultural Ecology," an approach proposed by Julian H. Steward, whose emphasis on behavioural considerations and on the comparative method make this approach among the most robust in the study of Environmental a Anthropology. Other approaches followed cultural ecology that expanded the scope of environmental research in anthropology. Whereas Cultural Ecology seemed to be concerned with cultural areas as a unit of analysis, the approach proposed by A. P. Vayda and R. Rappaport (1976) emphasise that humans are but a compartment in much larger ecological systems.The ecosystem concept accords the physical environment a more prominent place than any other biological concept or theory. In the latter part of the'1970s and a good part of the 1980s, anthropologists with environmental interests took a number of directions. One of the most notable ones was to focus on biocultural processes using concepts from evolutionary ecology. Evolutionary ecology refers to the study of evolution and adaptive design in ecological context (Smith and Winterhalder, 1992). Another direction taken by researchers was to focus on Ethnoecology or Ethnoscience, the study of how people categorise their environment.

It appears that the work in Ecological Anthropology will emphasise culture-areas across continents well as the comparisons of evolutionary stages, and production types characterised by the neofunctionalist, and neoevolutionary approaches. It has been questioned about how far

adaptation adjustments will be adequate, if there are vigorous changes in the most effected plane of social-ecological system. Then the materialistic, and the idealistic approaches in Anthropology are likely to find a base in interpretation of culture, and ideology as systems that mediate between actors, and environment by the construction of behavioral alternatives. The Environmental Anthropology tries to understand its subject through processual approaches in the time frame, and the role of actors by focusing on the mechanisms of change, and the role of social organisation, culture, and biology. It has incorporated the models, and research approaches from other areas of Anthropology, and even from other disciplines to match with demands. This approach takes Environmental Anthropology closer to Biology, and History, and becomes enriched and enriches other fields. The current trend in Environmental Anthropology shows a growth of new lines of fruitful research. The diversified range of methodological approaches resulted in a number of remarkable innovative works, and pushing further environmental anthropology. Thus, it could start contributing in the policy making, and its practice. So, the wide range of its new areas is opening up for more productive interaction between environment, ecology, and the human social and cultural spheres, and thus Environmental Anthropology will be central in future scientific explorations.

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Sample Questions

1) Discuss about the current approaches in Environmental Anthropology.
2) What do you understand about the approach of cultural ecology?
3) Explain how Political Ecology Approach views its subject with a suitable example.
4) What is environmental economics?
5) Describe ethnoecology?

UNIT 4 RESEARCH METHODOLOGY IN ENVIRONMENTAL ANTHROPOLOGY

Contents

Learning Objectives

At the end of this unit, you will be able to:

- be familiar with key concepts, theories, approaches and strategies in environmental anthropology.
- learn about the various methods and techniques by which the relationship between human society and its environment has been studied by anthropologists; and
- gain knowledge of each of the methods and consequent techniques that has been guided by some basic theoretical assumptions about the nature of this relationship.

4.1 INTRODUCTION

The relationship between environment and human society and culture was reflected upon by European philosophers such as Voltaire and Montesquieu even in the 17th and 18th century but theoretically approached in a systematic way by the American Cultural tradition in Anthropology only in the early twentieth century. The British Social Anthropology during the period of its structural – functional approach ignored environment as an influencing variable as they worked with the Durkheimian assumption that all social facts should be explained by other social facts. Franz Boas, guided by the influence of the German Diffusionist School put forward his theory of *Historical Particularism* reviving the notion of history and physical contextualisation of cultures from the early ideational view taken by the classical evolutionists like E.B. Tyler, and the sociological view taken by Radcliffe-Brown and others. Since history must assume a physical context, the notion of an environment of physical area and geographical

location of culture was introduced in the cultural historical approach of the Americans.

