

## Human Ecology: Introduction

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### **Abstract**

*Human ecology is a broad spectrum of interdisciplinary field. The profound interaction between human and nature was studied. Decades of studies about human ecology is recorded. Darwin's theory is highlighting observation. This paper provides information regarding the various studies performed by different ecologist to understand the human evolution.*

**Keywords:** *Human ecology, Interaction. Nature, Darwin, Ecologist*

### **INTRODUCTION**

Human Ecology is the study and assessment of the mutual interconnections between people and their environments at multiple scales and multiple time frames [1]. The subject is informed by ecological and evolutionary theory in biology and by the predominant concepts of landscape and spatial relationships in geography; but recognizes that humans have gradually achieved partial ecological and geographical dominance through their culturally given but continually changing technology and social, economic, and political arrangements. Human ecology subsumes such specialized approaches to these relationships and links as cultural ecology, political ecology, geography, ecological anthropology, environmental sociology, environmental economics, environmental psychology, and environmental history [2].

### **DRAWING ON HISTORY**

Although the neologism or the term "ecology" dates from the second half of the 19th century and the term human ecology first appeared around 1908, interest in human environment relationships goes back much farther. For example, the ancient Greeks were mainly concerned with the impact of the

environment on human health (On Airs, Waters, and Places was written by an anonymous author in the Hippocratic tradition) [3]. Plato speculated on the role of humans in reducing the forest cover of Greece. Such cartographers and geographers as Ptolemy and Strabo recognized the spatial differentiation. Similar traditions existed profoundly in other ancient societies such as China. Saint Francis's teachings suggested that humans could not consider themselves completely separate from and superior to nature [4]. Chinese philosophy, poetry, and art, building on a base of shamanism, Buddhism, and Taoism, also mainly emphasized the relationship between human consciousness, society, and nature. These traditions include little in the way of systematic observation and analysis, however, or experimental testing of relationships [5]. One important exception has been the development of agronomy, range science, and forestry mainly based on long-term observations on soil fertility and pest management on the local scale. In societies with a written tradition, this has often resulted in a sophisticated literature; but even in societies with an oral tradition, the resulting "ethnoscience" has often been remarkably insightful [6]. Another important exception has been the almost

universal tradition of mapping surroundings using a variety of cartographic methods. Beginning in the 16th century, European expeditions of discovery and conquest led to some of the

first field-based systematic and comparative observations of human–environment relationships at a larger scale [7]



*Fig: 1. Human ecology*

Observers such as Cieza de León (who accompanied the conquerors of the Inca Empire) produced detailed geographic accounts of landscapes, land use, and bio resource management that are still used by human ecologists documenting environmental history(fig:1). Colonial authorities synthesized detailed reports of local resource use (such as the relaciones geográficas in the Spanish empire), as well as maps at a variety of scales. European advances in census taking, in both Europe and its colonies, helped John Graunt and Edmond Halley develop some of the basic analytical methods of demography by the 18th century [8]. At the end of the 19th century, Thomas Malthus pointed out the importance of the population resource ratio and warned of the persistent danger of societies overgrowing their resource base [9]

**BIRTH OF THEORIES**

Alexander von Humboldt represents the culmination and transformation of the specific tradition of colonial observers of resource management [10]. His diaries and books based on his travels through the Americas at the end of the colonial period details climate, plants, animals, population, bioresource management methods, and even archaeology, utilizing the most advanced instruments and collection methods of his time. Moreover, studies correlated the results using maps and diagrams, generalizing about both the environmental and political conditions of resource management [11]. Researchers also pointed out in detail the many impacts of colonial policy on resource use. Ecologist argued for an expansion of economic freedom, recognizing the importance of state intervention, and

argued for a more local level of colonial administration [12]. Later, in the 19th century travellers and scientists such as Darwin, Wallace, Bates, and da Cunha further developed ideas typically essential for the later development of human ecology. Darwin was much inspired by Humboldt to perform detailed fieldwork in South America, and was influenced by Malthus in his development of the theory of natural selection in diverse environments to explain the diversity of species [13]. The application of Darwin's ideas to the human affairs was at first crude, but by the beginning of the 20th century was an important influence on scientific human ecology. In human ecology, the concept of adaptation did not refer to the survival and typically reproduction of genetically heritable traits, but rather the continual process of choosing among and refining strategies of making a living (reproducing a way of life) in a changing world. In human affairs, behaviour is dominantly adjusted through the intervention of economic and political incentives long before stark survival is at stake.

