

## Human Ecology and Diseases Ecology: A Medico - Geographical Review

S.R.L.S Rathnasekara  
Department of Geography, University of Kelaniya.

### Abstract

---

*Medical Geography is one of the main approaches to study disease ecology and related issues in current Geographical Research. Disease ecology has originated from human ecology and the human ecological processes have been helpful in generating some diseases where the humans and diseases environment. It is a known fact that the every health issues are connected with human ecology and diseases ecological background. This paper examines the relationship between human ecological process and diseases ecology through a medical geography approach using secondary data.*

---

### Introduction

According to Odum and Barrett (2004), the word ecology has derived from two Greek words as of *Oikos* and *logos*. According to them, *oikos* is the household and *logos* are the study. There are various definitions for human ecology by innumerable authors. Michael, (1986), has defined human ecology as the study of the living organism and the relationship between those organisms and their inanimate environment. According to MacIntosh (1985), ecology is the body of knowledge concerning the economy of nature which investigates the relationship between humans and animal in relation to their inorganic and organic environment. Inorganic and organic environments relate to the study of homes or an organism is the ecosystem otherwise. Worster (as cited by Gare YNA) was of the view that ecology is representing the manifold and complex relationship between the plants and animals that form one community.

Williams, Roberts, and McIntosh (2009), were of the view that human ecology has its roots in ecology where the word was used to describe the study of organism and its relationship with the environment. Lopes and Begossi (2009) have defined human ecology as the study of all relationships between human and nature. According to this definition, human culture and behaviour is not a sole product of the society but it takes place due to interactive physical and biological variables with the society including culture and behaviour.

According to Foley (1987), studying the interactions of humans with their environments is known as human ecology. Foley has further stated that ecology is also related to the study of the distribution and abundance of humans. Accordingly, it could be concluded that human ecology expresses a broad ambition to understand human behaviour. This means that the ecology is the study of the distribution and abundance of organisms. Accordingly, Foley has concluded that human ecology actually expresses broad ambitions for understanding human behaviour. Foley has further stated that human ecology has a relationship with biological science and both human ecology and biological science are sharing concepts related to both. Therefore, concepts in biological science are useful to understand the human behaviour as well as human ecology. Accordingly, human behaviour is very much essential and important in understanding the general ecological processes.