4.2 THEORETICAL PARADIGMS AND METHODS IN ECOLOGICAL ANTHROPOLOGY

4.2.1 American Cultural Tradition

Culture area and Climax Culture

Alfred Kroeber, a direct student of Boas, along with Clark Wissler developed what came to be known as the cultural area hypothesis. They presumed that a contiguous spatial location would show similar cultural traits and Kroeber attempted to systematize his theory by putting forward the notion of a centre and a periphery in cultural development. Every culture develops in favourable environmental conditions that can provide resources and climate conducive to cultural growth. Such an environment can foster the growth of a culture to its full potential, what Kroeber had called as Climax Culture. From this centre the culture spreads to outer areas and Kroeber believed that one could trace the spread of culture through the study of similarities and differences of cultural traits and also their dilution which would indicate that one was coming away from the centre. Along with his colleague Otis T Mason he mapped several cultural areas in Northern America. However the entire process appeared too cumbersome and speculative to other scholars and did not take off as a major methodological device although his hypothesis on the link between culture and geography has led to the establishment globally of what we today call regional studies.

Environmental Possibilism

The inclusion of environment as a variable for analysis also led to a conceptualisation of culture in materialist rather than in idealist terms. To scholars like Edward B Tylor, culture was purely ideational and the product of mind. Cultural development took place by the development of the process of thought, in other words ideas built ideas. But within the American tradition, the concept of culture was conceived in much more practical and material terms, as a historical development. According to Herskovits, culture is a solution to the problems faced by humans thrown up by their habitat. Thus the direct link of habitat on human culture was first explored by the school of environmental possibilism as developed by Darryl Ford (1934). He countered the earlier theory of environmental determinism, giving humans a greater degree of agency. The method comprised of examining cultures in their relation to the environment to determine first of all what aspects of culture are at all determined or affected by the environment and secondly how nature puts a limit the creative process of culture. Thus in any given habitat there are a vast number of substances that have potential use value, but which human society chooses which one depends on its own creative abilities and choice. Thus in the same environment of the North Arctic, the *Eskimoes* make igloos out of snow and the *Chukchee* Indians make tents out of animal skins, yet none can use wood or cement for house building as these resources are absent from the environment all together. Also some aspects of culture were seen to be more dependent upon the habitat than the others, like art, religion and storytelling drew inspiration from habitat but was not directly dependent. Neither was kinship seen to have any particular relation to where one lived. The method

of environmental possibilism was comparative and could involve both direct observation and comparison of data collected by others. However, with more and more data available for comparison, the model weakened as similar traits were often found in diverse environments and diverse traits in similar environments. The processes of diffusion and acculturation made any kind of co-relation tenuous. The method of environmental possibilism was also synchronic and changes in both environment and culture were not incorporated into it.

4.2.2 Neo-Evolution and Cultural Ecology

By the mid fifties the field of Ecological Anthropology developed with renewed interest in cultural evolution. The new generation of evolutionists who tried to reconstruct evolution without the shortcomings of classical evolutionism were Leslie White, Marshall Sahlins and Elman Service and most notably Julian Steward. All attempted to develop diachronic models but only Steward developed what may be called a dialectical method that would take into account both changes in culture and changes in environment. The major criticism directed against classical evolutionism was the methodological one of not having any rational criteria for measuring development. Thus while White agreed with Tyler on almost all counts, he was not convinced about Tyler's criteria of literacy as an index for measuring civilisation. According to White, it is the Industrial revolution that marks the major transition in human environment relationship when the threshold from use of organic energy is crossed, towards the use of mechanical energy or machines. The major criteria for measuring development according to White were the amount of energy harnessed per capita, per person in any culture. Although White gave elaborate mathematical equations for measuring the level of technological development and cultural evolution, at the practical level it was never possible to apply these equations and as a result this method remained as a theory but was not applied actually to any sequence. Although conceptually White made an evolutionary schema from the use of less sophisticated technology to more efficient technology; the factor of demography was also present in his evolutionary sequence and technological evolution could be seen as supporting more dense populations. Later Sahlins had criticized White for being too mechanistic and materialistic in his approach; whereas humans have a wider range of wants and goals in life than the mere technological.