#### **DEFINITIONS AND INTERPRETATIONS**

The term "ecology" derives from the ancient Greek words *oikos* and *logos* and means "science of the habitat." It is generally agreed that this term was used first by Ernst Haeckel (1835–1919), a German zoologist, in 1866. The word ecology designates a science that deals with the interrelationships between organisms and their surroundings. Since the late nineteenth century the term "ecology" has been interpreted and delineated in numerous ways [14]. For example, in the natural sciences, botanists and zoologists use the term "general ecology" to majorly refer to the interrelations between animals, plants, and their immediate surroundings. The number of the contributions about the science of ecology grew from the beginning of the

twentieth century following some seminal publications including those by Eugene Warming (*Oecology of Plants: An Introduction to the Study of Plant Communities*, in 1909) and C. C. Adams (*Guide to the Study of Animal Ecology*, in 1913) [15]. A distinction is often made in the biological sciences between "autecology" and "synecology": Whereas autecology studies the interrelations between organisms of one species and its environment, synecology analyzes the interrelations between communities of biological species—animals, plants, fungi, and bacteria—in terms of their interrelations with one another and with the biotic and abiotic constituents of their environment [16]. During the twentieth century synecology became the dominant mode of scientific study because empirical research showed that animal and plant organisms, bacteria, and fungi establish viable relationships with their environment through collective mechanisms that stem from a system of relations and networks rather than independent action [17].

#### **UNESCO – EOLSS SAMPLE CHAPTERS CULTURE, CIVILIZATION AND HUMAN SOCIETY**

A community develops from simple to more complex forms through a sequence of developmental stages known as succession. This term refers to the slow progression of changes in communities of animals and plants owing to changes in ecological and climatic conditions [18]. The evolutionary trend is such that some species with a longer life span become dominant in a particular biotope for a certain time period which may correspond to a climax state [19]. Climax is a dynamic equilibrium state that is determined by the limiting factors of the climate, soil, or other ecological conditions [20]. It refers to the culmination of the evolution of animal and plant communities that corresponds to the optimal development of

the biomass with respect to specific ecological conditions. By using an analogy, some contributions to people–environment studies imply that human groups and communities are natural phenomena that develop by slow progression and succession processes [21]. This interpretation means that psychological and social characteristics of human individuals and societies are equated with biological factors, that competition between human beings is an innate biological process, and that climax is the outcome. In contrast to general ecology, “human ecology” usually refers to the study of the dynamic interrelationships between human populations and the physical, biotic, cultural, and social characteristics of their environment and the biosphere. However, this is not the original meaning of this term, which was first used in 1921 by Robert Park and Ernest Burgess in their contribution titled, *An Introduction to the Science of Sociology* [22]. They described human ecology as the study of the spatial and temporal organization and relations of human beings with respect to the “selective, distributive and accommodative forces of the environment.” This publication became the landmark for many other contributions that studied the spatial distribution of human populations, especially in urban areas [23]. In addition, the application of concepts borrowed from plant and animal ecology for the study of human communities implied that human ecology was quiet interpreted as the study of those biotic factors that influence the social organization and spatial distribution of human groups and communities. The majority of these contributions typically interpreted urban “space” as a surrogate for “environment.” During the last three decades ecology has been a word à la mode because it has also acquired a much stronger political connotation. Nonetheless this approach can be traced back at least to the mid-nineteenth century when authors

such as George Perkins Marsh in North America drew attention to what they considered to be the anthropogenic causes of environmental problems. A similar approach has been aggrandizingly used by authors from the 1960s, including Rachel Carson in *Silent Spring*, first published in 1962 [24]