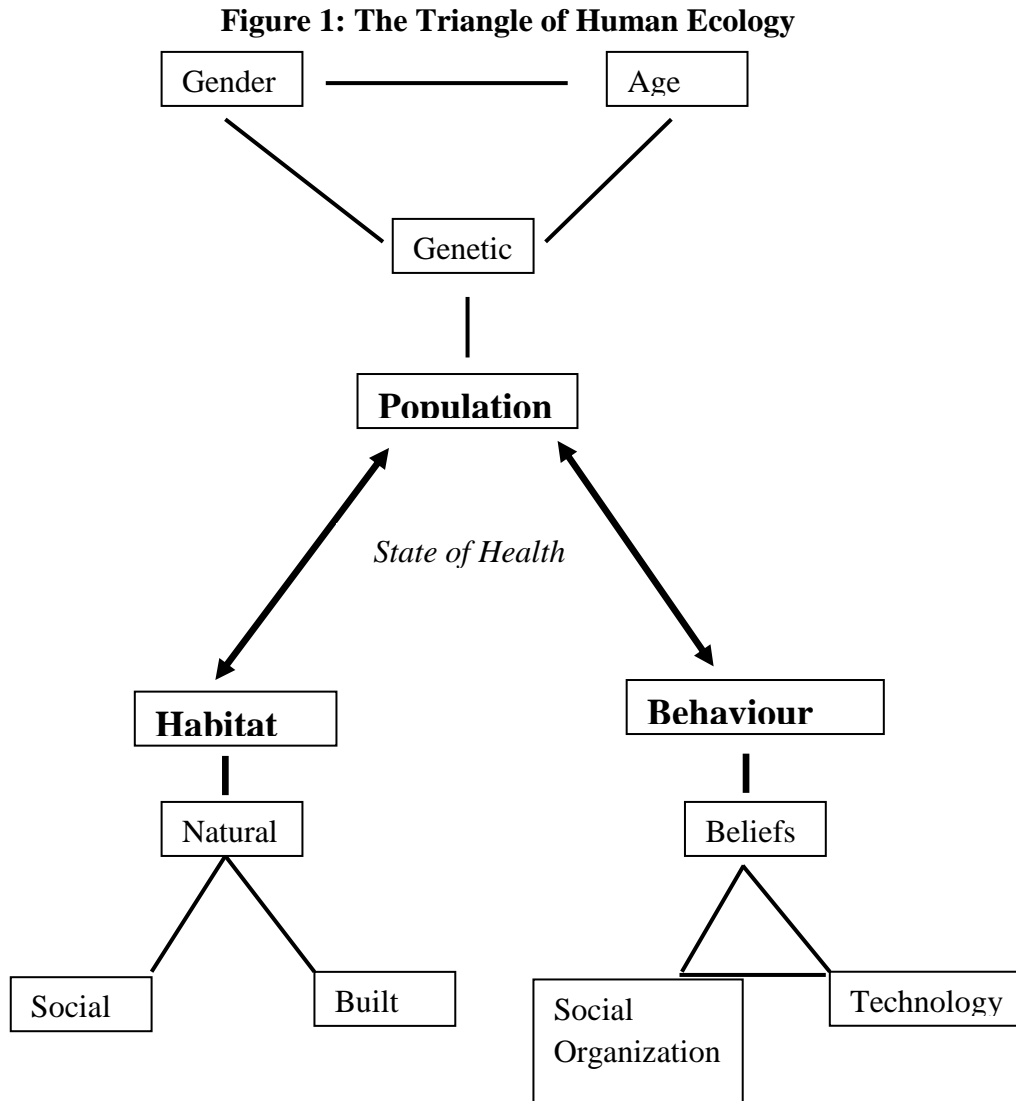
Williams, Roberts and MacIntosh (2007) were of the view that human ecology has its roots in ecology in Western definitions. This has a relationship to Foley's definition. William *et al*

(2007) has further stated that human ecology initially has grounded in the physical and biological sciences and ecology is largely concerned with the study of the ecosystem which is considerably distinct from human beings. Accordingly ecology is studying of households. On the other hand, then it is the study of life at home with emphasis on the pattern of relations between organisms and their environment. Organism and the environment are considered as considered as the ecosystem. Accordingly, when we discuss about human ecology, there is a strong link to the ecosystem. An eco-system includes components of the environment such as forest, grasslands, deserts, wetlands and coastal areas. The nature of the ecosystem is based on its geographical features such as hills, mountains, plains, rivers, lakes, coastal areas or islands. It is also controlled by climatic conditions such as the amount of sunlight, the temperature and the rainfall in the region. The geographical, climatic and soil characteristics form its abiotic (non-living) components. These features create conditions that support a community of plants and animals that evolution has produced to live in these specific conditions. The living part of the ecosystem is referred to as its biotic component.

### **Human Ecology of Diseases**

As discussed earlier, human ecology of the disease is concerned with the ways of human behavior for two reasons. It is the interaction with the cultural, socio-economic and the environmental conditions in order to either produce or prevent diseases to the people and from the people. The main purpose of discussing human ecology and disease is to establish a conceptual framework in order to understand as to why human disease and health vary over the surface of the earth. This situation was well explained as follows by Meade and Emch (2010). According to them population, habitat and behavior triangle enclose the state of human health. Habitat is part of where people are living. This includes households, workplaces, settlement patterns, biotic and physical phenomena, health care services, transportation systems and governments. Population in this triangle considers human as a biological organism which hosts for the disease. The ability of the population to resist diseases depends on the nutritional status, immunological status, and the physiological status of the people. Behavior component of the triangle represents the human culture prevailing in the society which can be observable. Meade and Emch (2010) were of the view that behavior springs from cultural precepts, economic constraints, social norms and individual psychology. Behavior is always influenced by mobility, roles, cultural practices and technological interventions.