The real breakthrough came with Julian Steward's theory of Cultural Ecology that he himself terms as both a theory and a method. Steward first developed a model of culture that combined both the historical and the functional method; he then used this model to prepare a schema of what he termed as *Multilinear Evolution*. He broke up the functional model of culture with equally interdependent parts to one in which the central or core consisted of those elements that interacted with the environment in a dialectical manner to push the culture forward in an evolutionary sequence. The parts of culture that did not interact directly with the environment could follow a historical and imaginative course where the culture developed according to its own distinct character. The core and periphery remind one about the infrastructure and super structure of Marxist theory as the real transformation or cultural change occurs in the core that he also terms as techno-economic. Yet the major difference from a Marxist method lies in that the culture change does not occur due to forces interior to the core (contradictions in Marxist theory) but as a result of the culture core's interaction with the environment that takes a dialectical path.

The aspects of culture that interact with the environment are not given, although they may be labeled as techno-economic, and need to be ascertained for each culture independently and by the empirical method. Thus empiricism was a central methodological concern in Steward's theory not only of cultural ecology but also its application for establishing multi-linear evolution.

By examining a culture first hand, that is by fieldwork, a researcher has to find out what are the aspects of culture that interact with the environment and makes the population adapt. The interactive core of cultural traits that include technology and associated social institutions through which the technology is made effective forms the culture core. The elements of culture that do not form the core are historically developed and referred to as peripheral culture.

The concept of culture core allowed a typology of societies to be formed based on their modes of adaptation to the environment. Thus for example a society that adapted to the environment through foraging as a technique has certain essential characters that allow it to be classified as a hunting and food gathering society. These essential characters that are typical of most hunting food gathering societies will be associated with other traits that make the people distinct from others. Thus Eskimos of the Arctic and! Kung Bushmen of Kalahari are both hunters and food gatherers. Both have a foraging or acquisitive economy and other salient characters like small size, band organisation, mobility and flexibility; yet they are very different from each other in aspects of their material and aesthetic culture. The similarity in the core is derived from their technology and mode of subsistence and the differences because of their different geographical locations, climatic conditions and history. On the basis of the cultural ecology model, many societies across the globe have been classified into broad categories of adaptive strategies; hunting –food gathering, pastoralism, shifting cultivation, settled agriculture and industrial/farming.

The techniques used for applying the cultural ecological approach is both qualitative and quantitative gathered by field work and associated methods. The approach is to look for those essential characters of culture that interact with the environment and parts of the environment being used. It is the latter that is directly related to technology, for example the hunters-gatherers would use the forest as a base and the agriculturalists would use land while the pastoralists will look for water and pastures for their animals.

The cultural ecological approach open the use of the historical method as it assumes that as culture interacts with the environment, it modifies the latter and then at the next stage, cultural modifications are needed to cope with the changed environment, The stronger the impact of culture or the techno-economic system, the more intense the environmental modification and need for change. The foraging technology produces the least effect upon the environment and is therefore least likely to transform. This may be the reason that for about 99% of their lives as Homo Sapiens; humans have lived as hunters/food gatherers and within a few hundred years of industrial technology, the world has been drastically transformed and the environment is sending out danger signals.