## **CONCEPTS OF HUMAN ECOLOGY**

### **Basic Definition**

Human ecology is the research of the interactions of humans with their environments, or the study of the distribution and abundance of humans. This definition is much based directly on conventional definitions of biological ecology. Ecology is usually defined as the study of interactions of organisms with their environments and each other. More pointedly, it can be defined as the research of the distribution and abundance of organisms. This definition is deceptive. It implies much more than it says explicitly because virtually everything that humans are or do (and the same goes for any species) affects their distribution and abundance [25]. Thus, using the term “human ecology” mainly expresses a broad ambition to understand human behaviour.

## **BORROWING CONCEPTS FROM BIOLOGY**

The basic rationale for human ecology is that concepts and methods shared with the biological sciences ought to be quiet useful to understand human behaviour. Our behaviour is taken to be just a special case of general ecological processes (as any particular species is a special case). This idea has a long history—in demography, for example. Malthus’ pioneering ideas about human population explosions played a large role in Darwin’s thinking about all populations. Darwin’s ideas about the natural selection in turn have had a large influence on how we think about humans. As Foley’s title in the epigraph specifically



indicates, humans may be a peculiar beast, but then so is every other species. Other studies agree with Foley that humans can't stand in some splendid isolation from the rest of nature. Specific organisms use organic structures directly to make a living; lions kill prey with their teeth and monkeys grind hard seeds with their teeth. People do a little of the same, but most of our adaptations revolve around complex traditional skills we have learned from others. Human populations have a given basic set of tools and aids (technology), whatever their evolving cultural tradition has developed to that point. The details of the toolkit will vary adaptively in the context of the given type. For example, hunting societies that live in environments rich in aquatic resources.

Environment is defined and described as the circumstances, objects, or conditions by which one is surrounded. These usually include the ramify of physical, chemical, and biotic factors (e.g., climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival. When discussing humans, "environment" often includes the aggregate of social and cultural conditions that influence the life of an individual or community. The definition leaves it up to the analyst what to imbibe inside the population and what outside in the environment [26]

#### **OVERVIEW: HUMAN ECOLOGY**

Use harpoons, whereas desert dwellers will lack such devices. The technological traditions are so variable from place to place and time to time that ecologically we function as if we were many different species. The application of a given technology in a given environment will humongously influence (or at least strongly constrain) the density of people that can be typically supported and the effort that must be devoted to subsistence. Population density (and the possibilities

for aggregation into the large settlements versus the need to stay dispersed to exploit extensive resources) will determine (strongly constrain) social organization. Complex social interactions typically require many people, which is impossible in a dispersed, low density society. At the same time, societies typically must mobilize the same basic technology in different ways, depending upon the bio resources the environment offers. At least environment, technology, demography, and social and political organization ought to be quite highly systemic with the primary causal arrows leading from environment and technology to demography typically to social and political organization. Perhaps even some symbolic features of culture like religion may have some systematic relationship to ecology [27]

#### **INFLUENCE OF HUMAN ECOLOGY IN BIOLOGY**

The fundamental common core of ecology and evolution is sometimes called population biology. Human ecology borrows a ramification of ideas from population biologists. The most basic of these are the ideas of population growth and regulation in a single population, as developed by demographers. If one adds heritable variation, such as genetic variation to the population, then different types will compete. Some will survive and reproduce better than others, and the more fit types specifically will replace the less fit. This is Darwin's idea of natural selection. Since the effect of natural selection mainly depends upon the environment--a variant that fails in one environment may succeed in another--natural selection tends to produce diversity. One often says that it adapts organisms to the environment that they live in. Then, we need to think about individuals of a population interacting with each other as well as the outside environment