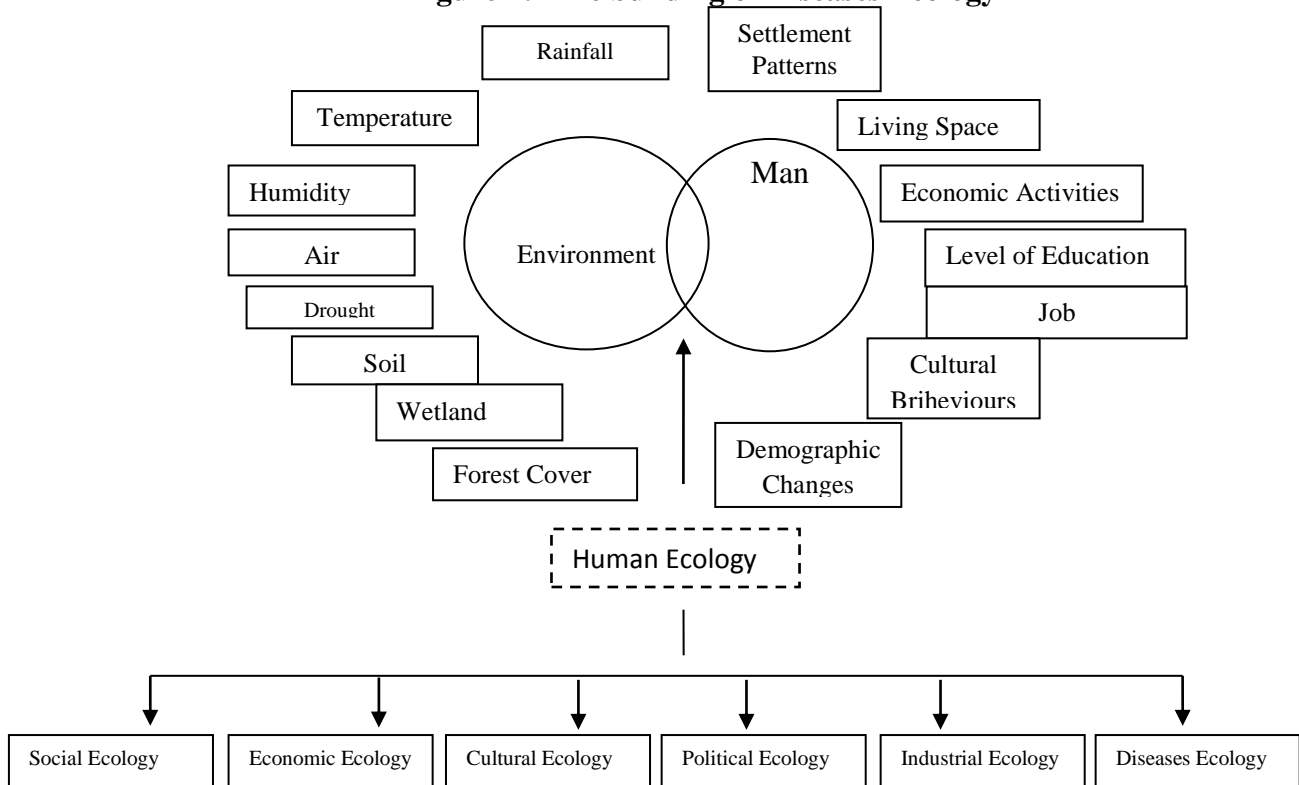
Meade and Emch (2010) pointed out a of conceptual frameworks to identify why human disease and health vary over the surface of the earth. This situation was well explained as follows by Meade and Emch (2010). According to them, population, habitat and behavior triangle enclose the state of human health (Figure 1.1). Habitat is a place where people are living. This includes households, workplaces, settlement patterns, biotic and physical phenomena, health care services, transportation systems and governments etc. Population in this triangle considers human as a biological organism which actively hosts the disease. The ability of the population to resist diseases depends on the nutritional status, immunological status and the physiological status of people. Behavior component of the triangle represents the human culture prevailing in the society which is observable. Meade and Emch (2010), were of the view that behavior springs from cultural precepts, economic constraints, social norms and individual psychology. Behavior is always influenced by mobility, cultural practices and technological interventions.