A key anthropological work based on Julian Steward's concept of culture core, is Clifford Geertz's (1963) work on Indonesia, where he has studied the impact of Dutch colonial rule on the local subsistence economy. The introduction of

Dutch capital into the wet rice cultivation of Indonesia did not lead to any linear progression of the system but to it becoming more complex in itself, a process Geertz has called "Involution". The intensification of rice cultivation established a dialectic relationship with the variable of population. As population rose, the requirements of this growing population was met by intensifying labour use to make the same system more productive. Thus requirements of increasing population was met by making that very population work more and thus creating a kind of cycle of labour use and labour production. However under different conditions in the coastal region, the introduction of more capital led to cash cropping and linear growth or evolution. Thus Geertz used the method of intensive field work along with that of tracing cultural history as well as comparison between two adaptive zones within the same culture. Thus the communities practicing wet cultivation showed up very different kinds of transformation than the *swidden* or shifting cultivators. The latter allowed the entry of cash crops and finally changed over to a market mentality, changing, as Geertz puts it the culture core itself. Rising population cannot be possibly supported by the intensification of cultivation on the swidden plots, like they could be on the wet cultivation plots. Thus in case of swidden pressures to produce more gave rise to more and more dependence on cash crops and land earlier devoted to swidden was gradually transferred to cash crops and the entire system transformed. In case of wet cultivation the very intensification of cultivation made the introduction of new technology impossible, as the more over cultivated the terraces were the less use could be made of mechanical implements. The dependence on human labour also went well with rising populations except that this population could only be maintained at the most basic level of survival.

The cultural ecological model assumes a functional interdependence between the elements of the core and the environment and is thus unable to accept negative impacts. Also the notion of biology as a variable had been totally ignored in Steward's analysis that depended totally on nature as a variable.

4.2.3 Ecosystems Approach

According to Vaydya and Rappaport (1968) culture and environment show co-variation and not causation by one variable over the other. According to Vaydya and Rappaport, the total environment is composed of three aspects; the biological, the natural and the social.

The ecosystems approach was devised by Andrew Vayda and Roy Rappaport, to include the entire social and cultural variables and the environment into one interactive system. Like all systems , the boundaries of this system was closed around what Rappaport called the 'ecological community'; a society and that part of its environment that is intensively exploited by it over a long period of time. As a test case, Rapport made an ethnographic study of the Tsembaga; a Maring speaking group of New Guinea. The model of the ecosystem is based on that of a thermostat and the regulatory effects of a negative feedback process. It is assumed that all parts of the system consisting of the biological, natural and cultural variables are in a state of homeostatic equilibrium. Any disturbance in the system triggers off the negative feedback mechanisms that tend to bring the system back to normal.

The boundaries of the system in this case are defined by the ties of kinship, what Rappaport has called the, "cognatic cluster"; the environmental variables consist

of the flora, fauna and the spirit world, the parameters of the natural system include the terrain, altitude, rainfall and temperature that in turn set the limits for whatever flora and fauna is available in this region. Rappaport extends the concept of ecosystem to include not only human and non-human species but also other social groups in the neighbourhood. He uses the term "regional population" for all those groups who interact with and influence each other. In fact it is difficult to use the notion of system for a natural system as they exist in continuity and it is difficult to locate a break; hence Rappaport treats the regional population as a system and the territorial population as a sub-system.

The role of the supernatural is central to the analysis and Rappaport shows how rituals play the key role of a regulatory mechanism to keep the system in balance. Through the method of detailed ethnography and rich fieldwork data, Rappaport is able to demonstrate how the population of pigs, the population of humans, the local flora and fauna are all kept in a state of equilibrium with respect to each other through the ritual of *Kaiko*, periodic warfare and pigs sacrifice for the ancestors. Although he presents a very convincing analysis , his model was criticized on two major grounds, firstly the problem of closure of the boundary of the ecosystem, that is possible only analytically and conceptually but not in terms of real ground level reality and secondly, the problems of adaptation or cybernation of the system.

Roy Ellen (1979) in his work on the Moluccans had shown that it was very difficult to isolate populations as closed reproductive units. Even Paula Brown, who had worked among the same people, raised doubts as to whether they had ever been a closed system since they had from

ancient time engaged in border trade and were given to constant efforts at expanding their territory through warfare. In fact much of later ethnographic works have indicated that the existence of bounded endogamous communities is a rarity and with increasing communication and at present globalisation the application of the ecosystem model to the study of ecological anthropology is becoming non-practical and theoretically anomalous.