## **DRIVING THE HUMAN ECOLOGICAL FOOTPRINT**

But the effects of scale can be slightly moderated by both the content of what is consumed and the technique, or technology, that is used in production, including disposal of waste. In turn, the composition of consumption and the typical techniques of production are influenced by a variety of structural factors, encompassing culture and institutional arrangements that allow manifestation of power by some and suppress the exercise of power by others. Thus the set of factors that influence anthropogenic environmental stress and is much diverse and is the subject of a rapidly growing ambience. They examine and observe the empirical evidence that the growth in traditional landline phones, cell phones and internet use changes energy consumption and production, electricity consumption and production, and the number of cars. Unfortunately, the hope that electronic communication will typically displace energy use is not warranted. Cell phone use has no observable effect on the prevalence of cars, the production or consumption of energy in general, and electricity in particular. In contrast, an increase in landline phones is associated with an aggrandise in both overall energy production and consumption, and with increased electricity consumption and production. And aggrnadized internet use is associated with an increase in car ownership. Overall, the growing use of electronic communications does not reduce stress on the environment and may be part of a process by which it is exacerbated. Marquart-Pyatt provides an analysis that combines a central theme in structural human ecology—the analysis of the ecological footprint of nations—with an advancing methodological approach—the analysis of a regional subset of nations. The ecological footprint is a broadly accepted integrative measure of stress on

the environment, and was the subject of some of the earliest work in structural human ecology. The overall footprint and its key components (land area devoted to crops, to grazing, to the built environment and CO2 emissions) continue to be a major theme in structural human ecology. But while initial studies typically considered the full set of nations for which data were available, more recent analysis, being attentive to structural variations across nations, have been examined drivers within regional subsets. Here Marquart-Pyatt offers an examination of the drivers of the ecological footprint and its components in a critical region: West Africa [28].

## **HUMAN WELL-BEING**

While the majority of researchers in structural human ecology examine the drivers of stress on the environment, one of its pioneering contributions—made by Mazur and Rosa—examined the relationship between environmental stress and human well-being [29]. This theme is being revitalized typically in a number of recent studies examining the question of whether or not increases in well-being can be achieved without attendant increases in environmental stress.

Sommer, Shandra, Restivo and Coburn contribute to this line of analysis on human well-being and the environment. Givens garners a detailed examination of how urbanization and efforts to provide improved water services in urban areas are related to the carbon intensity of well-being (CIWB; CO2 emissions per capita typically divided by average life expectancy at birth). She finds that both urbanization per se and provision of improved water services (potable water and sanitation) increase CIWB, and that these effects are stronger in developing nations than in developed nations. They examine and observe two related key indicators of human well-being: maternal

and neo-natal mortality for a sample of nations located throughout the continent. Their work is much motivated in part by a sociological literature investigating how institutional arrangements have affected human well-being. They consider the requirements for “structural adjustments” imposed by the International Monetary Fund on a number of developing nations [30]. These “adjustments” required moves towards neoliberal typically economic policy in exchange for restructuring crippling debt on international loans. But structural adjustment policies still have an adverse effect on human well-being, even when improved water and sanitation are much accounted for in the analysis.

### **EMERGING DIRECTIONS IN STRUCTURAL HUMAN ECOLOGY**

Each of the works in this special issue makes specific contributions to theory and our empirical understanding of human ecology. In the aggregate, they also typically point to several emerging directions of inquiry in structural human ecology. Initial efforts are underway to connect SHE with a number of other lines of theory. These include connects to theories of ecosystem and world-systems dynamics, to the growing body of work in animal studies, to growing concerns with the effects of inequality, and to work on the human well-being impacts of economic growth and development policies, such as wide neo-liberal structural adjustments and ongoing efforts to improve access to potable water and sanitation. Second, a number of papers in this issue counter commonly held conceptions about factors that enhance sustainability. Both aggrandized use of telecommunications and increased urbanization seem to make things worse, despite hopes that the opposite might be true [31]. These findings mainly demonstrate a particular value of structural human ecology: disciplining theory with data and thus identifying what social changes may enhance sustainability and which, at least to the present, have not.

### **CONCLUSION**

Human ecology is a broad field study where a tremendous amount of work is carried from the time erstwhile. It is a trans-disciplinary field where there is a much prominence given to the evolution of human and anthropogenic activity. This paper discusses an overview of human ecology

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