Source – Melinda, S. Meade, Michael, Emch (2010), Medical Geography, P31.

All humans spend most of their time in a building. These buildings either may be their homes or workplaces which are the built up environment by humans and it is far from the nature. What do we feel when we are at our own home? When we take our home, there are various things that are surrounded there. The house may be well ventilated or with insufficient ventilations. There may be various types of insects in the house. We may use sprays for such insects. Dogs and cats are living inside some houses. There are houses with sufficient windows to light the house and some are with fewer windows. There are places where you can find roaches, spiders or mice live in the house. These are the common systems and features of facilitating diseases to be transmitted to humans. Accordingly, our homes or workplaces can be considered as ecology of disease and it is a good example of creating much of the disease environment by humans. Meade and Emch (2010) has found that modern building construction methods and structural procedures are encouraging to create disease ecologies. Further they have stated that the houses with less sunlight, less ventilations and too much crowded are ideal habitat for tuberculosis bacteria.

**Figure 2: The building of Diseases Ecology**



Sources – Design by the Author, 2013

According to Figure 1.2, Man or human side represents living situations such as settlement patterns, living space, economic activities, level of education, employment, cultural behaviours and demographic changes. In the environmental side, it has eight components namely, rainfall, temperature, humidity, air, drought, soil, wetland, and forest cover. In the situation where, the environment and humans are meeting together, the anthropological ecology is established and when there is conflict between humans and the environment disease ecology will be created. There are eight human activities that contribute to make disease ecology. These activities are as follows.

1. According to establishment of housing schemes
2. Cultural behavior of humans
3. Economic activities of humans
4. Migration pattern of humans
5. How humans have established their living environment
6. How humans are utilizing land
7. Traditions, attitudes, characters of humans
8. Changes made to the surface of the land structure by humans

Settlements patterns are also creating disease ecology. There are three types of settlements in humans that of nuclear, dispersed and linear. Nuclear settlement is the most common and popular method of settlements by rural people all over the world. From these settlements, people are moving from houses to agricultural fields, forests, grasslands etc. This creates people to be infected with insect transmitted diseases. People who are living in dispersed settlements have only exposed to vectored diseases originating natural surroundings. In linear

settlements people residing in houses are lined up along both sides of a canal which is a prominent feature in Sri Lanka. These settlements are the most exposed diseases ecology.

There are five ecologies and we have already known much about the disease ecology and hence other five ecologies are described below briefly. These all ecologies are related with diseases ecology when clash with the root course of diseases.

### **Social Ecology**

Initially, the social side of the ecologies was slightly discussed among some academics of the University of Chicago in 1920s. According to Stokols, Lejano and Hipp (2013), during the period 1925 to 1950, Chicago School of Human Ecology was established through some relationship between human ecology and social communities which were the starting point of the social ecology. Alihan (1938) as cited by Stokols et al (2013), has published her first document on ecology conceptualizing of human communities that combined the concerns of bioecology and economic with those of ethics, anthropology, urban planning, psychology, sociology and other fields. After Alihan (1938), Emery and Trist (1972) as cited by Stokols (2013), has referred this broader conceptualization and study of human-environment relationship as social ecology.

According to Stokols et al (2013), social ecology highlights the multidimensional structure of human environments. Further it incorporates multiple levels of analysis and diverse methodologies in social situations. moreover they have stated that social ecology draws upon key concepts and assumption derived from systems theory such as interdependence, homeostasis, negative feedback required to understand the interrelationships among people and their surroundings while analyzing human environment system. Meade and Emich (2010), have defined social ecology as a part of human ecology which deals with social and societal aspects of the human environment.