Moreover Freedman in 1979 had also raised a major issue regarding the thermostat effect suggested by Rappaport saying that this mechanism does not have a mind of its own; it cannot function out of its own volition. If we theorize that the *Maring* rituals act as a thermostat then it has to be assumed that there is some consciousness that triggers off the critical point at which the ritual is to be held. According to Freedman it would be more rational to suppose that the ritual has an outcome that is conducive to equilibrium rather than the ritual exists for that purpose. Moreover the Maring conflicts can also be seen to have the same effect as the rituals to maintain balance between the various variables both cultural and natural. Thus the assumption of cybernetics in systems that are neither set from the outside like a machine or are self-conscious like animate beings is at best erroneous.

4.2.4 Cultural Materialism

Another methodological view point in the study of ecological anthropology was put forward by Marvin Harris, who like Steward attempted to use the basic Marxist model with modifications that advocated a relationship of interaction between behaviour and environment, mediated by culture bearing organisms. The two

elements of cultural materialism are techno-environment and techno-economic. Methodologically cultural-materialism seeks to establish a relationship between these two variables and culture. At the core of Harris's argument is the hypothesis that all aspects of culture have a materialist reason for its existence, an axiom for which he has often been branded as a vulgar Marxist. Harris agrees with Steward's model in most respects except that he thinks that Steward does not clarify what exactly goes into the culture core leaving it to the expertise of individual researchers. He put in a third layer in his conceptualisation of culture, breaking it up into superstructure, structure and infrastructure. Thus while in Steward's model, the culture core contained within it social organisational elements like kinship and rituals, in Marvin Harris's model they are all put into what he calls '*Structure'* leaving only the purely techno-economic variables in the base of infrastructure.

Harris made some persuasive arguments in his application of the model of cultural materialism in which he tries to explain what he considers some of the most apparently irrational cultural practices that can be shown to have very material and practical reasons for existence. As test cases he takes the pig love of the *Tsembaga*, the pig hate of the *Moslems* and the cow worship of the Hindus among others. However, although he gained a lot of popularity because of the exotic value of the topics chosen by him; the method in itself was never followed by anyone else except him. The extreme materialism was shunned by both Marxist and non-Marxist scholars.

4.2.5 The Cognitive and Phenomenological Approach

Many anthropologists preferred to use the less positivist approach of trying to look into the community's perception of their environments rather than imposing external models upon them. Positivism assumes that there is an external reality that can be accessed by the researcher and which has the character of indelible truth. The real analysis in positivism can only be done from the outside of the society by the scholar; the members of the society cannot understand the real implications of their actions. All the approaches mentioned so far are of this type. Scholars like Philippe Descola and Gisli Palsson (1997) and Elisabeth Croll and David Parkin (1992) have tried looking into indigenous categories of thought and cosmologies rather than fitting all observations into the models provided by the analysts. The attempt was to study and understand the cultural models of various societies with respect to environment, in which some of the moot questions to be asked were regarding the very understanding of nature and culture, of animate and inanimate, time and personhood and so on. The researchers tried to understand each culture's mode of classification and coding of the entities that constitute their environment. It was posited that by imposing external categories (here Western) one could not understand the ecological relationships as the very nature of relations were dependent upon how one understood the categories of nature and culture, wild and domestic etc. In fact as suggested by Roy Ellen it was better to dispense with these terms and regard Nature as anything that lay beyond the immediate living area of humans. According to Descola and Palsson (1997:18), "*etymologically, the concept of the 'environment' refers to that which surrounds and, therefore, strictly speaking, an environment incorporates just about everything, except that which is surrounded".*

Thus with the cognitive and phenomenological approaches the very paradigm of western scientific classifications were overruled. More significantly the dualist

paradigm of western mode of thinking was seen as only one kind of mode of thinking and not part of any universal mode of thought. Thus, it was found that not all people everywhere understand the world in dialectical terms as well as in time and space along with other categories that may exist as continuities or processes. Thus the modernist way of understanding the world in terms of neat classifications; like this or that, black or white, was seen as inapplicable to situations in which things were not classified in terms of their intrinsic properties but according to their spatial and temporal location, use, or situational interpretation. Thus, instead of identifying definitive properties like states and substance, the intellectual inquiry has now turned towards process and praxis.

Some scholars attempted to study indigenous categories of classification as "*ethno-botany" and "ethno-zoology"* where the idea was not to collect native terms but to understand the basis for classification of all animate and inanimate objects and aspects of the environment. The cognitive approach attempted detailed reconstruction of categories that were being used in that particular culture. For example if one took something like say 'wood' ; then the various ways in which wood was classified in that culture, would be according to the cultural usage; like fire wood, building wood, wood for making ritual objects, for gifting and so on. The cognitive approach however, differs from the phenomenological in that in it the world is seen as already existing with a set of defined meanings and then the humans live in it accordingly. Thus the meanings are pre-existing and external to human practice.

Activity

Try to document the manner in which natural objects are classified in your native language

However, it is also recognized that since things are constructed in specific historical and temporal contexts, the categories may change with changes in the context. Thus with industrialisation and impact of monetary economy many of the earlier existing categories may change. However, deconstruction as a methodology had its own drawbacks as the very purpose of understanding, that is, classification and categorisation becomes a difficult task. As Palsson (1997:16) has demonstrated that it is possible to have a broad based typology of the different ways in which a culture relates to its environment; namely orientalism, paternalism and communalism. *Orientalism* is the cosmology where nature is viewed as something to be dominated and used by society such as found in early industrial capitalism, paternalism is an attitude of conservation where nature is sought to be preserved and taken care of for human consumption such as the notion of management as applied to the environment .*Communalism* is the cosmology where no difference is perceived between nature and society and also science remains an outcome of practical knowledge rather than abstract reasoning. People who learn about environment by engaging directly with it and treating all objects as equally animate also live in an equal and interactional relationship with the environment. Such a world-view has also been referred to as 'cosmogenic'.

Activity

Ask your parents and other older relatives about what they think about natural objects like trees, rivers etc. Do you find that they have a reverence for natural objects?

The phenomenological view of culture is that people create culture through practices that enables them to live and make sense out of the world in relation with others situated in similar situation and sharing these practices and life ways. People do not live according to a given set of meanings but create these meanings through the process of living itself. Thus a landscape becomes imbued with the meanings that people's actions bestow upon it; like it can become an agricultural field, a city or wasteland, anything that human action can make it into and then these very actions endow it with meaning and convert it into an object of relevant concern. Thus as Ingold (1994:330) puts it is more realistic to say that, "people live culturally rather than *they live in cultures*".

Scholars who follow the phenomenological approach tend to rely on qualitative data that focuses on the body in relation to its environment rather than on the constructions of the mind. Unlike in the cognitive approach where the categories as collected in the ethno-botany or ethno-zoology are seen as passed down from generation to generation ; in the phenomenological approach it is the conditions of life such as hunting or pastoralism that are passed down and each generation lives and recreates its own dispositions through embodies experience. It is because they live under the same conditions that they reproduce much of the way of life and bodily experiences of the previous generations. But such might change if the bodily experiences change; so that if hunters become agriculturalists their view of the world will change. In this form of analysis the researcher begins not from given conceptual categories but by the performances of the body, that is what people do, where they do it, why they do and what meaning they then derive from it.

Activity

Identify all the rituals that involve natural objects and phenomenon in your culture?