### **Economic Ecology**

Malthus and Ricardo are the pioneers in economic ecology. Malthus is the first one to talk about economic ecology by publishing his work in population growth. Malthus in his writings (1798) has argued that human populations were capable of increasing exponentially and would do so as long as sufficient food and other essentials of life were available. He further hypothesized that food supply will increase arithmetically whereas population will increase geometrically.

David Ricardo (1926) has introduced a second model of how economic activity relates to the environment, not because he was concerned with environmental degradation or human survival, but rather because he wished to justify why landlords received a rent from land ownership. According to Costanza et al (1997), subsequent to these two contributions, ecology and economic have been pursued as separate disciplines through most of the 20<sup>th</sup> century by borrowing theoretical concepts from each other. According to Costanza et al (1997), by 1980s, group of scholars realizes that protecting the environment for future generation is a must and for that purpose ecology and economy have to be brought bring to a one single platform. Costanza et al (1997) have further stated that the ecological economics is not a single new paradigm based in shared assumptions and theories.

## **Cultural Ecology**

According to Sutton and Anderson (2010) cultural ecology is the humanistic side of the human ecology. They have further stated that in human ecology, various aspects of culture and environment are studied in order to ascertain many aspects of culture and environment. These studies will try to find answers as to why and how cultures are behaving in such a manner to solve their problems, how groups of people understand their environment, and how they share their knowledge of the environment. In cultural ecology, the way in which culture is used by people to adapt their environment is studied. The study of the relationships between culture and environment is not just academic, it is vital, not simply because it is interesting but because it offers understanding and possible solutions to important contemporary problems such as issues in deforestation, loss of species, food scarcity, and soil loss etc. In cultural ecology vector diseases such as yellow fever, bubonic plague, malaria, dengue hemorrhagic fever (DHF), schistosomiasis, Lyme disease, and Rocky Mountain spotted fever (RMSF) are common (Meade and Emich 2010).

## **Political Ecology**

According to Sutton and Anderson (2010), political ecology is concerned with power relations and specifically with the day-to-day conflicts, alliances, and negotiations that ultimately result in some sort of definitive behavior. It directs our attention to immediate processes and conflicts. It also is notably concerned with scale, analyzing collisions from the household level to the local to the global. It has therefore meaningfully supplemented the other branches of human ecology that tend to look at the long term but that have often ignored the wide scale. Where cultural ecology tends to concentrate on a particular small ethnic group over a long time, political ecology tends to focus on larger forces impinging on a community at the point of time.

According to them political ecology falls into two broad categories that of resource management and research on the fate of small scale, indigenous societies caught in the midst of modernization.

## **Industrial Ecology**

According to Garner, Andy and Keolelion, Gregory (1995), studying the physical, chemical, and biological interactions and interrelationships within industrial and ecological system is the industrial ecology. Frosch (1992) was of the view that industrial ecology involves identifying and implementing strategies for industrial systems to more closely emulate harmonious, sustainable, ecological ecosystems. Frosch (1992) has further stated that one goal of industrial ecology is to change the linear nature of industrial system. The aim of industrial ecology is to optimize the use of by products and minimize the wastes that leave the production system. Robert (1997), has identified that identifying and tracing flows of energy and materials through various systems is another goal of the industrial ecology. Ayres has further stated that this concept could be utilized to follow material and energy flows, transformations and dissipation in the industrial system as well as into natural systems.

## **Conclusion**

There are countless situations where diseases are created by humans with their activities which change the physical environment and their cultural ecology. This situation is especially

related to the infectious diseases. Creation of infectious bio-environment, creation of spreading media of diseases and creating opportunities for infectious media to be exposed are some human activities which allow infective diseases to spread. Different ecological background has been creating the flat form for spread out the diseases. Medical Geography study area is the main academic approach that study for the relationship between human ecology and diseases ecology.

## Reference

- Alihan, M.A (1938). *Social Ecology: A Critical Analysis*. USA : Columbia University Press. Retrieved from <https://www.questia.com/library/100628046/social-ecology-a-critical-analysis>. Accessed 2013.09.12
- Costanza, R., Cumberland, J., Daly, H., Goodland, R., & Norgaard, R (1997), *An Introduction to Ecological Economics* (e-book). St. Lucie Press and International Society for Ecological Economics. Retrieved from <http://www.eoearth.org/view/article/150045/>. Accessed 2014.12.16.
- Foley, R (1987). *What is Human Ecology*, book on evolutionary human ecology. Retrieved from <http://www.des.ucdavis.edu/faculty/Richerson/BooksOnline/He1-95.pdf>. Accessed 2013.10.28
- Frosch, A.R (1992). *Technology Transfer: A previously unsolved problem*. MRS Bulletin in Material Research Society. Volume 17. Published online by UK:Cambridge University Press 2013. Retrieved from <http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=8901500&fileId=S0883769400041981>. Accessed 2013.11.02
- Garner, A., & Keoleian, G.A (1995). *Industrial Ecology an Introduction*. Pollution Prevention and industrial ecology. Published by National Pollution Prevention Center for Higher Education. USA: University of Michigan.
- Lopes, P., & Begossi, A (2009). *Current Trends in Human Ecology*. UK : Cambridge Scholars Publication.
- Meade, M., & Emch, M. (2010). *Medical Geography* (3<sup>rd</sup>ed.). USA: Guilford Press and Publish.
- Michael, A.L (1986). *Human Ecology in Anthropology: Past, Present, and Prospects*. Anthropologist special volume Nu 03. Retrieved from [www.krepublishers.com/.../Anth-SI-03-4-Little-M-A-Tt.pdf](http://www.krepublishers.com/.../Anth-SI-03-4-Little-M-A-Tt.pdf). Accessed 2013.11.18.
- MacIntosh, R.P (1985). *The Background of Ecology : Concept and Theory*. *The British Journal for the History of Science*. Published by UK : Cambridge University press. Vol. 20, No. 1. Retrieved from [http://www.jstor.org/stable/4026465?seq=1#page\\_scan\\_tab\\_contents](http://www.jstor.org/stable/4026465?seq=1#page_scan_tab_contents). Accessed 2012.11.02.
- Odum, E., & Barrett, G. (2004). *Fundamentals of Ecology* (3<sup>rd</sup>ed.): Thompson Publication.
- Robert, A (1997). *Industrial Ecology: Environmental Chemistry and Hazardous Waste*. UK : Edward Elger Publication.
- Stokols, D., Lejano, R.P., & Hipp, J (2013). *Enhancing the Resilience of Human–Environment Systems: a Social Ecological Perspective*. *Journal of Ecology and Society*. 18 (1): 7. Retrieved from <http://dx.doi.org/10.5751/ES-05301-180107>. Accessed 2015.11.17
- Sutton, Mark Q., and E. N. Anderson. 2010. *Introduction to cultural ecology*. Lanham, MD: AltaMira.
- Williams, L., Roberts, R.A., & McIntosh, A (2009). *Radical Human Ecology: Intercultural and Indigenous Approaches*. UK : Ashgate Publishing
- Worster, D (ed) (1988). *The Ends of the Earth: Perspectives on Modern Environmental History*. Cambridge: Cambridge University Press. ISBN 0-521-34846-3.
- Williams, R.J (2007). *Making Nature Whole: A History of Ecological Restoration*. The Science and Practice of Ecological Restoration Series USA : Island Press. Retrieved from [https://books.google.lk/books?id=gUQi1mry\\_ZcC&dq=ecological+definitions+of+William++2007&source=gb\\_s\\_navlinks\\_s](https://books.google.lk/books?id=gUQi1mry_ZcC&dq=ecological+definitions+of+William++2007&source=gb_s_navlinks_s). Accessed 2015.10.15