4.2.6 Indigenous Knowledge

It is now believed that there can be many epistemologies than just one that different people can have different ways of gaining knowledge than what in the West is viewed as formal learning. Such modes of learning and knowledge were earlier dismissed as non-knowledge or superstition, but the contemporary world, faced the reality that the western world view of orientalism and paternalism that are not working towards a sustainable relationship of humans and the environment as demonstrated by a world faced with global warming and climate change. Scholars are turning towards the communal pattern of life and understanding what is now labeled as indigenous knowledge and wisdom. To consider indigenous ways of doing things as serious science is one of the recent developments in Ecological Anthropology. The specific forms of knowledge pertaining to the environment are also called *Indigenous Ecological Knowledge* or *IEK*.

Activity

Take a list of all the things that any elder in your family can tell you about the medicinal properties of various botanical specimens that you see around you)

4.3 SUMMARY

In this unit we have learnt the ways in which anthropologists have approached the study of human environment relationships or in other words, what are the methodologies of Ecological Anthropology. To some of you it may have appeared that we are talking more about theory than about techniques of collecting data or doing research. It must be remembered that every methodology has three components, the first and the most important is the theoretical approach or the basic premises on which the research is based. Moreover all research is limited to the subject matter of its discipline. Since as anthropologists we are concerned primarily with the study of culture and society; any methodology would have as its first premise the manner in which one is conceptualizing these two terms.

Since Ecological Anthropology arose out of the American Cultural tradition, and as we have already discussed it is rooted in the notion of culture; we have seen that each of our approaches had dealt with one specific way of looking at culture. The basic premises tell us about the questions that we need to ask and the objectives that we may have. For example in the approach of Environmental Possibilism our questions pertained mainly to asking what resources from the environment were being used by people by using which technology. Once we have a set of questions then we need to approach our study by some methods like it could be a *synchronic method or a diachronic or historical method or a comparative one;* or one focusing on a single case. In environmental possibilism; the studies were synchronic and comparative. There was no time frame involved but data from more than one society was compared, as we find in the classic work by Daryl Forde presented in his book entitled *Habitat, economy and Society*. Once we have the approach, we come down to the techniques that depend upon the basic information that we are seeking and kind of explanation we aim at, namely the theory and the approach. In the example, that we are discussing it would involve comparing field data collected by several people including the analyst although it is not a necessary condition.

Thus whether it is Ecological Anthropology or any other field of investigation we work within the outer limits of the discipline; in other words we are always talking about the construction of culture and society. And as we know as students of anthropology, there is nothing on ground that exists objectively as society and culture, these are constructs and like all constructs they vary over historical time and the context in which the researcher is situated. Thus the subjective construction of the analyst is also part of the theory for it is as important to know who is saying rather than only what is being said.

The variation in Ecological Anthropology from other branches is that here the environment or the natural and biological world enter into analysis as definite variables to be incorporated. However, what constitutes environment and how it is conceptualised in relation to culture and society is what has been changing as methodologies of study change. From the positivist or scientific method of comparison and empirical data collection and also construction of overt generalisations, like the neo-evolutionary schemas proposed by scholars like Leslie White and Julian Steward and the concept of ecosystems as given by Rappaport; we have come to far more reflexive and inter-subjective methods used by the scholars whose works have been compiled by Descola and Pallson

and Croll and Parkin; where the focus is on cosmologies and world views and people's own perceptions.

The techniques used by anthropologists are solidly based in fieldwork and qualitative data collection. However cognitive anthropology may focus more on quantitative data as they try to reconstruct the categories that people use. Phenomenologist's on the other hand are concerned only with purely subjective and qualitative data and may depend more on narratives than on quantified or otherwise objective mode of data collections.

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Sample Questions

1) How did the theory of Cultural Ecology help in creating a typology of human societies?

2) What is cognitive approach to study of Ecology? What is the classification given by Gisli Palsson?

3) What is the phenomenological approach? What techniques are used for it?

4) What is Indigenous knowledge? Why should we study it?

5) Who gave the theory of cultural materialism? How is it different from cultural ecology?

6) What is the ecosystem theory? Is it possible to use it in contemporary world?